

Book of Abstracts

2025 Virtual All-Hands Meeting

October 27-31, 2025

Hosted by the Universidade do Estado de Minas Gerais and the Universidade Federal de Minas Gerais in GatherTown



global lake ecological observatory network

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Wildfire ashes alters foraging behaviour of a freshwater crab

Pétterson Batista Pereira da Silva¹

Diogo Ramos Pacheco², Sandro Santos¹, Bruno Renaly Souza Figueiredo²

¹Post-graduation program in Animal Biodiversity, Laboratory of Carcinology, Federal University of Santa Maria (UFSM)

²Post-graduation program in Ecology, Laboratory of Freshwater Biodiversity, Federal University of Santa Catarina (UFSC)

Wildfires have become more frequent and intense due to climate change, and the resulting ash can reach freshwater ecosystems through runoff, wind, or flooding, containing metals and potentially toxic organic compounds such as polycyclic aromatic hydrocarbons. This study experimentally tested the effects of different concentrations of ash on the behavior of the freshwater crab *Aegla jarai*, an important shredder of organic matter in South American freshwater environments. Ashes were produced by controlled combustion of plants typical of the fire-prone highland grasslands of southern Brazil. Individuals of *A. jarai* (n=42) were exposed for 48 hours in a 3x2 factorial design, combining three ash concentrations (0, 0.75, and 1.5 g/L) and two types of aqueous ash extracts (filtered and unfiltered), simulating the dissolved and particulate forms in which particles can occur in water. Behavioral tests were conducted to assess agonistic interaction, refuge use, and foraging before and after exposure, with a 5-minute acclimation period and video recording for subsequent analysis. Behavioral analysis revealed no significant differences in displacement times for agonistic interaction or refuge use across treatments. In contrast, a significant increase in displacement time during foraging was observed in individuals exposed to the unfiltered extract. These findings suggest that suspended ash particles can affect the foraging behavior of *A. jarai*, potentially impacting critical ecological processes such as detritus fragmentation, nutrient cycling, and the stability of benthic communities in freshwater ecosystems.

Greenhouse gas fluxes from lake littoral zones: macrophyte community composition and spatial variability in the GasLit Project

Anna Nyberg¹

Tonya Delontro², Meredith Holgerson³, Roxane Maranger⁴, Jorrit Mesman¹, Gesa Weyhenmeyer¹, Charlotte Grasset¹, GasLit Network⁵

¹Department of Ecology and Genetics, Limnology, Uppsala University, Uppsala, Sweden

²Department of Earth and Environmental Sciences, University of Waterloo, Waterloo, Ontario, Canada

³Department of Ecology and Evolutionary Biology, Cornell University, Ithaca, New York, USA

⁴Department of Biological Sciences, Université de Montréal, Montréal, Québec, Canada

⁵Various institutions

Macrophytes in littoral zones play a key role in shaping carbon and greenhouse gas fluxes, by for example providing organic matter that fuels methane (CH₄) and carbon dioxide (CO₂) production, and mediating gas transport between sediments and the atmosphere. Despite this, littoral zones of lakes are usually overlooked in continental carbon and greenhouse gas budgets. These productive nearshore areas potentially strongly affect both lateral (littoral-pelagic) and vertical (water-atmosphere) carbon fluxes in lakes.

As part of the Greenhouse Gas Littoral (GasLit) Project, we are investigating spatial variability in CO₂ and CH₄ concentrations across vegetated and unvegetated littoral zones in lakes spanning multiple regions. Sampling methods include collecting dissolved gas samples using the headspace method, measuring diffusive fluxes with chamber measurements and using bubble traps for ebullition, according to a standardised protocol. Data collection is ongoing, and this poster will present an overview of the project, protocol and collaborative network.

Association between macroplastic pollution and enteric viruses in urban freshwater ecosystems

Gustavo Kirsch¹

Eduardo A. Guimarães^{1,2}, Laíse D. Gasparetto¹, Luan H. Armando¹, Catielen P. Pavi², Gislaine Fongaro², Bruno R. S. Figueiredo¹

¹Laboratory of Aquatic Biodiversity, Department of Ecology and Zoology, Federal University of Santa Catarina, Florianópolis, SC, Brazil

²Laboratory of Applied Virology, Department of Microbiology, Immunology and Parasitology, Federal University of Santa Catarina, Florianópolis, SC, Brazil.

As plastic pollution becomes pervasive in freshwater ecosystems, its role as a vector for pathogenic microorganisms has gained attention. Macroplastics (>2.5 cm) provide stable substrates for biofilm formation, which can adsorb and protect pathogens from environmental stressors, promoting their persistence and spread. However, studies demonstrating the convergence of macroplastic pollution and viral load in freshwater ecosystems remain scarce. We investigated the relationship between the occurrence of human enteric viruses: noroviruses (HNoV-GI and HNoV-GII), rotavirus A (RV-A), hepatitis A and E viruses (HAV and HEV), and adenovirus (HAdV), and macroplastic abundance across ten lotic ecosystems within a metropolitan region of southern Brazil. Viral sampling was performed in triplicate from both water (3 L per site, collected directly and via adsorption onto a sponge for one hour) and sediment. Samples were concentrated and analyzed by qPCR/RT-qPCR. Macroplastics were collected from surface waters within three plots (3 m diameter each) along a 100 m transect per site, and classified by use, color, and integrity. Generalized linear models revealed that RV-A loads in water samples were significantly higher in streams heavily polluted by macroplastics, suggesting a substrate–virus interaction. No significant relationship was found between macroplastic abundance and enteric viruses in sediments. These findings indicate that plastic pollution, besides contaminating water and compromising its quality and biodiversity, may increase the loads of specific enteric viruses. Macroplastics thus act as persistent substrates facilitating RV-A accumulation and dissemination, reinforcing the need for integrated monitoring of plastic debris and viral contaminants in freshwater systems.

Urban land use and phosphorus enrichment jointly predict macroplastic pollution in lotic ecosystems

Laíse D. Gasparetto¹

Gustavo Kirsch¹, Claudinei J. Rodrigues², João M. C. Manso¹, Igor M. Prado¹, Lucas G. Miguel¹, Bruno R. S. Figueiredo¹

¹Laboratory of Freshwater Biodiversity, Department of Ecology and Zoology, Federal University of Santa Catarina, Florianópolis, SC, Brazil

²Chico Mendes Institute for Biodiversity Conservation, Florianópolis, SC, Brazil

The large-scale production and inadequate disposal of plastics contaminate watercourses, threatening freshwater biodiversity and representing an emerging global environmental challenge. There is limited information on whether anthropogenic-mediated changes in land use, especially urbanization, are the main factor behind macroplastic accumulation in freshwaters. Here, we sampled macroplastics (particles > 2.5 cm) in three circular plots (3 m in diameter each) distributed along a 100 m stretch of the surface water of 12 streams, to test which environmental variables better predict macroplastic abundance and their characteristics. Collected macroplastics were classified by use, color, and physical integrity. A land-cover data layer from 2024 was obtained from the MapBiomas project to estimate natural and urban areas in the entire catchment upstream from the sampling sites. Generalized linear models showed that macroplastics were significantly more abundant in areas with higher phosphorus concentrations and a higher proportion of urban areas in the catchment. Also, redundancy analysis revealed that some macroplastic characteristics, such as food packaging, bags and sacks, colored and white plastics, and fragmented pieces, were most strongly associated with urbanization. Hierarchical cluster analysis based on Bray–Curtis showed that watercourses in catchments with a higher urban area were the most dissimilar sites in terms of macroplastic characteristics compared to streams in catchments with a lower urban area. These findings reinforce the link between urbanization and freshwater macroplastic pollution, revealing plastic debris patterns clearly related to urban areas and highlighting the need for strategies to mitigate plastic contamination in watercourses.

Untangling the relationship between landscape and water quality: a multi-buffer analysis across seasons

Bianca Loureiro do Valle¹

Diego Guimarães Florêncio Pujoni¹, Gabriel Pereira², Francielle da Silva Cardozo², Lorena Torres Oporto¹, João Vitor de Alvarenga Martins³, Daiana dos Reis Pelegrine¹, Thiago Marques Salgueiro¹, Carlos Magno Oliveira Tadeu¹, José Fernandes Bezerra-Neto¹

¹Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brasil

²Departamento de Geociências, Universidade Federal de São João del-Rei, São João del-Rei, Minas Gerais, Brasil

³Departamento de Geografia, Universidade de São Paulo, São Paulo, Brasil

Riparian zones are widely recognized as essential buffers that regulate pollutant transport to rivers. In regions with expressive land-use change, such as the Doce River basin in Brazil, understanding how these zones help maintain water-quality is crucial for effective conservation. However, the factors that influence the explained variance of this relationship, especially the spatial scale of the buffers, remain poorly understood. Here, we investigated the explained variance of models based on composition (LULC) and landscape metrics on river water-quality across seven buffer widths and six buffer lengths, considering different years and seasons. We sampled water were collected in January (2023, 2024) and July (2022, 2023) at 14 sites along the Doce River and 6 along the Santo Antônio River analyzing dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), total phosphorus (TP), total nitrogen (TN), ammonium (NH₄⁺), nitrate (NO₃⁻), chlorophyll-a, dissolved Fe, dissolved Al, and total Mn. High-resolution Planet imagery was used to generate buffers with seven widths and six lengths. We applied redundancy analysis, variation partitioning, and relative importance analysis. We found that configuration metrics such as the percentage of like adjacencies (PLADJ) and patch density (PD) outperformed composition in explaining water-quality variation. When only composition was considered, wider buffers increased model performance; however, this scale effect disappeared once configuration metrics were included. Seasonality was pronounced, with landscape water-quality relationships stronger in the dry season. The relative contribution of buffer width vs. length remained stable across seasons. Our results highlight that configuration metrics are critical for optimizing monitoring and management.

Patterns and Drivers of Water Quality Variation in Western Lake Erie Tributaries

Alex Ferkul¹

Nitin Singh², Ruchi Bhattacharya³

¹Cleveland State University

²Assistant Professor of Environmental Systems, Department of Crop, Soil and Environmental Sciences, Auburn University, Auburn, AL, USA

³Assistant Professor Earth System Science & Data Analytics, Dept. of Biological, Geological & Environmental Sciences, Cleveland State University, Cleveland, OH, USA"

The Western Lake Erie Basin (WLEB) has been subject to a prolonged history of water quality issues, including harmful algal blooms (HABs) fueled by inputs from surrounding tributaries. For this study, water quality data spanning 1990 to 2022 from three major tributaries (Maumee River, River Raisin, and Sandusky River) and two sub-tributaries (Honey and Rock Creek) was used in conjunction with a suite of landscape and climate variables. Multivariate analysis was conducted to explore trends and identify key drivers of variation in water quality. Between 1997 to 2002, soluble reactive phosphorus (SRP) flow-weighted concentration (FWC) significantly increased while nitrate/nitrite (NO₃⁻/NO₂⁻) FWC significantly decreased between 2003 and 2007 for all tributaries. A reduced set of key variables explained 55.1% of variation in water quality from 1990 to 2011. Clay (%) and flashiness (tile drainage proxy) were associated with higher transport of total suspended solids and total phosphorus while rate of fertilizer application was correlated to higher SRP and NO₃⁻/NO₂⁻ FWC. SRP FWC was also influenced by changes in tillage practices adopted in some watersheds. Clay soils are susceptible to the formation of preferential pathways that transport runoff into tile drainage systems that strengthen the connection between the landscape and tributaries. Thus, nutrient applications are at risk of entering waterways when not used properly with appropriate tillage practices. This research highlights how modifications of the landscape, agricultural practices, and inherent properties of a watershed impact water quality and emphasizes the need for continued monitoring of probable drivers.

Opportunities for collaboration and training through the Global Lake Ecological Observatory Network (GLEON) Student Association

Lipa G. T. Nkwalale¹

Keerthana Suresh², Anna G. Schmidt³

¹Department of Lake Research, Helmholtz Center for Environmental Research (UFZ), Magdeburg, Germany

²Department of Physical Geography, Faculty of Geosciences, Utrecht University, Utrecht, The Netherlands

³Department of Biology, University of Vermont, Burlington, Vermont, USA

The Global Lake Ecological Observatory Network (GLEON) is an international grass-roots, voluntary network of researchers, educators, and community groups interested in conducting team science to advance our understanding of lakes and their benefits in a changing environment. GLEON comprises 850+ members from 62 countries across six continents, spanning limnology, ecology, information technology, and engineering focused on building a global network of lake ecology observatories, creating theoretical models based on extensive data, integrating new technologies, fostering team science education, and public engagement. GLEON aims to provide a unique learning experience for students from a wide range of backgrounds and disciplines, offering many opportunities to get involved, contribute, collaborate and learn. The unique Working Group structure of GLEON encourages student leadership of projects, and many GLEON students are co-leading Working Group projects and publications. Within GLEON, the GLEON Student Association (GSA) advocates for students, fostering effective communication and collaboration. The GSA addresses student needs, promotes well-being, provides training opportunities, and ensures student perspectives in decision-making. The association organizes workshops and initiatives to enhance the overall student experience in a positive and inclusive scientific environment. The GSA is run by and for GLEON student members with direction from the GLEON Steering Committee. Through its various subcommittees (Workshop, Communications, and Poster), the GSA provides various enriching training and leadership opportunities for students in the GLEON network. Any student (undergraduate, master's, Ph.D.) is encouraged and welcome to help coordinate various GSA initiatives including our monthly Limnoseries, GLEON blog posts, networking activities, and poster session planning.

Papel das áreas úmidas costeiras na mitigação da eutrofização

Alice N. Carvalho^{1,2}

Claudinei José Rodrigues¹, Schayana Bonin dos Santos¹, Vicktoria Matte¹, Heitor Shimitz¹, Luís, Fernando Oliveira de Matos¹, Paulo Roberto Pagliosa², Nei Kavaguichi Leite³

¹Laboratório de Análise da Água do NGI Florianópolis - Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio)

²Universidade Federal de Santa Catarina (UFSC) - Laboratório de Biodiversidade Costeira (BIOCOST)

³Universidade Federal de Santa Catarina (UFSC) - Laboratório de Ecologia de Águas Continentais (LIMNOS)

Áreas costeiras úmidas (estuários e manguezais) fornecem diferentes serviços ecossistêmicos (suporte, cultural, provisão e regulação). Quando localizadas em ambientes urbanos, as áreas úmidas costeiras têm o potencial de atenuar a poluição hídrica oriunda da urbanização. Neste trabalho, organizamos e analisamos um banco de dados de qualidade da água superficial da Bacia Rio do Tavares, localizada na Ilha de Santa Catarina - Brasil. Os dados levantados são de diferentes fontes, como estudos acadêmicos (artigos, dissertações e teses) e relatórios obtidos junto a órgãos públicos locais. O banco de dados abrange o período de 28 anos (1992 a 2020), no qual foram realizadas 552 coletas. Avaliamos o papel das áreas úmidas (caracterizadas pela presença de manguezais) como atenuadora da eutrofização causada pela urbanização. No estudo comparamos as áreas úmidas e áreas adjacentes (a montante) na bacia hidrográfica usando o Índice Trófico (TRIX). Os dados demonstram que, dentro das áreas úmidas, há predominância de águas oligotróficas ($TRIX < 4,0$), enquanto as áreas a montante da área úmida, área urbanizada, predominam condições mesotróficas ($TRIX \geq 4,0$). As diferenças do estado trófico dentro e fora da área úmida foram estatisticamente significativas (teste K-S; $p = 2.2 \times 10^{-12}$) ressaltando o papel da zona úmida na proteção da eutrofização de áreas costeiras. Processos físicos, químicos e biológicos que ocorrem nas áreas úmidas costeiras são responsáveis por mitigar os impactos da eutrofização. No entanto, a montante das áreas úmidas, observou-se maior ocorrência de hipóxia que pode afetar drasticamente o funcionamento desses ecossistemas, levando à perda de serviços ecossistêmicos.

Antagonistic effect of changing salinity and dissolved organic carbon on N₂O production via different pathways in saline lakes

Xiaoxi Sun¹

Hongchen Jiang¹

¹State Key Laboratory of Geomicrobiology and Environmental Changes, China University of Geosciences, Wuhan, Hubei, China

Saline lakes are experiencing significant changes in salinity and organic matter content due to climate change. However, the specific impacts of these environmental changes on the production processes of nitrous oxide (N₂O)—particularly nitrification and denitrification—in saline lake sediments are still poorly understood, leading to significant uncertainty in current estimates of greenhouse gas (GHG) emission from these ecosystems. Here, we employed ¹⁵N-isotope labeling, functional gene quantification, and structural equation modeling to elucidate N₂O production pathways and rates in surface sediments along a salinity gradient (0.7–149.3 g/L) within Qinghai-Tibet Plateau (QTP) lakes undergoing rapid desalination and organic carbon enrichment.

The results identified saline lake sediments as hotspots for N₂O production, with nitrification contributing an average of 43.51% to N₂O flux and reaching up to 91.73% in specific high-salinity habitats, highlighting its previously underestimated significance. Salinity was found to limit N₂O production through both nitrifying and denitrifying processes in lake sediments, although dissolved organic carbon (DOC) in the sediment could counteract the limitation caused by salt. Low-salinity systems (<35 g/L) exhibited predominant salinity-related inhibition of denitrification, whereas high-salinity systems (>35 g/L) displayed DOC-mediated counteraction of salinity stress, stimulating both denitrification and heterotrophic nitrification through alterations in microbial community structure. This finding illustrates that climate-driven freshening and organic carbon loading synergistically exacerbate N₂O emissions in saline lakes. While denitrification remains dominant, heterotrophic nitrification pathways are increasingly significant under saline conditions. This highlights susceptibility of cryosphere-affected ecosystems to hydrological disturbances, and emphasizes the necessity of refining global GHG inventories by incorporating context-dependent N₂O source partitioning.

Três Décadas de Monitoramento da Qualidade da Água em Florianópolis: Evidências do Impacto da Urbanização e do Saneamento sobre Bacias Urbanas

Luis Fernando Oliveira De Matos¹

Claudinei José Rodrigues¹, Alice Nunes Carvalho¹, Schayana Bonin dos Santos¹, Victoria Matte¹, Heitor Shimitz¹, Paulo Roberto Pagliosa², Nei Kavaguichi Leite²

¹Laboratório de Análise da Água do NGI Florianópolis - Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio).

²Universidade Federal de Santa Catarina (UFSC)

A intensa atividade antrópica em ambientes urbanos impacta a qualidade da água, contudo, apesar da crescente urbanização que ocorre no Brasil, programas de monitoramento contínuo são escassos. Neste trabalho organizamos um banco de dados de qualidade da água superficial para Florianópolis composto por 28 fontes, entre estudos acadêmicos e relatórios obtidos junto a órgãos públicos. A série temporal, com 32 anos de dados (1992 a 2023), totaliza 46.965 análises. Para avaliar os dados utilizamos duas abordagens: o percentual de atendimento à resolução CONAMA 3357/05 e o índice de poluição de Nemerow – NPI.

Considerando as quatro bacias hidrográficas analisadas (Ratones, Saco Grande, Itacorubi e Tavares), os parâmetros mais críticos foram: carbono orgânico total (98%), surfactantes (72%), E. coli (71%), fósforo total (64%) e oxigênio dissolvido (60%).

A bacia do Ratones teve o maior número de amostras analisadas (11.924). Já a bacia do Itacorubi apresentou a pior qualidade, com 54% das amostras acima do limite permitido, predominando as categorias de qualidade da água “Poluído” e “Severamente Poluído”. Nas bacias do Ratones, Saco Grande e Tavares, predominaram as categorias “Poluição Leve” e “Poluído”.

Os dados revelam que a urbanização e a deficiência de saneamento básico afetam a qualidade da água. A do Itacorubi, a mais urbanizada (61%), e a do Tavares, que carece de esgotamento sanitário, exemplificam essa relação. Isso demonstra a urgência de políticas públicas que priorizem o monitoramento, a ampliação do saneamento e a tomada de decisões que visem garantir a saúde ambiental e a segurança hídrica da região.

Bridging the Gap in Understanding the Effects of Floating Photovoltaic Systems on Dissolved Oxygen

Pedro Gabriel¹

Michael Mannich²

Andreas Lorke³

¹Postgraduate Program in Environmental Engineering

²Department of Environmental Engineering

³Department of Environmental Physics

The rapid expansion of floating photovoltaic (FPV) systems on inland water bodies has raised growing concerns about their potential environmental impacts, particularly regarding dissolved oxygen (DO), a key indicator of water quality. Although the effects of FPVs on evaporation and thermal dynamics are relatively well understood, their influence on the physical processes governing gas exchange and oxygen consumption at the air–water interface remains insufficiently explored. This study examines how FPV installations affect both the reaeration rate and the nighttime oxygen consumption across the air–water boundary. To achieve this, we applied the nighttime regression method—which estimates reaeration and consumption from the nighttime decline in DO concentrations—to high-frequency data collected over eight months in the Passaúna Reservoir (Paraná, Brazil) under varying wind conditions. To improve robustness, the DO time series were smoothed using LOESS (Locally Estimated Scatterplot Smoothing), minimizing noise and spurious fluctuations. The results reveal that FPV coverage can significantly modify both oxygen exchange and consumption rates relative to open-water areas, with pronounced variations—particularly under low wind conditions. These findings demonstrate the sensitivity of both reaeration and respiration to FPV-induced physical alterations and emphasize the need to consider such effects in environmental assessments and the planning of future FPV developments.

Understanding how changing winters are affecting under-ice dynamics

Hannah Cane¹

North Rebecca Holgerson², Meredith Morales³, Mindy Oleksy⁴, Bella Richardson⁵, David Kelly¹, Adeline Price⁵, Andrea Velasquez², Mayra Yokota², Kiyoko Wain⁶, Danielle Farragher⁷, Matt Socha⁷, Ellie Knoll³, Lesley Gannon⁸, Katie Ross⁵, Abbey Higgins⁵, Scott Hrycik⁹, Allison Wigdahl¹⁰, Courtney Pop¹¹, Julia Havens⁵, Sonya Ajayan⁹, Anila Vanpelt⁴, Kayla Miller¹², Madison Gager⁸, Bryan Small⁵, Gabby Weg¹, Sophia Rasic Stagnar¹, Solva Baez¹, Rodolfo Dougherty¹, Charlie Hendrickson⁵, Eva Henderson⁴

¹SUNY New Paltz

²University of Missouri

³Cornell University

⁴University of Vermont

⁵University of Colorado Boulder

⁶State University of New York at Oneonta

⁷Lakes Alliance

⁸Miami University (Ohio)

⁹IISD-ELA

¹⁰RPI

¹¹Fredonia

¹²SUNY Oneonta

Winters are becoming warmer and shorter, leading to a loss of ice cover on lakes. Warmer winters will result in decreasing lake ice cover and thickness affecting ice transparency and accumulation of snow on the lake. We expect changing ice cover to increase phytoplankton blooms, including both cyanobacteria and eukaryotic taxa, threaten water quality, drinking water supplies, recreation, and energy flow through food webs. Despite the risks, current ecological theory and field sampling methods are not well equipped to predict alterations to phytoplankton structure and function throughout the entire year, including winter. Our project (Thin Ice) compares lakes across a latitudinal gradient (Ontario to Florida) to span a variety of ice cover conditions, ranging from long ice cover to intermittent to ice-free. We focus on how ecosystem memory of winter conditions may result in altered spring and summer ecosystem conditions, including changes in cyanobacteria biomass, toxin production, and lake metabolism. We present our experimental approach with our expectations based on preliminary results. Our project assesses how changing winters will ultimately affect basal ecosystem structure and function in every season.

Seasonal variability and uncertainty in degassing fluxes in a temperate hydropower reservoir emphasizes need for high-frequency monitoring

Rachel M. Pilla¹

Natalie A. Griffiths¹, Carly Hansen¹, R. Trent Jett¹, Michael Jones¹, Nikki Jones¹, Trystan Bordeau¹

¹Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA

Globally, human-made reservoirs are important ecosystems in inland water carbon processing, and reservoirs can be hotspots of methane (CH₄) fluxes. In many hydropower reservoirs, one CH₄ flux pathway is via degassing, where deepwater intakes can pull water with high dissolved CH₄ concentrations through turbines. When this water is removed from deepwater pressure and circulated during power generation, much of the dissolved CH₄ is released (“degassed”) into the atmosphere. While this flux pathway is understudied, a global modelling study suggested it can account for over one-third of carbon fluxes from hydropower reservoirs. In 2023-2024, we conducted monthly sampling at Douglas Reservoir (Tennessee, USA) to quantify seasonal patterns in CH₄ degassing. Across this year, CH₄ degassing was highest in summertime due to CH₄ accumulation in deep waters. These high summertime degassing fluxes were greater than that of both CH₄ ebullition and diffusion. In contrast, degassing was very low much of the rest of the year during mixed conditions when CH₄ did not accumulate in deep waters. However, due to the relatively coarse monthly sampling, we could not precisely quantify the duration of the period when degassing fluxes were dominant. To address this in future work, we installed an autonomous high-frequency sensor system in reservoir’s pumphouse to measure gas concentrations and flow at 15-minute intervals. We plan to use this monitoring system to more precisely assess the temporal patterns in degassing fluxes in response to reservoir phenological patterns and weather events to better understand the role of degassing in hydropower reservoir carbon accounting.

Climate change and the future of biological invasions: divergent risks of wetland grasses in protected areas

Larissa Carrara¹

Diogo Ramos Pacheco¹, Amanda C. Stuermer¹, Lindamir H. Pastorini², Luiz A. Souza², Bruno R. S. Figueiredo¹

¹Graduate Program in Ecology, Department of Ecology and Zoology, Federal University of Santa Catarina (UFSC), Campus Universitário, Edifício Fritz Müller, Bloco B, Córrego Grande, 88040-970, Florianópolis, SC, Brazil.

²Department of Biology (DBI), Center of Biological Sciences (CCB), State University of Maringá (UEM), Maringá, Brazil.

Climate change is exacerbating biological invasions, threatening global biodiversity, particularly in vulnerable wetland ecosystems. Wetlands are biodiversity hotspots that provide essential ecological services but are highly sensitive to both climatic changes and biological invasions. Yet, predictive assessments integrating climate projections and invasion risk remain scarce for these systems. This study used Species Distribution Modeling (SDM) to assess the divergent future risks of two grasses under projected climate change scenarios: the invasive alien *Urochloa mutica* and the native South American *Panicum dichotomiflorum*. Our projections for 2070 indicate a significant longitudinal climatic niche shift for *U. mutica*. The species is expected to lose suitable habitat across its current invaded range in tropical Brazil but find highly favorable conditions to invade protected wetland areas in Central Europe. This represents a critical emerging threat to European native flora. In stark contrast, the native *P. dichotomiflorum* is predicted to lose much of its historical range while simultaneously gaining suitability in new adjacent areas. This exhibits its potential to become a "range-shifter", a native species that turns invasive by outcompeting other native flora in novel environments. This dual threat, posed by a globalizing alien species and an expanding native one, can trigger cascades of novel ecological interactions and fundamentally alter ecosystem functions. The ecological plasticity of both species, which allows them to transition across ecosystem boundaries, amplifies this risk significantly. Furthermore, anthropogenic disturbances, such as land-use change, can accelerate these invasions by creating newly disturbed and susceptible habitats, providing pathways for establishment.

Spatial Heterogeneity in Metabolism-Discharge Relationships Across a Tropical River

Carlos Magno Oliveira Tadeu¹

Ludmilla Silva Brighenti², Cristiane Freitas de Azevedo Barros³, Daiana dos Reis Pelegrine¹, Diego Guimarães Florencio Pujoni¹, Lorena Torres Oporto¹, Thiago Marques Salgueiro¹, José Fernandes Bezerra Neto¹

¹Limnea, ICB, UFMG - Universidade Federal de Minas Gerais, Av. Antônio Carlos, 6627, Pampulha, Belo Horizonte, Minas Gerais, Brazil

²UEMG - Universidade do Estado de Minas Gerais, Av. Paraná, 3001, Divinópolis – MG

³UEMG - Universidade do Estado de Minas Gerais, Av. São Paulo, 3996, Vila Rosário, Ibirité."

Understanding River metabolism responses to hydrological variation is crucial for predicting carbon cycling in changing climates, particularly in understudied tropical ecosystems. We hypothesized that metabolism–discharge (Q) relationships display consistent spatial heterogeneity across a large tropical network and that using both maximum-likelihood (MLE) and Bayesian frameworks increases estimate robustness and completeness. This study investigated the spatial variability of discharge (Q) relationships with gross primary production (GPP), ecosystem respiration (ER), and gas exchange (K_{600}) in the Doce River, Brazil. We employed the streamMetabolizer package in R, implementing both maximum likelihood estimation (MLE) and Bayesian modes. Data from eight stations collected during September 2023, March 2024, and September 2024 underwent rigorous preprocessing including outlier detection via IQR method with linear interpolation, timestep verification, and data quality control. Metabolic parameters were estimated using both modeling approaches, and discharge relationships were quantified through ordinary linear regression with significance testing ($p < 0.05$). Results revealed strong spatial heterogeneity: GPP generally decreased with Q at multiple sites, indicating autotrophic suppression during high flow. ER showed fewer negative relationships with Q, suggesting context-dependent heterotrophic responses, and K_{600} increased with Q at a subset of stations, reflecting enhanced air–water gas exchange under higher hydraulic energy. The dual-model approach (MLE+Bayes) provided robust parameter estimation, with Bayesian methods yielding more complete ER and NEP datasets. Together, these heterogeneous responses reflect differences in local channel morphology and hydraulics, demonstrating that Q exerts a consistent constraint on autotrophic processes but variable effects on heterotrophic and physical processes across the network.

Forest–grassland mosaics drive aquatic insect community structure across spatial scales

Diogo R. Pacheco¹

João Miguel da Costa Manso¹, Ronnilda Maria Gonçalves Araujo¹, Pedro Henrique Santos Ferreira², Bruno Renaly Souza Figueiredo¹

¹Laboratory of Freshwater Biodiversity, Department of Ecology and Zoology, Federal University of Santa Catarina, Florianópolis, SC, Brazil

²Laboratory of Ecology and Conservation of Aquatic Ecosystems, Institute of Biological and Health Sciences, Federal University of Mato Grosso, Araguaia Campus, Pontal do Araguaia, MT, Brazil

The structure and composition of aquatic insect communities are shaped by abiotic and biotic factors across multiple spatial scales, with the landscape acting as an environmental filter. For example, some insects are more commonly found in streams surrounded by forests, while others are well-adapted to streams in native grasslands. Understanding the role of landscape features in community structuring is therefore crucial for mitigating biodiversity loss and guiding conservation efforts, particularly in scenarios of rapidly changing land use and land cover. Here, we sampled aquatic insect communities in 10 streams with varying proportions of native forest–grassland in their catchments, as determined through geoprocessing, using a multiscale spatial approach (catchment, riparian, and local). Specifically, we tested the relationship between landscape characteristics (forest and grassland cover) and community attributes (alpha and beta diversity) of aquatic insects from the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT). We found a total of 1,246 EPT individuals. The EPT community structure was significantly associated with land-cover gradient, with greater taxonomic uniqueness in grassland-dominated landscapes, a high contribution of species turnover to beta diversity, and distinct community compositions between grassland and forest. Riparian and catchment scales were the best scales for EPT community composition. These results suggest that both grasslands and forests are essential for preserving the EPT community and the uniqueness of their species composition. Considering the multiscale interactions that shape aquatic insect communities can inform more effective biodiversity conservation strategies. Future studies should investigate whether similar multiscale biodiversity patterns occur in other biological groups.

Investigating the effects of Lake Trout suppression on water quality in Yellowstone Lake

Isabella Sadler¹

Lusha Tronstad², Annika Walters³, Todd Koel⁴

¹Wyoming Cooperative Fish and Wildlife Research Unit, Department of Zoology and Physiology, University of Wyoming, Laramie, WY 82071

²Wyoming Natural Diversity Database, Department of Zoology and Physiology, University of Wyoming, Laramie, WY 82071

³US Geological Survey, Wyoming Cooperative Fish and Wildlife Research Unit, Department of Zoology and Physiology, University of Wyoming, Laramie, WY 82071, USA

⁴U.S. National Park Service, Yellowstone Center for Resources, Native Fish Conservation Program, Yellowstone National Park, WY

The spread of invasive fish is a pressing ecological issue that directly and indirectly alters the water quality of lakes. Managers often implement invasive fish suppression programs, but their effects on water quality are rarely examined. Yellowstone Lake provides an opportunity to study how a large-scale suppression program alters nutrient dynamics. Invasive Lake Trout (*Salvelinus namaycush*) have been removed through gillnetting since 1995 due to their negative effects on native Yellowstone Cutthroat Trout (*Oncorhynchus virginalis bouvieri*). The carcasses are returned to the depths of Yellowstone Lake, potentially altering nutrient cycling through carcass decomposition. Additionally, the park is exploring the novel use of carcass-analog pellets to induce mortality of Lake Trout embryos, which adds 0.3 mg N/m² and 0.004 mg P/m² to one spawning reef. Our objectives are to understand baseline conditions and spatiotemporal patterns in water quality and assess the effects of the carcass-analog pellet treatment. We monitored nitrogen, phosphorus, and several water quality variables biweekly during the open water season from 2023 to 2025 at four locations. We measured nutrient concentrations before and after the pellet treatment at 20 locations, increasing in distance from the treatment site. Nutrient concentrations exhibited seasonal variation with high concentrations after ice-off. The Southeast Arm exhibited higher chlorophyll concentrations than the other three locations. The carcass-analog pellet treatment produced minimal effects on water quality surrounding the treatment site and lake-wide. Further monitoring will inform park managers about the effects of carcass-analog pellets and assist their decision-making regarding future application.

Post-fire regeneration in amphibious native and exotic Poaceae species

Amanda C. Stuermer¹

Larissa Carrara¹, Bruno Renaly Souza Figueiredo¹

¹Department of Ecology and Zoology, Federal University of Santa Catarina, Florianópolis, Santa Catarina, Brasil

Fire events have increased around the world as a consequence of climate change. Fires can modify plant community composition through the removal of established species and increase in the availability of soil nutrients, which leads to favorable conditions for opportunistic species. Species ability to survive and regenerate after fire will contribute to determine their success or failure in establishing and developing after a disturbance. However, species exhibit different responses to fire, which can influence the dynamics of the recovering community and favor disturbance-resistant species. This study aimed to verify whether an invasive exotic species (*Urochloa arrecta*) and a native species (*Hemarthria altissima*) differ in regeneration after fire and whether there is a difference in species sprouting rate, biomass production and allocation, total growth and resprouting rate after fire. We conducted two greenhouse experiments: the first aimed to evaluate differences in sprouting rates between the two species under normal conditions and the second evaluated the species' responses to fire in monocultures. Both species produced more biomass after fire, however the invasive species showed greater regenerative capacity, producing a greater amount of biomass after fire compared to the native species. Biomass allocation differed between species, as the invasive invested more resources in the roots while the native invested in aerial parts. *Urochloa arrecta* had higher sprouting rate under natural conditions and higher resprouting capacity after fire. Our results indicate the potential of fire to act as a facilitator of the establishment of an invasive species in humid and aquatic environments in Brazil.

Understanding lake phytoplankton-zooplankton interactions on a global scale

Chase J. Rakowski¹

Jason D. Stockwell², Stephanie E. Figary², Michael F. Meyer³, Rachel M. Pilla⁴, Orlane Anneville⁵, Warren J. S. Currie⁶, Isabella A. Oleksy⁷

¹Institute of Arctic and Alpine Research, University of Colorado Boulder, Boulder, Colorado, USA

²Rubenstein Ecosystem Science Laboratory, University of Vermont, Burlington, Vermont, USA

³Oregon Water Science Center, US Geological Survey, Portland, Oregon, USA

⁴Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA

⁵National Institute for Agricultural Research, UMR Centre Alpin de Recherche sur les Réseaux Trophiques des Ecosystèmes Limniques, Thonon-Les-Bains, France

⁶Great Lakes Laboratory for Fisheries and Aquatic Sciences, Fisheries and Oceans Canada, Burlington, Ontario, Canada

⁷Institute of Arctic and Alpine Research, University of Colorado Boulder, Boulder, Colorado, USA

One of the most urgent challenges in ecology is predicting the effects of biodiversity change on ecosystem functions and associated ecosystem services. However, making such predictions is difficult because ecosystem functions are influenced by species interactions which themselves can vary with the community and regional context. Freshwater plankton provide multiple important ecosystem services, but freshwater communities are especially prone to biodiversity loss and invasive species, causing widespread changes in community composition and species interactions. While phytoplankton and zooplankton often interact strongly, basic patterns of freshwater plankton interactions across a global scale are not well described. To address this gap, we are compiling a global dataset of phytoplankton and zooplankton taxon abundances by combining data from lakes shared by both the Zooplankton International Geospatial dataset (ZIG) and the Global Evaluation of the Impacts of Storms on freshwater Habitat and Structure of phytoplankton Assemblages (GEISHA) dataset. We will employ time series analyses, GLMMs, and multivariate analyses to uncover general relationships between phytoplankton community properties and zooplankton community properties around the world. One of our predictions is that copepod dominance will predict phytoplankton composition and abundance, with calanoid copepods associated with low phytoplankton abundance and cyclopoid copepods associated with high phytoplankton abundance. Finally, we will test whether these lake plankton relationships vary by region, with stronger trophic interactions predicted in colder regions. As freshwater biodiversity changes rapidly around the globe, our results will facilitate predictions of changing freshwater ecosystem functions and services such as water quality and purification.

A Whole Ecosystem Experiment to Assess How Late-Summer Mixing Effects Pond Methane Dynamics

Katherine Stenehjem¹

Meredith Holgerson¹, Pascal Bodmer¹

¹Cornell University

Ponds emit significant amounts of methane (CH₄) into the atmosphere; however, these emissions are very uncertain at regional and global scales. Among the sources of uncertainty are the mechanisms and timing of CH₄ emissions. Most temperate ponds stratify in summer, allowing CH₄ to accumulate in the hypolimnion between mixing events, especially if those waters become anoxic. When mixing occurs, accumulated CH₄ can either be oxidized or emitted to the atmosphere. Summer storms are increasing in frequency and intensity with climate change, potentially increasing the frequency of summertime mixing and altering the fate (oxidation vs. emissions) of CH₄. In this study, we experimentally mixed a dimictic pond over two days in late summer using a water circulator. Before, during, and after induced mixing, we tracked changes in methane concentrations, ebullition, diffusive flux, and oxidation (using stable isotopes). The pond began to re-stratify immediately after the circulator was turned off, but post-mixing stratification was far weaker than pre-mixing stratification and the pond mixed several times before fall turnover. Methane concentrations declined rapidly during mixing and remained lower than pre-mixing concentrations through the end of the study. Our results will contribute to the understanding of how mixing events impact the fate of pond methane and will help constrain estimates of pond methane emissions.

Spatial versus temporal influence on CDOM variability in tropical lentic and semi-lentic systems: evidence from a tropical river basin, Brazil

Lívia M. M. Oliveira¹

Laura M. Gagliardi², Diego G. F. Pujoni³, Luciana P. M. Brandão³, Mariana N. Moura², Ludmila S. Brighenti⁴

¹Departamento de Ciências Naturais e da Terra, Universidade do Estado de Minas Gerais, Divinópolis, Minas Gerais, Brazil

²Amplo Engenharia e Gestão de Projetos Ltda., Belo Horizonte, Minas Gerais, Brazil

³Departamento de Genética, Ecologia e Evolução, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil

⁴Departamento de Ciências Naturais e da Terra, Universidade do Estado de Minas Gerais, Divinópolis, Minas Gerais, Brazil

Chromophoric dissolved organic matter (CDOM) plays a central role in regulating the optical and biogeochemical processes of aquatic ecosystems, influencing light availability, primary productivity, and water quality. In tropical environments, CDOM variability is driven by spatial factors such as morphometry, depth, and land use, as well as by temporal factors associated with hydrological seasonality. This study aimed to investigate whether variations in CDOM optical indices in (semi) lentic environments are primarily driven by spatial heterogeneity among environments and sampling sites or by seasonal dynamics between dry and rainy periods. The indices a_{254} , SUVA₂₅₄, S_{275–295}, and SR, and the light attenuation coefficient (K_d), were analyzed in three marginal lagoons and two contrasting reservoirs - 1 with 2 billion cubic meters of water and 63 years of operation and 1 with 240,000 cubic meters and 15 years of operation. Variance partitioning analyses showed that spatial variation explained 19% to 29% of the variability in the indices, whereas seasonality accounted for less than 6%, indicating that spatial differences, even among sites within the same water body, exert greater influence than temporal factors. K_d values were higher during the rainy period, reflecting lower water transparency and increased sediment transport and resuspension, whereas during the dry season, autochthonous organic matter and greater internal processing predominated. These results suggest that local spatial heterogeneity - including depth, morphometry and catchment land use - can modulate CDOM dynamics more strongly than seasonal rainfall variation, highlighting the importance of monitoring strategies that consider local heterogeneity alongside seasonal changes.

Phytoplankton and Cyanobacteria Classification using Hyperspectral Remote Sensing Data

Samantha L. Sharp¹

Alicia Cortés², Alexander L. Forrest³, Liane S. Guild⁴, Yufang Jin⁵, Jeremy Kravitz⁶, Lisl Lain^{7,8}, Carl Legleiter⁹, Sifiso Mpapane⁸, Rabelani Mudzielwana¹⁰, Ryan E. O'Shea^{11,12}, Humeshni Pillay⁸, Glynn Pindihama¹⁰, S. Geoffrey Schladow³, Marié Smith⁸, Juan Torres-Perez⁴

¹NASA Postdoctoral Program Fellow, NASA Ames Research Center, Moffett Field, CA, USA

²University of Granada, Granada, Spain

³Tahoe Environmental Research Center, University of California, Davis, Davis, CA, USA

⁴Biosperic Science Branch, NASA Ames Research Center, Moffett Field, CA, USA

⁵Department of Land, Air and Water Resources, University of California, Davis, CA, USA

⁶Pixxel Space Technologies, El Segundo, CA, USA

⁷Department of Oceanography, University of Cape Town, Cape Town, South Africa

⁸Council for Scientific and Industrial Research, Cape Town, South Africa

⁹Observing Systems Division, U.S. Geological Survey, Golden, CO, USA

¹⁰Department of Geography and Environmental Sciences, University of Venda, Thohoyandou, South Africa

¹¹Science Systems and Applications Inc., Lanham, MD, USA

¹²NASA Goddard Space Flight Center, Greenbelt, MD, USA

Phytoplankton community composition is an important measure of inland water body aquatic health. Shifts in phytoplankton populations towards cyanobacteria dominance are a concern due to the potential for toxin production. Therefore, tools for monitoring phytoplankton and cyanobacteria communities are important for management of these water resources. Increasingly available hyperspectral data from recent and upcoming satellite missions will allow for the development and testing of phytoplankton and cyanobacteria identification algorithms. This study evaluates the performance of the phytoplankton classification algorithm Phytoplankton Detection with Optics (PHYDOTax) and the cyanobacteria classification algorithm Spectral Mixture Analysis for Surveillance of Harmful Algal Blooms (SMASH). We apply these tools to inland waters in California, United States and the Greater Cape Floristic Region, South Africa. PHYDOTax classifications are compared to in situ phytoplankton community composition determined from phytoplankton pigment measurements using both CHEMTAX and phytoclass. Additionally, PHYDOTax classifications were compared between those derived from in situ hyperspectral measurements and those derived from satellite- and airborne-based data to assess the impact of atmospheric correction. SMASH cyanobacteria classifications are compared to cyanobacteria community measurements from microscopy data. We found limited success of SMASH using the original spectral library and improved classification when using a site-specific spectral library we developed from field spectroradiometer measurements. These initial studies show promise of hyperspectral data for classifying phytoplankton and cyanobacteria populations in inland waters.

Effect of macrophyte cover on aquatic metabolism of a hypereutrophic reservoir

Ana Flávia M. Silva¹

José Fernandes Bezerra-Neto², Ludmila Silva Brighenti³

¹Programa de Pós-Graduação em Ecologia, Conservação e Manejo da Vida Silvestre, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil

²Departamento de Genética, Ecologia e Evolução, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil

³Departamento de Ciências Naturais e da Terra, Universidade do Estado de Minas Gerais, Divinópolis, Minas Gerais, Brazil

Aquatic metabolism reflects the balance between primary production and respiration, offering insights into ecosystem functioning and responses to environmental disturbances. In hypereutrophic systems, high nutrient loads promote excessive macrophyte growth, altering light availability and dissolved oxygen (DO) dynamics by shading the water column and modifying metabolic processes. This study evaluated the effect of macrophyte cover on metabolism of a hypereutrophic tropical reservoir, comparing two 14-day periods: one under dense macrophyte cover and another after mechanical removal (July 17), totaling 28 days. Two DO and temperature sensors (0.2 and 1.0 m), four underwater light sensors (0.05–1.0 m), and a wind speed sensor (1 m height) recorded data every 15 minutes. Metabolic rates—gross primary production (GPP), ecosystem respiration (R), and net ecosystem productivity (NEP)—were estimated using the free-water method (bookkeeping approach). Light availability was represented by the mean irradiance (E_{mean}) in the mixed layer. During the macrophyte cover phase, 50% of DO values were below 2.21 mg/L, increasing to 7.56 mg/L after removal. Low DO concentrations and irregular diel variation limited metabolism estimation for several days (up to 10 excluded days at 1.0 m). E_{mean} was significantly lower under macrophyte cover, while metabolic rates showed no statistical differences between phases. NEP median values at 0.2 m shifted from slightly negative (-0.92 mg O₂/L) during macrophyte cover to slightly positive (0.35 mg O₂/L) after removal. At 1.0 m, NEP remained negative in both periods. These results highlight the strong physical control exerted by macrophyte cover on light and oxygen dynamics in eutrophic reservoirs.

Pesticide Use and Freshwater Contamination in Latin America and the Caribbean: A Critical Review

Manuel Castro Berman¹

Haydée Norma Pizarro^{2,3}, María Florencia Gutierrez^{4,5}, Verónica Laura Lozano⁶, María Solange Vera^{2,3}, Juan Manuel Gutiérrez⁷, María Eugenia Llames^{8,9}, César Rodríguez-Bolaña⁷

¹Rensselaer Polytechnic Institute

²Instituto de Ecología, Genética y Evolución de Buenos Aires (CONICET - UBA), Buenos Aires, Argentina

³Depto. Ecología, Genética y Evolución, Universidad de Buenos Aires, Facultad de Ciencias Exactas Naturales, Buenos Aires, Argentina

⁴Instituto Nacional de Limnología (CONICET-UNL), Santa Fe, Argentina

⁵Facultad de Bioquímica y Ciencias Biológicas, Universidad Nacional del Litoral, Ciudad Universitaria Santa Fe, Argentina

⁶Facultad de Ciencias Naturales, Universidad Nacional de Salta, CCT Salta y Jujuy CONICET, Argentina

⁷Departamento de Ecología y Gestión Ambiental, Centro Universitario Regional del Este (CURE), Universidad de la República, Maldonado, Uruguay

⁸Instituto Tecnológico de Chascomús (CONICET-UNSAM), Chascomús, Argentina

⁹Escuela de Bio y Nanotecnologías (UNSAM), Argentina

Pesticides widely used in food production pose a major threat to freshwater ecosystems. This study reviews pesticide use in Latin America and the Caribbean (LAC) between 1990–2020, combined with a systematic analysis of freshwater contamination reports published from 1990–2023.

Brazil reported the highest annual consumption (231,621 t), followed by Argentina (132,255 t) and Colombia (52,553 t). By 2020, LAC reached the world's highest application rate, with Ecuador leading at 13.74 kg/ha. South America accounted for 90.9% of the total use, dominated by herbicides (51.5%). In contrast, North and Central America and the Caribbean showed heterogeneous usage linked to diverse agricultural practices.

The systematic review included 221 records spanning 26 of 51 countries, exposing a major knowledge gap in many regions. Most studies originated from Argentina, Mexico, and Brazil. Rivers (37%), streams (20%), and lakes (12%) were the most frequently assessed systems. Research largely addressed pesticide concentrations in water (46%), sediments (27%), and aquatic biota (15%).

Our analysis reveals a stark imbalance between intensive pesticide application and limited monitoring in LAC freshwater systems. This mismatch raises serious concerns about ecological risk awareness and the capacity to safeguard aquatic biodiversity and ecosystem services. Strengthening environmental monitoring and expanding research coverage are urgent priorities to assess and mitigate pesticide impacts on these critical freshwater resources.

Environmental Surveillance of Enteric Viruses in Freshwater and Sediments from Florianópolis Metropolitan Region, Southern Brazil

Eduardo Azevêdo Guimarães^{1,2}

Catielen Paula Pavi², Gustavo Kirsch¹, Bruno Renaly Souza Figueiredo¹, Gislaïne Fongaro²

¹Laboratory of Freshwater Biodiversity, Department of Ecology and Zoology, Federal University of Santa Catarina, Florianópolis, SC, Brazil.

²Laboratory of Applied Virology, Department of Microbiology, Immunology and Parasitology, Federal University of Santa Catarina, Florianópolis 88040-900, Brazil.

Enteric viruses pose major public health concerns due to their involvement in waterborne and foodborne outbreaks. Transmitted mainly via the faecal–oral route, their persistence and concentration in aquatic ecosystems vary according to environmental conditions. This study investigated the circulation of noroviruses (HNoV-GI and HNoV-GII), rotavirus A (RV-A), hepatitis A and E viruses (HAV and HEV), and adenoviruses (HAdVs), and their association with environmental parameters in 13 freshwater ecosystems from the Florianópolis metropolitan region, southern Brazil. Water, sediment, and house-made sponge samples were collected in triplicate and analyzed after viral concentration using polyethylene glycol precipitation or the Katayama method. HAdVs were the most frequent (94.8%, 37 samples), with the highest genomic copy numbers in Ratonés (7.25×10^8 gc/mL) and Papaquara (2.10×10^8 gc/mL). The sponge method was most efficient for RV-A recovery (7 samples, vs. 4 in sediment and 1 in water), notably at Monte Verde and Ratonés (1.45×10^8 and 1.38×10^8 gc/g). HEV was more abundant in Katayama-concentrated water (6 samples, compared to 3 in sponge and 2 in sediment), particularly at Monte Verde and Caieira (5.10×10^6 and 3.68×10^6 gc/mL). Redundancy analysis showed that HAdVs loads were positively correlated with conductivity, while RV-A and HEV were positively associated with suspended solids. HAdVs also correlated with lower pH and elevated temperatures. These findings demonstrate active enteric virus circulation in Florianópolis aquatic environments and highlight environmental factors influencing their persistence.

Estimating Global Lake Area Periodicity using Wavelet Analysis

Kirsty Forbes¹

Dr Iestyn Woolway¹

¹School of Ocean Sciences, Bangor University, Menai Bridge, Anglesey, UK

Lake area's seasonal and annual cycles are crucial for understanding water availability, flood risk, greenhouse gas emissions, and more. Much work has been done on lake area change at a decadal and annual scale, but less is known about its periods of variability, particularly at a global level. This study used continuous wavelet transforms to determine and map the dominant periodicity in surface area for more than 700,000 lakes over 23 years.

Half of these lakes were found to have a 12 month periodicity, meaning that they peak consistently once per year. This signal was often strongest in monsoonal regions. However, 25% of these lakes had no significant periodicity, showing their annual cycles are much more irregular, and that they need to be monitored more carefully to plan for resource and hazard management. Certain regions, including central Australia and equatorial lakes, did not follow either of these patterns and instead had periodicities ranging between 2 and 6 months. These regional differences in periodicity highlight the impact of local climate systems on lake extent as well as the necessity of individualised resource management.

To establish why these patterns may persist, wavelet analysis was also done using lake evaporation data and ERA5 precipitation data, which showed similar discrepancies around the equator, potentially linking to the intertropical convergence zone. In the future, the correlation between lake surface extent and climatic variables will be further investigated using the cross-wavelet transform and wavelet coherency.

Buffalo Pound Lake - a shallow reservoir and drinking water source in Saskatchewan subject to rapid change

Helen Baulch¹

Lisa Boyer¹, Katy Nugent¹, Kristin J. Painter¹, Jason J. Venkiteswaran², Lana Vuleta³, Colin J. Whitfield¹

¹School of Environment and Sustainability and Global Institute for Water Security, University of Saskatchewan, Saskatoon, Canada.

²Wilfrid Laurier University, Waterloo, ON, N2L 3C5, Canada

³Department of Geography, Memorial University of Newfoundland, St. John's, NL A1C 5S7, Canada

Buffalo Pound Lake is a long, narrow, and shallow drinking water reservoir in the northern Great Plains (the province of Saskatchewan, Canada). The lake has multiple water quality issues, that impact water treatability, including frequent cyanobacterial blooms, elevated dissolved organic matter for a drinking water source, taste and odour issues, and challenges associated with how wind conditions affect the lake (ranging from transient stratification under low wind, to sediment resuspension during extreme wind events). Since 2014, the lake has been equipped with one or more water quality monitoring buoys that collect high-frequency sensor data. Sensors measure photosynthetically active radiation (PAR), pH, dissolved oxygen, turbidity, specific conductivity, phycocyanin, and chlorophyll, temperature, and a buoy-mounted weather station that records air temperature, barometric pressure, PAR, rainfall, relative humidity, wind direction, and wind speed. In addition, a >30y chemical dataset is maintained on the lake, with more limited monitoring of the different water sources to the lake. Research to date has shown the impacts of flow source on water quality, evidence of worsening of bloom issues, and contributed insights on toxin risk, climate oscillation impacts, changing DOC quality and other factors. Multiple other opportunities exist to understand both this important drinking water source, and use data from this system in synthesis efforts to understand shallow lakes and reservoirs.

GLAMR: The Global LAke Metabolism Repository

Christopher T. Solomon¹

Paul C. Hanson², Stuart E. Jones³, Bennett J. McAfee³, Isabella A. Oleksy⁴, Kathleen C. Weathers¹

¹Cary Institute of Ecosystem Studies, Millbrook, New York, USA

²Center for Limnology, University of Wisconsin-Madison, Madison, Wisconsin, USA

³Annis Water Resources Institute, Grand Valley State University, Muskegon, Michigan, USA

⁴Institute for Arctic and Alpine Research and Dept. of Ecology and Evolutionary Biology, University of Colorado, Boulder, Colorado, USA

Our team is working to assemble GLAMR, an open-access repository of lake metabolism data from around the globe. In this brief talk we introduce GLAMR, highlight some of the research questions that it could be used to answer, and invite others to collaborate in this effort.

A long-term perspective on under-ice zooplankton communities of Lake Tovel

Ulrike Obertegger^{1,2}

Stefano Corradini³, Cerasino Leonardo¹

¹Fondazione Edmund Mach, Research and Innovation Centre, Hydrobiology Research Unit, 38010 San Michele all'Adige, Italy

²National Biodiversity Future Center – NBFC, Piazza Marina 61, 90133 Palermo, Italy

³Fondazione Edmund Mach, Technology Transfer Centre, Agrometeorology and Informatics Unit, 38010 San Michele all'Adige, Italy

Most studies on under-ice zooplankton consider low-land lakes over relatively short temporal scales, while little is known about long-term under-ice zooplankton of mountain lakes. We compared the under-ice zooplankton community (n = 11; one sampling per year) to that of the ice-free seasons (monthly samplings) of mountain Lake Tovel from 2001 to 2023. As complementary approaches, we applied a taxonomic and functional perspective on zooplankton diversity. The prevailing absence of seasonal differences was linked to the lake's cold-water temperature year-round. From the last autumn to under-ice sampling, rotifers and crustaceans increased in abundance that we attributed to reproduction under ice. Our study showed that in mountain Lake Tovel the under-ice period is characterised by a similar high zooplankton diversity as during the ice-free period. Studies like ours, covering both taxonomic and functional diversity, are more needed to understand under-ice zooplankton communities.

LAGOS-US HUMAN: Data module of human population (1990-2020), urbanization classification, and lake access in the conterminous U.S.

Abigail Lee Lippert¹

Zoe Naylor¹, Xinyu Sun¹, Patrick J. Hanly¹, Jessica Díaz Vázquez², Maggie Haite¹, Kendall Ash¹, Kendra S. Cheruvellil¹, Patricia A. Soranno¹

¹Michigan State University, East Lansing, MI, USA

²South Baltimore Gateway Partnership

The newly released LAGOS-US HUMAN data module integrates human population and lake access data with the LAGOS-US research platform, enabling interdisciplinary studies at the interface of social and environmental systems. This data product characterizes the human context of 479,950 lakes ≥ 1 ha across the conterminous United States using decadal U.S. Census data (1990–2020), urbanization classifications, and national datasets on public access. The module includes four linked tables containing information on race, ethnicity, income, urbanization (via land cover and Census definitions), and lake accessibility (e.g., boat launches, roads, public lands). By using the shared lake identifier `lagoslakeid`, researchers can connect this dataset to other LAGOS-US modules—LOCUS, GEO, and LIMNO—to explore human-lake interactions in a spatially explicit, nationally consistent framework. This integrated resource supports studies in limnology, urban ecology, environmental justice, conservation, and beyond, promoting a more holistic understanding of lake ecosystems in human-dominated landscapes.

Study on the Abundance of Nitrogen Cycle Microorganisms in Poyang Lake Sediments and Their Environmental Influencing Factors

Qiang Wu¹

¹Jiangxi University of Water Resources and Electric Power

To reveal the distribution characteristics of the abundance of nitrogen cycle microorganisms in Poyang Lake sediments, this study employed the quantitative real-time PCR (qPCR) method to determine the abundances of functional genes involved in nitrogen fixation (POL), anaerobic ammonium oxidation (Anammox), and denitrification (nosZ and nirS). It analyzed the spatiotemporal variations in the abundance of nitrogen cycle microorganisms and conducted a correlation analysis between the abundance of nitrogen cycle microorganisms and environmental factors. The copy number of the nosZ gene ranged from 2.4×10^7 to 4.2×10^7 copies/g, with no significant seasonal difference in nosZ gene abundance. The copy number of the nirS gene varied from 1.0×10^8 to 2.6×10^8 copies/g, showing a significant seasonal difference in nirS gene abundance. The copy number of the 16S rRNA gene of Anammox bacteria ranged from 3.7×10^8 to 1.8×10^9 copies/g, exhibiting a significant temporal difference in the abundance of the 16S rRNA gene of Anammox bacteria. The copy number of the POL gene ranged from 4.7×10^8 to 6.6×10^8 copies/g, with no significant seasonal difference in POL gene abundance ($P > 0.05$). The abundance of the nosZ gene was extremely significantly negatively correlated with pH ($P < 0.01$). The abundances of the nosZ and nirS genes were both extremely significantly positively correlated with organic matter. The abundance of the nirS gene was extremely significantly negatively correlated with electrical conductivity and significantly positively correlated with total nitrogen.

Water contamination by wildland fires causes cellular and tissue changes in the digestive system of larvae of the aquatic insect *Chironomus xanthus*

Bruno R. S. Figueiredo¹

Ronnilda M. G. Araujo¹, Gustavo Kirsch¹, Madson S. Melo², Nathália Ronconi-Krüger², Mário A. Navarro-Silva³, Evelise M. Nazari²

¹Department of Ecology and Zoology, Federal University of Santa Catarina, Florianópolis, Brazil

²Department of Cell Biology, Embryology and Genetics, Federal University of Santa Catarina, Florianópolis, Brazil

³Department of Ecology, Federal University of Paraná, Curitiba, Brazil

Wildfire ash is a complex substance containing toxic compounds that, once transported into aquatic environments, can contaminate water bodies and cause mortality in aquatic organisms. Previous studies have demonstrated that sublethal concentrations of ash induce molecular and biochemical damage, impairing the development, reproduction, and morphology of benthic insects, which are key decomposers in aquatic systems. However, the mechanistic link connecting these subcellular, individual, and population-level outcomes remains poorly understood. Here, we examined the cellular and tissue integrity of the digestive system in *Chironomus xanthus* larvae, a widely distributed aquatic insect in tropical regions, following ash exposure. Subchronic assays (8 days) were conducted using concentrations ranging from 0.01 to 10 g/L. The exposed larvae exhibited histological changes, including marked enlargement of the lumens in midgut regions I, II, and III, and a reduction in brush border thickness in midgut region III. Reductions in cell size and nuclei of salivary gland cells, oenocytes, trophocytes, and Cuénot cells, as well as cytoplasmic vacuolization in salivary gland cells and adipose tissue, were also observed. Trophocytes, in particular, presented irregular sizes and nuclei with signs of chromatin condensation. These results indicate that *C. xanthus* tissues are sensitive to ash exposure, and the observed changes may be the primary mechanism underlying the previously reported compromise of physiological functions. Our findings underscore the importance of considering not only the immediate lethality of fire ash from severe wildland fires, but also the effects of sublethal concentrations, particularly in regions prone to recurring fire events.

Succession of phytoplankton functional groups and their driving factors in Poyang Lake

Jinfu Liu¹

Haoyue Zou¹, Yuwei Chen¹

¹College of Water Conservancy, Jiangxi University of Water Resources and Electric Power, Nanchang, China

Phytoplankton functional groups have gained increasing attention in recent years. To understand the composition of phytoplankton functional groups and their drivers in Poyang Lake, field investigations were conducted over three years. Phytoplankton were generally dominated by diatoms, contributing from 20.19% to 57.57% of the total biomass, followed by cyanobacteria, which contributed 9.81% to 39.98% of the total biomass. *Microcystis* sp. and *Anabaena* sp. were the dominant species among cyanobacteria. Twenty-six functional groups were identified among 72 genera or species, with 6 groups (P, B, MP, Y, H1, and G) categorized as dominant. All dominant groups, except for H1, tolerated highly fluctuating mixing intensities and exhibited typical monthly succession variations. All of dominant groups except H1 were tolerate highly fluctuating mixing intensities and showed a typical monthly succession variation. Water temperature, water level and nutrients are key drivers for the variation of phytoplankton communities at taxonomic and functional levels. Both of RDA and variation partitioning analyses showed that environmental variables might explain functional groups better than taxonomic communities. This implied that functional groups would be more advantageous in showing the effects of environmental conditions than taxonomic communities. We conclude that hydrological conditions have a crucial influence on phytoplankton assemblage dynamics in highly variable water regime lakes, but not in the largest ones. Additionally, the functional groups method is suitable for identifying the spatial and seasonal characteristics of aquatic environments significantly affected by water regimes.

Methane Production, Oxygenation, and Flux Patterns: Snapshot Analyses in a Shallow Hypereutrophic Danish Lake

Emma Polauke

Theis Kragh

Phosphorus- and carbon-enriched lakes sustain high algal production and sedimentation of labile organic carbon, leading to substantial methane (CH₄) production and emissions that exacerbate global warming. Accurately assessing their role in global climate change and developing restoration strategies to limit carbon release into the atmosphere requires robust knowledge of CH₄ production drivers, removal processes (oxidation), and spatial variability in production and emission patterns – factors often constrained by costly instrumentation. While lakes with complex morphometry exhibit strong spatial heterogeneity in CH₄ dynamics, it remains unclear whether similarly large variability occurs in morphometrically uniform lake systems.

We conducted high-resolution summer “snapshot” measuring campaigns in a small (10-hectare), shallow, hypereutrophic Danish lake (2022–2025) to assess spatial variability in sediment CH₄ production and surface fluxes. At 37 stations, we deployed low-cost automated vented floating chambers (‘DIY’ design) to record surface CH₄ fluxes, sampled water column CH₄ concentrations using the headspace equilibrium technique, and sampled sediments for incubation in the laboratory to quantify CH₄ production and assess sediment geochemical drivers.

Despite the lake’s overall homogeneous depth and sediment characteristics, we observed pronounced horizontal and vertical gradients in CH₄ dynamics. Production potential increased with sediment nutrient content, but correlations between local sediment production and surface emissions were weak - likely reflecting frequent sporadic ebullitive CH₄ release and substantial CH₄ oxidation in the oxygenated surface water layer.

Restoration strategies that permanently remove the nutrient-enriched surface sediments to improve water quality and limit algal production may prevent long-term anoxia and effectively mitigate CH₄ emissions to the atmosphere.

When natives fight back: biotic resistance and drought resilience in aquatic plant invasions

Larissa Carrara¹

Lucas Garbo Miguel¹, Bruno Renaly Souza Figueiredo¹

Graduate Program in Ecology, Department of Ecology and Zoology, Federal University of Santa Catarina (UFSC), Campus Universitário, Edifício Fritz Müller, Bloco B, Córrego Grande, 88040-970, Florianópolis, SC, Brazil.

Climate change is intensifying across the globe, reshaping hydrological regimes and amplifying the frequency of extreme climatic events such as floods, heatwaves, and prolonged droughts. Drought events, in particular, impose strong selective pressures on aquatic macrophytes, driving physiological and morphological adjustments that determine species survival and dominance. Given the recognized invasiveness of *Urochloa arrecta*, we hypothesized that this alien species would exhibit greater tolerance and resilience to drought stress compared to the native macrophyte *Leersia hexandra*. To test this, we conducted a controlled bifactorial greenhouse experiment using propagules from plants commonly found in the upper Paraná floodplain. Plants were exposed to a constant water supply (control) and a two-week drought period (stress treatment). Plant performance was assessed using a two-way ANOVA to evaluate the interactive effects of species identity and hydric condition. Contrary to our expectation, *L. hexandra* outperformed *U. arrecta* under drought stress, exhibiting higher tolerance and maintenance of growth. This finding challenges the prevailing assumption that invasive species universally possess superior physiological plasticity under environmental stress. Instead, it suggests that native macrophytes may exhibit context-dependent advantages that contribute to biotic resistance against invasion. Moreover, the drought performance of *L. hexandra* implies that under future climatic scenarios, where droughts are projected to intensify, this native species may itself display invasive tendencies beyond its current range. Overall, our results underscore the complex and bidirectional nature of plant invasiveness under climate change, emphasizing that native species can both constrain and, under favorable conditions, surpass the ecological strategies of successful invaders.