

SIL Student Competition

Page 5

Limnology Around the World

Page 10

Opinion: Inland Waters

Page 17



Upcoming SIL Congress

Page 4

*Boca Grande Lakes, Colombia.
Photo by Carlos Rivera*

IN THIS ISSUE

SILnews	1
Letter from the President	1
SIL Strategic Plan 2020-2022	3
Korean Local Organizing Committee (LOC) for SIL 2021	4
Upcoming SIL 2021 Congress	4
SIL Student Competition	5
Call to Our Members: COVID-19 and the Effects on Our Aquatic Systems	7
SIL Social Media Volunteers	8
Limnology Around the World	10
China	10
Estonia	13
Tanzania	15
Opinion: Inland Waters	17
Tonolli Memorial Award	19
Faces of SIL	21
Colombia	21
Denmark	21
Netherlands	22
New Zealand	22
Book review	23
Phosphorus in Lakes	23
Obituary	24
Ramesh Datt Gulati (1935 – 2019)	24

LETTER FROM

the President

Dear colleagues,

I am writing you from my home office, an experience I am currently sharing certainly with many of you. I am convinced that none of us have predicted or considered that we would ever be faced with such a global pandemic crisis, causing worries and fear to many of us. I hope you, your families and colleagues, are all healthy and in good shape.

Covid-19 is fundamentally challenging the ways we do research and how we interact with each other. The only other time during its almost 100 years of history that SIL had to cancel one of its international congresses was during World War II. The announcement that the upcoming SIL congress would be postponed was sad news for all of our members and international colleagues who planned to meet in Korea during August 2020. The decision was, however, much more critical and complex for the Korean organisers who took the organisational effort and financial risk to prepare the SIL congress. Therefore, I am very glad and thankful that our Korean

colleagues agreed to explore alternative meeting dates.

I hope many of you will take the opportunity to participate. Our Korean colleagues deserve our support and appreciation for their willingness to continue with the congress organisation.

The pandemic and its consequences also enforce us to think critically about our attitude towards and practical modes of doing research. International research is enormously fostered by globalization, and has profited from the numerous networks among colleagues we have been creating. However, the frequent international travelling that has become

Contributions for the **January issue** should be sent to SILnews Editor, Giovanna Flaim, by 01 October 2020 at flaim.giovanna@gmail.com



*Thomas Mehner, SIL President
Photo by David Ausserhofer*

standard to so many of us is also part of the causation of the pandemic. And we should not forget that the massive travel also contributes to exacerbating global change, with all unwanted but already clearly obvious consequences on the global ecosystem. Therefore, SIL, as an international society with a long history, has to address these challenges and has to re-define what we are and what we intend to do.

The SIL Executive Board, together with several strongly engaged SIL members, has been working on a re-formulated mission and vision for SIL. According to the discussion, SIL continues to be a society promoting excellence in limnological research. But we added that SIL also engages in contributing to solving global issues, strategically aligned with the UN Sustainable Development Goals. Furthermore, SIL intends forming partnerships with other organisations and societies for the sustainable management of freshwater resources. The new expression is documented here in this issue of SILnews and also [here](#) on the SIL website. I hope you all endorse the newly formulated focus of our activities.

We have also started two initiatives, which may link the mission of SIL to engage in sustainable development with the research interests of our members and colleagues. First, SIL asks for documenting the effects of the Covid-19 pandemic on our freshwaters. The current period of reduced industrial, agricultural and human activity will have consequences for the ecological status and succession of the lakes, rivers and wetlands we have been studying for decades. If it is possible to take samples and generate relevant data now, please help to demonstrate the anthropogenic footprint on aquatic ecosystems, by submitting the analysed data in comparison with similar data obtained in previous years. Use your experience and imagination to generate hypotheses that are relevant to the Covid-19 pandemic and collect the data to examine those. Your hypotheses could range the entire spectrum of aquatic studies. Examples could be that fish breeding in the littoral zone would benefit from the reduction

in human activity during the pandemic. Or that reduced atmospheric CO₂ will impact primary production. Please find the detailed call for action later in this issue of SILnews.

A second initiative intends to support our early career researchers who might particularly be affected and stressed by the work limitations caused by the pandemic. Young limnological researchers can register as volunteers to contribute in analysing existing datasets provided by international senior researchers. This initiative will become powerful only if a sufficiently high level of mutual interest is expressed by both submitting respective datasets and by registering as analysis volunteers. The call text of this second initiative is likewise found in this issue of SILnews.

With these examples I want to show you that the SIL Executive Board is working hard to address the challenges that are ahead of us, to serve the needs of you, our members. We envision both long-term strategic developments and short-term activities that reflect SIL to be a society that acts responsibly and sustainably. Scientific research is urgently needed to help solve global issues, whether by analysing data to mitigate the consequences of a pandemic or by providing facts to support sustainable management of freshwaters in an era of global change. We will keep you informed, but also welcome ideas, suggestions and engagement in developing SIL.

Thomas Mehner
SIL President



Lake Siecha, Colombia. Photo by Carlos Rivera



SIL Strategic Plan 2020-2022

Mission and Vision

MISSION

Promoting excellence in studying and managing inland waters and addressing global issues through the fostering of interdisciplinary approaches and the transfer of knowledge.

STRATEGIC FOCUS/PRIORITIES

- ➔ Foster and support international scientific networks of freshwater research
- ➔ Develop and maintain partnerships for sustainable management of freshwater ecosystems and water resources
- ➔ Contribute to addressing environmental and societal issues through a strategic alignment with the UN SDGs
- ➔ Empower researchers of tomorrow and facilitate knowledge-transfer to promote limnology to a wider audience

VISION

- ➔ SIL is recognized as:
 - a community of researchers that supports creating and promoting innovative scientific ideas in limnology
 - a society that assumes thought leadership in developing concepts and solutions to address problems in water-related fields
 - fostering global partnerships for sustainable provision and maintenance of healthy freshwater ecosystems including their biodiversity and nature’s contributions to people
 - a society that educates researchers and water managers on interdisciplinary approaches of sustainable freshwater management
 - a society with a vibrant international network of early-career researchers in water-related research fields

Approved by the Executive Board of SIL during an on-line Board meeting on 23 April 2020

Korean Local Organizing Committee (LOC) for SIL 2021

“We will do our best to make SIL 2021 safe.”

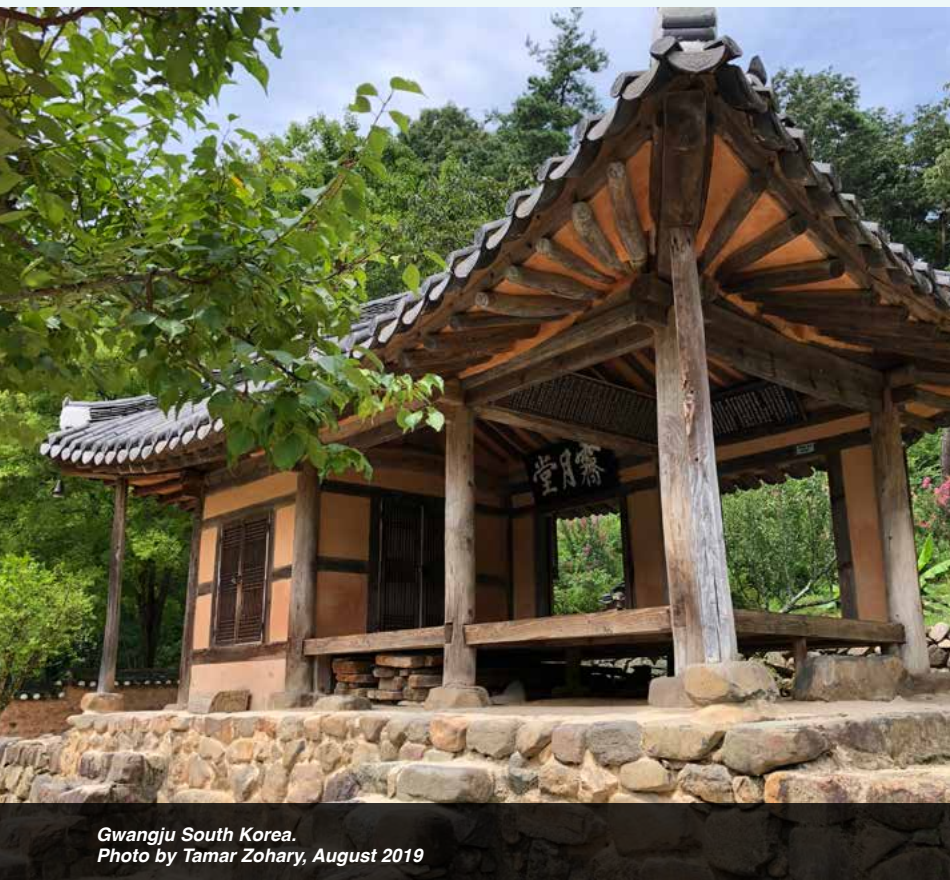
In light of the current COVID-19 pandemic, both the SIL and the LOC have made the responsible decision to postpone the 2020 congress scheduled for August in Gwangju, South Korea to August 22-27, 2021. To limit confusion, we have maintained the existing venue and content. We also appreciate your enthusiasm, which has resulted in 38 submitted session proposals.

In South Korea, the daily number of confirmed cases has been stable since April. South Korea has the 58th highest infection rate globally. Of over 1,158,063 tested, 1.1% had been identified as positive as of June 19. The most serious infection source has been a religious group (42%) which caused a massive increase in February. In Gwangju, however, only 32 people were infected and there have been no casualties. For early virus detection and prevention, the Korean government instituted 638 screening clinics including drive-thru stations and conducted contact tracing and quarantine for positive cases. With this advanced infection response system, South Korea successfully managed the de-escalation of the virus.

The LOC will run SIL2021 with the health and safety of our attendees as its number one priority. We will regularly update you on the situation in South Korea via SIL and the congress website. We will secure pandemic resources based on the government's policy for public events and provide a guideline helping participants utilize these resources. A registration-fee policy and entrance procedure/travel information will be announced later.



Meriam Beklioglu, chair of the scientific committee for SIL2021, is trying to judge bamboo height in Gwangju. Photo by Tamar Zohary, August 2019



Gwangju South Korea. Photo by Tamar Zohary, August 2019

Upcoming SIL 2021 Congress

As you know, due to the global expansion of the COVID-19 virus, we made the difficult decision to postpone SIL2020 planned in August 2020. The SIL Executive Committee along with the Local Organizing Committee have now agreed on a new date for the SIL Congress: August 22-27, 2021 always in Gwangju, South Korea.

One of the purposes of the SIL Congress is to promote open discussions on new scholarly findings and pioneer research in the field of limnology to foster knowledge transfer to scientists and researchers worldwide, including early career researchers as well as limnology students. This new date will enable us to uphold our scientifically outstanding and innovative congress tradition.

More details will be announced concerning abstract submissions and registration as soon as possible. Please visit the website of the conference for updated information at:

SIL2020.ORG



And the winner of the 3rd SIL Student Competition is...



First place:
FENGZHI HE

GERMANY

For the article: He F, Zarfl C, Bremerich V, David JNW, Hogan Z, Kalinkat G, Tockner K. Jähnig SC. 2019. The global decline of freshwater megafauna. *Global Change Biology* 25: 3883-3892.



Second Place:
MANDY VELTHUIS

THE NETHERLANDS

For the article: Velthuis M, Koste S, Aben R, Kazanjian G, Hilt S, Peeters ET, van Donk E, Bakker ES. 2018. Warming enhances sedimentation and decomposition of organic carbon in shallow macrophyte-dominated systems with zero net effect on carbon burial. *Global Change Biology* 24: 5231-5242.



Third place:
NICOLÁS MARTYNIUK

ARGENTINA

For the article: Martyniuk N, Modenutti B, Balseiro E. 2016. Forest structure affects the stoichiometry of periphyton primary producers in mountain streams of Northern Patagonia. *Ecosystems* 19: 1225-1239.

The winners will be awarded their certificates at the Congress in Gwangju, South Korea and be exempt from paying registration. The winner of the first place, **Fengzhi He**, will give a plenary. The winners of the second and third places will present an overview of their impressions of the congress at the closing ceremony.

We thank all those who contributed to the competition, including the 13 applicants from 9 countries that entered the first (National) stage of the competition, mentors who wrote recommendation letters, SIL National Representatives who coordinated internal elections at the first stage of the competition, and national committee members who ranked the papers at the National level competition.

Most importantly, we all owe great thanks to Cristiana Callieri (Italy), Régis Céréghino (France), David Hamilton (Australia), Luigi Naselli-Flores (Italy), Anne Robertson (United Kingdom), Nico Salmaso (Italy), Piet Spaak (Switzerland), and Sidinei Magela Thomaz (Brazil) who examined and ranked the 10 articles participating in the second (international) stage of the competition. All of them are leading editors of limnological journals, thus experts in assessing the merits of scientific papers.

The fourth SIL student competition will begin in September 2021, details of this competition will be announced in due course. Its winners will present in the SIL Congress in Berlin in 2022.

Judit Padisák
Chair, Student Competition Committee

Tamar Zohary
SIL General Secretary



Table 1. Seven additional participants who qualified for the second (international) stage of the SIL Student Competition

RECIPIENT/COUNTRY	TITLE OF ARTICLE	JOURNAL AND YEAR PUBLISHED
Blanka Gál Hungary	The effect of urbanization on freshwater macroinvertebrates – Knowledge gaps and future research directions	Ecological Indicators (2019)
Christina A. Murphy USA	Resilience of zooplankton communities in temperate reservoirs with extreme water level fluctuations	Inland Waters (2020)
Prisca Mziray Tanzania	Seasonal patterns of thermal stratification and primary production in the northern parts of Lake Tanganyika	Journal of Great Lakes Research (2018)
Clarice Casa Nova Brazil	Living in a browning environment: Effects on <i>Daphnia</i> 's growth and fatty acid pattern	Limnology and Oceanography (2019)
Oleksandra Shumilova Germany	Simulating rewetting events in intermittent rivers and ephemeral streams: A global analysis of leached nutrients and organic matter	Global Change Biology (2018)
Allan Cruz-Ramirez Mexico	Relationship among physicochemical conditions, chlorophyll-a concentration, and water level in a tropical river–floodplain system	International Journal of Environmental Science and Technology (2019)
Wojciech Wilczyński Poland	The combined effects of hypoxia and fish kairomones on several physiological and life history traits of <i>Daphnia</i>	Freshwater Biology (2019)



S. Giustina Reservoir, Italy.
Photo by Giovanna Flaim

CALL TO OUR MEMBERS:

COVID-19 and the effects on our aquatic systems

Dear SIL members and colleagues,

The SIL Executive Board continues working and is developing plans and actions on how we as a society can cope with the changed scientific environment. However, we also note that the pandemic induced a large-scale experiment, during which the anthropogenic effects on aquatic systems are massively changing, at least for the current weeks and months. Negative effects from industry and agriculture may become weaker, whereas the use of aquatic systems for recreation may even increase, in particular towards the summer in the northern hemisphere.

Therefore, we ask you, our members, to help document these changes. If it is legally safe, please continue with monitoring your field sites. If you run field sampling, try to obtain samples that are comparable to samplings in previous years. We may later think about initiatives to accumulate this information to make the use of aquatic systems more sustainable in the long term.

In the short term, pictures and short stories that document the changes relative to previous years are welcome. Please share them on our SIL social media channels, using the hashtag #HealingInlandWaters and/or filling out this form: <https://forms.gle/b9ZsGLhRfGnd6LFC8>

Facebook: SIL – The International Society of Limnology

Twitter: @SIL_limnology

Instagram: sil_limnology

Stay safe, with my best wishes to all of you,

Thomas Mehner

Dear Colleagues,

I hope this message finds you, your families and friends well and healthy!

I am reaching out to you as one of the SIL National Representatives of Canada and President of the Society of Canadian Limnologists/Soci t  canadienne de Limnologie (SCL). In these challenging times I am thinking about the possible role of scientific societies in alleviating some of the impacts of the COVID-19 pandemic. Medical treatment is in the hands of health professionals, reducing the spread of the corona-virus depends on common sense of all citizens, and financial support for individuals, Indigenous Peoples, NGOs, businesses, etc. is organized by provincial and federal governments.

But there are a number of secondary impacts that are more specific to the scientific community, such as cancelling/postponing conferences, job losses, travel restrictions, and closures of lab- and field-based research. As so often, students, post-docs and international/non-resident scientists are likely most impacted by this. Given that travel, field/lab research is pretty much shut down indefinitely, this might be a good time to focus on synthesis work. Many senior researchers have existing data sets that need to be analyzed. MSc/PhD Thesis or Post-Doctoral projects based on such existing data sets could be a way to help out those students/post-docs whose projects are stranded now, as it would be independent of travel, geographic locations, etc. As such a web-based data-student/post-doc matching website already exists (<https://otlet.io/coivid19-resources>), SCL decided to distribute the link rather than creating a new, competing platform that would likely reduce or delay the chance for successful matches. I encourage all of you to distribute and participate in this initiative in your respective roles at:

https://docs.google.com/forms/d/e/1FAIpQLSdl32ju3lifAETih1F116fdqygS-WGVOI_7NVBhKTg7m6P6ZQ/viewform

I wish you all health, safety and sanity in these times of uncertainty, worries and reflections.

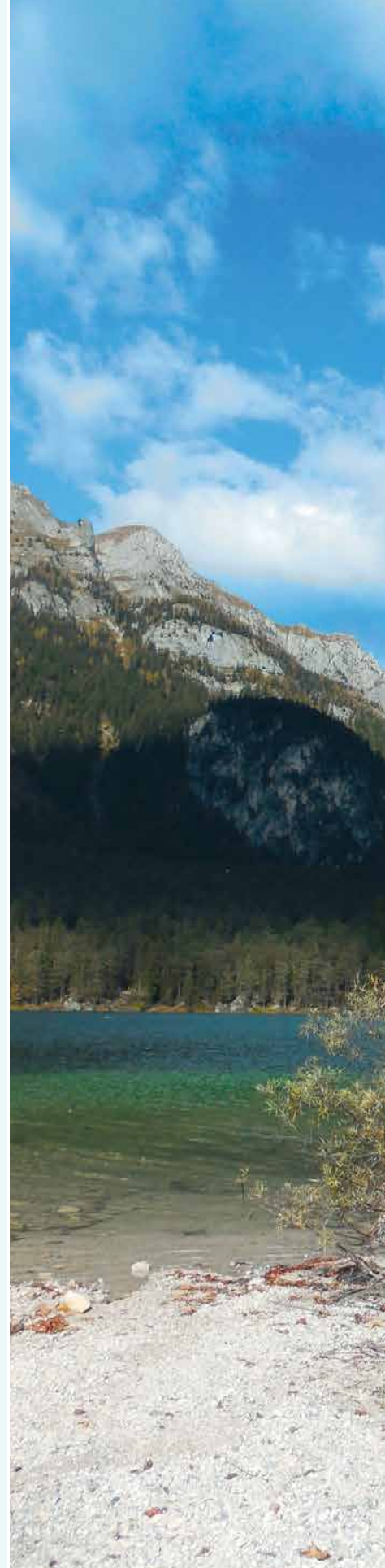
Sincerely,

Bj rn

--

Bj rn Wissel, PhD

President, Society of Canadian Limnologists/Soci t  canadienne de Limnologie (SCL)
National Representative (Canada), International Society of Limnology



Lake Tovel, Italy.
Photo by Giovanna Flaim

SIL social media volunteers

A heartfelt **THANK YOU** to our amazing social media volunteers who help us every day in sharing global limnological news to our society and beyond!

Xinyu Sun, Canada

I am a Ph.D. student in biology at Queen's University in Canada. My research interest lies in the field of aquatic ecology, particularly the effects of multiple environmental stressors on freshwater ecosystems. My current project focuses on the interactive effects of lake salinization and climate change on freshwater zooplankton communities and the influence of timing. Working for SIL as a social media volunteer helps broaden my understanding of freshwater ecology. I also really appreciate this wonderful opportunity that allows me to share the knowledge with the public.



Janine Tolod, Philippines

My name is Janine and I am from the Philippines. I recently finished my master's in the Graduate School of Environmental Science in Hokkaido University, Japan. My research interest lies in leaf litter decomposition in river systems and their associated macroinvertebrates, in sites having different water temperature. My aim is to understand the response of leaf decomposition to both biotic and abiotic factors and determine its underlying mechanisms. Working as SIL's social media manager helped me gain more knowledge not just about rivers and invertebrates, but on lakes and fishes as well. Indeed, this experience has been very rewarding.

Mark Louie Lopez, Philippines and Taiwan

I am a Filipino Ph.D. student under the Biodiversity Program of the Taiwan International Graduate Program in Academia Sinica and National Taiwan Normal University. My research focus is on the taxonomy and ecology of microcrustacean zooplankton from surface and groundwater within the subtropic-tropical regime. Currently, I am focusing on timescale metatranscriptomics and metabarcoding of zooplankton in reservoir to answer community ecology questions. It is my pleasure to serve the society by updating our social media followers regarding the current topics in limnology.



Wu Kai Ti (also as Katy Winton), Germany

I work in the Ecohydrology department at the Leibniz Institute IGB in Berlin, Germany. It has been a pleasure to support the SIL community with social media outreach. I'm keen to support freshwater related citizen science projects as well as open-source technology projects.

Join the Conversation

SIL - The International Society of Limnology
Published by Hootsuite [?] · May 14 at 6:40 PM · 🌐

"An algal bloom is the overgrowth of microscopic algae or algae-like bacteria in fresh, salt, or brackish waters." There has been a growing number of harmful algal blooms which may impact the environment and human health. Learn more about the causes and consequences of algal blooms from here:
<https://www.nrdc.org/st.../freshwater-harmful-algal-blooms-101>
via NRDC



NRDC.ORG
Freshwater Harmful Algal Blooms 101
Ugly, foul-smelling and sometimes toxic, algal blooms are...


SIL - The International Society of Limnology
Published by Hootsuite [?] · February 14 · 🌐

Aquatic invasive species can be introduced accidentally or intentionally into freshwater systems by human activities. Here are what we can do to help prevent them (To learn more about aquatic invasive species prevention: <http://ow.ly/xCPL50yIQKN>)
#FreshWaterFriday

Five tips for preventing aquatic invasive species:

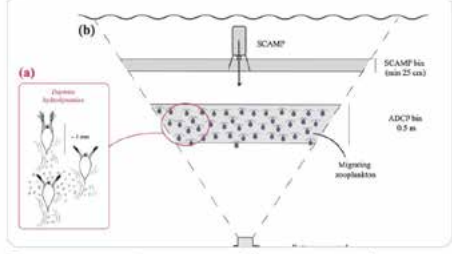
1. Cleaning (use hot water and/or pressure washer if possible), draining and air drying any equipment used in the water.
2. If the boat and equipment will be used in different locations in a day, please clean them between uses.
3. Don't dump live aquatic plants or animals into the natural environment or sewers.
4. Never moving organisms or water from one body of water to another.
5. If possible don't keep invasive species as pets!

SIL Limnology @SIL_limnology · Mar 3
Currents threats to diversity of Glacier lakes.
"In Glacier National Park, Ice Isn't the Only Thing That's Disappearing"
www.nrdc.org



In Glacier National Park, Ice Isn't the Only Thing That's Disappearing
Two species of tiny stonefly have been added to the Endangered Species List because their habitat is expected to melt by 2030.
www.nrdc.org

SIL Limnology @SIL_limnology · May 26
Can zooplankton make turbulence in water?
link.springer.com/epdf/10.1007/s...



The diagram illustrates a cross-section of a lake. At the surface, a SCAMP (Surface Cooled Acoustic Monitoring and Profiling) sensor is shown. Below it, a net is used to collect zooplankton. The diagram is labeled with (a) and (b). (a) shows a close-up of the net and the zooplankton. (b) shows the SCAMP sensor and the net. The net is labeled 'Migrating zooplankton'. The SCAMP sensor is labeled 'SCAMP bio (max 25 cm)' and 'ADCP bio 0.5 m'.

SIL Limnology @SIL_limnology · Mar 5
The Giant freshwater stingray, *Urogyminus polylepis*, is one of the largest freshwater fishes in the world. However, it's experiencing a huge population decline and has been listed as an endangered species, mainly due to fisheries and habitat degradation.
[iucnredlist.org/species/195320...](https://www.iucnredlist.org/species/195320...)

Species of the Day: Giant Freshwater Stingray

The Giant Freshwater Stingray, *Urogyminus polylepis*, is listed as "Vulnerable" on the IUCN Red List of Threatened Species™. One of the largest freshwater fish in the world, this impressive species occurs in several rivers in Southeast Asia and western Australia.

The subspecies of Giant Freshwater Stingray in Thailand is listed as "Critically Endangered" and is under threat from both direct fishing and accidental capture. The alteration and degradation of river habitat is a further threat, and results from a range of factors including deforestation, dam building and pollution. Dams further threaten the species by isolating parts of the population, preventing interbreeding. While the species appears to be more secure in Australia, pollution and dam construction is a potential cause for concern.

The dramatic decline of Giant Freshwater Stingray in Thailand led to the establishment of an experimental captive propagation programme, aiming to stabilise populations while attempts are made to address habitat degradation. A national recovery team is planned in Australia, and further research into the species is urgently needed in other parts of its range.

Logos for IUCN, SSC, ARKive, and UNEP are shown at the bottom.

SIL Limnology @SIL_limnology · Feb 7
Phytoplankton are reported to be potential indicators for monitoring urban aquatic systems through in situ fluorometry and microphytoplankton biovolume. #FreshwaterFriday

Read more in this recently published article:
www.tandfonline.com



Are fluorometric, taxonomic, and functional indicators of phytoplankton... (2020). Are fluorometric, taxonomic, and functional indicators of phytoplankton community structure linked to environmental typolo...
www.tandfonline.com



LIMNOLOGY AROUND THE WORLD: CHINA

Cyanobacterial blooms and their treatment in China

Yonghong Bi

State Key Laboratory of Freshwater Ecology and Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, China

Email: biyh@ihb.ac.cn

Cyanobacteria, once referred to as blue-green algae, may occur as single cells, filaments, or as colonies of various sizes and shapes. Throughout their long 3.5 billion year history, cyanobacteria have evolved survive strategies to adapt to many geochemical and climatic changes and anthropogenic disturbances. They can tolerate and survive high ultraviolet radiation, desiccation, hypersalinity, and extreme temperatures, some species may even endure such harsh conditions for many years. As a normal part of most aquatic ecosystems, cyanobacteria form the base of the food web in ponds, reservoirs, lakes, rivers and oceans, and their presence in waters is natural and very important!

However, some cyanobacteria have the ability to produce cyanotoxins. The main toxin-forming genera are *Microcystis*, *Anabaena* and *Aphanizomenon*. Furthermore, given optimal conditions of light, temperature, nutrients and stagnation, cyanobacteria can quickly form a bloom that essentially take over parts or an entire water body. Common bloom-forming cyanobacteria include *Microcystis*, *Nodularia*, *Planktothrix*, *Aphanizomenon*, *Cylindrospermopsis*, *Dolichospermum* and *Trichodesmium*. Recently, they appear to be increasing in frequency, intensity, and duration in many lakes, reservoirs, and estuaries and becoming a global concern because they threaten aquatic ecosystem functioning and degrade water quality for recreation, drinking water, fisheries and human health, causing major economic loss. They increase turbidity and smother submerged vegetation; microbial degradation of decaying blooms may induce hypoxia and anoxia, causing

the sudden death of fish and benthic invertebrates. Taste and odor compounds can be produced, hampering the recreational function of waters and its use as drinking water. A variety of cyanotoxins can also cause liver, digestive and neurological diseases. Similar to the global situation, cyanobacterial blooms are a very serious problem in China. Scientists, government and the public are highly concerned and experts are hard at work to find mitigation methods. Here is a short status of cyanobacterial blooms in China.

Cyanobacterial blooms occur from south to north in China, with tropical and subtropical areas such as Gongdong province and Jiangsu province, experiencing the worst blooms. However, blooms are moving towards the temperate zone. In some temperate lakes that never experienced cyanobacterial blooms, such as Qinghai Lake and Hulun Lake, cyanobacterial blooms have occurred several times in recent years. The ecological mechanism behind this spread is worthy of attention and further study. Cyanobacterial blooms mainly occur in summer with high temperatures, but they can be observed the entire year in Dianchi Lake and also in winter in the Three Gorges Reservoir and in Qinghai Lake. The temporal characteristic of these blooms are essentially the external manifestation of cyanobacterial adaptability to temperature, as has been already verified.

While cyanobacterial blooms mainly appear in stagnant water bodies such as lakes, reservoirs, and ponds, they are rarely observed in flowing water. No blooms have been reported in rivers except the tributary of a reservoir, which is actually the bay or backwater area. It can be deduced that water fluidity significantly inhibits cyanobacterial blooms. Though the threshold value of fluidity - water velocity is uncertain due to site specific characteristics, it still gives us a clue for bloom mitigation technologies. Cyanobacterial blooms can occur in waterbodies with different trophic status, from mesotrophic to severely eutrophic, while blooms in oligotrophic waters are unlikely. Cyanobacterial blooms have occurred in Erhai Lake and Three Gorges Reservoir, both mesotrophic. Evidence in China has shown that the nutrient load is not a vital condition for these blooms when the nutrients meet the need of cyanobacterial cells' growth. That implies there is no direct causation between blooms and eutrophication. It explains why nutrition control and reduction are ineffective in controlling cyanobacterial blooms.

Though there are many different views on the mechanisms of cyanobacterial blooms, the progression from occurrence to disappearance has been observed in detail and cyanobacterial blooms do not happen suddenly, they are



Fig. 1 The progression of a cyanobacterial bloom from first occurrence to decline.



Fig. 2 Treatments of cyanobacterial blooms (Left: shade net; middle: modified clay; right: artificial biofilms and artificial floating islands).

not an instantaneous accident. Given enough light intensity, the cell density of the dominant cyanobacterial species in the water column increases gradually with an increase in temperature; then, cells in the water column gradually move upward, changing the color of the surface water. Under suitable conditions, the high cell density forms aggregates and starts bloom formation; the persistence of the bloom depends on the stability of external environmental conditions. Once the external environment changes, the color of the aggregates change from blue-green to yellow, cells decay and the bloom gradually disappears (Fig. 1). Research on the dynamics of bloom formation and its maintenance mechanism is helpful to find control methods.

While researching cyanobacteria blooms, we also developed several highly effective cyanobacterial bloom disposal technologies. Many physical, chemical, biological and ecological technologies have been used in different water bodies. Physical technology includes shade nets, water exchange, artificial flow, ecological regulation on the cascade reservoir, ultrasound, ultraviolet radiation, artificial collection, mechanical harvesting, and so on. Shade nets are used to reduce the photosynthetically available radiation in the water column (Zhu *et al.*, 2015). Ponds are the optimal sites for the use of shade nets (Fig. 2). Water exchange, artificial flow and ecological regulation of the cascade reservoir are methods that modify water velocity, stratification and mass exchange rate, causing cascading changes and breaking the mechanism

sustaining cyanobacterial blooms. Ultrasound and ultraviolet radiation are methods used to kill the cyanobacterial cells. Artificial collection and mechanical harvesting are used to remove cyanobacterial biomass from water. Harvesting has high costs and low efficiency and is considered a short-term emergency response (Fan *et al.*, 2019). All these methods are exploited and used in different waters.

Chemical treatment is the most commonly used method, including nutrient reduction, modified clay, flocculants, algicides, etc. Nutrition reduction is considered to be an effective means of disposal, cutting off the input channels of exogenous pollution and reducing the endogenous pollution load has become an important task of bloom control everywhere. Agriculture and aquaculture in the watersheds are considered to be the main culprits and have caused serious cyanobacterial blooms in receiving waters. After nearly two decades and hundreds of millions of dollars and other resources devoted to nutrition reduction, little success can be found in controlling cyanobacterial blooms because the major causes are complex (including agriculture, aquaculture, animal farming, wastewater, storm water, fossil fuels, and households) and difficult to control as quickly and effectively as necessary. Modified clays are widely used to mitigate cyanobacterial blooms in China (Fig. 2). While its application in deep water has been successful (Yu *et al.*, 2017), no obvious effects have been seen in shallow waters. Flocculants, such as polyaluminum chloride (PAC),



Fig. 3 Biomanipulation for cyanobacterial bloom control.

ferric chloride (PFC) and polyacrylamide (PAM) are rarely used in natural waters. Algicides, such as copper sulfate, diuron and others are forbidden due to secondary pollution caused by their environmental persistence. Hydrogen peroxide is recommended in China and has shown high efficiency to selectively eliminate cyanobacterial blooms because cyanobacteria are more sensitive to hydrogen peroxide than eukaryotic phytoplankton (Wang *et al.*, 2015, 2019). A key advantage of hydrogen peroxide is that it leaves no long-term chemical traces in the environment and its effect can be enhanced when it is coupled with UVC (Wang *et al.*, 2015). Chemical methods are mainly used in emergencies and cannot solve the problem completely; cyanobacterial blooms can reappear after the treatment.

Biological control methods include plant allelopathic substances, filtration by mussels, and so on. The interaction between cyanobacteria and other aquatic organisms are the principle behind these technologies. Viruses, pathogenic bacteria or fungi are also an attractive idea for bloom suppression. All these methods may cause sudden collapses of cyanobacterial biomass but rarely achieve a long-lasting decline of cyanobacterial blooms. Biological control relying solely on a group of organisms for cyanobacterial bloom control is still under debate in China.

Ecological technologies are methods that utilize cascading effects of food webs, material transfer and energy flow of aquatic ecosystems, such as artificial biofilms, artificial floating islands (Figure 2), and biomanipulation (Fig. 3). Ecological effects in the entire ecosystem are considered and physical methods are always used in combination with biological methods. These methods have the advantages of low cost, easy operation and lasting effect on cyanobacterial blooms.

The application of all the above technologies have succeeded in some places and failed in others. Site specificity and conditions at the time of implementation are important factors in their success. It is necessary to have a comprehensive ecological diagnosis of water bodies, and select appropriate methods based on the diagnosis. Although research on cyanobacterial blooms and mitigation technology has been ongoing in China for more than 30 years, further studies are still need and cooperation with international colleagues is also very important to understand and control cyanobacterial blooms.

References

- Fan F, Shi X, Zhang M, Liu C, Chen K. 2019. Comparison of algal harvest and hydrogen peroxide treatment in mitigating cyanobacterial blooms via an in situ mesocosm experiment. *Science of the Total Environment* 694: 133721.
- Wang B, Song Q, Long J, Song G, Mi W, Bi Y. 2019. Optimization method for *Microcystis* bloom mitigation by hydrogen peroxide and its stimulative effects on growth of chlorophytes. *Chemosphere* 228: 503–512.
- Wang B, Wang X, Hu Y, Chang M, Bi Y, Hu Z. 2015. The combined effects of UVC radiation and H₂O₂ on *Microcystis aeruginosa*, a bloom forming cyanobacterium. *Chemosphere* 141: 34–43.
- Yu Z, Song X, Cao X, Liu Y. 2017. Mitigation of harmful algal blooms using modified clays: Theory, mechanisms, and applications. *Harmful Algae* 69: 48–64.
- Zhou Q., Song L., Li L. 2015. Effect of shading on the algal blooms during spring in Lake Dianchi, China. *Environmental Science & Technology*38(9): 53–59. (In Chinese with English abstract)



LIMNOLOGY AROUND THE WORLD: ESTONIA

Limnology and high-frequency lake studies in Estonia

Alo Laas and Tiina Nõges

Centre for Limnology, Chair of Hydrobiology and Fishery, Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences
Email: Alo.Laas@emu.ee

Inland water observations in Estonia started already in the 18th Century when the first data on the fishery in Lake Võrtsjärv was documented by A.W. Hupel in 1774. In 1851-1852, K.E. von Baer studied fish catch declines in Lake Peipsi. The first complex freshwater studies were conducted in 1904-1905 in Lake Ülemiste, Tallinn, for urban water supply. The Estonian Society of Naturalists was established at University of Tartu in 1905 and until the First World War, its Lake Commission was responsible for hydrobiological studies in Estonia. Their research mainly involved the massive data collection on the flora and fauna of Estonian rivers and lakes and on the geology of these waterbodies. The first publications on Estonian limnology were published in the early 1920s on lakes Võrtsjärv (by M. von zur Mühlen and G. Schneider) and Pühajärv (by A. Audowa and H. Bekker), involving the whole ecosystem biodiversity. Systematic hydrochemical studies of Estonian freshwaters were started by Heinrich Riikoja in 1925, first concentrating on oxygen stratification in eutrophic lakes. As Prof. Riikoja was studying and teaching limnology in Tartu University for more than 50 years, he is acknowledged as a real founder of Estonian limnology.

After the Second World War, limnological studies focused mainly on fish and fisheries economy. Large changes in Estonian limnology started in 1954 with the founding of the first and only Limnological station (nowadays Centre for Limnology) at the Institute of Zoology and Botany of the Estonian Academy of Sciences. The main building of the new unit was constructed on the shore of Lake Võrtsjärv (completed in 1963; Fig. 1) and since then it has been acting as the main centre for limnological studies in Estonia. Alongside qualitative description of the water bodies also quantitative studies of the biomass and production of lakes were started in the new station. A first list of Estonian lakes (1148 lakes) was compiled by I. Kask in mid-1960s. The data on the geography, hydrochemistry, macroflora,



Fig. 1 Centre for Limnology on the shore of Lake Võrtsjärv.

phytoplankton, zooplankton, zoobentos and fish of 150 lakes were published by A. Mäemets and co-authors in the first monograph of Estonian Lakes in late 1960s. The first monograph about Lake Võrtsjärv was published in early 1970s by T. Timm. In the mid-1970s and 1980s the first impacts of urbanization were seen in Estonian lakes and anthropogenic eutrophication started to be overwhelmingly addressed in lake studies. Since the 1970s until the first part of the 1990s, many publications described the status of Estonian lakes and man's impact on them. In 1994, a team lead by P. Nõges summarised all those complex works (conducted in 1989-1994) about Estonian lake production-biological processes into one report.

After the re-independence of the Republic of Estonia in 1991, the financing of research changed significantly and also required the structural re-organization of research centres, which earlier mostly belonged to the Academy of Science. At the beginning of 2000s, the Võrtsjärv Limnological Station was merged with the Estonian University of Life Sciences (earlier Estonian Agricultural University) and in 2005 it was renamed the Centre for Limnology. The end of 1990s and the beginning of new century was very productive scientifically with new monographs about lakes and rivers in Estonia, and also saw the first English language, complete monographs about large Lakes Peipsi (Müdel & Raukas, 1999; Nõges, 2001; Pihu & Haberman 2001) and Võrtsjärv (Haberman *et al.*, 2004). In the last decades, Estonian limnologists have actively taken part in many national and international scientific workgroups and networks, and have organized and co-organized several international workshops and conferences.

High frequency (HF) lake monitoring in Estonian waterbodies started in 2003, when first simple temperature loggers were installed into Võrtsjärv and Peipsi. In the first year the water temperature was recorded at 1-meter depth after every 6 hours, while in the next two years the frequency increased up to 3-hour timesteps. The data of those first HF measurements were published only marginally in a monograph dedicated to the results of EC 5FP project CLIME. In 2008, Lake Võrtsjärv got its first platform for HF water measurements (Fig. 2). The platform, built by A. Laas, survived only one open water season and almost drowned afterwards! First data collection was performed under the umbrella of a NordForsk Project, Sensor networks of Nordic lakes, Sensor-Lakes, led by Uppsala University and conducted in Lake Erken (Sweden), Lake Vanajanselkä (Finland) and Lake Võrtsjärv (Estonia). On all three lakes, hourly data of water turbidity, nitrates, dissolved and total organic carbon were registered with an *in-situ* spectrophotometer. In spring of 2008, A. Laas and T. Nõges took part of the GLEON (Global Lake Ecological Observatory Network) meeting in Norrtälje, Sweden. Lake Võrtsjärv was offered as a new GLEON site at this meeting. Joining GLEON opened up new opportunities to work closely together with leading researchers all over the world on HF limnology. In 2009, a new version of a simple platform was designed for Lake Võrtsjärv (Fig. 2). In addition to the *in-situ* spectrophotometer, the new platform was equipped with a multiparameter probe for more water physical-chemical parameters like water temperature, dissolved oxygen, conductivity and pH, which were collected at 15 minutes frequency during the open water period. This new version of the platform had more success compared to its predecessor and it was used in Lake Võrtsjärv monitoring for 6 next years. Similar platforms were later built for HF lake studies in other Estonian lakes as well as in Sweden, Spain and Turkey. First 'real' lake buoy was installed into Lake Võrtsjärv in summer 2010 (Fig. 2). The buoy was designed in collaboration with other GLEON partners. In addition to underwater measurements (every 10 minutes frequency), it also contains in-air sensors for weather parameters and global irradiance. In 2014 HF data collection was extended also to other Estonian lakes, first with a simple handmade platform's and later with small independent lake buoys. Since 2016 the first profiling buoy for ice free seasons was installed at



Fig. 2 First high frequency monitoring platform was installed into Lake Võrtsjärv in 2008 (upper photo). Second design of Lake Võrtsjärv platform in 2009 (centre photo). Lake Võrtsjärv buoy in 2010 (lower photo by H. Tammert). Lake Saadjärv buoy in 2016 (right-side photo).

Lake Saadjärv (Fig. 2), which represents one of the deepest lakes in Estonia (max depth of 25m). This station is the first autonomous freshwater HF monitoring buoy built fully in Estonia as a cooperative effort from the Centre for Limnology researchers. In the last decade we have been active taking part of many international research projects and studies using HF lake data. In addition to Estonian lakes, we have conducted studies with automated buoy systems, together with our international partners, in Poland, Italy and Spain. HF lake studies have helped us to improve the understanding the distribution of dissolved gases (O_2 , CO_2) in lakes and to recognize the importance of the dynamics of these gases for the characterization of lake metabolism, carbon dynamics and whole aquatic ecosystem functioning. HF lake studies enable us to better address the driving forces of turbulent heat loss and variation of algal biomass within and among lakes and to understand, how atmospheric stilling could lead to prolonged thermal stratification even in shallow lakes. Those and many other HF studies in Estonian lakes have been supported by Estonian Ministry of Education and Research (IUT 21-02) and by the Estonian Research Council grants (PSG32, PRG709).

References

- Haberman J, Pihu E, Raukas A. (eds). 2004. Lake Võrtsjärv. Estonian Encyclopaedia Publishers, Tallinn, 463 pp.
- Miidel A, Raukas A. (eds). 1999. Lake Peipsi. Geology. Sulemees Publishers, Tallinn, 148 pp.
- Nõges T. (ed). 2001. Lake Peipsi. Hydrology, Meteorology, Hydrochemistry. Sulemees Publishers, Tallinn, 163 pp.
- Pihu E., Haberman J. (eds). 2001. Lake Peipsi. Flora and Fauna. Sulemees Publishers Tallinn, 153 pp.



LIMNOLOGY AROUND THE WORLD: TANZANIA

Citizen Science in limnology research: Experience from Lake Tanganyika, Tanzania

Happiness A. Moshi¹, Catherine M. O'Reilly², Daniel Shilla³,
Ismael Kimirei² and Steven Loiselle⁴.

¹Kigoma Centre, Tanzania Fisheries Research Institute,
P.O. Box 90, Kigoma, Tanzania

²Department of Geography, Geology, and the Environment,
Illinois State University, Normal, IL, 61790, USA

³Department of Aquatic Sciences and Fisheries Technology,
University of Dar es Salaam, Tanzania

⁴University of Siena, Italy

Email: happinessanold@yahoo.com

Water quality monitoring is an important means for the environmental management of water sources at all levels including lakes, rivers, estuaries and other water body types. Understanding the spatial and temporal dynamics of waterbodies requires frequent measurements that provide accurate and relevant information on ecosystem conditions like water quality (Stutter *et al.*, 2008). This has become increasingly important with a rising population, increasing urbanization and the pressure of agricultural intensification, causing widespread pollution of our precious water bodies (Zhang *et al.*, 2017)

In developing or low-income countries like Tanzania, monitoring water quality in our water bodies may be challenging. Traditional methods used to collect and analyze water samples are very costly, spatially limited, time consuming and their long-term sustainability is not guaranteed (Altenburger *et al.*, 2015). These traditional methods normally involve *in-situ* boat surveys where *in-situ* measurements or water samples are collected and returned to the laboratory, which also requires technical staff for analyses.

Engaging the general public in monitoring water quality using easy, low-cost and simple equipment has shown positive steps to overcome the monitoring challenges faced by developing countries (Loiselle *et al.*, 2016). Our current study has gained experience from data collected and analyzed by citizen scientists from the second deepest lake in the world - Lake Tanganyika. This 676 km long and 50 km wide lake holds about 16% of the world's available fresh water and is bordered by Tanzania to the east, Congo to the west, Burundi to the north and Zambia to the south.

Five Tanzanian villages (Kibirizi, Karago, Ilagala, Ujiji and Gombe) along Lake Tanganyika were selected as study sites (Fig. 1) and a total of 150 citizen scientists, mostly fishermen, were recruited for the study. These citizen scientists were trained on how to measure nutrient levels for phosphates and nitrates as well as turbidity. Citizens carried out simple measurements and filled out an online datasheet using a special developed phone application. Results were then sent to a central server (FreshwaterWatch, UK) and the citizen scientists received immediate automated feedback for their measurements (Fig. 2).

For the measurement of dissolved phosphates and dissolved nitrates citizen scientists use water chemistry test tubes

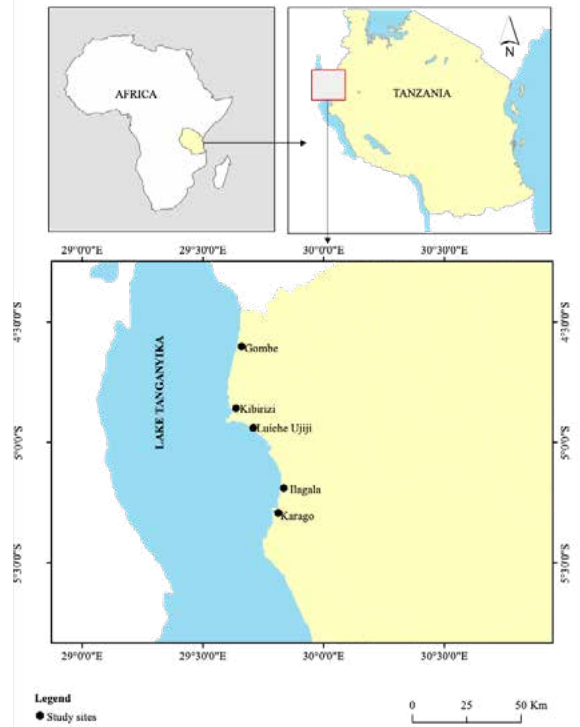


Fig. 1 Map of Lake Tanganyika showing study sites

using enzymatic and Griess methods respectively, and compare the colour of the sample in the tube with a reference colour chart which bears different colour brightness values with respect to concentration of the sample. For turbidity measurements citizen scientists use a turbidity tube and they were required to fill the tube with the water sample until the Secchi disc at the bottom could no longer be seen (Fig. 3). The measurements were done on a monthly basis with assistance from researchers. Researchers were also taking parallel water samples to analyze in the laboratory. This served to compare actual laboratory measurements with citizen scientists' data, a necessary step to check the reliability and accuracy of the data collected.

Results from this study revealed that there were no significance differences in temporal as well as spatial patterns of nutrients and turbidity produced between citizen scientists and researchers. These results indicate that citizen science can be used as a complementary approach in monitoring water quality in the African Great lakes and other small water bodies. The data produced



Fig. 2 Citizen scientists in Ilagala village referring colour charts for dissolved phosphates and nitrates concentrations.



Fig. 3 Citizen scientists in Ujiji village measuring turbidity using turbidity tube (left)



Fig. 4 Citizen scientists at Kibirizi in their sampling routine (below)

provided by trained citizen scientists may be used to inform the government and decision makers on several management issues such as pollution (Fig. 4).

Citizen science approaches can be a considerable step towards understanding the impact of pollution on water resources. Trained and motivated citizens can provide reliable and accurate water quality data as researchers. Fishermen are uniting to manage the fisheries resources (Lowe *et al.*, 2019) and hopefully the citizen science movement will also come together to provide monitoring of the whole lake for better management.

Adequate training and incentives are necessary to motivate people to become citizen scientists in support of local researchers and to better understand and protect their local environmental resources. Our citizen science initiatives concerning Lake Tanganyika will hopefully trigger other communities to participate and use this approach to monitor water quality especially in African Great Lakes in which this methodology is not well known for management purposes.

Acknowledgements

We would like to thank the citizen scientists in Lake Tanganyika for their work in monitoring water quality. Also, special thanks for MONOCLE (Multiscale Optical Monitoring of Coastal, Lakes and Estuaries) project. This

project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776480.

References

- Altenburger R, Ait-Aissa S, Antczak P, Backhaus T, Barceló D, Seiler TB, Aragão Umbuzeiro G. 2015. Future water quality monitoring — adapting tools to deal with mixtures of pollutants in water resource management. *Science of the Total Environment* 512: 540–551.
- Loiselle SA, Cunha DGF, Shupe S, Valiente E, Rocha L, Heasley E, BaruchA. 2016. Micro and Macroscale Drivers of Nutrient Concentrations in Urban Streams in South, Central and North America. *PloS one* 11(9): e0162684. DOI: 10.1371/journal.pone.0162684
- Lowe BS, Jacobson SK, Anold H, Mbonde AS, O'Reilly CM. 2019. Adapting to change in inland fisheries: analysis from Lake Tanganyika, East Africa. *Regional Environmental Change* 19: 1765–1776.
- Stutter MI, Langan SJ, Cooper RJ. 2008. Spatial and temporal dynamics of stream water particulate and dissolved N, P and C forms along a catchment transect, NE Scotland. *Journal of Hydrology* 350(3–4): 187–202.
- Zhang Y, Ma R, Luo J, Hu., Li J, Liang Q. 2017. Combining Citizen Science and Land Use Data to Identify Drivers of Eutrophication in the Huangpu River System. *Science of The Total Environment* 584–585: 651–664.

Opinion

Inland Waters:

ENGAGING THE SIL COMMUNITY WITH NEW PUBLISHING OPPORTUNITIES

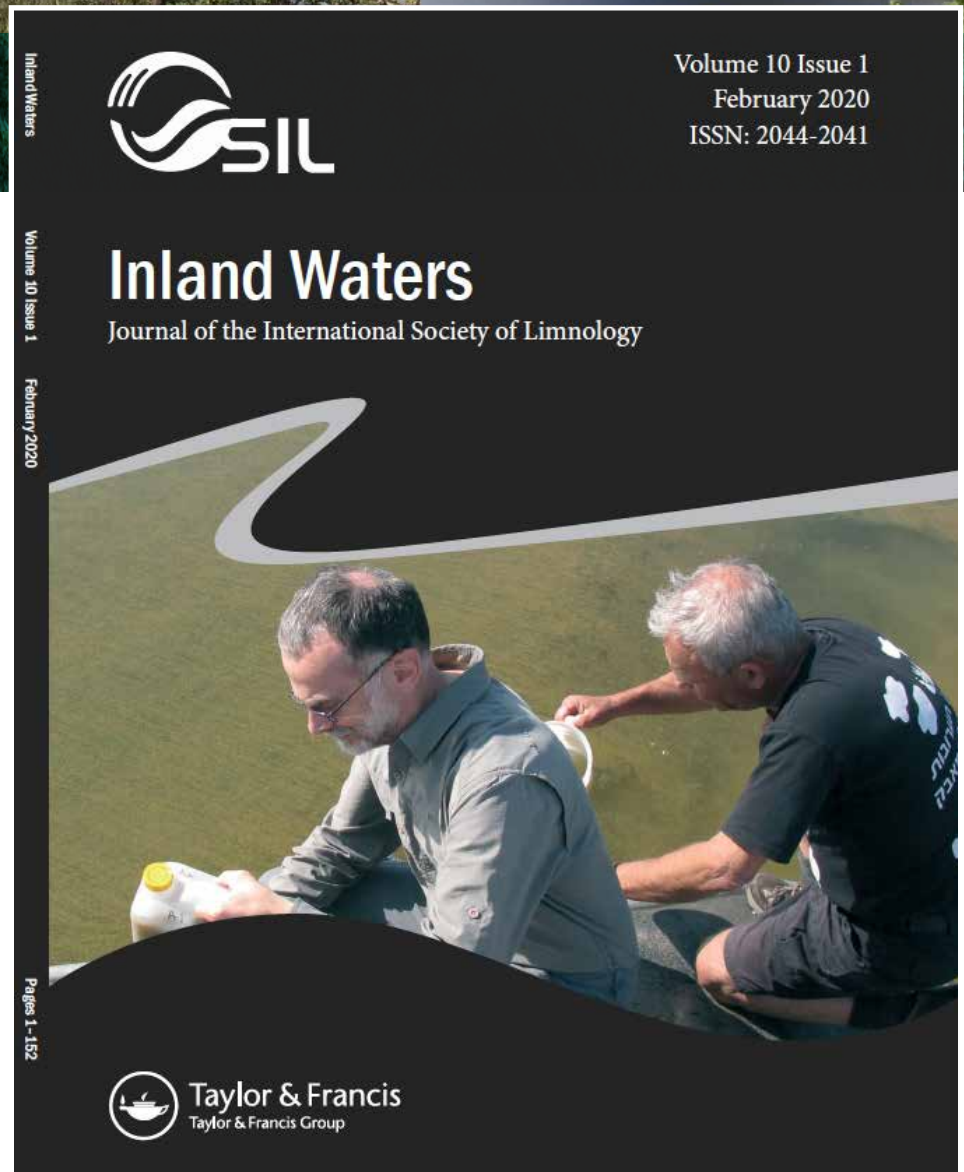
David P. Hamilton
Editor-in-Chief, Inland Waters

It was put to me recently that *Inland Waters* is a 'traditional journal' and therefore may not be 'sexy' for publishing our recent work. Why do I strongly refute such a statement? It is because *Inland Waters* has evolved out of the SIL Proceedings published from 1921-2010, to be a modern peer-reviewed journal with none of the 'traditional' characteristics of the Proceedings, as well as offering author options for Open Access. The editorial manager system available through the publisher Taylor & Francis, uses the same or a similar system as that used nowadays by almost all other journals. It places a small burden on authors to input credentials and carefully format papers prior to submission. This process has greatly streamlined the review process and allowed editors and publishers to identify key issues and bottlenecks in the publication process, complimented by detailed statistical analysis.

I believe that as SIL members we should be asking what we can do to allow *Inland Waters* to gain a strategic advantage over the for-profit journals, particularly the predatory journals (see definition from Wikipedia: https://en.wikipedia.org/wiki/Predatory_publishing).

SIL and Inland Waters could include:

Mentoring at Associate Editor level SIL is blessed with a group of highly motivated and outstanding Associate Editors (who our previous Editor-in-Chief, Jack Jones, described to me as a bunch of editorial superstars). Perhaps we should consider co-opted membership to the editorial board for early career researchers (ECRs) on a proviso that they 'shadow' an Associate Editor and become fully fledged editorial board members after two years? In this way the editorial board could begin to renew its membership and increase its breadth of expertise. This approach may help to address issues of limited diversity and a gender imbalance that currently exists in the editorial board. The experience of reviewing and performing editorial duties puts ECRs on the



'other side of the fence' and can be a valuable experience to understand what makes a high-quality submission with smaller probability of being rejected.

Pre-review opportunity. I mentioned at a previous SIL meeting that I would provide an opportunity for PhD students and members from developing countries to obtain a pre-review by me or an Associate Editor, prior to a formal submission. Unfortunately, we still have a high rate of rejection of papers from these groups and this opportunity would help to address this issue. No-one has yet taken up the opportunity.

Publishing in a Society journal like Inland Waters. Our society journal is one of a multitude of aquatic publications and it is in the mid to upper tier of this group, with an Impact Factor currently approaching 2. I seek to boost this Impact Factor (IF) and there are ways we can get our 'house in order' to achieve an increase, but we also need

prominent authors to support SIL by publishing their work in the journal from time to time. As a very prominent colleague has said to me several times: "there is impact and there are Impact Factors, and the two are not synonymous". I urge SIL members to consider how they can support a journal that seeks to support them.

One issue that is of increasing concern is the downturn in reviewers accepting requests to review papers (e.g., Fox *et al.* 2017), which has even become evident within my tenure as Editor-in-Chief of *Inland Waters*. The number of requests to review has increased, in line with a sustained expansion in the number of scientific journals. Individuals and companies have realised the opportunity for enormous profits to be made in the publishing industry (Buranyi 2017), especially as hard-copy journal issues disappear, and have exploited the fact that much of the underlying intellectual capital that underpins these journals (e.g., editors handling papers, reviewer time,

etc.) is effectively 'free' from the publisher's perspective. I am also mindful of the pressure we are under in academia or from research agencies to excel in our regular career tasks (publishing, teaching, conducting outstanding research, obtaining funding, having a social media profile, etc.), which is clearly impacting on decisions made about devoting time to review papers. However, it sometimes disturbs me when I see Editorial Manager statistics that show many requests to review being turned down from an author whose number of submitted papers to the journal far exceeds their acceptances to review papers.

The publishing situation motivates me to alert our SIL members about reasons why they should support a society-based journal, where SIL works hard to negotiate with *Taylor & Francis* on the best possible deal for its members and ploughs any profits it makes back into the Society for the benefit of its members. Some will argue that the commercial model of Open Access linked to pay-to-publish papers is the way of the future. I agree and this model will undoubtedly expand as funding agencies begin to tie funding to requirements for open access publications and data (see Plan S: https://en.wikipedia.org/wiki/Plan_S), with leadership in this area from the European Commission (see <https://ec.europa.eu/digital-single-market/en/open-science>). The issue of Open Access has been strongly debated within the SIL Executive and externally with Taylor & Francis. My personal view is that a staged approach over the next 2-3 years could allow us to move rapidly towards Open Access in a way that addresses some fundamental issues:

How the Open Access model does not selectively disadvantage those from poor and/or developing countries. Allowing these authors free or strongly subsidised publishing costs will need to be covered by increasing publishing costs for other authors. If we do not consider the needs of authors from developing countries, then we will be reinforcing the strategic advantage that those of us in first-world countries have had all along. This advantage relates to mostly being able to afford to pay for the costs of publishing and/or to have had powerful governments who have enabled Open Access to be negotiated at a high level, removing a direct financial burden on authors.

Our publishing model also needs to be mindful of the limited access of authors from developing countries to peer reviewed published works. It is hardly surprising that researchers from developing countries lag in citation indices; often they need to be truly exceptional to advance their careers and achieve international recognition. Many of these people desperately seek to bring our attention to the poor and often deteriorating environmental condition of many of their local ecosystems across the globe. I have witnessed the expansion of so-called global meta-analysis studies in recent years but many of these studies are heavily biased to northern temperate systems, and often tropical or subtropical regions (where there are many developing countries) are poorly represented or absent; can these studies truly purport to provide a global representation? Those from developing countries need our help. In this regard SIL has been a leader in working on ways to attract and mentor members from developing countries and

develop their funding base. For example, the Tonolli Memorial Fund for *Furthering Limnology in Developing Countries* provides scholarships to assist the research training of young scientists from developing countries.

We need to be quite clear about the potential for 'double-dipping' by publishers. That is that publishers can benefit from an author paying to make an article Open Access while also receiving income from a library for a subscription to the journal in which the article is published (Smith 2019). Double-dipping is complicated because, whether intentionally or unintentionally, publishers have 'bundled' many journals together for libraries. The libraries then find resistance from their requests for unbundling, often expressed as fewer options and a net financial burden. Part of the answer lies at a grassroots level with libraries forging closer relationships with authors and working on a collective response to ensure proper accounting by publishers while at the governance level having strong backing from large collectives (e.g., supporting Plan S).

Inland Waters strives to get a balance between standard papers and research briefs, and papers that are part of a special issue or special section. With a prescribed number of pages spread over the four issues per year of *Inland Waters*, this balance can be quite difficult and proposals for special issues have to present a compelling case. Good special issues are characterised by a set of high-quality papers delivered by prominent authors who meet time deadlines. Good guest editors act strongly and decisively to ensure adherence to these deadlines, full and unbiased peer reviews, and timely delivery of reviews and editorial feedback. Guest editors also usually write an introductory editorial paper to summarise the collection of papers and the subject area more generally. A mix of editors often provides benefits from editors who have prior experience, as well as early-career scientists who can bring diversity and enthusiasm to the process.

Turning attention to some of the practical issues that I face with papers submitted to *Inland Waters*, and with due apologies to many authors who are already familiar with what I mention below, I wish to explore common reasons why authors' work might be rejected. Since becoming Editor-in-Chief of *Inland Waters*, I have noted common features of papers that have been rejected:

- Long, poorly worded titles, often with words repeated or inadequately communicating the actual subject matter of the paper.
- Inability to read the instructions for authors. This failing is reflected in a range of issues from sections badly worded to references in the wrong format.
- Poor English, including spelling mistakes. I accept that 'correct' English is a major challenge for authors whose first language is not English but the cases I refer to appear to be almost devoid of any pre-review by someone competent in English (and lack of a spell checker also).
- Lack of a clear scientific objective or any stated hypothesis testing. A suitable statement is often best placed at the end of the introduction section.
- Inability to provide a broader context for the implications of the study within the field of

research; often as a sentence or two placed at the end of the abstract and in the conclusions section.

- Lack of detail in the methods section. For example, I note that many authors performing water quality meta-analyses forget to mention the depth from which samples were taken.
- Poor figure quality, with a multitude of different font sizes and types, unnecessary lines (e.g., grid lines) on graphs, and poor resolution.
- Papers that lack statistical analyses and present extensive raw data in the main body of the paper (rather than in supplementary material).
- Combined results and discussion sections. I do not suggest that combining these sections is a basis for rejection, but the fact is that these papers have a higher rate of rejection and it often reflects an inability of authors to present results with brevity and clarity, and allow the discussion to be more broadly encompassing within the subject area of the study.

I hope I have the opportunity to talk in person to SIL members (or virtually for now) about the future of *Inland Waters* and to hear suggestions about how to raise the performance and status of the journal, as well as receiving feedback on some of the suggestions I have raised above.

References

- Buranyi S. 2017. Is the staggeringly profitable business of scientific publishing bad for science? *The Guardian*, 27 June 2017. www.theguardian.com/science/2017/jun/27/profitable-business-scientific-publishing-bad-for-science (accessed 17 May 2020).
- Fox CW, 2017. Difficulty of recruiting reviewers predicts review scores and editorial decisions at six journals of ecology and evolution. *Scientometrics* 113: 465–477.
- Smith M. 2019. University of California's showdown with the biggest academic publisher aims to change scholarly publishing for good. *The Conversation* March 8, 2019. <https://theconversation.com/university-of-californias-break-with-the-biggest-academic-publisher-could-shake-up-scholarly-publishing-for-good-112941> (accessed 17 May 2020).

Tonolli Memorial Award

Lake Maggiore as seen from the Istituto Italiano di Idrobiologia in Pallanza, Italy.
Photo by CNR IRSA Archives

The Tonolli Fund of SIL was created in 1985 through a request from Vittorio and Livia Tonolli, well known limnologists at the Istituto Italiano di Idrobiologia in Pallanza, Italy. The purpose of the fund is to provide assistance to young limnologists in developing countries and encourage them to join SIL. Information about the fund can be found at [LIMNOLOGY.ORG/tonolli-memorial-award](https://www.limnology.org/tonolli-memorial-award). Below is a recent report from a Tonolli Fund recipient.

The effects of reopening Mbita Channel on eutrophication in Nyanza Gulf of Lake Victoria, Kenya

Benard Simiyu and Rainer Kurmayer

University of Innsbruck, Research Department for Limnology, Mondsee, Austria

Email: bmucholwa@gmail.com |

rainer.kurmayer@uibk.ac.at

For several decades, the large Nyanza Gulf of Lake Victoria (Kenya) has shown signs of eutrophication such as the occurrence of harmful algal blooms formed by cyanobacteria of the genus *Microcystis* (Sitoki *et al.* 2012, Simiyu *et al.* 2018). Recently, in May 2017 part of the Mbita Channel closing was reopened to reinstall the natural connection to the main lake basin, eventually increasing dilution and reducing eutrophication (Fig. 1A, B). Water exchange between Nyanza Gulf and the main lake is driven by daily water level variation initiated by wind stress on the water surface and the change in wind direction (Okely *et al.* 2010). In the afternoon, the lake breeze blows eastwards propelling barotropic flows into the gulf and reverses towards the main lake after a change in wind direction at night (Antenucci *et al.* 2006; Okely *et al.* 2010).

Previous work has also shown that daily water level fluctuation is related to variations in specific conductance in the gulf, for example, the high inflows from rivers during the wet (rainy) period might increase specific conductance when the open water (main lake) influence decreases. In contrast, during the dry period, a decrease in specific conductance is expected when river inflows decrease and the main basin inflows increase (Gikuma-Njuru *et al.* 2018). Thus, specific conductance can be considered a tracer for monitoring dilution influence through the main basin. In this study, in order to document changes in water quality after reopening the Mbita channel, specific

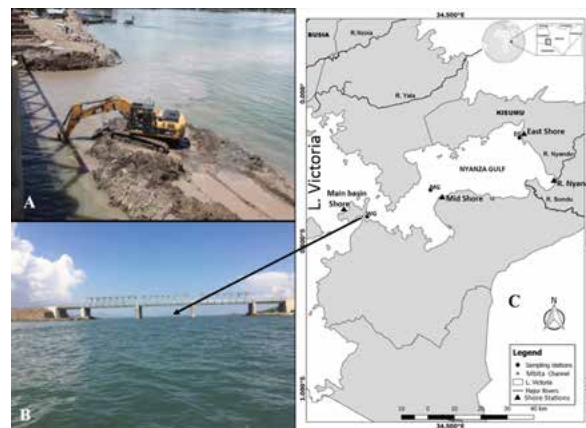


Fig. 1 A) Excavation work under way to remove murrum and stones used for constructing of the Causeway and reopening the Channel to allow flow of water from one part of the lake to another. B) The Mbita-Rusinga bridge & Mbita channel (width, 150 m) re-opened in May 2017. Photo source: <https://twitter.com/KeNHAKenya/status/859808313051164673/photo/1>. The photo of the bridge is taken from the gulf (Benard Mucholwa Simiyu). C) Map of Lake Victoria, Kenyan section, showing Nyanza Gulf and sampling stations, East Gulf (EG), Mid Gulf (MG) and West Gulf (WG) indicated by black circles. Corresponding shore stations (East shore, Mid shore, Main basin and mouth of River Nyando) indicated by black triangles.

conductance and phytoplankton biovolume were monitored monthly from July 2017 to July 2018 at three stations (West, Mid and East Gulf) along the gradient in connectivity to the main basin (Fig. 1C).

As observed previously, specific conductance showed a distinct increasing gradient with distance from the main lake and was highest at East Gulf. However, compared with reports from the period before opening, specific conductance decreased by $11.1 \pm 3.3\%$ (SE). Similarly, a significant decrease in total phosphorus (TP) concentrations and an increase in water transparency at East Gulf were recorded (Fig. 2). In addition, while phytoplankton biovolume declined only marginally, the abundance of nuisance cyanobacteria such as *Microcystis* decreased by $33.7 \pm 5.5\%$ (Fig. 3). The decrease

in the proportion of *Microcystis* was attributed to the increased dilution effect through the main basin and the general sensitivity to flushing (Reynolds *et al.* 2002), (Fig. 3).

For a deeper understanding, specific conductance was used as a tracer to monitor dilution effects in dependence on water level variability recorded on a daily basis at the shore side (Fig. 1C). A highly significant correlation between specific

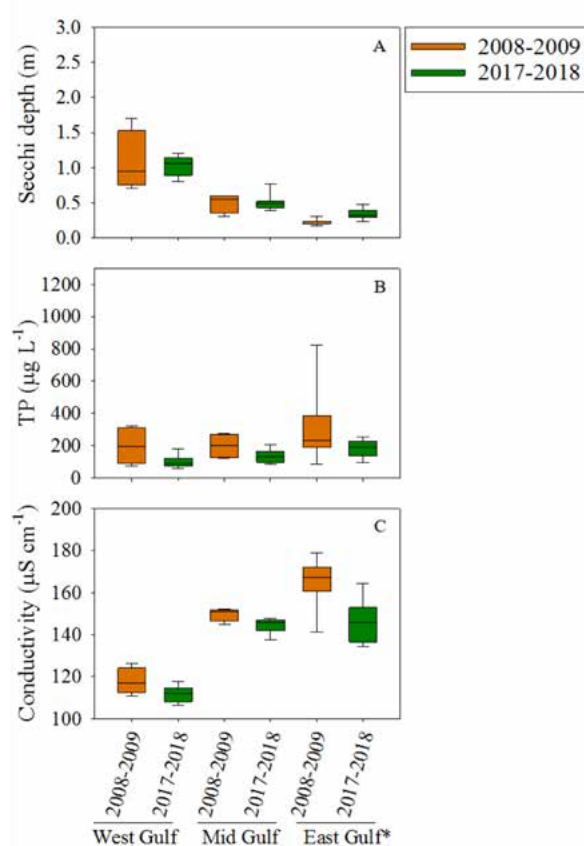


Fig. 2 Boxplots for comparing (A) Secchi depth (m), (B) total phosphorus ($\mu\text{g L}^{-1}$), (C) specific conductance ($\mu\text{S cm}^{-1}$) between sampling stations (West Gulf, Mid Gulf, East Gulf) and between two study periods: July 2008 – September 2009 and July 2017 – July 2018. * Indicates significant difference between the two study periods (Wilcoxon Signed Rank Test, Secchi depth: $p < 0.001$ $n = 13$; total phosphorus: $p = 0.027$; specific conductance: $p = 0.008$).

conductance at the shore measurements and the specific conductance recorded for the water column was observed. Thus, shore specific conductance was used to monitor the influence of the main basin on the water column in the gulf on a daily basis. As a result, water level variability was highest at East Gulf ($1, 10 \pm 0.3, 32$ cm; min, average \pm SE, max) and was significantly related to wind speed. Water level was negatively related to specific conductance, which was found most influential during the dry period and less – albeit significantly – related during the wet period. In summary it is concluded that reopening of the Mbita Channel led to an increased dilution of the East Gulf through the main basin, mainly by wind-driven changes in water level.

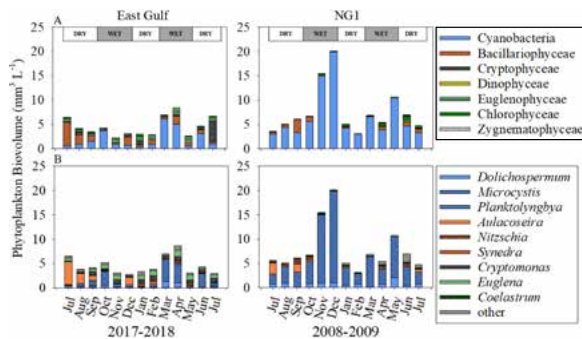


Fig. 3. Comparison of total phytoplankton biovolume composition ($\text{mm}^3 \text{L}^{-1}$) assigned to (A) classes and (B) genera contributing $> 5\%$ to the total phytoplankton biovolume recorded monthly between two study periods, from July 2008 to July 2009, and from July 2017 to July 2018 in Kisumu Bay. The top bar indicates wet and dry periods.

Funding

This study was funded by the Austrian Agency for International Cooperation in Education and Research (OeAD-GmbH) OEZA Project number 0894-00/2014, with additional support from the International Society of Limnology (SIL), Tonolli Fund, to B.S. Sample analysis was supported by the Austrian Science Fund (FWF) P32193 to R.K.

References

- Antenucci JP, Alexander R, Attwater G, Ewing T, Feaver S, Imberger J, Khisa P, Lam C, Njuguna H, Romero JR, Shimuzu K. 2006. The physical limnology of Winam Gulf and Rusinga Channel of Lake Victoria during April–May and August of 2005. Proceedings of 11th World Lakes Conference, Nairobi, Kenya, 2:1–6.
- Gikuma-Njuru P, Hecky RE, MacIntyre S, Guildford SJ. 2018. Physicochemical gradients and water fluxes between Nyanza Gulf and main Lake Victoria, East Africa: Tracing dynamics of gulf-main lake interaction. Journal of Great Lakes Research 44: 1252–1263.
- Okely P, Imberger J, Antenucci JP. 2010. Processes affecting horizontal mixing and dispersion in Winam Gulf, Lake Victoria. Limnology and Oceanography 55: 1865–1880.
- Reynolds C, Huszar V, Kruk C, Naselli-Flores L, Melo S. 2002. Towards a functional classification of the freshwater phytoplankton. Journal of Plankton Research 24(5): 417–428.
- Simiyu BM, Oduor SO, Rohlack T, Sitoki L, Kurmayer R. 2018. Microcystin content in phytoplankton and in small fish from eutrophic Nyanza Gulf, Lake Victoria, Kenya. Toxins 10(7): 275. doi:10.3390/toxins10070275
- Sitoki L, Kurmayer R, Rott E. 2012. Spatial variation of phytoplankton composition, biovolume, and resulting microcystin concentrations in the Nyanza Gulf (Lake Victoria, Kenya). Hydrobiologia 691: 109–122.

FACES of SIL

SIL is truly an international organization and FACES of SIL wants to emphasize our diverse community with short stories about SIL members. If you want to tell your story, send a short text (maximum 250 words and a photo) to the editor at flaim.giovanna@gmail.com.



Carlos A. Rivera-Rondon
Associate Professor
Head of the Department
of Biology
Pontificia Universidad Javeriana
Bogotá, Colombia

CARLOS RIVERA | COLOMBIA

I am a limnologist and a diatomist, and I am Head of the Limnology Laboratory at the Javeriana University (Bogotá, Colombia). My main interest is in ecosystem processes and their response to climate variability and human disturbance. I study the present conditions of freshwater ecosystems, lake sedimentary record and diatoms assemblages in order to understand the response of aquatic ecosystems to past environmental fluctuations. My PhD thesis (Barcelona University) was about a diatom-based reconstruction of the late glacial and early Holocene environment in the Pyrenees.

Now, I am focused on high mountain lakes in Colombia. The high mountain lakes of Colombia are located in the Páramo ecosystem. Páramo lakes are very important because they provide more than 50% of the water used in Colombia. In addition to the impacts associated with the global warming, the Páramo and their tropical mountain lakes are affected by agriculture, livestock and mining activities. Despite Colombia being one of the most water-rich countries in the world, it is a country with very few limnologists. I believe that by increasing connections with other SIL members, we will be able to provide better information for decision makers in Colombia dealing with global change scenarios. My favorite lake is Guatavita (2990 m a.s.l., z_{max} 30 m), a small emblematic lake tied to the legend of El Dorado. In addition to its scenic beauty, it was the lake where my wife and I fell in love.

✉ crivera@javeriana.edu.co

🐦 twitter.com/limnorivera

f facebook.com/carlos.a.rondon.98

📷 instagram.com/limnorivera

📍 paramolakes.wixsite.com/lagosdeparamo

📍 sites.google.com/site/limnorivera/home



Kirsten Olrik
Cand. scient, Ph.D.
Laboratory of Environmental
Biology
Henningsens Allé 2C, DK-2900
Hellerup, Denmark

KIRSTEN OLRIK | DENMARK

My PhD (1976) dealt with succession of Cyanobacteria, Dinoflagellates, and Desmids in relation to water quality and physical lake parameters in 15 Danish lakes.

After 12 years at the Water Quality Institute, I ran an independent plankton laboratory from 1984 to 2016, when I passed the baton to younger biologists, but still have selected tasks.

Among many hundreds of lakes, my favourites are the clear-watered L. Maglesø and L. Holmsø, as well as lakes that tell a story: eutrophic lakes that changed from external to internal P-loadings; summer stratified and stagnant L. Søholm and L. Farum both changed permanently from dominance of Cyanobacteria to *Ceratium*, and shallow lakes L. Arreskov and L. Arresø changed dominance from Chlorophytes to Cyanobacteria.

International cooperation has meant a lot to me. In 1994 I wrote a book on Phytoplankton Ecology for the Danish Ministry of the Environment. Jack Talling, S.I. Heaney, and Colin Reynolds from FBA in Windermere, were all inspiring and helpful. The book treats freshwater and marine phytoplankton strategies and environmental factors. I have enjoyed participating in Conferences including SIL, IAP, the WWCN with Charles R. Goldman, Michio Kumagai, Richard Robarts, and students from the entire World.

At the SIL Congress in Nanjing 2018, degradation of lakes and rivers by hydropower dams was a main issue. SIL can help save the World's freshwater by influencing public opinion and politicians to understand how destructive dams are for freshwaters, their biodiversity and surroundings. This involves all levels up to the UN Climate Panel, which at present classifies hydropower as green energy.

✉ Kirsten.olrik@k-olrik.dk

☎ +45 2814 6254

FACES of SIL



Lisette de Senerpont Domis
Netherlands Institute of Ecology
(NIOO-KNAW)

LISETTE DE SENERPONT DOMIS | NETHERLANDS

I am an aquatic ecologist at the Netherlands Institute of Ecology, where I head the group AKWA. AKWA translates state-of-the-art fundamental scientific knowledge to encompassing solutions for the complex problems water users face in the light of environmental changes. Together with water managers, hydrologists, social scientists, and economists we address pressing issues facing aquatic ecosystems and the provision of aquatic ecosystem services. Using a combination of modelling, experimentation and fieldwork we study key pressures such as eutrophication, climate change, urbanization and emerging pollutants. To this end, I am involved in various EU projects, such as AQUACOSM, MANTEL, NETLAKE, DRYVER and AQUACOSM Plus. Apart from being the chair person of the longest running SIL working group, i.e. the Plankton Ecology Group, I am also the chairperson of the Global Lake Observatory Network (www.gleon.org), a grassroots network consisting of researchers, educators and community groups conducting innovative science by sharing and interpreting high resolution sensor data to understand, predict and communicate the role and response of lakes in a changing global environment. In addition, I am an associate editor of *Freshwater Biology*. I hold a PhD in Natural Science of Leiden University, and my favourite lake systems are the marine lakes of the Berau Archipelago in Indonesia. Originally trained as a marine biologist, marine lakes are close to my heart as these lakes bring together the colourful beauty of tropical reef systems, and the insularity of lakes. I wish for SIL to become an inclusive society welcoming scientists across the world regardless of gender, age, and ethnicity in sharing knowledge on freshwater systems.

✉ L.desenerpontdomis@nioo.knaw.nl

🐦 [@AKWALisette](https://twitter.com/AKWALisette)

👉 nioo.knaw.nl/nl/employees/lisette-de-senerpont-domis



Simon Stewart
Cawthron Institute
Nelson, New Zealand

SIMON STEWART | NEW ZEALAND

If I had to choose my spirit creature to symbolise what I strive to be in limnology, it would be a catfish – the generalist. I love ‘consuming’ all aspects of limnology (physical, biogeochemical and food web dynamics) and while I love lakes the most, I’m also more than happy to venture into streams and estuaries. I also love a research diet that includes ‘recycling’ old data, like a true detritivore, and new data (my predatory instincts). Just to hammer home the point, I also don’t have scales!

Most of my research involves stable isotopes, particularly focused on N-cycling and food web interactions. I managed to integrate all of these aspects of limnology into my recent PhD (2018) through examining nitrogen recycling in Lake Taupō, New Zealand. Now I am working as a freshwater scientist at the Cawthron Institute in Nelson New Zealand. I am now helping to develop new projects including research into dissolved organic nitrogen (DON) cycling in New Zealand lakes and understanding the drivers of filamentous algae blooms in the littoral zone of large, clear-water lakes.

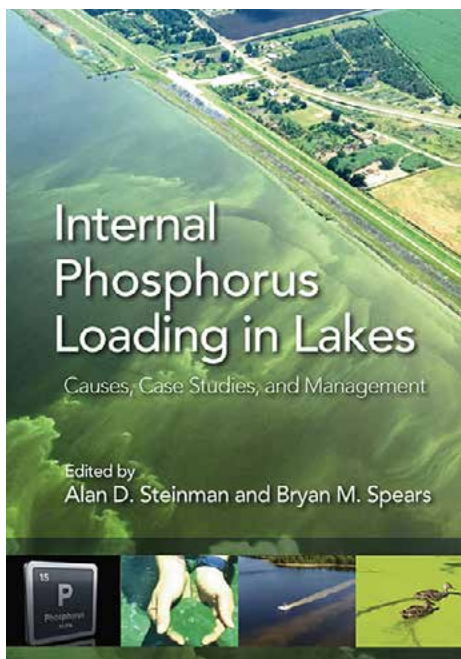
I am new to SIL but loved the welcoming and diverse community at the Nanjing meeting. As an SIL member, I am also proud of the advocacy work done on our behalf addressing global impacts on freshwater ecosystems (e.g., recent support for Russian limnologists’ views on protection of Lake Baikal). I’m looking forward to contributing more to SIL over the coming years.

✉ Simon.stewart@cawthron.org.nz

🐦 [@SimonDStewart_N](https://twitter.com/SimonDStewart_N)

👉 cawthron.org.nz/people/182-simon-stewart/

Book Review



A.D. Steinman and B.M. Spears (Eds)
Internal Phosphorus Loading in Lakes;
Causes, Case Studies, and Management.
J. Ross Publishing Florida, 2020

Hardcover: 464 pages, ISBN: 978-1-60427-144-7,
\$89.95

Looking for a crash course on internal phosphorus (P) loading in lakes? Or an opportunity to “truly” understand it? Look no further, Steinman and Spears provide a one-stop shop for all things internal P loading. Eutrophication is a key driver of global change impacting aquatic ecosystems and its legacy is maintained in the bottom of lakes worldwide. Internal P loading is the primary mechanism delaying most lake rehabilitation efforts. Resource managers are challenged by the long-term supply of biologically available P hidden in the depths of lakes. Internal P loading is facilitated by a number of complex, interacting, physical, chemical, and biological mechanisms that are highly site specific. This is the most comprehensive book on internal P loading to date, and provides fresh perspectives on this wicked problem. The book is divided into 3 Sections 1) Introduction to and Overview of Internal Phosphorus Loading, 2) Case Studies from Around the World, and 3) Integration and Synthesis. It was a joy to read cover-to-cover, with seamless integration between chapters; none of which were written in isolation. This book is the complete package- covering definitions, mechanisms, methods, drivers, and management of internal P loading. The meat of the book is an impressive global representation through 17 case studies, highlighting the international nature of this phenomenon. Steinman and

Spears’ efforts towards international reach are obvious; the diverse case studies are from 16 countries representing all continents, with the exception of Antarctica. The book culminates in a meta-analysis of release rates from an additional 27 published incubation studies and concludes with a Synthesis, Implications and Recommendations chapter by the Editors.

The first 5 chapters provide everything a new scientist to the field should know about internal P loading including the definition and why it occurs, methods for rate measurements with an entire chapter dedicated to modelling approaches, drivers, and management efforts. The Editors synthesize data from published meta-analyses to illustrate weak relationships between sediment total P (TP) and water column TP that vary by trophic status (Figure 1.2). Lake managers and practitioners will appreciate the methods chapters, which summarize and provide advantages and disadvantages of each approach. The illustrative figures are particularly helpful, depicting the variety of devices used to measure internal P loading with labels and schematics. These images take the mystery out of the techniques, and may facilitate the achievement of the Editors final plea- for a standardization of methodologies to facilitate quantitative comparisons. Physical, chemical, and biological solutions to internal P loading are reviewed, and it is clear that there is not a one-size-fits-all solution. The varying success of geoengineering approaches are reflected in the individual case studies. For example, in Barton Broad, sediment dredging was effective in reducing internal P loads, but largely due to decreases in organic P, and not changes in sediment characteristics. Internal P loading in Lake Kinneret is also controlled by organic matter flux. Realistic solutions will be in-lake AND catchment interventions. Future predictions of stressors likely to exacerbate internal P loading are climate change, expressed as changes in precipitation, wind, increasing water temperatures, and increasing atmospheric pollution deposition. Future models need to incorporate climate and water temperatures in order to accurately account for climate change. Increases in human population growth and land use change will increase catchment loading, which is why the overarching recommendation remains land management of P.

The global nature of internal P loading is expertly demonstrated with choice and range of case studies from around the world including: Lake Simcoe, Canada; Lakes Apopka and Okeechobee, USA; Grand Lake St. Mary’s, USA; Lake Arendsee, Germany; Lake Peipsi, Estonia/Russia; Lake Taihu, China; Loch Leven, UK; Barton Broad, UK; Esthwaite Water, UK; Lake Søbygaard, Denmark; Lake Hjälmaren, Sweden; Lake Eemmeer, Netherlands; Säkylän Pyhäjärvi, Finland; Lake Erie, Canada/USA; Lake Kinneret, Israel; Jacarepaguá Lagoon, Brazil; and Lake Malawi, Africa. I congratulate the Editors on their global vision and efforts. Through case study

comparison, novel mechanisms and drivers are revealed. For example, the work on Esthwaite and Malawi go beyond sediment release and examine P exchange across the thermocline, with implications for a changing climate. In Loch Leven, teleconnections are identified as important drivers of internal P loading; application to other lakes remain untested.

The Editors deliver new and colorful conceptual diagrams (Figures 1.1 & 24.2) and a table of global P loading rates derived from the case studies (Table 24.1). Synthesis of case studies revealed that internal P loading is positively correlated with catchment P load and lake residence time. The common theme is that internal P loading is important; ranging from 237 times higher than the external load (Lake Simcoe) to only 5% of the external load (Lake Eemmeer; data derived from Table 24.1). The Editors challenge us to explain this variability in internal P loading through a better understanding of the drivers across scales, legacy P in watersheds, and multiple and interacting stressors; all whilst reconciling economic development needs with the provision of ecological integrity. This book will be of interest to upper year undergraduate students, graduate students, and anyone (emerging or experienced) working in the field of P and lakes. I only wish it existed when I started exploring this danger in the deep.

Rebecca L North

northr@missouri.edu

School of Natural Resources,
College of Food, Agriculture, and Natural Resources,
University of Missouri, Columbia, MO, USA

Obituary

It is with a heavy heart that SIL announces the death of former SILnews editor Dr. Ramesh Gulati. We are very grateful for his work and dedication during the many years (2006-2019) he was Editor of SILnews. Our most sincere condolences to family and colleagues.



Ramesh Datt Gulati

1935 – 2019

Dr. Ramesh Datt Gulati, a limnologist and pioneer in lake management studies, passed away on 23rd December 2019 at his hometown, Hilversum (Netherlands). Born on 28th of September, 1935 in Piplan (in erstwhile Panjab, now in Pakistan), he fled to New Delhi, as a refugee with his brothers and sisters, after losing his parents during the war following partition between India and Pakistan. He completed his school and university education in Delhi. He obtained his B.Sc. honours in Zoology (1956), and M.Sc. in Fish and Fishery Biology (1958) from the Department of Zoology, University of Delhi. He developed his interest in lakes at the very beginning of his research career that spanned over six decades. He obtained his PhD degree in general limnology in 1964 from Delhi University under the supervision of Prof. H.L. Sarkar. His doctoral research provided the first limnological insight into the lakes in the north India plains and mountain lakes (Lake Nainital and Lake Bhimtal) in the Kumaon Himalaya. He investigated thermal stratification, plankton ecology, algal blooms and lake eutrophication. He taught zoology to graduate students from 1959 to 1968 at the Hans Raj College and the Zoology Department of the University of Delhi, before moving to the Netherlands.

At the invitation of Dr. H. L. Golterman, he joined the Centre of Limnology (then Limnological Institute) at Nieuwersluis on 1 May, 1968, first as a research trainee in water chemistry for one year. His stay was supported by a fellowship from the Dutch Ministry of Foreign Affairs (1 May 1968 to 30 April 1969). He joined the research staff of the Institute on 1 May 1969 with permanent tenure. During the first three years, he studied primary production (14C technique), energy flow and general limnology of Lakes Wijde Blik and Lake Vechten, both stratifying lakes. He became a senior scientist in 1974

and headed the "Working-Group 'Primary and Secondary Production'", one of the three working groups at Nieuwersluis and remained in this position until 1987. His research was devoted to the grazing, assimilation and excretion rates of zooplankton community in Lake Vechten (1972-1978) and the role of zooplankton in eutrophication in the restoration of lakes of Loosdrecht area (1982-1988). His studies also involved stoichiometric changes in seston and zooplankton in response to eutrophication control measures. In December 1996, he took early retirement due to serious health problems but continued to work as a senior guest scientist at the Centre of Limnology. He formally retired at the age of 65 in December 2000 (see Parma, 2003) but continued as an Emeritus Guest Scientist, NIOO/Netherlands Institute of Ecology, Wageningen until he passed away.

Dr. Gulati will be known for his pioneering contributions to limnology, particularly in the field of biomanipulation and restoration of shallow lakes. He served the science equally vigorously through his support and advice to limnologists worldwide. He served on the editorial board of many prestigious journals and was the Editor of SIL News for a decade (2009-2019). He was editor in chief of Aquatic Ecology (1996-2015) besides serving on the editorial boards of many prestigious journals including Hydrobiologia. Dr. Gulati edited special issues of many journals, which include Ecology of Meromictic Lakes (2017); Inland Waters 4 (2014); Hydrobiologia (12 volumes between 1980 and 2013) and Freshwater Biology 38(3) (1997). The journal Limnologica dedicated a special volume to him in 2009.

In 2005 he was invited to Russia by the Russian Hydrobiological Society. He was offered the hon. position of a senior scientist by the Society. In 2014, the Siberian

Academy of Sciences awarded him with an honorary PhD and professorship in limnology.

Dr. Gulati actively promoted limnological research and helped improve its quality in several countries. He conducted workshops on different themes of limnology and scientific manuscript writing in India and Mexico. He also delivered keynote addresses in many international conferences in Europe, Latin America and Asia. During his visits, he always interacted with young researchers, generously offering them advice on their research proposals and manuscripts. Several established limnologists/aquatic ecologists received guidance from him during their formative years. To the very end he maintained his curiosity in plankton ecology, his love for field biology and a deep interest in research in the aquatic sciences.

Dr. Gulati published more than 200 research and review papers. Google Scholar mentions citations of Dr. Gulati as close to 7500 and h index 45. In the web of science, 10 of his articles have received at least 100 citations each. Some of them are listed at the end.

Dr. Gulati leaves behind his beloved wife Toshi and two children, Rohit and Riti. Although, he settled in the Netherlands half a century ago, he remained very much an Indian at heart, and visited India almost every year to meet his extended family, friends and fellow researchers.

References

DeMott WR, Gulati RD, Siewertsen K. 1998. Effects of phosphorus-deficient diets on the carbon and phosphorus balance of *Daphnia magna*. *Limnology and Oceanography* 43: 1147–1161.

DeMott WR, Gulati RD, Van Donk E. 2001. *Daphnia* food limitation in three hypereutrophic Dutch lakes: Evidence for exclusion of large-bodied species by interfering filaments of cyanobacteria. *Limnology and Oceanography* 46: 2054–2060.

Gulati R.D, DeMott WR. 1997. The role of food quality for zooplankton: remarks on the state-of-the-art, perspectives and priorities. *Freshwater Biology* 38: 753–768

Gulati RD, van Donk E. 2002. Lakes in the Netherlands, their origin, eutrophication and restoration: state-of-the-art review. *Hydrobiologia* 478: 73–106

Gulati, RD, Wurtz-Schulz G. 1980. Remarks on the present status of limnology in India based mainly on the Indian publications in *Hydrobiologia* and suggestions for further approach. *Hydrobiologia* 72: 211–222.

Mooij WM, Trolle D, Jeppesen E, Arhonditsis G, Belolipetsky PV, Chitamwebwa DBR, Degermendzhy AG, DeAngelis DL, De Senerpont Domis LN, Dowing AS, Elliot JA, Fragoso Jr CR, Gaedke U, Genova SN, Gulati RD, Hakanson L, Hamilton DP, Hipsey MR, Hoen J, Hulsmann S, Los FH, Makler-Pick V, Petzoldt T, Prokopkin IG, Rinkle K, Svhep SA, Tominaga K, Van Dam AA, Van Nes EH, Wells SA, Janse JH. 2010. Challenges and opportunities for integrating lake ecosystem modelling approaches. *Aquatic Ecology* 44: 633–667

Ozimek T, Gulati RD, van Donk E. 1990. Can macrophytes be useful in biomanipulation of lakes, the lake Zwemlust example? *Hydrobiologia*, 200/201: 399–408.

Parma S. 2003. Ramesh Gulati: a personal approach, based on his retirement lecture. *Hydrobiologia* 491: 1–8

Sarma SSS, Nandini S, Gulati RD. 2005. Life history strategies of cladocerans: comparisons of tropical and temperate taxa. *Hydrobiologia* 542: 315–333

Van Donk E, Gulati R.D, Iedema A, Meulemans JT. 1993. Macrophyte-related shifts in the nitrogen and phosphorus contents of the different trophic levels in a biomanipulated shallow lake. *Hydrobiologia* 251: 19–26.

S.S.S. Sarma

Universidad Nacional Autónoma de México,
Tlalnepantla, Mexico
Email: sarma@unam.mx

S. Nandini

Universidad Nacional Autónoma de México,
Tlalnepantla, Mexico

Brij Gopal

Centre for Inland Waters in South Asia,
Jaipur, India

Upcoming Meetings

1st Scientific Conference in Memory of Prof. Vladimir I. Shadin

19-23 APRIL 2021, IN ST. PETERSBURG, RUSSIA

To find out more about the event, contact:

Alexandra L. Rizhinashvili: <http://ihst.nw.ru/work/conf/zhadin-en>

SILnews (ISSN 2707-9422) is the official newsletter of SIL (International Society of Limnology @ limnology.org) and is published online twice yearly in January and July (<https://limnology.org/publications/sil-news/> online). International Society of Limnology c/o UQAM - P.O. Box 8888, succ. Centre-Ville Montreal, QC, CANADA H3C 3P8. Business Manager Genevieve Leclerc; Editor Giovanna Flaim. Disclaimer - The opinions expressed in this publication are those of the authors and do not necessarily reflect the opinions or views of SIL or its members.