



SIL

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Society of Limnology

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Jefferson River, Montana, USA. Photo by Samuel J. Larkin.

The Presidents

After almost 30 years, SIL returned to Brazil for the 37th Congress held in May 2024. In Foz do Iguaçu, about 575 researchers from 43 countries met to discuss recent limnological studies and insights into the management of inland waters. The joint effort of limnologists from many South and Central American countries facilitated the organization of a stimulating meeting that combined diverse perspectives. These include the impact of multiple stressors on freshwater ecosystems, such as climate and global change, landscape evolution and conversion, pollutants, and the different responses of aquatic communities. The congress addressed the need for the restoration of water resources and focused on the co-development of sustainable management of inland waters together with indigenous and non-indigenous peoples. The crucial role of aquatic ecosystems in the emission of greenhouse gasses and carbon sequestration was another central topic. Additionally, the significant impacts of cyanobacteria on ecosystem services and ecosystem functioning were emphasized. This highlighted the need for effective eutrophication control and biodiversity conservation. Naturally, the status of freshwaters in South America and its most significant challenges were an ongoing theme. The Congress accomplished its goal, bringing together researchers, stakeholders, and policymakers to understand the importance of sustainable water resource management and the need for urgent actions given the current global scenario. We would like to express our deepest appreciation for the hard work of Luciana Gomes Barbosa, Susie Wood, José Luiz (Coca) Attayde and Néstor Mazzeo, who led the local organization and international scientific committees. We have emphasized repeatedly that it is the engagement of volunteers, most often long-standing SIL members, that creates opportunities for scientific and social exchange, such as our SIL Congresses. We, as the SIL community, send a big Thank You to all volunteers who made the 37th SIL Congress possible.

During the Congress in Foz do Iguaçu, SIL also went through a substantial reorganization of the board. After almost six years, the outgoing president Thomas Mehner handed over the presidency to the incoming president María de los Ángeles González Sagrario. We use this opportunity to write a joint letter to express our thoughts about recent and future developments of SIL.

Thomas has been serving as the president of SIL for the past six years. During his tenure, he revamped the SIL structure by introducing new portfolios such as *Communication* and *Global Outreach*, along with respective new vice-president and early career researcher positions. This restructuring has provided SIL with fundamental pillars for its functioning, resulting in the rearrangement of National Representatives into a network of National Ambassadors that links SIL to national societies, a new website and logo, and the delivery of several educational resources. With board members from five continents, SIL has become more inclusive and pluralistic. Furthermore, three congresses were organized during Thomas's presidency, including the centennial Congress of SIL in 2022.

Ángeles is the first SIL president from South America, and only the second female president in the more than 100 years of SIL history. She has shown

her creativity and strong dedication to SIL during her previous term on the SIL board as Vice President for Education. Being elected as SIL president by SIL members clearly reflects the appreciation of her work as Vice President. The newly appointed VP of Education, Mariana Meerhoff, is dedicated to supporting ongoing projects and generating new educational content. She aims to enhance international networks of collaboration and promote the exchange of students and young limnologists. She envisions a close collaboration with the VP in Developing Countries, where education and research conditions are often limited by economic, social, and sometimes political contexts. Also, for Inés O'Farrell, the term as Vice President for Developing Countries has come to an end after six years of continued engagement for SIL. Inés has been particularly active in supporting Early Career Researchers from the Global South. Beyond organizing the competition for Tonolli research grants and Wetzel travel awards, she has developed the successful Mentor-Mentee program of SIL that facilitates scientific support of ECRs from the Global South by more senior researchers from the Global North. Our newly elected VP of Developing Countries is Meryem Beklioğlu who has already introduced her ideas about potential further programs facilitating the integration of researchers from all over the world into the international community of SIL. We would also thank all other SIL members who were nominated for the positions, but were ultimately not elected. It is encouraging to see the substantial willingness to support and shape SIL via their candidacies at SIL elections.

It has also to be mentioned that Geneviève Leclerc has stepped down as the SIL Managing Director. Geneviève has been the mastermind behind the conceptual and structural re-organization of SIL, beginning with the Congress in China in 2018. She brought professional guidance and endurance to keep the spotlight on major organizational requirements. Geneviève will still assist SIL in some of the ongoing structural processes, but her position as Managing Director is now filled by Michelle Gros who managed the SIL Business Office during the last years. We are happy that a smooth transition could be facilitated, and we would like to thank both Geneviève and Michelle for their dedicated engagement. Last but not least, this is the last issue of SILnews with our editor Giovanna Flaim at the helm. Giovanna fundamentally modernized the appearance and structure of our newsletter, and turned it into a worthy publication not only for SIL members. We are very happy that her voluntary contribution to SIL communication accompanied the numerous changes that became necessary to prepare SIL as an international scientific society for a future that is more complex than ever before.

The substantial organizational changes also facilitate fresh perspectives and opinions within the SIL leadership. In a rapidly changing world, which affects research, education and management of natural resources, a scientific association such as SIL has to adapt as well. One of the major challenges is the adequate placement of scientific activities into the societal and political framework. We are convinced that SIL is obligated to contribute to global and local initiatives that support Sustainable Development Goals, for example, SDG 6 with a focus on sustainable management of water. The alignment of SIL activities

with the SDGs is already expressed in our [mission and vision](#). However, we think it is time to develop an advocacy concept for our society to strategically manage and share knowledge that will change and influence policies and practices that affect people's lives and resources. During the retreat of the SIL board at the SIL Congress in Brazil, preliminary ideas were discussed. We will contact you, our members, with more ideas and suggestions in the next months, and hope for insightful feedback.

Ángeles would like to reach out to all SIL members, to bridge gaps in the limnological community and to create fair and inclusive opportunities. From her perspective, some of the key aspects of SIL's mission include empowering young researchers and facilitating knowledge transfer. A further important aspect is aligning with the UN SDGs for sustainable management of inland waters, to achieve healthier ecosystems and to enhance their contribution to human wellbeing. These aspects represent the pillars for developing a strategic plan centered on providing resources and promoting networking for SIL members.

The global and multicultural composition of our society provides us with the perfect background for bridging gaps and counteracting inequalities. Given that water use has increased globally over the last years and that this trend will continue in the decades ahead, working toward healthier aquatic ecosystems is a commitment for all of us. Ángeles is dedicated to creating diverse and inclusive working environments, with equal opportunities for all, and she will base her leadership on these values.

Last but not least, our journal *Inland Waters* needs human resources and support to anticipate changes and to define future directions in the dynamic publishing world. Supporting is an important part of her agenda.

We wish you a safe and productive time!



Thomas Mehner

Outgoing SIL President



María de los Ángeles González Sagrario

Incoming SIL President

37th SIL Congress in Brazil:

Building bridges for the future

Latin America and the Caribbean represent diverse ethnic and cultural civilisations, with a rich scientific heritage and biodiversity. Historically, diversity has been one of the most important aspects of limnological fieldwork. We search for response variables, factors associated with decline, such as human pressures and climate change. Behind the diversity of ecosystems, the diversity of scientific societies emerges as an incredible challenge and responsibility to ensure inclusion of and respect for all individuals. Diversity and inclusion require that the diversity among individuals must be recognized and integrated into our societies, creating opportunities and strengthening human rights.

The theme of the 37th SIL Congress was “*Building Bridges between Science and Society to reduce the Effects of Fragmentation and Degradation of Inland Waters*”. This theme raises several questions, such as how we build bridges with society and how scientific societies embrace different cultures, ethnicities, Indigenous Peoples and people and civilizations in general. During this Congress we took a step towards the international recognition of much-neglected Indigenous Peoples, re-establishing their traditional role in science and limnology.



The Opening Ceremony of the 37th SIL Congress : Maurrem Ramon Vieira (National Agency of Waters), Simone Frederigi Benassi (Itaipu Binational), Thomas Mehner (SIL President), Luciana Gomes Barbosa (President of the 37th SIL Congress), Maynamy José Santana da Silva (Superintendent of Indigenous Peoples Policies in the State of Alagoas, Brazil) and Ernesto González (Central University of Venezuela and Master of Ceremonies).

From 05 to 09 May, the SIL Congress in Brazil showcased the strength of the Latin American and Caribbean people. For five days, Foz de Iguazu hosted 575 individuals from 43 countries, with 54% of the participants being women. Furthermore, this Congress highlighted the importance of student members for SIL (31% of the participants), pointing the way to the continuous renewal of the Society.

The world is changing, and the consequences of climate change are putting pressure on societies and ecosystems around the world. In this way, one of the most significant achievements of the 37th SIL Congress was the achievement of carbon-free certification under international regulations, demonstrating our commitment to reducing emissions and achieving a carbon-neutral event.

The 37th SIL Congress also symbolised the strength and vision of the Brazilian Limnology Association (ABLimno) and the Latin American and Caribbean Limnology Network (LACAN) for a new future, with a more pronounced role at the global scale. All the volunteers brought diverse perspectives and their incredible commitment, dedication and kindness was crucial for the success of the 37th SIL Congress.

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In this issue, SIL's in-coming and out-going Presidents write a joint letter sharing their thoughts about the recent and future developments of SIL. The organizers of the quite successful 37th SIL congress, held in Brazil, share some info and photos. There is also some important information about SIL membership fees, making them more equitable. This issue's Opinion article highlights the accomplishments of a grassroots movement tackling an emerging environmental problem. Two book reviews about running waters will have many readers ordering their copies, and from the Limnology Around the World section, we can learn more about the changing landscape of Canada's Arctic lakes and some ideas from Ireland on how to engage citizens in data collection. Please meet four of our members from China, Ghana, Türkiye and Ukraine in the FACES of SIL section. Sadly, we have lost another great limnologist, Jacob Kalff.

Hope you enjoy this issue,

Giovanna Flaim,
Editor SILnews

Contribution deadline for the January 2025 issue: **October, 2024**
Send to: SILnews Editor at SILnews@limnology.org



Some volunteers of the 37th SIL Congress from Guatemala, Argentina, Bolivia, Brazil, Colombia and others.

For the 16 member countries of LACAN, our ancestry teaches us the importance to fight, to recognise the right to struggle, but also to recognise our achievements and progress. This ancestry, which has shaped us as a people today, offers us a new path of leadership and common ideals in solidarity. I hope we can join hands and continue to pursue our collective ideals and a more inclusive world where human rights are upheld. We all belong to a global society, with different backgrounds, cultures and languages, but with the same and unique aspirations.

Thank you SIL for believing in us and working with us to strengthen limnology in Brazil, Latin America, the Caribbean and the World! See you in 2026 at the 38th SIL Congress in Canada for another memorable event of science making a difference, building bridges and making the world more inclusive and diverse!



Attendees saying goodbye at the closing ceremony of the 37th SIL congress



Survey on researchers' expectations of conferences

Are you a researcher planning to attend scientific conferences?

Please consider participating in and distributing this survey on researchers' expectations of conferences that Ariane Wenger – a doctoral student at the Transdisciplinarity Lab (TdLab), ETH Zurich – is conducting as part of her dissertation on changing research exchange practices. The short (10-15 minutes) online survey is aimed at researchers of all scientific disciplines and career stages who are planning to attend scientific conferences. In particular, opinions and views of researchers from all around the world are appreciated. Participation in the survey will not only enrich this study, but will also help to identify avenues for enhancing current conference practices, benefiting the wider academic community. [The survey can be accessed here.](#)

Thank you very much for your support!



Laguna Grande Ciervo de los Pantanos PN Argentina. Photo by Rodrigo Sinistro.



To be globally relevant and promote fairness, SIL is proposing a new Membership-Fee Structure in line with EDI principles

SIL's mission is to "...promote excellence in studying and managing inland waters and addressing global issues through the fostering of interdisciplinary approaches and the transfer of knowledge". Our specific priorities are to build international networks and partnerships, address UN Sustainable Development Goals (SDGs), and empower the researcher of tomorrow. To truly achieve this mission, SIL is in the process of incorporating EDI (equity, diversity and inclusion) principles into its activities and statutes. While SIL has been an international society since its

foundation over 100 years ago, it is still not a global society. Despite our members representing 70 to 80 countries, fewer countries as well as fewer members per country are being represented with decreasing per capita GDP (Fig. 1). Further, the ratio of members from high income countries (GDP > \$25K) to low income countries (GDP < \$25K) is 2:1 for Students, but increases to 3:1 for Early Career Researchers (ECR), and 4:1 for Regular Members. This weak retention of members from low-income countries is not surprising as the annual membership fees increased from \$5.00,

to \$23.40 to \$46.80 across these categories. Consequently, SIL membership is skewed towards high income countries, and therefore not representative of the global population.

We believe that for a global organization to be relevant, we need to remove barriers for limnologists from low-income countries to join our society (Fig. 2, Table 1). Hence, we propose small increases in SIL membership fees for high- and very-high income countries (in line with historical GDP increases) to subsidize affordable membership fees for low- and very-low income countries (Fig. 2, Table 1). This approach is also in line with the philosophy of our successful mentorship program, where experienced Mentors are not only paired with Students or ERC from low-income countries, but are also responsible for the membership fees of their Mentees. Specifically, we plan to implement a 5-tier system for membership fees based on GDP, instead of the current 2-tier system (above and below \$25K). To account for past increases in GDP, we plan to include a new top bracket for members from countries with a GDP exceeding \$50K. Below that, brackets will be \$50K to \$25K, <\$25K to \$12.5K, <\$12.5K to \$5K, and <\$5K. As before, Early Career Researchers (ERC) and Emeritus members (with journal subscription*) will pay 50% of the Regular Member fees, while 3-year student memberships are between \$35 and \$15. We also plan to offer 2-year membership options at a discount to facilitate the renewal process. Model simulations based on our current membership composition indicated that the new system would result in a ~10% increase in revenue due to membership dues, representing about 40% of the total revenue of SIL.

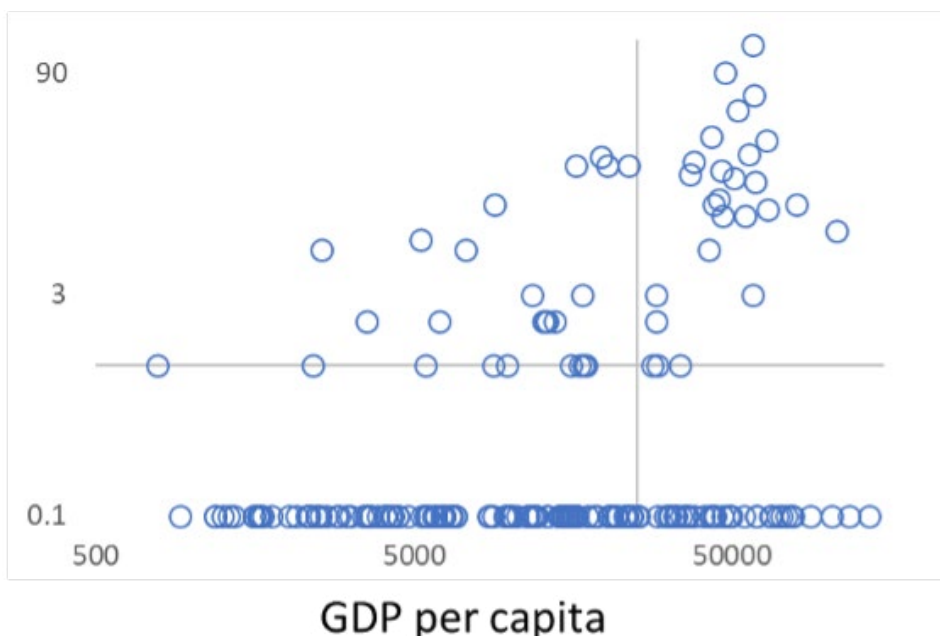


Fig. 1 Number of SIL members as a function of annual per capita GDP (\$US). Bottom row (0.1) represents non-members vs. GDP.

will be evaluated and communicated annually, with a major review planned five years after its implementation in 2025. We will host an online forum in September 2024 where we will present our plan, followed by an online vote (October 2024) on the new fee structure by our membership. Implementing this change will be a first step towards the incorporation of equity, diversity and inclusion principles. In parallel, we created a working group at the 37th SIL Congress in Foz do Iguazu (SIL 2024) that is tasked with developing priorities and strategies on how to best implement EDI at local, regional and global scales. All future activities and statutes will be informed and guided by these principles. This is your society and we invite and encourage you to share your thoughts concerns and suggestions. Of course, all comments will be kept anonymous and confidential.

*Emeritus members without journal subscriptions receive free membership.

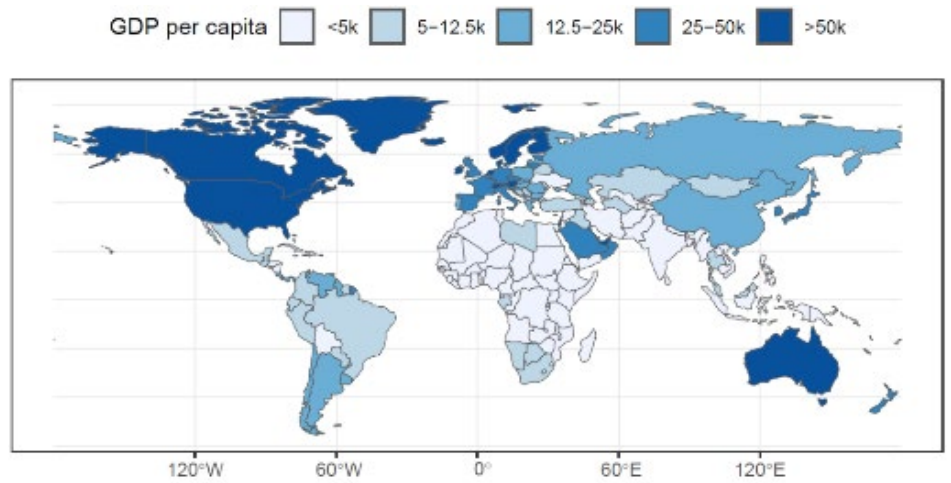


Fig. 2 Global distribution of national GDP values (annual per capita in \$US).

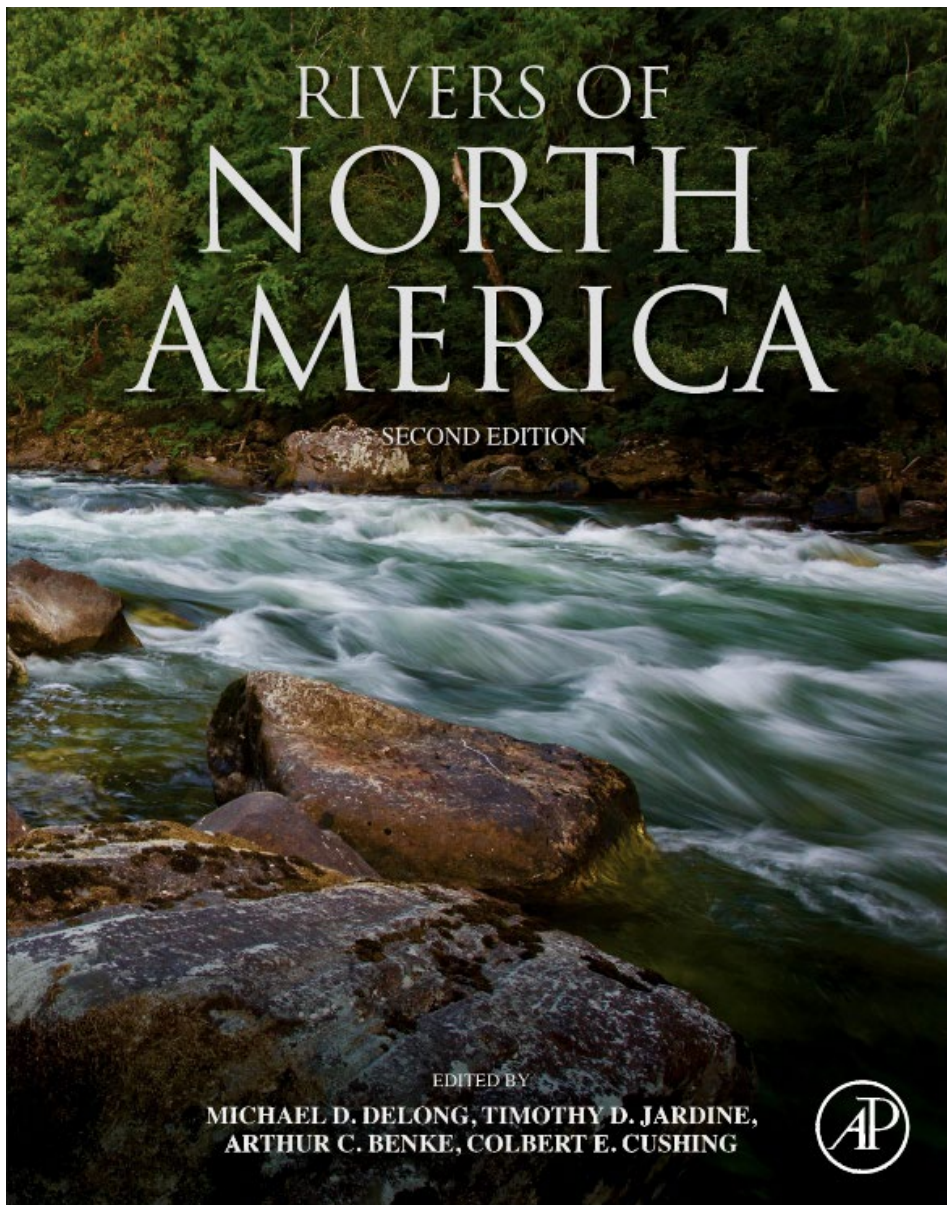
Table 1: Proposed membership categories and fee structure in \$US.

GDP per capita	Regular	Regular	ECR / Emeritus (w/ journal)	ECR / Emeritus (w/ journal)	Student member
> 50K	\$120 for 1 yr	\$220 for 2 yrs	\$60 for 1 yr	\$110 for 2 yrs	\$35 for 3 yrs
25 - 50K	\$100 for 1 yr	\$180 for 2 yrs	\$50 for 1 yr	\$90 for 2 yrs	\$30 for 3 yrs
12.5 - 25K	\$50 for 1 yr	\$90 for 2 yrs	\$25 for 1 yr	\$45 for 2 yrs	\$15 for 3 yrs
5 - 12.5K	\$25 for 1 yr	\$45 for 2 yrs	\$12 for 1 yr	\$22 for 2 yrs	\$15 for 3 yrs
< 5K	\$10 for 1 yr	\$15 for 2 yrs	\$8 for 1 yr	\$12 for 2 yrs	\$15 for 3 yrs



Iguazu Falls, Argentina & Brazil. Photo by Björn Wissel.

Book Reviews



By Michael D. Delong, Timothy D. Jardine, Arthur C. Benke, Colbert E. Cushing (Editors)

2nd Edition, Elsevier Publishing
Paperback ISBN: 9780128188477
eBook ISBN: 9780128188484
\$161 or \$230 for both

Stream and river scientists, managers, and enthusiasts will be excited to dig in to the second edition of *Rivers of North America*, edited by Delong, Jardine, Benke, and Cushing. This is a handsome – and hefty (1088 pages) – book that provides detailed descriptions of 156 rivers that drain 22 distinct geographic regions in North America. The spatial coverage is comprehensive,

with chapters spanning the northernmost rivers of the Arctic, warm and humid tropical rivers of southern Mexico, and nearly everything in-between. Perhaps more aptly considered a second ‘volume’, the focus of this book is on mid-sized rivers that were only briefly mentioned or not mentioned at all in the first edition, which tended to highlight the larger rivers in North America. Thus, the second edition provides a wealth of new material that very much complements the first, and - in my opinion - is worthy of occupying a prominent place in your library, perhaps even snuggled between the first edition and its companion, *Rivers of Europe*.

The book begins with an introductory chapter that covers a bit of general background about rivers and a more detailed account of the book’s approach. Here, the editors provide a high-level overview of the multiple subsections that are common to all

subsequent chapters (e.g., Physiography and Climate, River Biodiversity and Ecology), including helpful maps that illustrate geographic boundaries of the large river basins and physiographic provinces, as well as example graphics that introduce the reader to regional variation in precipitation, runoff, and evapotranspiration. This chapter does a nice job of setting the stage for subsequent chapters and providing a scaffolding that imbues a high degree of consistency, both among chapters and between the first and second editions.

Each primary chapter takes us on a journey of multiple rivers within a geographic region, and is co-written by experts – predominantly scientists and a few engineers – that study, manage, or work to protect these rivers. Chapters begin with a broad geographic description of the region, often providing a history of human habitation, including a brief sketch of early and present-day Indigenous communities and European settlers. One is reminded that each of these regions has a unique human history, and that rivers have always been at the center of human activity, subsistence, and culture. Next, each chapter describes the physiography of the region, highlighting key aspects of geology, including physiographic provinces that underlie the focal river basin(s). In addition, chapters provide general information about regional climate (i.e., temperature, amount and types of precipitation), as well as a subsection dedicated to basin landscape and land use, reporting dominant terrestrial ecoregions and forest types and a description of past and present land use. Together, these introductory sections paint a comprehensive ‘template’, which is leveraged in subsequent descriptions of individual focal rivers.

Each chapter then describes multiple (ranging from 4 to 9) focal rivers, presenting much more granular information about physiography, climate, and land use, and knowledge about the river’s geomorphology, hydrology, chemistry, and biodiversity/ecology. The level of detail in these sections varies greatly among chapters, revealing large differences in the current state of knowledge. For instance, while there has been substantial research and monitoring in places such as the Colorado River Basin or the Gulf Coast Rivers of the Southeastern US, much less is known about rivers of Mexico or those in remote regions of the Canadian Arctic and sub-Arctic, including large portions of the Mackenzie, Nelson, and Churchill River Basins which drain an area roughly one-third the size of the European continent! These sections also contain a brief discussion of ‘Human Impacts and Special Features’, as well as one on ‘Areas of Need for Research and Management’ – a new feature in the second edition. Finally, chapters contain beautiful photos of the focal rivers, literature cited, and one-page ‘snapshots’ of each focal river that includes a high-quality map, climatic and runoff data, and a brief list of major geographic, physical, and biological attributes. A careful perusal of any individual chapter will leave the reader with a foundational understanding of the rivers, and their variation, in the region or basin.

The final chapter of the book provides a general overview, synthesizing basic physical and biological characteristics among the major basins, and presenting a few interesting patterns and relationships. Although

Book Reviews

such an endeavor could represent an entire book on its own, this chapter does a nice job of comparing 'vital statistics' of rivers (e.g., basin size, relief, discharge, etc.) and highlighting various aspects of biodiversity and ecosystem processes. Among other things, we learn that non-native fishes represent a much higher proportion of total species richness in the Columbia, Pacific US, and Colorado River Basins than in, for example, the Ohio, MacKenzie, and Southeastern US River Basins. The final section of this chapter is focused on restoration and recovery of North American rivers, first outlining major threats (e.g., pollution, fragmentation, non-native species) and then presenting key challenges and opportunities for mitigating these threats. I found this chapter decidedly optimistic, with the message that there is historic precedent for reversing negative trends and rehabilitating rivers, and that we have a collective choice about making this happen moving forward.

There are many aspects of this book that will be valuable to dedicated readers. First, a serious reading of the book (which should not be done over a short period of time!) represents a master class in 'river macrosystems'. Although most of us spend our time and effort working or playing in a limited number of rivers, the rich descriptions and photos presented in this book leave the reader with a strong sense of how these ecosystems vary across large spatial scales and why. Second, the structure of each chapter forces the reader, in a good way, to recognize just how much the 'valley rules the stream', and provides a wealth of insight into how human activities have modified this relationship. Third, the book will provide a useful reference for those moving to work on rivers in a new

region, heading to a job interview in an unfamiliar landscape, entering graduate school in river science, or developing research projects and teaching modules that require a continental-scale perspective. It certainly got my wheels turning with respect to research and teaching ideas.

Finally, in the course of reviewing this book, a few general thoughts emerged. First, it's clear that much of what we know about North American rivers comes from the efforts of a relatively small group of scientists and agencies clustered around major universities and population centers. Consequently, some river basins have received substantial attention and continue to be studied and monitored closely, while others remain somewhat 'off the radar'. In large areas of the continent (especially parts of the Arctic and Mexico), ongoing or planned anthropogenic activities including oil drilling or new hydroelectric projects are likely to continue with little background information or surveillance. It is worrying that we will know little about the consequences of these actions. In addition, even in well-studied regions, it seems that there are simply too many rivers and too little resources to keep our collective fingers on the pulse. It is heartening, however, that public awareness about the importance of rivers is growing, as are citizen science groups and support for non-profit conservation organizations. There is hope!

Second, I was left with the feeling that there is a vast amount of information based on long-term monitoring efforts that is underreported and underutilized. Given how much time, effort, and money goes into collecting these datasets, one hopes that we can work towards dedicating the resources to collate and synthesize these data to

better understand and manage these ecosystems into the future. Growing interest and capabilities in data science are likely to help. Last, I was struck by how abbreviated most of the 'Ecosystem Process' sections were throughout the book. Although monitoring efforts by agencies and research groups have led to a rudimentary understanding of biodiversity in most of the focal rivers, much less is known about ecosystem processes, or the emergent relationships between biodiversity and ecosystem functions. Once again, there is reason to be optimistic as new advances come online in deployable sensor technology, remote sensing products, integrative ecosystem modeling efforts, and eDNA metabarcoding. I am hopeful that a future edition will show progress in these areas.

So, whether you're an academic, an agency or non-profit scientist, a student, or even an avid traveler interested in rivers, I encourage you to buy a copy of this book. You'll find that it is really different than your other books about rivers – and can serve as a fantastic reference text. Just don't read it too fast.

Prof. Wyatt F. Cross

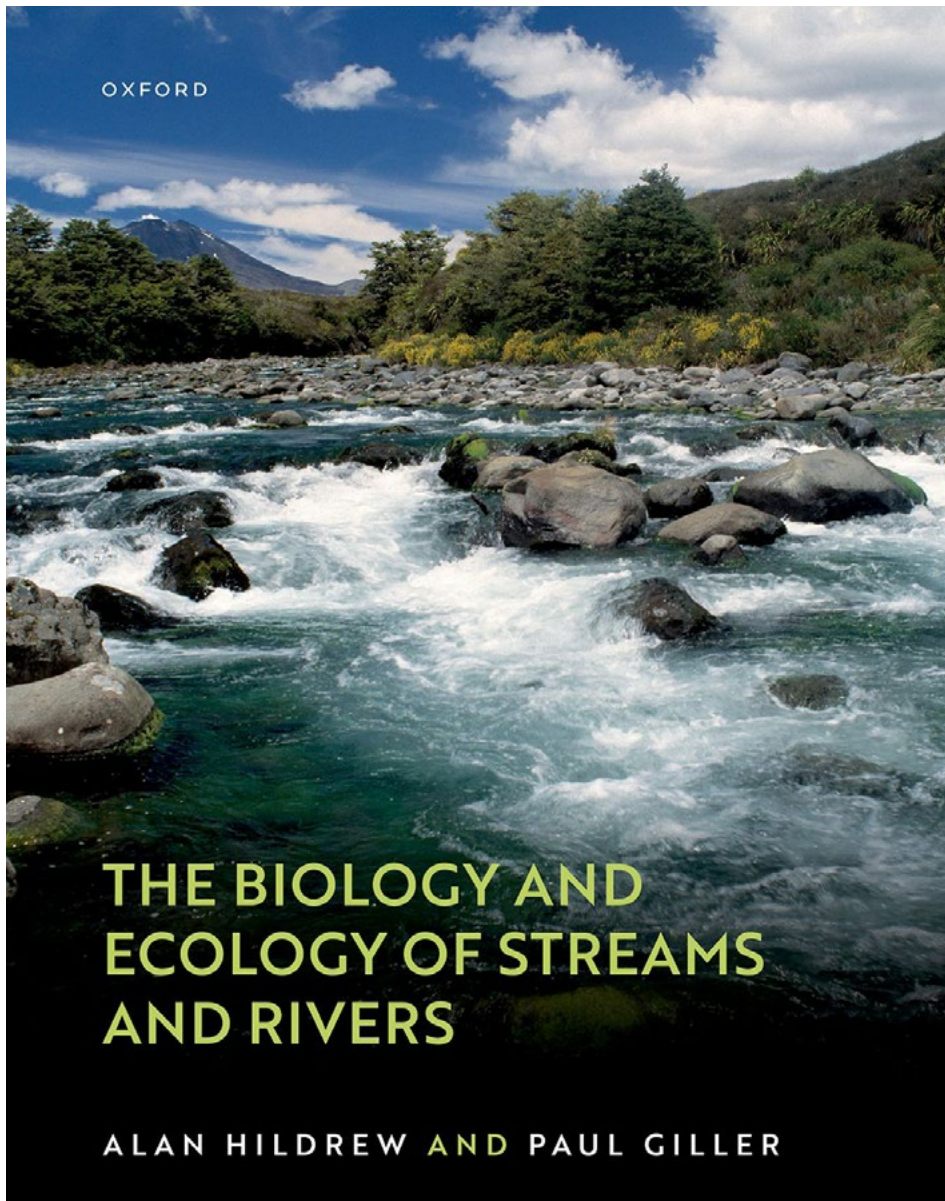
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South Cottonwood Creek, Montana USA. Photo by Samuel J Larkin



By Alan Hildrew & Paul Giller

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€49.99

Since the publication of *The Ecology of Running Waters* by H.B.N. Hynes in 1970 (Liverpool University Press, Liverpool, England), which arguably invented the field of contemporary stream and river ecology, flowing water ecosystems have been the focus of several excellent undergraduate- and graduate-level textbooks. Hildrew & Giller have contributed to these by producing a remarkably fresh and comprehensive overview of historical and modern developments in stream and river ecology.

This attractively bound book consists of 10 chapters, numerous high-resolution figures, and 15 “topic boxes” providing authoritative vignettes of selected aspects of flowing-water ecology. Chapters 1-3 (Rivers

as ecological systems, Habitat templet, River biota) provide a solid introduction to the physical habitat templet, the natural flow regime, and the organisms found in streams and rivers. Although these chapters are all generally very good, the treatment of fluvial geomorphology and hydraulics seemed perhaps too elementary, with key processes, such as the relationship between near-bed hydraulics and the return interval of storm flows with the maintenance of habitat structure and channel form not being effectively integrated. On the other hand, the comprehensive treatment of non-fish vertebrates (e.g., birds & mammals) was both excellent and welcome.

The book really begins to shine, however, with Chapter 4 (Matching the habitat templet) which focuses on organismal adaptations to flowing water. In particular, I found the discussion of body form and the use of silk to be fascinating. In Chapters 5-7 (Population ecology, Living communities in rivers and streams, Species interactions and food webs), Hildrew & Giller provide an excellent review of population and community ecology. Notable sub-sections include a comprehensive expose of the tension between downstream drift and

population persistence, migration and mobility, the dynamics of “open populations”, and disturbance. A focus on climate change and intermittent streams, here and elsewhere in the book (e.g., Chapter 10), was particularly welcome as was the realistic critique of the current state of “species-trait analysis”, once thought to be a panacea for problems associated with purely taxonomic approaches; throughout these chapters Hildrew & Giller illustrate both the strengths and weaknesses of trait analysis. Finally, the authors deftly point out in several places how the specialized jargon developed by some stream and river ecologists may actually impede understanding and effective communication. Chapters 8 and 9 are devoted to ecosystem ecology (Running waters as ecosystems: Metabolism, energy and carbon, Running waters as ecosystems: Nutrients). Here the authors provide authoritative and readable accounts of energy flow and nitrogen and phosphorous cycling in rivers and streams with a particular emphasis on downstream transport and terrestrial-aquatic linkages.

The book finishes with Chapter 10 which is focused on reciprocal interactions between humans with stream and river ecosystems, although this topic is also foreshadowed in many places throughout this forward-looking book. Here the authors provide timely and concise reviews of relevant topics, examples being “the invasional meltdown” (rampant replacement of native biota with alien and invasive species), biodiversity losses, effects of the interconnection of river basins, new and emerging contaminants, and the consequences of on-going climate change. Hildrew & Giller also provide guarded predictions about how stream and river ecosystems may be affected by climate change, bringing an element of urgency regarding the need for accelerating the development of solution-oriented knowledge while simultaneously fostering a widespread awareness of the scale of the effects of human activities on freshwater ecosystems worldwide. The statistics regarding the geographical scope of the effects of basin linkage, invasive species, and water abstraction, for example, will likely be truly astonishing to many readers of this book. It is not all doom and gloom, however, as the authors document a significant number of river ecosystems that have shown remarkable improvements in water quality and recovery of diversity through human intervention. Although I personally am most inspired by questions concerning basic biology and ecology, as provided in the previous nine chapters, I found Chapter 10 to be absolutely riveting and I believe that it will likely be the most important contribution of this textbook.

In summary, this is an excellent book that was a pleasure to read. Here and there the writing was enlivened by a delightful whimsy that itself hints at the high level of inspiration and excitement that so obviously drove Hildrew & Giller to their writing desks. *The Biology and Ecology of Streams and Rivers* should be considered an essential desk reference for all stream and river ecologists and should be required reading for all undergraduate and graduate classes that focus on freshwater ecology.

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Opinion

NoPFAS moms (and dads) meet inside the European Parliament in Bruxelles.

Lives Upended: Mothers No PFAS

Mamme No PFAS

Email: info@mammenopfas.org

PFAS (per- and polyfluoroalkyl substances) are the chemical compounds that half of Veneto (Northern Italy) found in their blood from drinking tap water at home and from consuming local food products.

PFAS are the perfect pollutant: a very large family of chemical substances (we are talking about over four thousand compounds) that are now found almost everywhere: dispersed in air, water and soil, in large or small quantities. Once ingested, they are deposited in our organs and tissues and remain there for years, we don't know how many. They have no color, they have no odor, and they have certainly made our lives easier thanks to their water-repellent properties. It's a shame that they simultaneously poison us and our environment for the rest of our lives, because they are practically indestructible.

We, contaminated by PFAS, are no different in any way from other people, except for the fact that we have a certain (variable) quantity of PFAS in our bodies, and for the fact that we are a population that is simultaneously sicker and more at risk of getting sick, compared to less exposed populations.

The story begins in 2006, with the European PERFORCE Project¹, coordinated by Stockholm University, to

monitor the presence of perfluorinated substances (PFAS) in the waters of the major European rivers, and in Italy the Po River appeared to have higher levels compared to other rivers in Europe (McLachlan *et al.*, 2007). In 2011, an agreement between the Italian Ministry of the Environment and Land and Water Protection (MATTM), the Water Research Institute (IRSA) and the Italian National Research Council (CNR) launched a study on the environmental risks from PFAS contamination in the Po basin and in other Italian river basins. In 2013 the Veneto Regional Agency for Environmental Protection (ARPAV) discovered that the main source of pollution was the chemical company Miteni S.p.A. of Trissino, in the province of Vicenza, but this information was not disclosed to the public. Between 2015 and 2016, the Veneto Region launched its first biomonitoring campaign to verify the presence of PFAS in blood, sampling just over 500 people. Letters inviting people to volunteer blood samples were sent out, and citizens begin to be concerned. Given the worrying results of the first sample collection, shortly thereafter a Health Surveillance Plan (Pitter *et al.*, 2020) was conducted on the entire population exposed to contamination in a vast area of three Venetian provinces, Vicenza, Verona and Padua, and which at the time involved approximately 350,000 people.

In 2017, following the results of the first blood tests² carried out on their children, some mothers began to look for information: they wanted to understand what was happening and, not finding sufficient answers and information from the relevant bodies, they became increasingly worried and began to form small action groups, initially in Montagnana (PD) and Lonigo (VI), with the aim of understanding the problem, understanding why information was not conveyed correctly to citizens, and above all to take action to have clean water in schools, and then in hospitals and homes.

Our lives changed suddenly and radically: we started studying the "PFAS topic", we collected documentation, we organized information evenings, we literally knocked on every door to expose the problem. We also changed our habits: now we use bottled water for drinking and cooking, even for making coffee; we stopped buying local food products and looked for products that came from supposedly uncontaminated areas; shopping became complicated, our children learned to bring water to school in a bottle, and we mothers have to scrutinize every slightest sign of discomfort that could indicate the presence or onset of a related disease.

The network of people mobilizing spread like wildfire, and because they are mostly women, hence the name Mamme No PFAS.

Word of mouth and the creation of small thematic working groups, always connected to each other, have led us to become a very numerous, spontaneous, environmental movement, joining other associations that deal with health and the environment, a network from Greenpeace to Legambiente, but also ISDE and CILSA, Medicina Democratica, PfasLand, and others.

We coordinate with each other mainly using WhatsApp and Telegram channels, and different groups follow various aspects of the problem: food contamination, criminal trials, proposed law on limits, studies and research that are published, remediation of the Miteni site (a company now bankrupt), meetings with ministers, contacts with journalists, photographic projects, website, Facebook page, and anything else needed to advance the cause.

Over the years we have achieved important results, including the closure of the Miteni company, the start of a criminal trial, the widening of the age limits of people included in the Health Surveillance Plan. Most importantly, we have spearheaded the construction (still underway) of new aqueducts to provide clean

¹ <https://cordis.europa.eu/project/id/508967>

² At the moment it is possible to carry out PFAS blood tests only if you are or were a resident in the red zone, and it is the Veneto Region that makes the call, via letter to interested parties. There is no medical prescription code for PFAS tests. Recently the possibility of analysis has also been extended to residents of the orange zone, but only on a voluntary basis and under a health cost sharing regime.

water to homes in the contaminated area, while activated carbon filters have been installed on the water intakes of the most contaminated municipalities (defined as the red zone). However, filters must be periodically replaced, with citizens bearing the burden of cost through their water bill. Contaminated filters are sent to Chemviron at Legnago for recycling or reactivation, but some doubts persist that PFAS are being dispersed into the atmosphere. Another ongoing problem, still with no solution, is the fate of private wells that are often used for irrigation.

We have become the subject of documentaries,

universities to conduct new scientific studies that aim to demonstrate the effects of PFAS on physical and psychological health. Furthermore, we participate in Citizen Science research projects. Currently, we are contributing to a study on male reproductive health promoted by the Association of Doctors for the Environment (I.S.D.E.) of Vicenza; to a study on foods conducted by prof. Annibale Biggeri, and another study by the University of Padua is about to start.

We are not alone! We founded the *Moms from North to South* movement, which now includes 46 Italian women's associations. Additionally, we are in contact

many other associations. Further information [here](#).

On December 13, Marcos A. Orellana, United Nations Special Rapporteur on the human rights implications of the environmentally sound management and disposal of hazardous substances and waste, held a press conference in Rome to conclude his visit to Italy and stated:

«I am seriously concerned about the extent of PFAS pollution – declared Orellana – The human dimension of the problem was illustrated to us by one of the mothers met during the visit: “Imagine what it means for a mother to realize that she has poisoned her children through breast milk?”.

and:

«For several decades the Miteni chemical company had been producing PFAS in Trissino (Vicenza) and releasing its waste without control, polluting surface and underground waters and the food chain, affecting the areas of Verona, Vicenza and Padua. While company officials appeared to be aware of the waste discharges and resulting pollution, they did not offer adequate protective measures to its workers, nor did they disclose information about the severity of the PFAS pollution.»³

After the visit of the UN commissioner, we prepared a series of observations for the Italian Senate Environment Committee. In addition to substantiating the request for zero limits, we presented numerous observations regarding transparency on the substances used by companies, the need to introduce obligations on producers and users (including the obligation to provide analytical standards to be able to identify the substances produced and used), to fill gaps in environmental authorizations and to protect people's health, starting from the most vulnerable categories such as minors.

«We ask the Government and Parliament to have the courage to adopt zero limits for the presence of all PFAS, not only in water intended for human consumption, but also in industrial waste: this is the only value that allows us to guarantee the right to live in a clean and uncontaminated environment. Italy, the scene of the largest contamination in Europe, which affected three provinces of the Veneto region, needs an urgent moratorium on PFAS, which not only eliminates their presence in waste water, but also introduces a production ban and use in all industrial sectors. Our country has the opportunity to make history and, with a truly ambitious measure, put the rights of all people before the profit of a few. The time has come to act urgently and without depreciating compromises.»

In the meantime, the trial continues against Miteni, or rather, against 15 individuals, including managers of the multinationals **Mitsubishi Corporation** and **International Chemical Investors Group** (I.C.I.G.) and the former manager of the Miteni company in Trissino. The alleged crimes range from poisoning of water intended for public consumption, to malicious disaster, to environmental pollution, to fraudulent bankruptcy. The two previous indictments were brought together in a single proceeding for crimes up to 2013 and for those from 2013 to 2018 and has resulted in a combined trial.

The hearings have so far followed one another at a rapid pace, with illustrious testimonies such as those of the American lawyer Robert Bilott, who alone faced



NoPFAS moms meet outside the European Parliament in Bruxelles

theatrical performances, conferences, degree theses and books. We have achieved these results through constant and peaceful dialogue with all institutions, at all levels, and through grassroots actions to raise public awareness on this issue. We met the heads of public and administrative offices, including ArpaV (Regional Environmental Protection Agency), Provincial, Regional and Local Health Authorities; the Ministry of the Environment, heads of the ASL, Coldiretti, Confagricoltura (farmers' unions and lobbies), up to the European Parliament and Pope Francis. We also have frequent contacts with the EEB, the European Environment Bureau based in Brussels.

These meetings serve to take stock of the situation and understand what actions are being implemented to mitigate contamination. During these discussions we present our point of view, our perception of the situation and our requests. We always leave written documentation.

But we don't limit ourselves to words. We have organized several mass demonstrations: the first on 8 October 2017 in Lonigo, saw the participation of 11,000 people. We protested in front of the Region and the Miteni plant, and we held a protest lasting five days and four nights, in front of the Vicenza Prosecutor's Office, with tents and gazebos, and with our families, including children.

We collaborate with research institutes and

with anti-PFAS groups in North Carolina (USA), France and Belgium. This solidarity network strengthens our voice and our determination to obtain laws that ban the production and use of PFAS.

In 2019, 150 of us became civil parties in the criminal trial to define responsibility for PFAS pollution in Veneto. Thanks to fundraising, we have funded important consultancies that will help demonstrate the damage caused by the accused.

For our activities and to disseminate information on PFAS we mainly use social media, Facebook, WhatsApp and Instagram. We organize thematic evenings and hold talks in schools to educate young people on this issue.

We are fighting for a future where clean water is a right for everyone, not just for women, or our families, but for every person who lives on this earth.

In December 2021 we received a visit from a UN commissioner for the violation of human rights, who contacted us because we sent a letter, written jointly by Mamma No PFAS Michela Piccoli, by Giuseppe Unghereso of Greenpeace, and by Alberto Peruffo of PfasLand, exposing our case of contamination. We accompanied him to the symbolic places of the Red Area of Veneto contaminated by PFAS, and he then spent an entire afternoon with us collecting the numerous testimonies of the No PFAS Mothers and

³ The statement can be found [here](#).



NoPFAS moms meet lawyer Robert Bilott

and won the case against the American company DuPont (responsible for a contamination similar to ours, albeit on a more modest scale, which occurred in the American state of Virginia, and depicted in the film **Bad Waters**); of Dr. Fletcher, Boston pathologist; and finally of Professor Philippe Grandjean, one of the world's leading experts on diseases related to PFAS substances.

Confident that we will obtain justice for our children and future generations, we will continue to organize events and actions against a culture that puts profit first at the expense of our health.

To follow us:

[Website](#) or [Facebook](#)

Suggested readings

Kurwadkar S, Dane J, Kanel SR, Nadagouda MN, Cawdrey RW, Ambade B, Struckhoff GC, Wilkin R. 2022. Per- and polyfluoroalkyl substances in water and wastewater: A critical review of their global occurrence and distribution. *Science of The Total Environment* 809:151003.

Podder A, Anwar Sadmani A.H.M., Reinhart D, Chang N-B, Goel R. 2021. Per and poly-fluoroalkyl substances (PFAS) as a contaminant of emerging concern in surface water: A transboundary review of their occurrences and toxicity effects. *Journal of Hazardous Materials* 419: 126361.

Wee SY, Aris AZ. 2023. Revisiting the “forever chemicals”, PFOA and PFOS exposure in drinking water. *npj Clean Water* 6: 57.

Suggested internet sites

<https://chemtrust.org/news/pfas-pollution-scandals/>

<https://cordis.europa.eu/project/id/508967>

<https://foreverpollution.eu/>

<https://www.eea.europa.eu/publications/emerging-chemical-risks-in-europe>

<https://www.epa.gov/pfas/pfas-explained>

<https://www.epa.gov/pfas/pfas-strategic-roadmap-epas-commitments-action-2021-2024>

<https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/aboutpfass/>

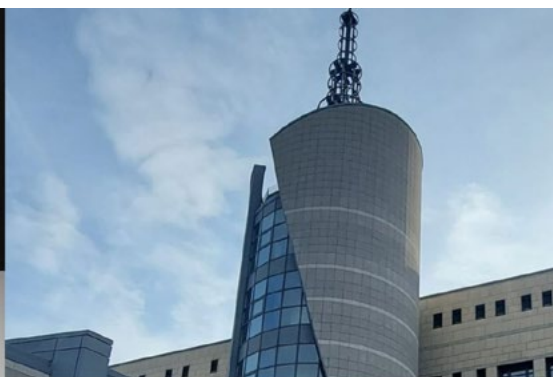
<https://perforce3-itn.eu/>

References

McLachlan MS, Holmström KE, Reth M, Berger U. 2007. Riverine discharge of perfluorinated carboxylates from the European continent. *Environmental Science & Technology* 41: 7260-7265. DOI: 10.1021/es071471p

Pitter G. et al. 2020. Serum levels of perfluoroalkyl substances (PFAS) in adolescents and young adults exposed to contaminated drinking water in the Veneto Region, Italy: A cross-sectional study based on a health surveillance program. *Environmental Health Perspectives* 128: 027007. DOI10.1289/EHP5337

<https://www.doi.org/10.5281/zenodo.11368398>



Il Giornale di Vicenza Martedì 28 novembre 2023

Processo

L'esperto danese in aula
«Pfas, pericolo per il futuro»

Key witness, Prof. Philippe Grandjean, testifies in Mitten trial.



LIMNOLOGY AROUND THE WORLD: CANADA

Thermokarst lakes of the western Canadian Arctic

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Photo by Joshua Thienpont

Fig. 1 Lake- and pond-rich landscape of the Tuktoyaktuk Coastal Plains, western Canadian Arctic.

The greatest number of lakes and ponds on Earth are found in high-latitude regions of the northern hemisphere (Verpoorter *et al.*, 2014). Numerical assessments do not demonstrate the amazing diversity in form and function of Arctic waterbodies (Fig. 1). As would be expected for such a broad geographic extent, considerable diversity exists in the origins and ecosystem function of lakes across the circumpolar north. Understanding this diversity is essential both as we work to better characterize the aquatic

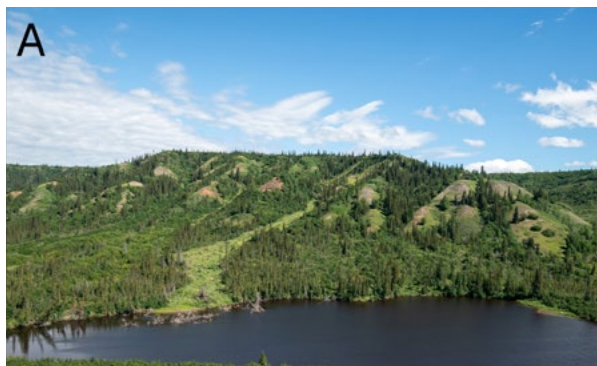
ecosystems on our planet and consider how they have been and continue to be affected by environmental changes.

A critical factor influencing both the prevalence of lakes and ponds in northern landscapes, as well as the way in which they manifest and function, is the presence, extent, and nature of permafrost. Defined as ground that remains frozen for two or more consecutive years, the make-up of permafrost and where it occurs is incredibly important for local and regional limnology. The proportion of the ground underlain by permafrost is used to delineate small-scale zones of permafrost extent. While the exact terminology and proportion can vary slightly by schema, most classify spatial coverage >90% as the continuous permafrost zone, the extensive discontinuous zone as 50-90% coverage, the isolated discontinuous zone as 10-50%, and sporadic coverage as <10% (Heginbottom *et al.*, 1995). Globally, lake area is decreasing in permafrost regions, though with regional heterogeneity (Nitze *et al.*, 2018). However, permafrost extent is not the only factor that contributes to the impact on lake ecosystems. In many ways the make-up of the permafrost, particularly the amount of ice present, plays the dominant role. In areas of ice-rich permafrost the melting of excess ice can lead to a range of geomorphic disturbances and changes associated with ground subsidence, collectively referred to as thermokarst processes.

Thermokarst processes and lake and pond ecosystems are closely tied to one another. In areas of low relief, permafrost thaw leads to the formation of thermokarst lakes and ponds (Bouchard *et al.*, 2016). These aquatic ecosystems play an important role in the limnological and biogeochemical context of Arctic and subarctic environments (Olefeldt *et al.*, 2016). When thermokarst occurs in sloped terrain with higher relief, it can result in mass movement (*i.e.*, landslide) events and features, many of which occur around and on the shorelines of northern lakes, rivers, and coastal locations (Fig. 2). Arguably the most spectacular, and best studied of these thermokarst mass wasting features are shoreline retrogressive thaw slumps (Fig. 2B).

The western Canadian Arctic is a water-rich landscape that includes the low-lying Mackenzie Delta and surrounding upland terrain. This includes the Tuktoyaktuk Coastal Plains to the east, and west into the foothills of the Richardson Mountains. Banks Island, located further north in the Arctic Ocean, is also lake rich. The landscape east of the Richardson Mountains was glaciated during the last glacial period, and deglaciated relatively early compared to other northern regions in Canada. West of the Richardson Mountains, including the Old Crow Flats in the northern Yukon Territory, remained unglaciated. Given this history of glaciation and the resulting terrain, the permafrost across much of the western Canadian Arctic is rich in ground ice, and thus thermokarst features are very common.

Retrogressive thaw slumps are common disturbances on lake shorelines in ice-rich morainal terrain of the western Canadian Arctic (Kokelj *et al.*, 2023). The impacts of retrogressive thaw slumps on downstream lakes in the Tuktoyaktuk Coastal Plains has been well studied from both a contemporary limnology perspective, and over longer timescales using paleolimnological



Photos by Joshua Thienpont

Fig. 2 Hillslope thermokarst features impacting lakes in the western Canadian Arctic. A – translational slides in the Caribou Hills impacting a low-lying lake, B – a large (~220 m across) retrogressive thaw slump (*i.e.*, rotational slide) on the shore of a lake in the Tuktoyaktuk Coastal Plains.

methods. This work was initiated by my good friend and colleague Dr. Steve Kokelj (Northwest Territories Geological Survey) in the early 2000s. He established a series of paired lakes in the Mackenzie Delta uplands region, with the presence of a retrogressive thaw slump as the main distinguishing feature between paired lakes. From this dataset, lakes with thaw slump activity on their shorelines have been shown to have higher specific conductivity (and major ion concentrations), lower dissolved organic carbon and colour, and higher pH (Kokelj *et al.*, 2005) (Fig. 3). Further studies have shown that lakes with thaw slumps have lower total phosphorus and total dissolved nitrogen (Thompson *et al.*, 2012). Lakes with thaw slumps have



Fig. 3 Water samples from two nearby, paired lakes showing differences in water colour / DOC with thaw slump presence. The lake with no slump (7A) is highly stained, while the lake with a slump (7B) is relatively clear.

higher abundances of aquatic macrophytes because of increased water clarity (Mesquita *et al.*, 2010), corresponding to higher macroinvertebrate abundances (Moquin *et al.*, 2014) compared to lakes lacking thaw slumps. Using paleolimnological techniques, my past work has shown that sedimentary diatom assemblages in lakes with thaw slumps exhibited an increase in periphytic diatom diversity associated with slump activity, likely associated with greater habitat availability in a lake environment with increased

light availability and habitat substrate on macrophytes (Thienpont *et al.*, 2013). However, despite the consistent trends when comparing lakes with and without slumps, the degree of change across lakes at the onset of thaw slump initiation is quite wide. Much of my recent work has been focused on understanding the wide range of factors that influence how different lakes respond to slumping over broad spatial and temporal timescales.

One of the important, interesting, but also confounding factors associated with studying thaw slumps and their impacts on limnology is the role that the age and activity level of the slump itself plays. Retrogressive thaw slumps are “polycyclic”, alternating through phases of active slumping and stability over time. When a new slump forms on the shoreline of a lake, it persists as an actively growing slump for some time (years to decades) but eventually sediments and soils cover exposed ground ice, decreasing melt rates, and ultimately decreasing the slump’s ground ice ablation and overall thaw activity. This permits regrowth of vegetation, and the slump enters a period of stability. Lakes across the landscape exist in a range of states of lake stability, from highly active to stable for many decades (Fig. 4). On many lakes, slumps will re-activate and enter a renewed phase of growth, continuing cycles of polycyclic slumping that can occur an unknown number of times over long timescales. We have seen from the paired-lake comparisons mentioned above that it appears subsequent, polycyclic slumping events result in more muted limnological changes; in most lakes, the most significant changes occur when a new slump occurs. However, in some cases the renewed slumping is highly active and results in significant limnological change (Fig. 5). The western Canadian Arctic landscape contains a mosaic of aquatic ecosystems impacted by thaw slump disturbances of varying ages, sizes, and activity levels. The historical impacts of these factors contribute to the limnological conditions in the impacted lake ecosystems and have important implications for future change as warming continues to intensify.

Our current research is focused on the role landscape history plays on thaw slump activity and the repercussions for limnology. We are interested in understanding whether lakes with a prior history of thaw slump impacts may be insulated from future changes when slumps re-activate. In this way, we are working to discover how and to what extent past slumping results in an ecological memory of previous disturbance in lake ecosystems, muting further impacts when slumps re-activate. We have also identified several cases where re-activated slumps appear to be

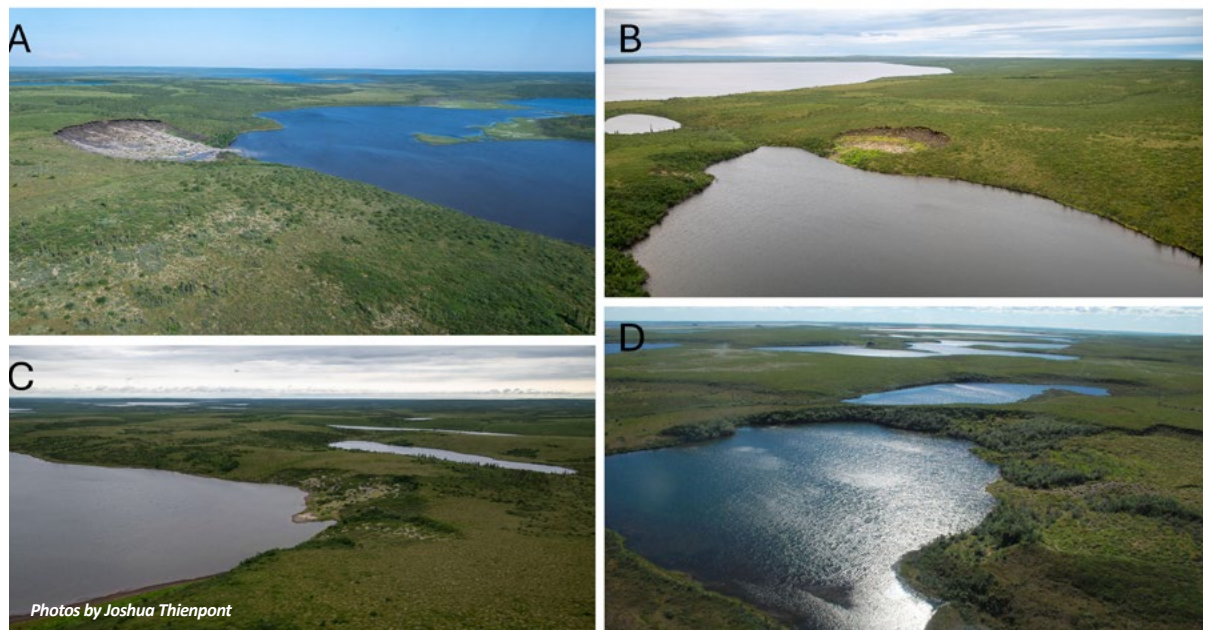


Fig. 4 Lakes in the Tuktoyaktuk Coastal Plains impacted by thaw slumps of varying ages and activity levels. A, B - highly active thaw slumps compared to C, D - slumps that are re-vegetated and stabilized.

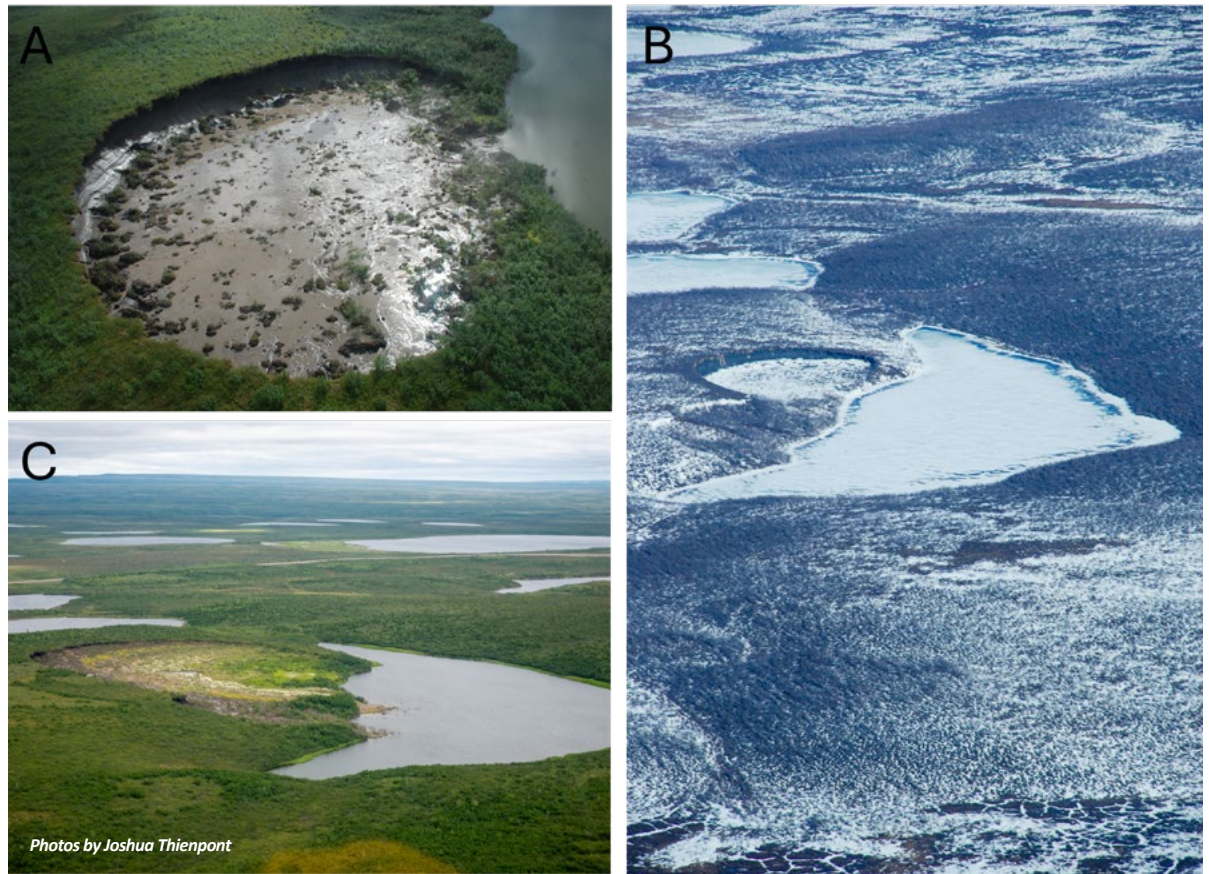


Fig. 5 Change of a thaw slump over time on the shoreline of a single lake. This lake had a previous slump on its shoreline, but this highly active slump that re-initiated in the early 2000s dramatically changed the lake ecosystem. A - highly active thaw slump in 2008, B - the same thaw slump in the winter of 2010, and C - the same slump exhibiting significant growth and vegetation development in the summer of 2023, likely beginning to enter a period of stability.

resulting in highly enhanced impacts in several lakes (Fig. 5). It is important to understand what is driving this intensification, and if these enhanced, re-activated slumps are more likely to occur as the region rapidly warms. Ultimately, we are interested in how lakes are going to change in the future, and whether an understanding of landscape legacies can help us predict future limnological changes across the western Arctic.

References:

- Bouchard F, MacDonald LA, Turner KW, Thienpont JR, Medeiros AS, Biskaborn BK, Korosi J, Hall RI, Pienitz R, Wolfe BB. 2016. Paleolimnology of thermokarst lakes: a window into permafrost landscape evolution. *Arctic Science* 3: 91-117.
- Heginbottom JA, Dubreuil M-A, Harker PA. 1995. Canada – Permafrost. Ottawa, Canada: Natural Resources Canada, National Atlas of Canada, 5th edition, Plate 2.1 (MCR No. 4177; scale 1:7 500 000).
- Kokelj SV, Jenkins RE, Milburn D, Burn CR, Snow N. 2005. The influence of thermokarst disturbance on the water quality of small upland lakes, Mackenzie Delta region, Northwest Territories, Canada. *Permafrost and Periglacial Processes* 16: 343-353.
- Kokelj SV, Gingras-Hill T, Daly SV, Morse PD, Wolfe SA, Rudy AC, van der Sluijs J, Weiss N, Brendan O'Neill H, Baltzer JL, Lantz TC. 2023. The Northwest Territories thermokarst mapping collective: a northern-driven mapping collaborative toward understanding the effects of permafrost thaw. *Arctic Science* 9: 886-918.
- Mesquita PS, Wrona FJ, Prowse TD. 2010. Effects of retrogressive permafrost thaw slumping on sediment chemistry and submerged macrophytes in Arctic tundra lakes. *Freshwater Biology* 55: 2347-2358.

Moquin PA, Mesquita PS, Wrona FJ, Prowse TD. 2014. Responses of benthic invertebrate communities to shoreline retrogressive thaw slumps in Arctic upland lakes. *Freshwater Science* 33: 1108-1118.

Nitze I, Grosse G, Jones BM, Romanovsky VE, Boike J. 2018. Remote sensing quantifies widespread abundance of permafrost region disturbances across the Arctic and Subarctic. *Nature Communications* 9: 5423.

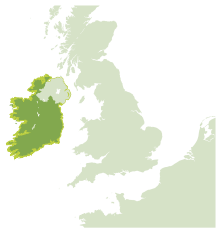
Olefeldt D, Goswami S, Grosse G, Hayes D, Hugelius G, Kuhry P, McGuire AD, Romanovsky VE, Sannel ABK, Schuur EAG, Turetsky MR. 2016. Circumpolar distribution and carbon storage of thermokarst landscapes. *Nature Communications* 7:13043.

Thienpont JR, Rühland KM, Pisaric MF, Kokelj SV, Kimpe LE, Blais JM, Smol JP. 2013. Biological responses to permafrost thaw slumping in Canadian Arctic lakes. *Freshwater Biology* 58: 337-353.

Thompson MS, Wrona FJ, Prowse TD. 2012. Shifts in plankton, nutrient and light relationships in small tundra lakes caused by localized permafrost thaw. *Arctic* 65: 367-376.

Verpoorter C, Kutser T, Seekell DA, Tranvik LJ. 2014. A global inventory of lakes based on high-resolution satellite imagery. *Geophysical Research Letters* 41: 6396-6402.

<https://www.doi.org/10.5281/zenodo.11368196>



LIMNOLOGY AROUND THE WORLD: IRELAND

Engagement of Citizen Science in Freshwater Data Collection

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In recent decades, although not a new concept, interest in the potential benefits of citizen science has grown rapidly in many fields and particularly in relation to freshwaters. So, do we as freshwater scientists and managers see a useful role for citizen science and how can we maximise the benefits for both scientists and the volunteers? In a paper published in 2023 the authors reviewed the experience gained from a selection of freshwater citizen science projects across Europe, particularly long-running projects, to identify key challenges and the supports required to sustain citizen engagement (Kelly-Quinn *et al.*, 2023). Their focus was on small water bodies as they saw significant data gaps that could be filled by well trained and supported citizen science projects. However, they noted that the framework proposed for operationalising citizen science in small water bodies was relevant to citizen science projects more generally. In this short piece I highlight some of the main take-home messages from the paper that may be particularly useful for new projects.



Citizen science has the potential to fill data gaps relating to small water bodies, in particular headwater streams.
Photo by Mary Kelly-Quinn

The proposed framework has five key attributes or steps that should be considered when developing citizen science projects. They are Project Establishment, Training of Volunteers, Data Acquisition and Interpretation/Reporting. Last but not least is Communication which is often an underestimated element of successful citizen science projects. Each has several associated tasks. However, a key starting point is to give thought to the purpose of a proposed citizen science project. It is generally agreed that the core focus should be data collection that addresses genuine scientific objectives. An added co-benefit, without doubt, is the potential of the project to increase societal awareness of the value of clean, healthy freshwaters and how human activities are degrading them together with the ecosystem services we depend on from those resources.

Key Take-home Messages

Effective co-ordination is required for sustained citizen science engagement.

This is particularly important for projects that envisage long-term or wide spatial collection of data and is key to sustained volunteer effort. The experience of long-running projects, such as those covered in the aforementioned paper, highlights the need for a defined organisation at national or regional level taking responsibility for overall coordination. Such a body would have oversight of the project's objectives and develop a strategy to enable a network of regional or local hubs, as well as addressing issues relating to site access, health and safety, data management and insurance.

Volunteers need to see that their efforts have a value. Therefore, project objectives should be well defined, and the data or information gaps being filled and use of the data needs to be communicated to potential volunteers. This, together with resources related to data storage training, systems for reporting and display of citizen science data as well as data validation procedures are key project establishment tasks.

Different levels of volunteer contribution can facilitate wider participation. Not all volunteers are available to make equal commitment to a project. It is, therefore, important to consider whether a project can accommodate variable inputs thus enabling wider participation. The authors note as an example the [Dragonfly Ireland project 2020-2024](#) that offered volunteers three levels of participation; *Spotters* who submit casual records; *Recorders* conduct timed surveys while *Monitors* conduct repeated surveys.



Male Beautiful Demoiselle damselfly (Calopteryx virgo).
Photo by Jan-Robert Baars.

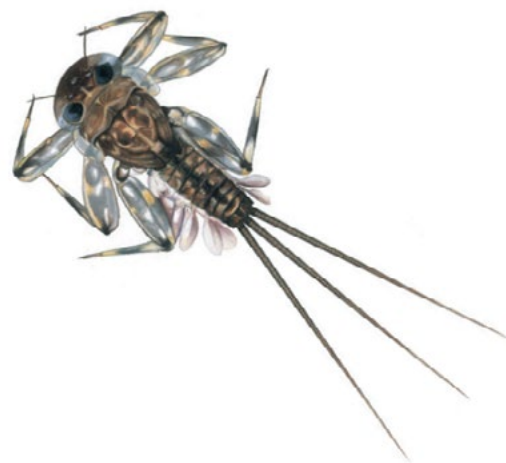
Good training underpins data quality. Data collection for water quality or biodiversity monitoring schemes should be appropriate to the varying level of expertise of the volunteers and ideally provide for progression as interest, knowledge and skills develop. Some examples include the Citizen Science Stream Index (CSSI) and the Small Stream Impact Score (SSIS) in Ireland. CSSI is based on just six macroinvertebrate indicators at a high level of identification compared to the family level identification required by the SSIS. The Anglers' Riverfly Monitoring Initiative (ARMI) in the UK also offers various 'Riverfly Plus' packages with extended list of taxa

that provide a progression pathway for volunteers to broaden their identification skills as well as providing more in-depth information on the river sites.

Training therefore needs to be adjusted to the level of expertise required for the different schemes with bespoke training materials. Some of the training material could introduce children to life in our rivers and lakes and the concept of water pollution. It is, however, important to be cognisant of the amount of time required for training volunteers. This will clearly vary with the type of data collection. Training for field water chemistry testing or collection of samples for analysis by others is generally quite quick, but identification of, for example macroinvertebrate indicators takes many training sessions and refresher sessions before volunteers gain sufficient confidence. The challenge here is to enable sustained training effort for long-term projects and those that require high spatial coverage. A Training-of-Trainers approach whereby trained volunteers become trainers is a capacity building approach that is worth considering but requires considerable planning and effort by the project leaders.

Communication is a critical element of successful citizen science projects.

A communication strategy should ideally be co-developed with volunteers but also with the wider public. Communication between coordinators and volunteers, and between volunteers needs to be facilitated and where relevant this could be extended to groups or hubs in other parts of the country. This may help reduce attrition among volunteers. We should remember that volunteers need to see the fruits of their efforts and feedback of results is a key communication task. In terms of the wider public the project needs to be visible. This could be achieved through a website presence, regular blogs and social media. The challenge is to extend the awareness beyond the volunteers and others who are already environmentally conscious individuals. As noted by Kelly-Quinn *et al.* (2023) communication of the project goals and results to local stakeholders and the general public helps spark interest, and at the very least creates awareness and could promote wider volunteer engagement.



Heptageniid mayfly nymph, a key indicator taxon in citizen science indices. Illustration by Aoife Quinn

Is there a role for citizen science in freshwater quality and biodiversity monitoring? It is a definite yes from me, but the effort and resources required should not be underestimated.

Reference

Kelly-Quinn M, Biggs JN, Brooks S, Fortuno P, Hegarty S, Jones JI, Regan F. 2023. Opportunities, approaches and challenges to the engagement of citizens in filling small water body data gaps. *Hydrobiologia* 850: 3419-3439.

<https://www.doi.org/10.5281/zenodo.11368269>



Eanna Reilly completes the field sheet of the CSSI scheme having identified the indicators in the stream samples with his brother Brendan.

Photos by Colette Dunlea

FACES of SIL



Fengzhi He

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FENGZHI HE | CHINA

My research seeks to understand patterns and drivers of freshwater biodiversity at different spatial scales. I was trained as a freshwater ecologist, investigating diversity patterns and community assembly processes of stream macroinvertebrates in the Hengduan Mountains, Southwest China. Later, I moved to Europe and began focusing on freshwater megafauna (*i.e.*, freshwater animals with a maximum reported body mass ≥ 30 kg, including river dolphins, beavers, hippos, sturgeons, salmonids, catfishes, crocodylians, turtles, and giant salamanders). I am particularly interested in the ecological impacts of these large animals and their responses to environmental change. My research also includes strong foci on interactions and cultural links between people and freshwater biodiversity, as well as the potential of megafauna for improving freshwater conservation and ecosystem restoration. Before joining the Northeast Institute of Geography and Agroecology at the Chinese Academy of Sciences as a professor, I moved around in Europe during my PhD and postdoc programs. I enjoy collaborating with researchers from diverse scientific and cultural backgrounds.

SIL provides an excellent network to connect limnologists from different regions and offers many opportunities for early-career researchers. In 2021, I joined the Associate Editor Mentoring Program of *Inland Waters* and received great support from my mentor Prof. Martin Kainz and the Editor-in-Chief Prof. David Hamilton. I have learned a lot from interacting with authors and reviewers. I am happy that I can stay in the editorial team after graduating from the Mentoring Program, allowing me to continue contributing to the society.

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SETH MENSAH ABOBI | GHANA

I am an early-career scientist whose research has always focused on lakes and reservoirs in the northern parts of Ghana. As Senior Lecturer with about 15 years of working experience, I teach undergraduate and graduate students and supervise research on fisheries assessment and management, ecosystem modelling, social-ecological systems, watershed management, food and nutritional security, and climate change adaptation in fisheries. I have collaborated on research projects with local and international partners mainly from Germany, Norway, Denmark, Nigeria, Burkina Faso, and Kenya.

My research primarily focuses on trophic dynamics and fisheries productivity in lakes and reservoirs. I investigate differences in food web structure and fisheries productivity related to age, morphometry, and hydrochemistry of lakes and reservoirs and then simulate sustainable fishing regimes. I also study the social-ecological resilience of reservoir systems, as most reservoirs in Ghana and other developing countries have multiple users with different challenges and needs for their sustainable management.

I lead the African Inland Fisheries Network (AFRIFNET). The goal of this network is to empower scientists and resource managers to engage in activities that strengthen the institutional capacity of their countries to deliver quality training, improve information, communication, and governance relating to inland aquatic ecosystems, and improve biological production, thus enabling science-based management of inland fisheries. It is my desire to be part of national and regional groups that work towards the development of partnerships for sustainable conservation and management of inland waters and their resources. I believe that by being part of SIL, I will be able to contribute to building a strong community that addresses the challenges confronting freshwater ecosystems.

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FACES of SIL



Dilvin Yıldız

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DILVIN YILDIZ | TÜRKİYE

As an early-career aquatic ecologist and PhD candidate at Middle East Technical University (METU) in Türkiye, my research focuses on understanding how freshwater food webs respond to stressors induced by climate change. Throughout my PhD journey, I had the privilege to join three mesocosm experiments in Türkiye (METU) and one in Germany (IGB) as part of the Aquacosm EU Project. These experiments aimed to investigate the effects of climate change-induced stressors, such as temperature increase, on various trophic levels from bacteria to fish. Within my research, I specifically examined zooplankton community structure and their interactions with other trophic levels.

The urgency of climate change motivated me to delve into the reactions of vital inland water ecosystems to global challenges. My scientific curiosity and goals lie in understanding how these stress factors influence freshwater ecosystem stability, functionality, and linking them to innovative water management solutions.

In our world, collaboration among scientists investigating similar issues under different environmental conditions is important. I believe SIL plays a pivotal role in establishing a network among limnologists worldwide. This network enriches our collective understanding and improves innovative solutions to global challenges by bringing together diverse early-career and senior scientists.

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OLENA BILOUS | UKRAINE

Hello SIL members! My research focuses on algal biodiversity, nomenclature, taxonomy, ecology, and geographical distribution. Risk assessments of surface water bodies due to phytoplankton and phytobenthos biodiversity also forms the core of my studies. Qualitative assessment is an additional tool for understanding the influence of climate change and anthropogenic contamination. The assessment of aquatic ecosystems and water quality is made based on quantitative and qualitative characteristics of algae. A response of algae to the effects of eutrophication, pH, temperature, salinity, presence of organic pollutants, etc., provides possibilities to assess water bodies.

The key question of my research is the understanding of species distribution patterns and species assembly processes related to environmental niches and dispersal abilities and the drivers that could explain their ecological preferences. My recent research interests are metacommunity dynamics and meta-ecosystems in river networks. In our current project, my colleagues and I aim to integrate the analysis of the spatiotemporal dynamics of algae in response to flood pulsing along an environmental and connectivity gradient in dynamic riverine landscapes (Danube River). We have already noticed the effects of connectivity and morphology of floodplain waters on metacommunity patterns of phytoplankton and phytobenthos composition, structure, and spatial scale distribution. The methods that help me investigate algae are based on light microscopy techniques; however, I am also quite familiar with new approaches to identifying algae at the molecular level. I will try my best to develop the SIL Ukraine cluster and involve scientists from my home country in the activities of the society.

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Obituary



Jacob Kalff
1935-2024

Jacob (Jaap) Kalff died on 22 April 2024, he was 88. Jaap was born and grew up in the Netherlands. Attracted by open spaces and wilderness, he moved to Canada at the age of 18 to attend the Ontario Agriculture College (now the University of Guelph) in the hopes of becoming a wildlife biologist. It is there that he met his future wife, Evelyn Rivaz, the love of his life and partner for 65 years.

After completing his master's degree, they moved to Indiana where he pursued a PhD under David Frey, thereby continuing the limnological lineage of the Birge and Juday Wisconsin school. His thesis explored primary production in small arctic tundra ponds. Shortly after completing his dissertation, he was hired by McGill's Biology department in Montreal where, as a young faculty member, he participated in the Char Lake Project, a study of energy flow in a high arctic lake and a Canadian contribution to the International Biological Programme (IBP). There, he compared the relative importance of phytoplankton and benthic productivity in lakes of varying nutrient content. His emphasis on the quantification of ecosystem-level processes remained a trademark of his scientific approach.

At first the only aquatic ecologist of the department, Jaap then began establishing the nucleus of McGill's limnology group with other hirings such as Bill Leggett, Rob Peters and Frank Rigler, also joined later by Joe Rasmussen. Together, they formed a most formidable group of aquatic scientists and initiated the Lake Memphremagog Project, a collaborative research effort aiming at integrating all the major components of lake ecosystem functioning including their interactions. During that period, Jaap's scientific interests also broadened considerably, simultaneously conducting research on algal dynamics, bacterial nutrition and metabolism, macrophyte ecology, periphyton, zooplankton, zoobenthos, nutrient loading and cycling, sediment processes and transport, just to name a few. Accordingly, the scope of the >150 publications he authored and co-authored over his career are equally broad. Regardless of the specific topic however, Jaap was always interested in the "big picture", willingly sacrificing details of minutiae in favor of proposing generally applicable ideas or identifying broad and repeatable patterns, another hallmark of his scientific legacy. This view was not only his own but instead was collectively shared, developed and nurtured by all members of the McGill group. The strength of such a cohesive vision is what ultimately gave rise, under his leadership, to the McGill Limnology Research Centre (LRC). In the late 1980's, and with the expansion of limnology in other Quebec universities, the LRC morphed and diversified into the GRIL (Groupe de Recherche Interuniversitaire

en Limnologie), a bilingual multi-university consortium devoted to the study of freshwaters that has remained continuously funded by Quebec's main science granting agency ever since. As a senior founding member of GRIL, he was particularly proud to see its successes and it remained close to his heart, attending its annual symposium well after his university retirement.

Being a graduate student at McGill at that time was simultaneously an exhilarating and daunting experience. The weekly limnology seminar series (the so-called "limno lunch") was almost a religious ritual (no valid reason to miss it existed, barring a recently broken limb) and was a formidable place to learn about current limnology and to sharpen your critical thinking skills. Jaap often led by example, with sometimes tough exchanges even with the most eminent scientists of the day but, in doing so, trained us to articulate more insightful questions. It was never personal, only his way to elevate the science. But behind this intellectual rigor, Jaap Kalff was a naturally very kind and generous man. His office door was always ajar as a sign you could drop in at any time to discuss new ideas you might have had, encouraging the ones he thought were potentially fruitful in the process. With his almost encyclopedic knowledge of the literature, he later embarked on the writing of his magnum opus, *Limnology* (Kalff, 2002), an undertaking that took several years to complete but which ultimately led to his now classic textbook. The book is much more than a compendium of limnological knowledge, it is first and foremost an articulation of his vision for limnology, weaving a narrative through empirical relationships of undisputable generality.

Over his career, Jacob Kalff trained an entire generation of aquatic ecologists, today populating universities and research institutions across Canada and abroad. On the occasion of his retirement, a special session was held in his honor at the ASLO Victoria meeting in 2002. He was presented with his scientific family tree with several of his "descendants" in attendance. But beyond the immediate impact he had on the many individuals he mentored, Jaap Kalff also received several accolades from his peers, most notably the Frank H. Rigler Memorial Award in 1989 from the Society of Canadian Limnologists and, in 2013, the Naumann-Thienemann medal, the highest distinction of the International Society of Limnology (ISL) in recognition of his enormous contribution to limnology.

Jaap is survived by his wife Evelyn, his children Dirk and Sarah, and five grand-children. His daughter Anna predeceased him.

Yves Prairie
Université du Québec à Montréal

Kalff, J. 2002. *Limnology: Inland Water Ecosystems*. Prentice Hall, NJ.

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