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Leticia, Amazonas, Colombia. Courtesy: Dario Alarcon Naforo (2025)

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LETTER FROM

the President

Dear SIL Members,

I hope you are all doing well. The purpose of this letter is to connect with the entire SIL community by sharing our activities, concerns, and updates. In this regard, I would like to provide you with an overview of our progress in several key areas.

The SIL Board has many ideas and projects that we wish to bring to fruition; however, our capacity in terms of human resources is limited. To address this, the Communication team, led by Cécilia Barouillet, organized a successful campaign to recruit volunteers for all committees. This initiative has resulted in new volunteers joining various committees and the EDI Task Force, enhancing our capacity for resource provision and cross-collaboration. For instance, the Developing Economies and Education committees have worked together to create online resources to present proposals to the Tonolli Award call. Meanwhile, the Equity, Diversity, and Inclusion (EDI) Task Force has diligently formulated the EDI principles that represent SIL. These principles have now been approved by the SIL Board and can be found on our website. They aim to establish a foundation for guiding SIL activities, including criteria for awards, planning congress activities and programs, ensuring equitable access to resources, and fostering a respectful and welcoming environment for all members. This essential work has been led by Anas Mohamed Usoof and Belén Franco-Cisterna with valuable support from Carla Olmo, Lilen Yema, Joana Mariz, Sasindu Gunawardana, and Shirina Begum.

On a special note, I would like to highlight the outstanding contributions of Zeynep Ersoy and Lena Schallenberg, the Vice President and ECR representative of the Global Outreach Committee, respectively. Over the last three years, Zeynep and Lena have instrumented a SIL network of Ambassadors, aiming to enhance the communication among SIL and national and regional societies and/or networks to connect limnologists worldwide. From the original 26 National Representatives of SIL, this network grew to 104 Ambassadors spanning 55 countries. Zeynep and Lena's terms will conclude next August, and I want to express our gratitude for their valuable contributions on behalf of the SIL Board: we all will miss you very much Lena and Zeynep! Talking about new additions to the Board, we recently welcomed Gülce Yalçın as the ECR representative for Communication.

> "I invite all members to explore four new videos that summarize the main content of different chapters from the new edition of Wetzel's Limnology."

I invite all members to explore four new videos that summarize the main content of different chapters from the new edition of Wetzel's Limnology. These videos cover topics related to phosphorus in lakes and rivers, the global water cycle, the origins of lakes and rivers, and benthic animals. These high-quality videos are produced by the SIL Video Team and the Education Committee, with input from many limnologists throughout the world. This outstanding project, led by Warwick Vincent, celebrates the rich diversity of lake and river ecosystems and provides valuable resources for educators and professionals beyond academia. You can find the new releases here. Please enjoy these amazing videos and help us promote them!

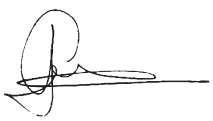
I would like to conclude this letter with a reflection and an invitation. Many countries are currently experiencing (as some examples, the United States of America, Argentina, and Hungary) or have previously faced (e.g., Brazil) explicit or implicit anti-science policies, which drastically reduce directly or indirectly their national budgets for research. This not only jeopardizes new knowledge creation but also threatens important programs and institutions, and disproportionately impacts the careers of early-career researchers. Consequently, the risk of losing scientific talent is high, which diminishes the scientific workforce and undermines the country's economic and national security.

Yet, planetary problems transcend national boundaries, and science's ultimate contribution is to humanity. Much scientific research is conducted internationally, and this collaboration often leads to original perspectives due to the interaction of scientists from diverse backgrounds and cultures. In our interconnected world, the COVID-19 pandemic demonstrated that we owe our survival and wellbeing to scientific advancements and collective actions.

Unfortunately, in many countries societal polarization occurs, and as scientists, we must defend and advocate for the value of science and its contributions. One of the key roles of international science is to promote security and peace, as outlined in the UNESCO constitution, and I firmly believe that a collective approach is essential. At SIL, with its international spirit and outlook, we have been discussing how to approach and support limnologists worldwide in this challenging environment, as well as what international strategic actions we can take to address key issues related to the management of inland waters. I encourage all members to participate in the activities we are planning in the coming months. Your opinions and contributions are invaluable, and together we can harness our creativity to collectively support science and society.

Despite these challenging times, I hope that we can all find ongoing pleasure in limnology, creativity and collaboration.

With warm regards,



María de los Ángeles González Sagrario
SIL President

Message from the Editor

This edition of SILNews opens with a thoughtful letter from our president, Maria de los Ángeles, balancing the status and goals of SIL up to date. Building on this, highlights from the recent SIL-ASLO joint meeting showcase efforts to foster stronger global connections among limnologists, while the SIL Education and ECR committees give us an update. The Book Review section offers a deep dive into *Ecologia e Conservação de Ecossistemas Aquáticos do Sul do Brasil* and *Daphnia Magna*. Expanding on climate-related challenges, the *Limnology Around (A More Extreme) World* section explores how heatwaves and fire are reshaping river biodiversity and ecosystem functioning. In this issue, we also meet inspiring members from Canadá in the *FACES of the SIL* section and EUPHORIA, an early career group of limnologists investigating macrophyte phenology across Europe. Finally, we get news from our members regarding the a recent training course on applied taxonomy and biodiversity of zooplankton developed in Mexico.

Let this issue inspire action to address the pressing challenges in modern limnology.

Juan David González-Trujillo
Editor SILNews

ASLO SIL
Building Bridges across the Aquatic Sciences

On April 22nd, the event titled "Building Bridges in the Aquatic Sciences: A Joint Early Career Networking Event with ASLO and SIL" was held, organized by the early career committees of the Association for the Sciences of Limnology and Oceanography (ASLO) and the International Society of Limnology (SIL). The event aimed to address the specific needs and challenges faced by aquatic science researchers worldwide by fostering a sense of community and facilitating meaningful connections.

The webinar featured an informal virtual networking session designed to showcase opportunities for collaboration and engagement with both societies. Key members shared information on funding options, research pathways, ongoing diversity, equity, and inclusion (DEI) initiatives, and details about the upcoming joint conference in Montreal, Canada, scheduled for 2026. The presentations were recorded and are available for viewing here.

Multiple breakout rooms provided platforms for networking, discussions on the organizations' efforts in DEI and mental health/wellbeing, and opportunities for feedback on Early Career Researcher (ECR) activities planned for the Montreal 2026 conference. These interactions were recorded on a Canva board. The Canva board of opportunities for early career and student aquatic scientists mentioned on the webinar can be accessed here.

The SIL Early Career Researcher Committee
(logo credits: Fenina Buttler and Brittany Schieler, ASLO)

IN THIS ISSUE

Guapi river mouth, Colombia. Photo by Dario Alarcon Naforo

Contribution deadline for the February 2026 issue:
December 2025
Send to: SILnews editor at SILnews@limnology.org

News from our SIL Officers & Committees

SIL International Society of Limnology

FROM THE ECR COMMITTEE

Goals and News

The Early Career Researcher (ECR) Committee was established following the 2024 congress of the International Society of Limnology (SIL) held in Foz do Iguaçu. Its creation marked a significant step forward in consolidating and energising the ECR community within SIL and fostering greater engagement beyond the society. The committee's mission is to provide support, connection, and resources to early career scientists working in the field of aquatic sciences, offering a platform for collaboration, skill development, and career advancement.

As its inaugural official activity, the SIL ECR Committee partnered with the Association for the Sciences of Limnology and Oceanography (ASLO) ECR Committee to organise a joint virtual networking event titled *Building Bridges in the Aquatic Sciences: A Joint Early Career Networking Event with ASLO and SIL,* which took place on April 22nd, 2025. The event drew over 200 registered participants from diverse regions and institutions around the world, creating an exciting and dynamic atmosphere for cross-disciplinary exchange. During the session, attendees had the opportunity to share and learn about current funding opportunities, job openings, and upcoming workshops that could support their career development. The event fostered valuable connections between early career researchers across multiple time zones and areas of expertise, highlighting the global nature of aquatic science research.

Building on the success of this first event, the SIL ECR Committee is now planning a follow-up event in collaboration with the ASLO ECR Committee later in the year. This upcoming session will be similarly structured, aiming to further strengthen our inter-organisational ties and enhance the support available to ECRs in the lead-up to the joint ASLO-SIL conference in Montreal. We are excited to continue building momentum and community through these shared initiatives.

The SIL Early Career Researcher Committee
Co-Chairs: Bruno Cremella & Kamil Hupało (former co-chair)

FROM THE EDUCATION COMMITTEE

Goals and News

The goal of the Education Committee is to support SIL's mission to promote limnology and its relevance to society. This is achieved by facilitating knowledge transfer to a wider audience, fostering international scientific networks among researchers, and providing opportunities for students and early-career researchers (ECRs)—especially from emerging countries—to gain visibility and expand their networks.

One of the Committee's main activities is the production of educational materials that can be used by researchers, environmental educators, and interested audiences worldwide. The most prominent product to date is a video series based on the chapters of *Wetzel's Limnology: Lake and River Ecosystems* (Edited by John Smol and Ian Jones, Elsevier Academic Press). This initiative was launched by Prof. Warwick Vincent (Co-chair of the Committee), who, together with Barbara Barta (ECR and Co-chair), is leading the creation and publication of the videos on the SIL YouTube channel. Originally produced in English, the videos are now being translated into Portuguese (by Simone Cardoso), Turkish (by Ali Ger), Spanish (by David Carrozo), and French (by Raoul Couture) to broaden accessibility and engagement across global audiences. We expect the reach of this initiative to grow with the ongoing dedication of our expanding Committee.

We also envision the SIL website as a hub for limnological knowledge. Under the leadership of Dianneke van Wijk, we are curating and centralizing high-quality but previously scattered resources on various topics such as statistics, field methods, and laboratory techniques. This resource hub is currently under development and is expected to launch in the coming months.

The Education Committee collaborates closely with other SIL committees. Notably, we have supported the Developing Countries Committee in promoting the Tonolli Award, which funds research projects led by postgraduate students from developing countries. To support applicants, we have produced written guidelines and video tutorials to help prepare stronger proposals (available on the SIL website and YouTube channel). We are also working with the ECR Committee to co-organize webinars and online courses. At present, we are planning a series of courses that will combine theory with hands-on workshops on both emerging and foundational topics identified as priorities by SIL members in a recent survey.

As part of our efforts to help students and ECRs gain visibility, the Education Committee organizes the **Brian Moss Student Competition**. The winner will be invited to give a plenary talk at the upcoming SIL Congress in Montreal, Canada. The competition, currently open, has two stages: the first at the national level, coordinated by the National Ambassadors, and the second at the international level, where winning papers from each country are evaluated by a panel of ten editors from leading scientific journals. The Chair of the competition is Prof. Ruben Sommaruga, with Mariana Meerhoff as Co-chair.

New Videos to Celebrate Limnology!

Our committee has released several new videos over the last few months, with more on their way! Each of these videos is a short (10-15 minutes), open-access tutorial introduction to a specific limnological theme, and provides a summary overview of a chapter in the multi-author textbook *Wetzel's Limnology – Lake and River Ecosystems* edited by Ian Jones and John Smol (2024; Elsevier, U.K.).

Numerous SIL members, friends and colleagues have contributed amazing photos, graphics and video clips to the project, and we are very grateful for this support. In addition to explaining key concepts in limnology, these videos are a celebration of the rich diversity of lake, river, and wetland ecosystems that limnologists work on throughout the world. Recent topics include the measurement and variations of dissolved oxygen (Fig. 1), the diversity of bottom-dwelling animals in freshwater ecosystems (Fig. 2), the geological origins of lakes and rivers (Fig. 3), and an introduction to hydrological concepts and the global water cycle (Fig. 4). As we hope you will discover in these examples, we always try to save some of the most compelling visual material for the start and end of each video.

Other features of the Wetzel SIL Video series include action videos of field sampling (e.g., sediment coring for paleolimnology), laboratory demonstrations (e.g., CO2 effects on pH), outlines of current approaches in limnology (e.g., automated sensors, molecular methods, GIS landscape analysis), and on-screen narrations by the chapter authors or other limnologists. The videos have collectively received more than 10000 views to date, and certified captioning in several languages is currently in progress by our committee to widen access throughout and beyond the SIL community.

New videos in production include 'Tracking the Aquatic Nitrogen Cycle' and 'Mixing Cycles & the Layers of a Lake'. The latest and archived videos are available on the SIL Wetzel page, and also via the SIL Wetzel YouTube page (if you enjoy them, please subscribe and hit 'Like'!). Our SIL video team is always open to new themes and approaches that may be additionally useful for your teaching and outreach activities, so if you have comments or ideas that you would like us to follow up on, please do not hesitate to get in touch, and please share these video links with teachers, technical staff, NGOs and students.

Warwick F. Vincent (warwick.vincent@bio.ulaval.ca)
Wetzel SIL Videos series editor; co-chair, SIL Education Committee

Barbara Barta (barta.barbara.eco@gmail.com)
ECR Representative, SIL Education Committee

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SIL VP of Education; chair, SIL Education Committee

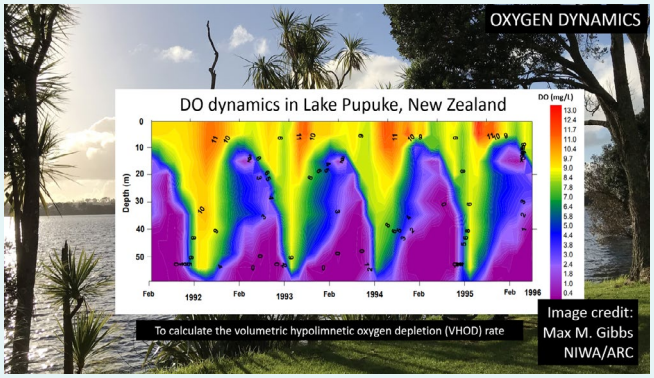

Fig. 1 Screenshot from the Wetzel SIL video 'Oxygen Dynamics' (available here).

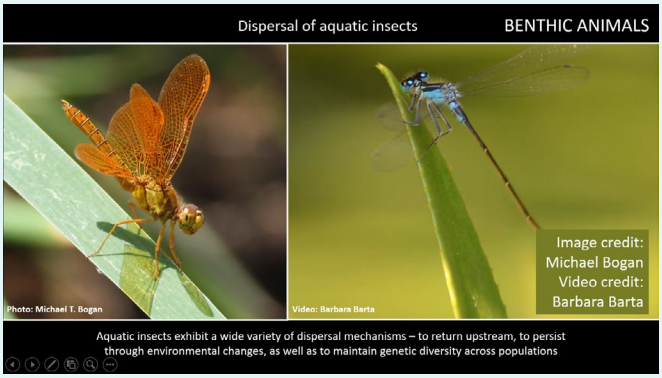

Fig. 2 Screenshot from the Wetzel SIL video 'Benthic Animals' (available here).

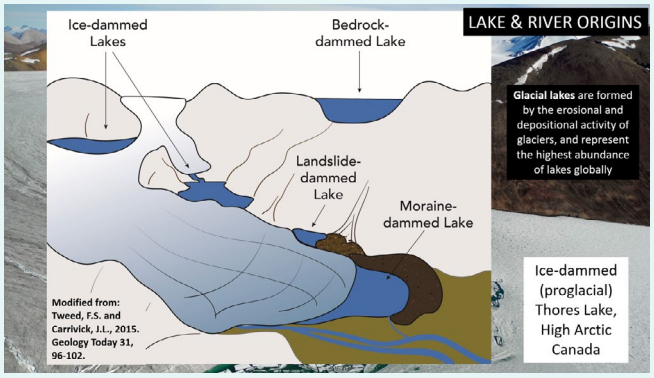

Fig. 3 Screenshot from the Wetzel SIL video 'Lake & River Origins' (available here).

Fig. 4 Screenshot from the Wetzel SIL video 'The Global Water Cycle' (available here).

EDI and ECR Taskforce

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Book Review

By Maycon S. S. Gonçalves, Vinicius A. G. Bastazini, Christian B. Andretti, Luis E. K. Lanés and Matheus V. Volcan

1st Edition, Editora União Sul-Americana de Estudos da Biodiversidade (USEB)

eBook ISBN: 978-85-89985-39-0
https://doi.org/10.5281/zenodo.16656056

This book contributes to filling the enormous gap in the information on aquatic ecosystems in southern Brazil. This region is a continental reference regarding the composition, structure, and function of its aquatic ecosystems. In addition, it can help to put together the harsh puzzle that makes up the relationships between man, water resources, and biodiversity conservation. The publication is open access and carefully edited in Portuguese by the Pró-Pampa Institute, founded in 2006 with headquarters in Pelotas, whose main purpose is to develop and participate in actions aimed at biodiversity conservation. The edition is based on the BAPs, follows homogeneous criteria, and the different chapters and the work have been submitted for peer review.

The book is organized into four sections: the physiology of aquatic crustaceans in the region, the ecology of populations and communities, the ecology of the landscape and ecosystems, and the conservation and the public policies, preceded by an introductory chapter. Note that the plan for the work does not intend to cover all areas of the aquatic ecosystems of Rio Grande do Sul, a task that would be impossible because of the enormous amount of work that still needs to be done. Instead, the book succeeds in its main achievement, which is the international presentation of the hydrobiological heritage of the region, and it provides an extensive and relevant bibliographic review in each of the chapters of the different sections. The authors and editors count on the interest of each of the contributions, which will undoubtedly trigger an explosion of research on the aquatic ecosystems of southern Brazil by other Brazilian scientists and the rest of the world.

The book begins with a special chapter that dedicates an affectionate autobiographical tribute to Professor Maximiano Pinheiro Cirne, an illustrious ornithologist from the region who sadly died during gestation.

The remainder of this work can be read in several ways.

- From beginning to end, as the chapters progress.
- Discriminating by section or section according to the reader's specialty.
- "Diagonally," extracting from the different chapters the descriptions of the areas of study considered.
- Under cross-cutting themes in different sections, which we will follow here to review every chapter.

If the reader chooses to discriminate by section, I recommend reading Chapters 1, 10, 11, 12, 14, 16, and 17 if interested in revising holistic approaches to address aspects of regional limnology, classification, conservation status, environmental impacts, and threats, with a final emphasis on urban wetlands. In turn, readers who love crustaceans and other aquatic invertebrates enjoy reading chapters 2, 3, 4, 7, and 8. For those interested in the basic and applied aspects of aquatic vegetation, I recommend reading chapters 5, 6, 8, 10, and 11. Finally, for those who are interested mainly in fish, but also in other vertebrates, Chapters 7, 9, 13, and 15 are must-read.

One strength of the book is its consideration of aquatic ecosystems in indigenous populations, especially in Chapter 1.

Also noteworthy is the technical approach of several chapters, such as the one dedicated to aquatic macrophytes with the potential for the remediation of polluted aquatic environments, the impact of wetland fragmentation on a passerine population, the conservation of reed beds, the problems of environmental degradation in urban wetlands, and the regional assessment of the environmental pressure of roads on the streams of Rio Grande do Sul, among others. Professional consulting work supports the corresponding chapters by the authors, reconciling scientific quality with applied interests.

Perhaps the most fascinating and masterful chapter to propose solutions is the one that deals with basic guidelines for the environmental authorization of projects in areas of confirmed or potential presence of annual fish of the Rivulidae family in the municipality of Pelotas, which is another product of the environmental consulting contracts of the Pró-Pampa Institute.

Whether one reads with the interest of a specialist or a generalist, the book leaves a bitter sensation because of the interest in its content and, the hunger

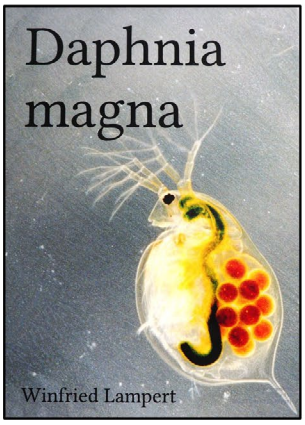
to know more about the limnology of Rio Grande do Sul, recalling the Spanish saying that goes: "Eat and scratch, everything is beginning." Going through the pages of any chapter awakens the inspiration of new tasks to undertake and perspectives to adopt, taxonomic and bibliographic databases, exploration projects to delve into the region, experiments to delve into several of the topics or impulses to contribute to the grain of sand to the search for solutions to the disturbing challenges posed by the conservation of aquatic ecosystems and biodiversity in southern Brazil. The greatest "danger" of the book is that temptation, which is also its greatest attraction, will seduce the reader.

Prof. Máximo Florín Beltrán

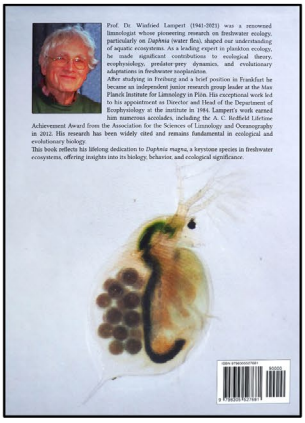
Centro Regional de Estudios del Agua
Universidad de Castilla-La Mancha
Ciudad Real, España

São José dos Ausentes, RS, Brazil
Photo by V. A. Bastazini

Book Announcement



Front cover



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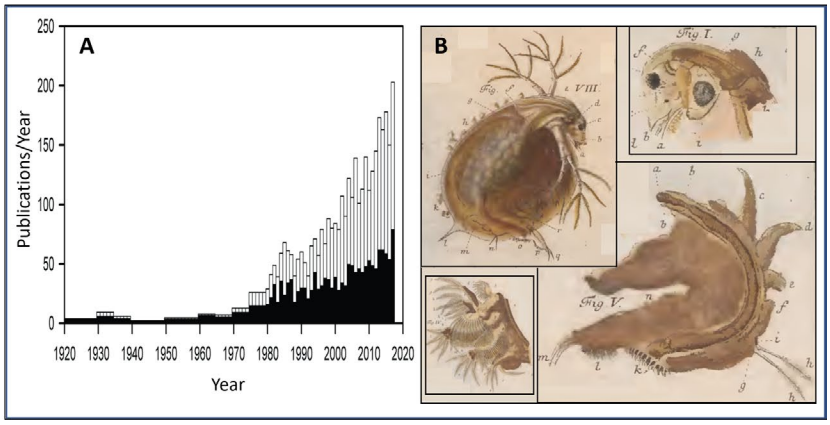

Figure sample A: *D. magna* publications by year; black bars for basic science, open bars for ecotoxicology.
Figure sample B: The first illustration of *D. magna* from Schäffer's (1755) book on freshwater organisms.

Daphnia magna by Winfried Lampert

Winfried Lampert's long-awaited monograph about *Daphnia magna* is now available at Amazon (just search "Daphnia magna by Winfried Lampert") – 499 pages – hardcover for $24 (US)

ISBN: 9798305527681

Winfried Lampert (1941-2021) was one of the foremost experts on the ecology and evolutionary biology of the genus Daphnia, and, as Director at the Max Planck Institute for Limnology in Plön, Germany (1984 to retirement in 2006), led a famous zooplankton research group, primarily focused on Daphnia. He was the recipient of numerous recognitions including the SIL Nauman-Thienemann Medal and ASLO Redfield Award. After retirement, he continued to be active in *Daphnia research*, including writing this remarkable book about *Daphnia magna* as an important ecological, eco-genomic and ecotoxicological model organism. The book's extensive coverage includes chapters on *History of discovery, Systematics/Biogeography, Morphology, Biochemistry, Reproduction, Population Genetics, Feeding, Metabolism, Growth, Development, Life History, Population Dynamics and Behavior.* The book is thoroughly illustrated with figures newly redrawn from the primary literature. Winfried Lampert completed drafting the book just before his untimely death from cancer in 2021, and his daughter and son, both successful university scientists, completed bring the book to publication this year. Published at cost for US$24, it is an exceptional bargain worthy of a place on every freshwater plankton biologist's bookshelf.

Nelson Hairston, Jr.

Cornell University
United Stated of America

LIMNOLOGY AROUND (A MORE EXTREME) WORLD: GERMANY

Getting into hot water: The challenge of heatwaves for freshwater ecosystems

Daniela Cortés-Guzmán[1]

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The magnitude and frequency of extreme weather events (EWE) are increasing owing to anthropogenic climate change (Seneviratne *et al.* 2021, IPCC 2023), and with it, the urgency to understand their effects on biological communities. EWE are discrete in time, rare in probability (e.g. <5% or <1% of occurrence based on climatic records), and frequently have deleterious effects on communities and ecosystems (Sabater *et al.*, 2022; Smith, 2011). Among EWE, heatwaves have increased worldwide in intensity, frequency, and duration since the 1950s (Perkins-Kirkpatrick & Lewis, 2020), meaning that they are becoming an intensifying stressor for communities. Our understanding of the degree to which EWE in general, and heatwaves in particular, affect communities is growing, but still needs to be improved.

Freshwaters are among the most vulnerable to heatwaves (Tassone *et al.*, 2023; Woolway *et al.*, 2021), as they accumulate the effects of multiple stressors in thelarge landscapes they connect to (Reid *et al.*, 2019). In addition, they hold a disproportionate diversity compared to the area they cover (Tickner *et al.*, 2020), much of which is composed of ectothermic organisms particularly vulnerable to temperature changes (Bonacina *et al.*, 2023). Water temperature strongly influences metabolic rates, species interactions and distributions, and ecosystem productivity. Therefore, the ecological consequences of increasing temperatures likely include local extinctions of sensitive species (Biswas & Mallik, 2011), compositional changes (Cortés-Guzmán *et al.*, 2024), and the introduction of non-native species (Gu *et al.*, 2023), ultimately disrupting ecosystem processes, functions, and services (Capon *et al.*, 2021). Moreover, the short duration, unpredictability, and high intensity of heatwaves can rapidly exceed the thermal limits of many organisms and affect communities more strongly than moderate and gradual changes in temperature (Jentsch *et al.*, 2007).

Heatwaves represent a complex challenge for freshwater communities. They must cope with heatwaves while being under the effects of multiple anthropogenic stressors. Anthropogenic stressors, including heatwaves, vary in intensity in space and time (Fig. 1; Blowes *et al.*, 2019). Research aimed at understanding the effects of heatwaves should include their spatiotemporal variation and their interaction with other stressors (Jackson *et al.*, 2021). For example, in a previous study, we addressed the effects of heatwaves by decomposing their temporal and spatial variations and found that sites undergoing heatwaves of higher intensity showed lower taxonomic and functional diversity than sites experiencing lower-magnitude heatwaves (Fig 2a, 2b; Cortés-Guzmán *et al.*, 2024). We also analysed the interaction of heatwaves with the ecological quality of the community and land cover. We found that communities with better ecological quality and in forested areas were highly sensitive to heatwaves

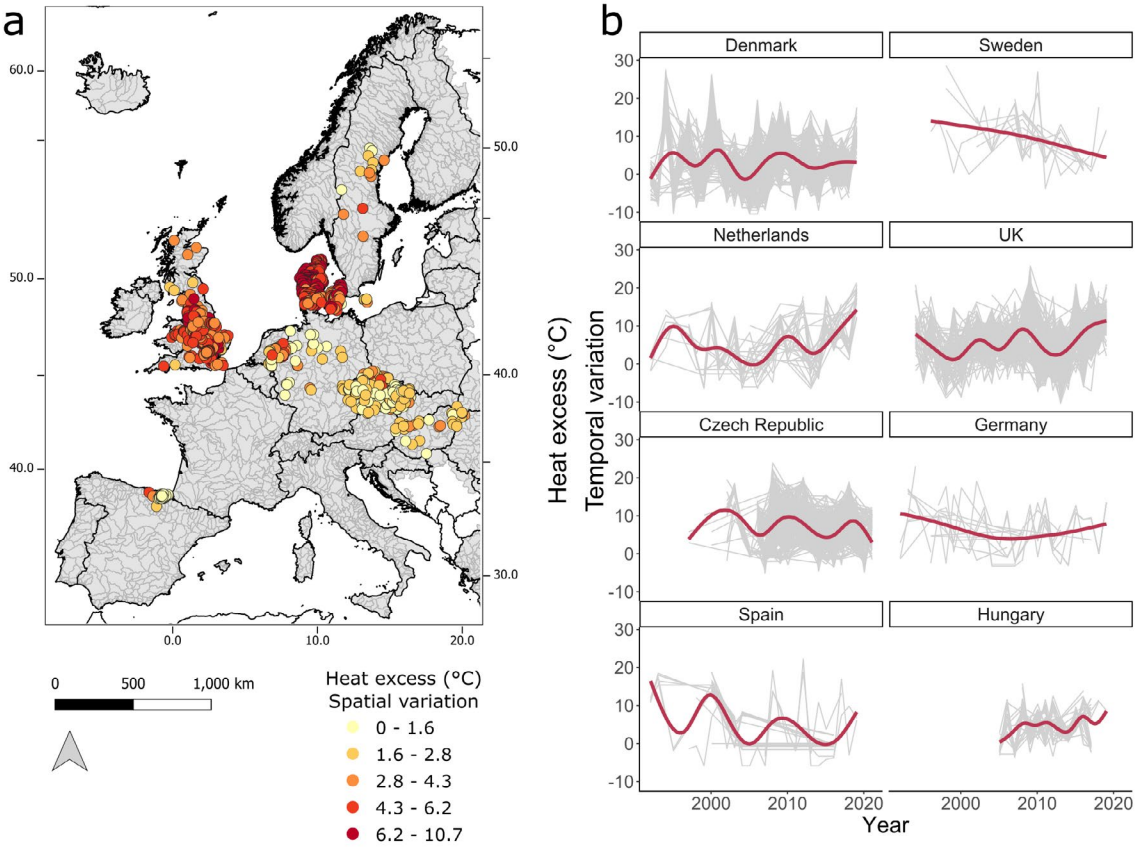

Fig. 1 Spatial (a) and temporal (b) distributions of heatwaves across European rivers. Intensity was measured as the excess heat in three consecutive days, exceeding 90% of the annual temperature distribution. Modified figure from Cortes-Guzmán *et al.* 2024.

(Fig. 2c-f), likely related to a higher proportion of sensitive species being lost after heatwaves of high magnitude. Other studies have analysed the interaction of heatwaves with pollutants (Hermann *et al.*, 2023; Wang *et al.*, 2023) and found that the combination of both modified the community composition and trophic structure. However, the interaction effects varied greatly among study groups and from individuals to communities (Polazzo *et al.*, 2022). It is clear from these studies that there are many more factors to consider. For example, the synergistic or antagonistic effects of other extreme events, such as floods or droughts, and the degree of synchronisation between disturbances (Jackson *et al.*, 2021) are open and promising research fields that will contribute to our understanding of the effects of global change on freshwater biodiversity.

To address the complexity of stressors, we need to add complexity to biological responses. Community responses vary spatially and temporally; therefore, communities usually do not cope with disturbances in a synchronised manner (Jackson *et al.*, 2021; Palmer *et al.*, 2017). The variation in responses depends on the range of species functional traits (Ross *et al.*, 2022), connectivity to and diversity of the regional pool (Vad *et al.*, 2023), and community ecological memory, which is the influence of past stressors on future responses (Jackson *et al.*, 2021). For example, communities in warmer regions might be composed of more warm-tolerant species but might be closer to their thermal limits than communities in colder regions (Cortés-Guzmán *et al.*, 2024; Maxwell *et al.*, 2019). On the other hand, temporal variation is often related to the time lag in community responses (Essl *et al.*, 2015) and when the event occurs during community assembly (Cinto Mejía & Wetzel, 2023). For example, an event occurring during the larval development of aquatic insects might result in higher mortality than an event occurring during the adult stage, when individuals can migrate over longer distances (Cinto Mejía & Wetzel, 2023). However, if heatwaves affect individuals during their reproductive stage, the population might not recover in the long term (Kingsolver & Buckley, 2017). Integrating traits, lags, and synchrony in aquatic community responses is an important venue that will increase our knowledge of the effects of heatwaves and other extreme events.

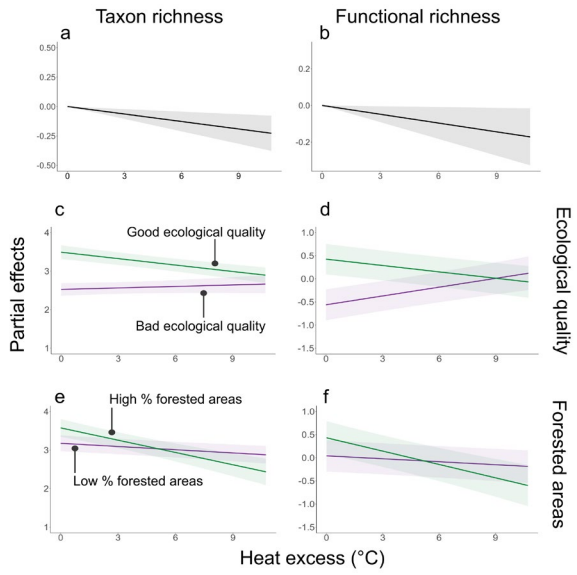

Fig. 2 Responses of river invertebrate communities to heatwaves. Taxon richness (a, c, e) and functional richness (b, d, f) decreased in sites exposed to high-intensity heatwaves. The intensity of the heatwaves was measured as the excess heat in three consecutive days, exceeding 90% of the annual temperature distribution. The upper panels (a, b) show the community response to increasing heatwave intensity. The middle panels (c and d) show the community response to the heatwave intensity interacting with the ecological quality of the community. The lower panels (e, f) show the community response to heatwave intensity interacting with the proportion of forested areas upstream. For details, please refer to the original publication (Cortés-Guzmán *et al.* 2024).

Our ability to predict the effects of heatwaves determines our ability to mitigate them. By understanding where and when communities are more vulnerable to heatwaves, decision makers and stakeholders can direct conservation efforts efficiently. Although simultaneously addressing multiple stressors increases the complexity of community responses, these interactions can also be used in our favour. For example, conservation actions aimed at mitigating the effects of warmer temperatures, such as maintaining or restoring riparian forests, also mitigate the effects of pollutants, which can make communities generally more resistant to heatwaves. Mitigating the effects of global change on freshwater communities is of paramount importance because adverse consequences for ecosystem services are anticipated owing to shifts in their composition and function (Capon *et al.*, 2021). For example, provisioning services, such as food resources from cold-adapted species like salmonids, are threatened by warming and heatwaves (Almodóvar *et al.*, 2012). In addition, water security is also threatened by heatwaves, which deteriorate the quantity and quality of water (Graham *et al.*, 2024; Van Vliet *et al.*, 2023) for aquatic communities and humans. The complex dynamics between heatwaves, community resilience, and ecosystem services demand further research to uncover innovative conservation strategies that not only mitigate these risks, but also enhance our capacity to adapt to an increasingly changing climate.

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LIMNOLOGY AROUND (A MORE EXTREME) WORLD: IBERIAN PENINSULA

What about fire & water? Wildfire consequences on aquatic ecosystems.

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Wildfires are among the most studied disturbances from several perspectives and science fields (Wright and Bailey 1982, Díaz-Delgado *et al.* 2002). The relevance of wildfires in shaping or affecting earth ecosystems constitutes a natural disturbance, intrinsic to some systems but fostered by human activities in others (Bowman *et al.* 2009, Pausas and Keeley 2009, Kelly *et al.* 2020). Wildfire regimes vary among regions owing to climatic characteristics and fuel structure, for example enhancing fire frequency in areas under a Mediterranean climate (Pausas 2004, Le Page *et al.* 2008, Pausas and Ribeiro 2013). However, these climatic characteristics are predicted to change globally with an increase in temperature coupled with a decrease in rainfall, particularly during the summer months (IPCC 2022). These conditions will promote wildfires by increasing their predicted frequencies, intensities, and extents (Turco *et al.* 2018, Pausas and Keeley 2021, Joshi and Sukumar 2021, Fernández-García *et al.* 2022).

Within the current context of global change, derived from both climatic alteration (IPCC 2022) and changes in human-environment interactions (for example, field abandonment, reforestation, fossil fuel usage, stockbreeding; Kelly *et al.* 2020, Pausas and Keeley 2021), it is imperative to comprehend and anticipate wildfire consequences in all ecosystems. Although terrestrial ecosystems have received the most attention regarding wildfire impacts, aquatic ecosystems have remained relatively understudied to date (but see Bixby *et al.* 2015, McCullough *et al.* 2019, Cunillera-Montcusí 2020). Even though they have remained understudied, some of the first studies focusing on wildfire impacts on aquatic ecosystems date back to 1989 (Christensen *et al.* 1989, Minshall *et al.* 1989). These works sparked many others focusing on lotic systems (Mihuc and Minshall 1995, Minshall *et al.* 1997, Minshall 2003, Romme *et al.* 2011), but also on lentic ecosystems (Gresswell 1999, Scrimgeour *et al.* 2001, Pinel-Alloul *et al.* 2002, McCullough *et al.* 2019).

What are the effects of wildfires on aquatic ecosystems?

The extant body of evidence identifies two major effects from wildfires: direct and indirect. The direct impacts are related to the characteristics of the wildfire event itself, whereas the indirect impacts are related to the period following the fire that can last over days, months, and years (Minshall *et al.* 1989, Gresswell 1999). In this context, the term "direct effects" refers to the entrance of ash or smoke diffusion into surface waters (Bright *et al.*, 2016; Scordo *et al.*, 2021). Contrastingly, the term "indirect effects" refer to the secondary outcomes of wildfires that influence post-fire trends in aquatic communities (Minshall *et al.* 1997; Silva *et al.* 2016). These alterations that wildfires may engender in the short, mid, and long terms within a catchment are the primary factors contributing to their repercussions. As aquatic systems receive water from areas affected by fires, the consequences of wildfires are concentrated within the aquatic system (Pinel-Alloul *et al.*, 2002; Prepas *et al.*, 2009; Smith *et al.*, 2011; Rhoades *et al.*, 2019).

Overall, the indirect effects of wildfires can be summarised into five groups derived from vegetation loss and ash generation/input in the watershed (Minshall *et al.* 1989, McCullough *et al.* 2019). First, an increase in runoff after a wildfire is generally expected owing to watershed vegetation loss and soil impermeabilization by ash, which fosters flash floods and higher runoff (Vieira *et al.* 2004, 2011, Whitney *et al.* 2015, Pereira *et al.* 2016), but also the modification of habitats mosaic withing the catchment (Kleindl *et al.* 2015). Second, vegetation loss, especially the canopy, will favour light incidence and, consequently, the rise in water temperature during the months or years following the wildfire (Minshall *et al.* 1997, Hossack and Corn 2008, Isaak *et al.* 2010, Mahlum *et al.* 2011, Rhoades *et al.* 2011, Cooper *et al.* 2015, Rodríguez-Lozano 2015, Rosenberger *et al.* 2015). Third, ash and debris entering the aquatic system will increase during wildfires, but mostly together with first post-fire rains. Such entrance will boost nutrient concentration (Spencer and Hauer 1991, Spencer *et al.* 2003, Bladon *et al.* 2008, Mast and Clow 2008, Smith *et al.* 2011, Mast *et al.* 2016), debris, turbidity and sediment transport (Bêche *et al.* 2005, Reale *et al.* 2015, Vaz *et al.* 2015). Fourth, the combination of light, temperature and nutrient increase will foster primary production and algal blooms during the months after a wildfire (Cowell *et al.* 2006, Klose *et al.* 2015). Such trophic changes will markedly reshape available resources, promoting a switch from allochthonous to autochthonous production (Cowell *et al.* 2006, Verkaik *et al.* 2013, Silins *et al.* 2014, Cooper *et al.* 2015, Klose *et al.* 2015). Finally, other groups of aquatic organisms will be also affected by the combination of previous consequences that will span all the trophic chain with bacteria (Ferrenberg *et al.* 2013), macroinvertebrates (Scrimgeour *et al.* 2001), amphibians (Hossack and Corn 2008, Muñoz *et al.* 2019), and fish (Beakes *et al.* 2014, Rodríguez-Lozano *et al.* 2016). These group responses can vary considerably in accordance with post-fire conditions (e.g., floods, droughts, and other fires). On one hand, they can lead to a strong decrease in abundance (Vieira *et al.* 2011, Whitney *et al.* 2015, Cunillera-Montcusí *et al.* 2019). On the other hand, together with the rise in temperature and trophic resources some groups may be benefited concomitantly increasing their abundance (Mihuc and Minshall 1995, Minshall *et al.* 2001, Scrimgeour *et al.* 2001, Malison and Baxter 2010a, Beganyi and Batzer 2011, Oliver *et al.* 2012, Brown *et al.* 2013, Lewis *et al.* 2014, Verkaik *et al.* 2015, Venne *et al.* 2016, Robson *et al.* 2018). Such a bottom-up event can feed terrestrial ecosystems with greater insect emergence and the consequent increase in terrestrial predators in what is known as fire pulse (Malison and Baxter 2010b).

Fig. 1 Images from a Mediterranean temporary pond impacted by a wildfire. From left to right images show the same temporary pond, located in North-eastern Iberian Peninsula before (spring 2012), right after (summer 2012) and few months after (spring 2013) the wildfire that burned the Empordà region in 2012. Mediterranean temporary ponds are aquatic ecosystems that can be impacted by both direct and indirect effects of wildfire with the direct burning of aestivating organisms such as Gastropods and the indirect posterior fire-pulse effect (see Cunillera-Montcusí *et al.* 2019, 2021). Photos taken by Jordi Sala.

Despite the apparent congruence in the reported wildfire consequences, its impacts will strongly depend on system characteristics and, therefore, on the ecological context (Bixby *et al.* 2015, McCullough *et al.* 2019). Wildfire impacts will not be the same in rivers, where post-fire floods can be a strong determinant (Vieira *et al.* 2011); or in permanent boreal lakes, where nutrient accumulation can lead to greater eutrophication and an increase in generalist species (Scrimgeour *et al.* 2001, Araneda *et al.* 2013, Lewis *et al.* 2014); or in temporary streams or ponds, where both wildfire direct (i.e. direct burning of aestivating organisms) and indirect effects are combined (Verkaik *et al.* 2015, Cunillera-Montcusí *et al.* 2019, 2021). Such variability in the responses of determined habitats and organisms highlights the large number of questions that remain to be answered when considering the impact of wildfires on aquatic ecosystems.

Future global change scenarios highlight the increasing importance of wildfires across many ecosystems because of the rise in their frequency and extent (Pausas and Keeley 2021, IPCC 2022, Fernández-García *et al.* 2022). Such scenarios emphasise the need to further advance our knowledge regarding their impacts on aquatic systems (Bixby *et al.* 2015, McCullough *et al.* 2019). One key asset to further consider is the role that regional-scale connectivity may play in post-fire community recovery (Chittapun 2011, Banks *et al.* 2017, Robson *et al.* 2018, Cunillera-Montcusí *et al.* 2021). (Fig. 1) The consequences that wildfires will have on the impacted part of the catchment will greatly rely on connectivity and recolonisation from non-burned areas, as some habitats, mostly shallow lentic systems, may rapidly recover their pre-fire physical characteristics (Beganyi and Batzer 2011, Bright *et al.* 2016, Cunillera-Montcusí *et al.* 2020). Metacommunity and metaecosystem perspectives constitute interesting frameworks from which to provide novel answers and expand our understanding of the potential impacts of current and future wildfires, both for lentic and lotic systems (Cid *et al.* 2020, Cunillera-Montcusí 2020). Overall, there is still a long road to follow to unfold the responses of aquatic organisms and ecosystems to wildfires and to incorporate both larger spatial and temporal layers in the assessment of their consequences. All these elements remain essential to confront the fiery future that is already here.

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Limnological groups and societies around the world

Early career limnologists investigating macrophyte phenology across Europe

Anne Lewerentz, PhD
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Since 2016 the European Federation for Freshwater Sciences (EFFS) is launching a biennial call for FreshProjects. Those projects are supported by EFFS-affiliated national societies and intended to foster networking and collaboration among early-career researchers (ECR) across Europe. At the start of 2025 the project EUPHORIA (European Plant Phenology Research in Aquatic Systems) was launched as the 5th FreshProject.

The project is led by Dr. Anne Lewerentz and Dr. Benjamin Misteli, two Postdocs based in Germany and Austria and brings together a team of 110 ECRs ranging from bachelor students to PostDocs. EUPHORIA brings together members from 13 national freshwater associations from 22 countries (Fig. 1).

The EUPHORIA project aims to fill a critical knowledge gap by studying the seasonal life cycle events, or phenology, of aquatic plants across environmental gradients in Europe.

Phenological shifts signal climate change and impact ecosystem functions like pollination. While terrestrial plant phenology is well studied, research on aquatic plants is limited, despite their key role in freshwater ecosystems. In particular, we still know little about how aquatic plant phenology varies with environmental conditions.

EUPHORIA aims to improve understanding and conservation of freshwater systems by studying how aquatic plants respond to different climates.

In the early months of EUPHORIA, the fieldwork methodology was collaboratively developed and refined by the project team. Detailed guidelines and standardized field sheets were created to ensure consistency across all sampling efforts. Monitoring will focus on 15 phenological traits across five key aquatic plant species representing different growth forms of submerged *(Myriophyllum spicatum, Elodea nuttallii, Elodea canadensis)*, floating-leaved *(Nuphar lutea)* and emergent species *(Phragmites australis)*. At least once per month phenological traits of species are recorded to monitor their changes in time (Fig. 2).

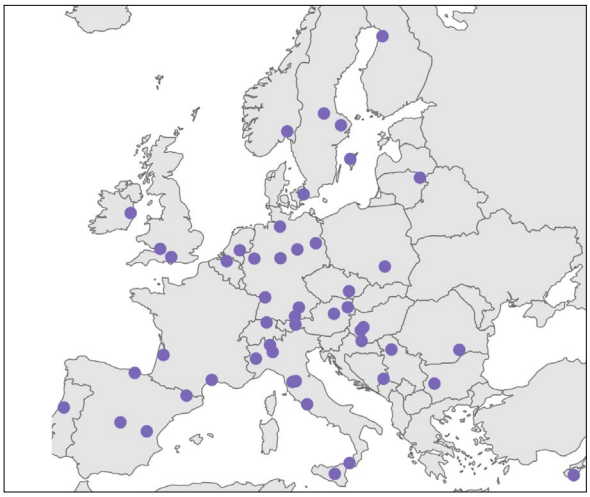

Fig. 1 Geographic distribution of EUPHORIA members across Europe, shown as violet dots, representing 13 national freshwater associations from 22 countries.

Fig. 2 Example of phenological traits monitoring conducted during April and Maycountries.

In addition to phenological traits, field teams will collect environmental data and characterize sites. Fifty teams will sample freshwater systems across Europe.

The fieldwork will last the entire 2025 vegetation period. The first results will be presented at the SEFS14 (Bolu, Turkey) and at the IAPG conference in Lisbon (Portugal). By bringing together so many Early Career Researchers (ECRs) interested in macrophytes, we are convinced that EUPHORIA contributes to both science and capacity building by facilitating networking among future experts in the field.

Find more about EUPHORIA
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FACES of SIL

John Smol

Queen's University
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JOHN SMOL | CANADA

Professor John Smol OC, OOnt, PhD, FRSC, FRS, is a Distinguished University Professor in the Department of Biology (cross-appointed with the School of Environmental Studies) at Queen's University where he also held the Canada Research Chair in Environmental Change for the maximum three 7-year terms (2001-2022).

Besides doing my research, I also enjoy participating in outreach activities. Recently, I collaborated on the art and science projects of the Gender & Science group of the Iberian Association of Limnology (AIL). Through these projects (art exhibitions for adults and storybooks for children), we raise awareness of how problems associated with climate change and freshwater ecosystems differentially affect women in many parts of the world.

In November 2018, John Smol was elected President-Elect of the Academy of Science, Royal Society of Canada, and then served a three-year term as President (2019-2022). More recently, he has been elected as an international member of the National Academy of Sciences in the US (see the release here).

Congrats John!

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Welcoming SIL's New Office Coordinator

Moksh Sood

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MOKSH SOOD | CANADA

I'm excited to join SIL and support their mission to advance limnology research worldwide. I'm currently pursuing my MEng in Information Systems at Concordia University and serve as a Director with the Graduate Students' Association. I'm also an aspiring business analyst.

In my role, I coordinate member activities and assist with communications, board support, membership management, and event planning. I enjoy organizing and coordinating events, including my involvement with TEDx Concordia University's production team, and I like playing badminton in my free time. I'm always happy to connect!

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Reports from the SIL community

Trankilandia River, San José de Guaviare, Colombia. Photo by JD González-Trujillo

TRAINING COURSE ON APPLIED TAXONOMY AND BIODIVERSITY OF ZOOPLANKTON

Reporters: S. Nandini and S.S.S. Sarma

Aquatic biodiversity is a priceless resource. During the United Nations Conference on Environment and Development (the Rio "Earth Summit") in 1992, the Convention on Biological Diversity (CBD) was agreed and came into force on 29 December 1993. In this regard, as is common practice in universities around the world, young undergraduates in our university (Universidad Nacional Autónoma de México, UNAM) are trained in the concepts of biodiversity and the taxonomic identification of various taxa. Regarding freshwater, rotifers are one of the three main taxonomic groups, and invaluable for the functioning of freshwater ecosystems, for aquaculture, and as indicators of water quality (Wallace *et al.*, 2006). One of the main problems with regard to the use of rotifers is the difficulty to identify them correctly.

To advance the knowledge on the taxonomy of rotifers and the working of the CBD of our students and faculty in our Facultad de Estudios Superiores Iztacala (FESI, UNAM), we organized a course on *Applied Taxonomy Exemplified by Recent Advances in Rotifer Taxonomy, and its Use and Implications for Biodiversity Conservation and Sustainable Use.* Dr. Hendrik Segers, the subject expert, is a renowned rotifer taxonomist and has also been working for several years as the Belgian National Focal Point to the Convention on Biological Diversity. He gave a series of lectures on the following themes

- State of the art of rotifer taxonomy, with special focus on knowledge gaps
- Why study rotifers? An overview of the unique features of the group, and their significance
- The convention on biological diversity and other multilateral environmental agreements related to biodiversity
- An introduction to the intergovernmental science-policy platform on biodiversity and ecosystem services (IPBES)
- How to engage in (international) biodiversity governance as a scientist?

In addition to these, a number of invited speakers presented topical issues. The first of these, *Contribution of Training Courses to the increase in our knowledge of Biodiversity-A case study on Zooplankton Studies in Mexico,* was given by Prof. H. J. Dumont of Ghent University, Belgium. With financial support from the the Belgian Ministry of Cooperation (ABOS) Prof. Dumont organized a series of training courses over 9 years, training participants from many countries from Africa, Asia, Europe, and North and South America in zooplankton taxonomy. Mexico and Thailand were among the countries that benefitted most from these courses. Participants from these courses returned to their home countries and contributed significantly to an increase in knowledge (40-75 %) on zooplankton diversity. Zooplankton studies in Mexico have steadily been increasing over the past 40 years. There has been an increase in our knowledge of protists by 58%, rotifers by 80%, cladocerans by 71%, copepods by 59% and large branchiopods by 39% (Sarma *et al.*, 2021; Cervantes-Martinez *et al.*, 2023). In spite of the investment in training participants from Africa, such a remarkable increase in the knowledge on the zooplankton diversity is not evident, most likely due to the lack of basic infrastructure. This highlights the importance of an urgent investment in equipment in universities, especially in Africa, to improve our knowledge on global diversity.

Second, Hesiquio Benítez, representative of CONABIO (an institution dedicated to the documentation of the biodiversity in Mexico) gave a talk on "Contribución del Órgano Científico a la COP e implementación del Convenio de la Diversidad Biológica en México". The CONABIO, after a series of meetings in 1991, was established by Presidential decree (March 1992) just a few months before the 1992 Rio Summit 1992. Since its inception, information on Mexican Biodiversity has been catalogued meticulously. Nowadays it is also focusing on relevant problems such as the effects of introduced species (CONABIO, 2010), one of the major problems facing freshwater diversity in our times (Downing, 2014).

Dr. Robert L. Wallace from Ripon College presented a talk on Information on the *Superorder Gnesiotrocha* with numerous suggestions for young and early career scientists to study. He has been working on sessile rotifers since late 1970s. Dr. Elizabeth Walsh, an expert in rotifer ecology and molecular studies gave an illustrative talk on *Rotifer Research in a Molecular Age.*

The inauguration of the course; from left to right Dr. S.S.S. Sarma, Dr. Hugo Perales, Dr. Nandini Sarma and Dr. Hendrik Segers

The experts and the participants in the laboratory (Zoología Acuática, FES Iztacala)

The accurate identification of rotifers is a demanding process. It takes time and adequate knowledge. Due to time limitations, we decided to apply a novel method to gain the maximum benefit from the comments of the invited subject expert, Dr. Segers. Prior to the workshop, students were encouraged to analyse several samples and microphotograph the rotifer species in different views. These were then presented as short talks by each student. The features to assign observed specimens to a particular genus or family were discussed in detail, to the benefit of all participants. Such technological means thus efficiently permit the taxonomic study of rotifers and to contact experts over long distances.

Hesiquio Benitez-Diaz and Hendrik Segers

In addition to the laboratory sessions, which were attended by 20 participants from Mexico, USA and India, the theoretical lectures were open to faculty and students from Mexico and the world. These talks were held in hybrid format and were attended by around 80 participants from Mexico, Peru, USA and India. For the benefit of the students the talks in English were translated into Spanish, by Padmini S. Sarma, a Tecnológico de Monterrey undergraduate student; the effort was much appreciated by the speaker and the participants.

The inauguration of the course was a formal event, presided by Dr. María del Coro Arizmendi, Dr. Hugo Perales Vela, Dr. Hendrik Segers and the authors of this text. The participants of the course organized a lunch in honour of the speaker, and a closing fun event with a *piñata*. Financial support for the course came from PAEP (UNAM) and additional grants were obtained from the Director of FES Iztacala.

We have organised several such courses in our laboratory over the past 25 years. We are convinced that exposure of young students to experts in the field of aquatic ecology has been a priceless experience and has helped to widen the view of students and has made them more aware of the further investigation dilemmas and paradigms in their field of research.

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With some of the students who took the course.

Join the SPS International Expert Working Group for the Eighth Sustainable Phosphorus Summit (SPS8), sponsored by SIL, taking place in Accra, Ghana, from September 30 to October 3, 2025. This interactive, interdisciplinary event will bring together researchers, policymakers, industry leaders, and stakeholders to tackle one of the world's most pressing challenges: securing a sustainable future for phosphorus. With a strong focus on African perspectives, SPS8 aims to foster cross-regional collaboration and generate concrete outcomes such as policy recommendations and actionable frameworks.

The Eighth (8th) Sustainable Phosphorus Summit (SPS8)

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