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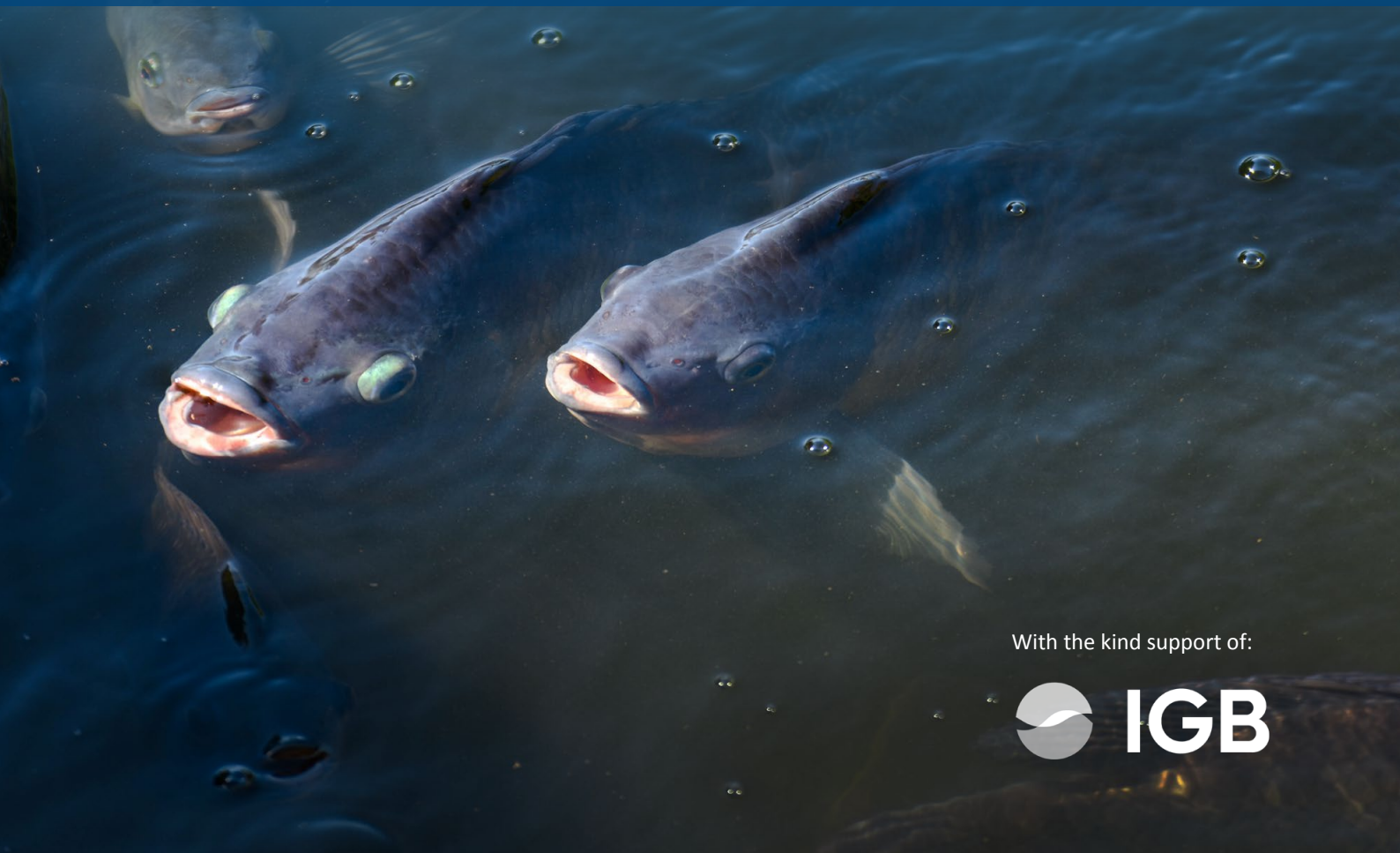
# Sustainable Aquaculture – Environmental Impacts and Food Security

Workshop co-organized by the German National Academy of Sciences Leopoldina and  
the Academia Brasileira de Ciências (ABC)

With the kind support of the Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)

**16 – 19 October 2023**

Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)  
Müggelseedamm 310 | 12587 Berlin



With the kind support of:



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### **Editors:**

Dr. Thomas Plötze, Stefanie Kirsch, Isabel Scheer, German National Academy of Sciences Leopoldina

### **Contact:**

Dr. Thomas Plötze | phone: +49 345 472 39-830 | email: [international@leopoldina.org](mailto:international@leopoldina.org)

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# Sustainable Aquaculture – Environmental Impacts and Food Security

The Brazilian Academy of Sciences (ABC) and the German National Academy of Sciences Leopoldina co-organize the workshop “Sustainable Aquaculture – Environmental Impacts and Food Security” from 16-19 October 2023 in Berlin. It is the fourth event of a workshop series on water, mainly designed for postdoctoral researchers. Two goals are in focus: 1) bringing together early career scientists from South America and Europe to identify needs for political action in relevant fields and 2) empowering participants in policy advice. The objective of the forthcoming workshop is to review, assess and discuss current and emerging challenges for and needs in sustainable aquaculture. The final outcome will be a policy brief published and distributed by both Academies.

Climate change affects where, how and when water, specifically freshwater, as a resource becomes available. Unevenly distributed rainfalls and droughts increasingly make water a limiting resource. The competitive use and scarcity of freshwater challenge food security. However, aquaculture – if sustainably implemented – may serve as a resource-efficient and low-impact protein source for people globally.

Given the critical water-food nexus, two thoughts guide the workshop: First, it assesses the environmental impacts on and by aquaculture in freshwater and transition waters. A systemic approach considering water as a resource as well as an ecosystem is urgently needed. The workshop will identify ways forward in using water sustainably and circularly. Second, it debates aquaculture’s prospect as an essential component of the global food production system. Due to the multiplicity and interdependence of ongoing crises, the policy brief should provide insights into the global food production challenge under changing climate conditions – with aquaculture in the focus. The workshop has the following objectives:

- ▶ discuss the opportunities and challenges of sustainable aquaculture in freshwaters and transition waters
- ▶ promote aquaculture as a viable and alternative source for protein nutrition in the Global South and Global North
- ▶ develop policy advice by a compact policy brief
- ▶ empower early career scientists in providing scientific policy advice
- ▶ create a platform and stimulating atmosphere for scientific networking

## **The scientific coordinators of this workshop are:**

- ▶ Professor Adalberto Val, Academia Brasileira de Ciências
- ▶ Professor Maria Célia Portella, São Paulo State University (UNESP)
- ▶ Professor Evoy Zaniboni-Filho, Federal University of Santa Catarina
- ▶ Professor José Galizia Tundisi, Academia Brasileira de Ciências
- ▶ Professor Klement Tockner ML, Senckenberg Society for Nature Research
- ▶ Professor Werner Kloas, Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB)

ML – Member of the Leopoldina

# Programme

## Monday, 16 October 2023

Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB)  
Müggelseedamm 310 | 12587 Berlin

### Session 1

#### 12:00 – 13:00 Welcome and Introduction (incl. Light Lunch)

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##### Words of Welcome

Ruth Narmann, *Head of International Relations, German National Academy of Sciences Leopoldina*

Marcos Cortesao Barnsley Scheuenstuhl, *Head of International Relations, Academia Brasileira de Ciências*

##### Introduction

Adalberto Val, *Brazilian National Institute for Research of the Amazon (INPA), Academia Brasileira de Ciências*

Werner Kloas, *Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)*

Klement Tockner, *Senckenberg Society for Nature Research, Leopoldina*

#### 13:00 – 16:00 Field Trip – Guided Visit of the IGB Facilities

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### Session 2

#### Group Work: Working on Text Components (Closed)

#### 16:00 – 17:00 Brief Presentation on Scientific Advice and Brainstorming of Policy Brief Draft (incl. Coffee & Light Snacks)

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Facilitators: Henning Steinicke & Thomas Plötze, *Leopoldina*

Marcos Cortesão Barnsley-Scheuenstuhl, *ABC*

#### 17:00 – 18:00 Group Work

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##### Discussion of Prepared Questions, Structure of the Policy Brief and Target Groups

#### 18:00 – 19:00 Plenum – Discussing the Structure of the Policy Brief

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Facilitator: Werner Kloas, *Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)*

## Tuesday, 17 October 2023

<b>Session 3</b>	<b>Group Work: Working on Text Components (Closed)</b>
<b>08:30 – 08:45</b>	<b>What is Important Today</b> Facilitators: Henning Steinicke & Thomas Plötze, <i>Leopoldina</i>
<b>08:45 – 09:15</b>	<b>Plenum – Definition of Main Chapters</b> Facilitator: Adalberto Luis Val, <i>Brazilian National Institute for Research of the Amazon (INPA)</i>
<b>09:15 – 10:30</b>	<b>Group Work</b> <b>Work on Chapters</b>
<b>10:30 – 11:00</b>	<b>Coffee Break</b>
<b>11:00 – 12:30</b>	<b>Presentation and Discussion of Results and Priorities in Plenum</b> Facilitator: Klement Tockner ML, <i>Senckenberg Society for Nature Research</i>
<b>12:30 – 13:30</b>	<b>Lunch</b>
<b>13:30</b>	<b>Bus Transfer to the Brazilian Embassy</b>

<b>Keynote and Roundtable (Public)</b> Embassy of Brazil in Berlin   Wallstraße 57   10179 Berlin	
<b>15:30 – 16:00</b>	<b>Registration</b>
<b>16:00 – 16:15</b>	<b>Welcome Addresses</b> Luiz Eduardo Fonseca de Carvalho Gonçalves, <i>Minister-Counsellor, Embassy of Brazil in Berlin</i> Prof (ETHZ) Dr Gerald Haug, <i>President, German National Academy of Sciences Leopoldina</i> Prof Dr Adalberto Val, <i>Academia Brasileira de Ciências (ABC)</i>
<b>16:15 – 16:45</b>	<b>Introduction and Keynote</b> <b>Aquaculture and Food Security in Brazilian Science and Strategic Planning</b> Introductory Remarks (Virtual) by Dr Marcia Cristina Bernardes Barbosa, <i>Secretary of Strategic Programmes and Policies, Brazilian Ministry of Science, Technology and Innovation</i> <b>Keynote</b> <b>Integrated Agri-Aquaculture Systems to Enhance Sustainable Food Production for Family Agriculture in Developing Countries</b> Prof Dr Maria Célia Portella, <i>São Paulo State University (UNESP)</i>

**17:00 – 18:30 Roundtable Discussion**

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**From Aquafarm to Fork? Sustainable Aquaculture as Part of a Resilient Global Food System**

Moderation: Vanessa Fischer, *Deutsche Welle*

**Panelists:**

Charlina Vitcheva, *Director General, Directorate-General “Maritime Affairs and Fisheries” (MARE), European Commission*

Esther Winterhoff, *Head of Subdivision EU Affairs and Fisheries, German Federal Ministry of Food and Agriculture*

Fernanda Sampaio, *Fishery Officer and Aquafeed Specialist, Food and Agriculture Organization of the United Nations*

Alfred Jansen, *Head of Corporate, Brand & Sustainability Communications, iglo Germany*

Dr Kathrin Steinberg, *Head of Research, Aquaculture Stewardship Council*

Prof Dr Adalberto Val, *Brazilian National Institute for Research of the Amazon (INPA), Academia Brasileira de Ciências (ABC)*

**18:30 – 20:00 Reception and Dinner**

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**20:30 Bus Transfer to Hotel Spreidyll**

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## Wednesday, 18 October 2023

**Session 4 Revision of and Feedback on Text Components (Closed)**

**08:30 – 10:00 Plenum: Reflection Roundtable & Compact Focus**

Facilitators: Henning Steinicke & Thomas Plötze, *Leopoldina*

... and Continuation of Group Work

**10:00 – 10:30 Coffee Break**

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**10:30 – 12:30 Group Work**

Working on the Chapters

**12:30 – 13:30 Lunch Break**

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**Session 5 Plenary Session (Closed)**

**13:30 – 14:30 Shared Group Feedback:**

Working Groups Read and Comment on the Text Components from their Fellow Working Groups

<b>14:30 – 15:30</b>	<b>Perspective of Aquaculture Producers</b>
	<b>Presentation and Discussion</b> Speaker: Bernhard Feneis, <i>President of Association of German Inland Fisheries and Aquaculture (VDDBA), Vice President Federation of European Aquaculture Producers (FEAP)</i>
<b>15:30 – 16:00</b>	<b>Coffee Break</b>
<b>16:00 – 17:30</b>	<b>Plenum: Presentation and Discussion of Results and Priorities</b>
	Facilitator: Maria Celia Portella, <i>Sao Paulo State University (UNESP)</i>
<b>17:30 – 19:00</b>	<b>Group Work</b>
	Revision of Text Components, Incorporating the Comments from Plenum Discussion

## Thursday, 19 October 2023

<b>Session 6</b>	<b>Revision of Text Components and Writing of Executive Summary</b>
<b>08:30 – 08:45</b>	<b>Compact Focus: What is Important Today?</b>
	Facilitator: Henning Steinicke & Thomas Plötze, <i>Leopoldina</i>
<b>08:45 – 10:15</b>	<b>Group Work</b>
	Writing of Executive Summary (Abstracts of Working Group Parts)
<b>10:15 – 10:30</b>	<b>Coffee Break</b>
<b>Session 7</b>	<b>Plenary Session and Writing of Executive Summary</b>
<b>10:30 – 13:00</b>	<b>Writing of Executive Summary</b>
<b>13:00 – 14:00</b>	<b>Lunch</b>
<b>Session 8</b>	<b>Summary &amp; Feedback</b>
<b>14:00 – 15:30</b>	<b>Writing of Executive Summary</b>
<b>15:30 – 18:30</b>	<b>Wrap Up</b>
	<ul style="list-style-type: none"> <li>▶ Writing Session, Executive Summary</li> <li>▶ Next Steps</li> <li>▶ Summary &amp; Feedback</li> </ul>

As of 13 October 2023.



# List of Participants

## Scientific Coordinators

**Werner Kloas**

*Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB)*

**Maria Célia Portella**

*Sao Paulo State University (UNESP)*

**José Galizia Tundisi**

*Academia Brasileira de Ciências*

**Klement Tockner ML**

*Senckenberg Society for Nature Research*

**Adalberto Luis Val**

*Academia Brasileira de Ciências*

**Evoy Zaniboni-Filho**

*Federal University of Santa Catarina*

## Scientific Researchers

**Cornelius Becke**

*North Rhine Westphalian State Agency for Nature, Environment and Consumer Protection (LANUV)*

**Alexandre Diógenes**

*Fundação Universidade Federal de Rondônia*

**Piotr Eljasik**

*University of Technology in Szczecin (ZUT)*

**Renato Ferraz**

*Nilton Lins University/National Institute for Amazonian Research, UNL – Manaus, Amazonas*

**Sílvia Gallani**

*Nilton Lins University/National Institute for Amazonian Research, UNL – Manaus, Amazonas*

**Koushik Roy**

*University of South Bohemia, České Budějovice*

**Ivã Lopes**

*Swedish University of Agricultural Sciences*

**Christopher Naas**

*Potsdam Institute of Inland Fisheries*

**Igor Ogashawara**

*Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) Berlin*

**Alyson Ribeiro**

*Federal University of Minas Gerais (UFMG)*

**Zala Schmautz**

*ZHAW Life Sciences und Facility Management*

**Mark Schumann**

*Fisheries Research Station of Baden-Württemberg*

**Christopher Shaw**

*Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) Berlin*

## ABC and Leopoldina Staff

**Marcos Cortesão Barnsley Scheuenstuhl & Vitor Vieira**

*International Relations, Academia Brasileira de Ciências*

**Henning Steinicke & Corinna Scholz**

*Science – Policy – Society Department, Leopoldina*

**Thomas Plötze & Stefanie Kirsch & Isabel Scheer**

*International Relations Department, Leopoldina*

# Curriculum Vitae

(In alphabetical order)



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## **Cornelius BECKE**

*North Rhine Westphalian State Agency for Nature, Environment and Consumer Protection (LANUV), Essen*

Since my childhood, I have been interested in aquatic life resulting in studying Biosciences at the University of Münster. In 2010, I graduated with a Bachelor of Science, with limnology as main subject. I continued my studies at the University of Münster deepening my knowledge of fish ecology in the master's program and writing my master thesis at the Fisheries Research Station of Baden-Württemberg. After finishing my Master's degree in 2012, I did an internship at a large sturgeon farm in Switzerland to get to know aquaculture from the workers' perspective and all the challenges that are associated with it before starting my doctorate. In my doctoral study, I worked with recirculating aquaculture systems investigating the effects of suspended solids load on the physiology and growth performance of rainbow trout. While finishing the doctoral thesis, I simultaneously worked in another project regarding fish welfare in aquaculture at the Fisheries Research Station in cooperation with the Institute of Inland Fisheries Research Potsdam-Sacrow. Since 2020, I am employed at the North Rhine Westphalian State Agency for Nature, Environment and Consumer Protection (LANUV) in the project "Aquaculture Network NRW". This project mainly comprises advising fish farms and communicating with relevant administrative authorities. To provide a guiding framework for decision making on permitting issues, I am currently writing a guideline for good practice in trout aquaculture. Additionally, I am lecturer and examiner in the training of the profession "fish farmer" and I am responsible for designing the new aquaculture facilities of the LANUV.

<https://www.lanuv.nrw.de/>



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## Alexandre DIÓGENES

*Fundação Universidade Federal de Rondônia, Porto Velho*

Alexandre Diógenes is a professor at the Federal University of Rondônia Foundation (UNIR), deputy head of the Fishery Engineering Department. He has a degree in Fishing Engineering from the Federal Rural University of Semi-Arid (UFERSA) in Mossoró (RN). Master in Aquaculture by the Aquaculture Center of the State University of São Paulo (CAUNESP) in Jaboticabal (SP). PhD in Biology from the Faculty of Sciences of the University of Porto (FCUP) and the Interdisciplinary Center for Marine and Environmental Research (CIIMAR) Porto, Portugal – Doctorate revalidated by the Federal University of Ceará, recognized as Doctor in Fishery Engineering and Fishery Resources. He has two postdoctoral degrees, one in shrimp farming at the Federal University of Ceará (UFC) and another in oyster farming at the State University of Maranhão (UEMA). His main area of interest is the nutrition of aquatic animals, currently focused on fish native to the Amazon. In this segment, particularly interested in research on zootechnical performance, nutritional status, oxidative and gut health, and nutritional strategies to reduce the environmental impact of aquaculture.

<https://www.unir.br/>



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## Piotr ELJASIK

*West Pomeranian University of Technology (ZUT), Szczecin*

I am a Postdoc at the Faculty of Food Sciences and Fisheries (ZUT in Szczecin, Poland) with particular interest in the sustainable aquaculture, genetics, disease, welfare, processing of common carp (*Cyprinus carpio*) meat and by-products and valorisation of carp aquaculture side streams. Key elements of my PhD thesis covered the evaluation of a variety of common carp welfare indicators including morphological, molecular and histomorphological, which formed a comprehensive set of KPI's for carp cultured in pond and RAS. Moreover, my thesis showed how to unlock potential of common carp aquaculture by reducing production cycle from 33 months to 19 months with coupling pond aquaculture with RAS. I have actively participated in two H2020 projects (GAIN and SEAFOODTOMORROW) and currently I am working in a Horizon Europe project (SAFE) focused on valorisation of aquaculture side streams. I have published 23 articles in international journals including Aquaculture, Food and Chemical Toxicology and Food Chemistry. I have actively participated in the development of two aquaculture-related MOOCs for undergraduate students, and I am an active member of three associations (Polish Fisheries Association, European Aquaculture Society, Polish Society for Conservation Genetics).

<https://www.zut.edu.pl/>



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### **Renato FERRAZ**

*Nilton Lins University/National Institute for Amazonian Research, UNL – Manaus, Amazonas,*

Renato Barbosa Ferraz is Brazilian, currently a professor at Nilton Lins University/National Institute for Amazonian Research (UNL – Manaus, Amazonas, Brazil) in the postgraduate program in aquaculture. He has a degree in Animal Science from the Universidade Federal de Viçosa (UFV) – Brazil (2013), a Master's degree in Animal Biology from the UFV (2015), and a PhD in Animal Sciences, Specialization in Genetics and Breeding from the Universidade do Porto, Portugal (2020). During the years 2020-2022 He worked as a Postdoctoral fellow in Entomology at the UFV. Finally, He was a temporary professor at the Department of Aquaculture at Universidade Federal de Santa Catarina, Brazil (2022). Briefly, He has experience in molecular biology applied to fish nutrition, focusing on LC-PUFA lipid metabolism in native Amazonian species, such as tambaqui (*Colossoma macropomum*), matrinxã (*Brycon amazonicus*) and pirarucu (*Arapaima gigas*). He is currently part of the committees CEP and CEUA of the UNL and works in the disciplines of Welfare and Animal Behavior and Genomics to Aquaculture.

<https://universidadeniltonlins.com.br/>



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### **Sílvia GALLANI**

*Nilton Lins University/National Institute for Amazonian Research, UNL – Manaus, Amazonas*

Sílvia Umeda Gallani graduated in Veterinary Medicine (2011) at Universidade Estadual Paulista (Unesp) and obtained her master's degree (2015) and PhD (2019) in Aquaculture (Aquaculture Center of Unesp). During her master's degree, she worked with photosynthetic microorganisms that were strategically used for wastewater treatment and biomass production for feeding of fish. During her PhD, she developed research focused on fish health (mainly immunology studies), which provided her with opportunities for international collaborations in Chile and the Netherlands. Since December 2019, she has occupied the position of Adjunct Professor 1 in the Post-Graduate Program in Aquaculture (Nilton Lins University/National Institute for Amazonian Research). Currently, she coordinates the Applied Microbiology Laboratory, where she supervises a group (masters, PhD, and graduate students) in two main areas: 1) vaccine prototyping and 2) biotechnologies for the treatment of aquaculture effluents and production of bacterial biomass applied to aquaculture. She collaborates as a reviewer for international journals and her research mainly highlights sustainable fish production. For the past four years, she has been investigating bioinspired solutions that favor a circular economy in the Amazon, where water resources are a major issue and fish farming and fishing are considered priority activities.

<https://universidadeniltonlins.com.br/>



### Werner KLOAS

*Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin*

Werner Kloas is Head of the Department of Fish Biology, Fisheries and Aquaculture at Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) in Berlin, Germany. He is also Professor for Endocrinology at the Humboldt-University Berlin, Faculty of Life Sciences, Institute of Biology and Albrecht Daniel Thaer-Institute. He studied biology and sports in Karlsruhe (1979 – 1986). 1986 – 1990 Promotion at Department of Zoology II, University of Karlsruhe on the subject endocrinology of amphibian osmomineral regulation followed by a postdoctoral stay (1991-1992) in France at the European Institute for Peptide Research, University Rouen. He returned to Karlsruhe as assistant professor (1992-1995) and received his habilitation to continue as associated professor (1996-1999). Since 1999 he works at IGB and leads the Aquaponics and Ecophysiology research group with strong knowledge in ecotoxicology and sustainable aquaculture. He and his team invented the “Tomatofish”, an aquaponic system for emission-free tomato and fish production.

The „Tomatofish“ received the German Sustainability Prize in 2012 and, in addition, in 2019 the Ralf Dahrendorf Prize for the European Research Area by the Federal Ministry of Education and Research.

<https://www.igb-berlin.de/en>



### Koushik ROY

*University of South Bohemia, Ceske Budejovice*

Koushik is a circular and sustainable aquaculture system biologist concentrating on the issues of improved resource (nutrients, biomass) use efficiency of Central European fishponds, intensive aquaculture, and farm-to-fork. Presently, he is employed at FROV, University of South Bohemia in Ceske Budejovice. His expertise includes aquatic animal nutrition, aquaculture environment interactions, climate change, and inland fisheries. His education and research started in West Bengal (India) where ‘fish for food security’ and ‘resource circularity for economic reasons’ have historical roots, while the European higher studies and research made him ‘environmentally conscious’. He is married to Dr. Deepali Rahi Roy, his fellow PhD batchmate, who is a biologist in vertebrate sperm. He is also working with a group of young and emerging food system researchers in his group.

<https://www.jcu.cz/en/>

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### **Ivã LOPES**

*Swedish University of Agricultural Sciences, Alnarp*

As a biologist working with organic waste management for more than seven years, Ivã Guidini Lopes is passionate about the possibility of transforming waste materials into useful products, promoting circularity. After purchasing his bachelor in Biological Sciences, he obtained his PhD title in Aquaculture at the São Paulo State University, and currently works as a postdoctoral researcher at the Swedish University of Agricultural Sciences in Alnarp, southern Sweden. Lopes believes it is possible to recirculate any organic waste stream back into the food supply chain and reduce the strong pressure exerted by the unrestrained exploitation of natural resources. His main goal in research is to develop and improve technologies that link a waste management perspective with food and feed production, replacing the unsustainable linear economy to more circular systems. The worldwide aquaculture production can greatly benefit from the adoption of waste management technologies, which can make it more sustainable and increase the food security around the globe. That is what Lopes believes and this is how he will contribute to the developments of the workshop Sustainable Aquaculture.

<https://www.slu.se/en/>

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### **Christopher NAAS**

*Potsdam Institute of Inland Fisheries, Potsdam*

I am an aquaculture scientist at the Potsdam Institute of Inland Fisheries. After my professional training as a trout farmer, I completed a Bachelor degree in agricultural sciences (Kiel University, Germany) and a master degree in “Fishery Science and Aquaculture” at the Humboldt University of Berlin, Germany. During my PhD, I investigated the effects of salt applications on pike-perch reared in recirculating aquaculture systems. My interests and aims are to conduct applied aquaculture research in practice for practice. Currently, I am working on several topics for the aquaculture sector. One project examines the control of pathogens in flow-through aquaculture systems of salmonids. Under site-specific conditions, the applications of UV-C light, ozone, peracetic acid and ultrasound are being investigated and the subsequent effects on fish health and aquaculture output are monitored. In another project, I conduct research on how the aquaculture sector can adapt to climate change. More specifically, I am investigating the effects of different shading materials on the rearing environment and fish performance and the benefits of temperature adapted feeding protocols as well as comparing the performance of locally adapted rainbow trouts with high performance breeding strains under different temperature regimes. Furthermore, I am involved in ongoing topics of farm emissions and innovative approaches on how to treat effluent water from farming systems. My responsibilities also include knowledge transfer through presenting research results, editing the institute’s newsletter and holding lectures for bachelor students to give insights into aquaculture.

<https://www.ifb-potsdam.de/>



### **Igor OGASHAWARA**

*Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin*

Igor Ogashawara is a postdoctoral researcher at the Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) and a Visiting Professor at Universidad the Concepción (Chile). He got his BSc in Geography from São Paulo State University (UNESP), his MSc in Remote Sensing from the Brazilian National Institute for Space Research (INPE) and his PhD in Applied Earth Sciences from the Indiana University (IU) in the USA. His research interests lie at the intersection of remote sensing and natural resources, and he is the co-editor of the book “Remote Sensing and Bio-optical Modeling in Inland Waters”. Ogashawara is co-chairing the Technical Working Group for the GEO AquaWatch Initiative where he is also part of the Management Team, the Director of the GEO AquaWatch Node on Calibration and Validation and the co-chair and founder of the GEO AquaWatch Early Career Society. He is also involved in working groups of the Brazilian Association of Limnology and the Global Lake Ecological Observatory Network (GLEON). He is currently involved in two European projects: the EU H2020 Water-ForCE and Horizon Europe AquaINFRA Projects.

<https://www.igb-berlin.de/en>



### **Maria Célia PORTELLA**

*São Paulo State University (UNESP), São Paulo*

Maria Célia Portella is an Associated Professor of the São Paulo State University (UNESP) since 2004. Her academic profile includes a PhD at the Federal University of São Carlos and a post-doctoral period at the Aquaculture Center. Portella has worked as a scientist for 16 years at the Fisheries Institute, Brazil, with active international collaboration in America, Africa, and Europe. She has been involved with the World Aquaculture Society (WAS) and the Latin American and Caribbean Chapter of WAS (LACC) as President of both societies. Her primary duties are research and education. She was Host Country Principal Investigator in projects of the AquaFish Collaborative Research Support Program (USAID/USA – 2006-2011) and responded as Co-Coordinator of LAC Regional Center of Excellence (AquaFish Innovation Lab/USAID – 2013 – 2018). Currently, she is as a member of the Advisory Committee on Aquaculture and Fisheries of the National Council for Scientific and Technological Development (Brazil), and a member of the Committee of Experts for the development of the FAO Guidelines for Sustainable Aquaculture. She was also a partner of the CITYFOOD consortium financed by the Belmont Forum, UE. She has authored approximately eighty manuscripts and book chapters.

<https://www2.unesp.br/>





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### **Alyson RIBEIRO**

*Federal University of Minas Gerais (UFMG), Belo Horizonte*

Alyson Ribeiro, a young Brazilian researcher, has been working at the Federal University of Minas Gerais since 2021. Ribeiro's teaching and research focus is on aquaculture wastewater treatment and reuse, as well as sustainable animal production. Currently, Ribeiro teaches undergraduate courses in Aquaculture and Veterinary Medicine, as well as a graduate program in Animal Science. Recognized for his exceptional academic and scientific performance, Ribeiro received a Postdoc fellowship from the São Paulo Research Foundation at the State University of Campinas between 2018 and 2020. During this time, Ribeiro and colleagues at the Institute of Chemistry investigated the environmental impact of veterinary and human pharmaceuticals using state-of-the-art analytical methods and applied studies in environmental chemistry. Ribeiro holds a Ph.D. in Water Science from Universität Duisburg-Essen in Germany, a Master's degree in Environmental Technology and Innovation, and an associated degree in Sanitation and Environmental Control. His current research interests and projects encompass three main areas: (I) Nutrient recovery and the application of circular economy principles to aquaculture wastewater, (II) The role of ecotoxicology in ensuring the safe reuse of water and wastewater in aquaculture, and (III) Advanced Oxidative Processes for the treatment and reuse of water and wastewater in animal production.

<https://ufmg.br/>



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### **Zala SCHMAUTZ**

*ZHAW Life Sciences und Facility Management, Wädenswil*

Dr. Zala Schmautz, a Slovenian national based in Switzerland, is a research associate in the Research Group Aquaculture Systems at the Institute of Natural Resource Sciences, Zurich University of Applied Sciences (ZHAW). With a dedicated emphasis on aquaponics, hydroponics, and vertical farming, Zala has over 8 years of combined academic and industrial experience, marked by leadership and collaboration in national and international projects. She attained her Bachelor's and Master's degrees in Sanitary Engineering from the Faculty of Health Sciences in Ljubljana, Slovenia. During her Master's studies and as part of the ERASMUS+ exchange program, Zala conducted experiments for her thesis at ZHAW, delving into the intricacies of mass balance in aquaponic systems with tomatoes and tilapia. She obtained her doctoral degree in Agricultural Sciences from ETH Zurich, and her research on the characterization of nitrogen dynamics in an aquaponic system and its connection to microbial communities was awarded with Hans Vontobel-Prize 2022. Since the beginning of 2023, she is leading on-site and online capacity building in living labs across Africa within the INCiTIS-FOOD project (<https://incitis-food.eu/>), mainly on aquaponics. Her main interest lies in increasing sustainability by implementing innovative and practical solutions that advance the intersection of aquaculture and agriculture, fostering a more resilient and efficient food production system for the future.

<https://www.zhaw.ch/de/lsfm/>

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## Mark SCHUMANN

*Fisheries Research Station of Baden-Württemberg, Langenargen*

I am a senior researcher at the Fisheries Research Station of Baden-Württemberg, Germany, where I started my scientific career in 2010. I obtained my doctoral degree from the University of Konstanz in Baden-Württemberg in 2021. I am very much interested in the optimization of salmonid aquaculture regarding water quality, environmental footprint, and animal welfare aspects. My main research focus is the impact of feed composition and alternative feed ingredients on aquaculture effluents in open and closed aquaculture systems for salmonids, which was also the topic of my doctoral theses. Another important research area is the fish farming of cold-water species in these times of global warming. My main interest here is the developing of strategies based on the predicted water parameters to enhance the resilience of the traditional domestic salmonid sector in Europe. Further emphasis of my research activities is the characterization of organic particles in recirculating aquaculture systems (RAS) in order to optimize the removal and to maintain water quality and increase fish welfare. I am in charge of running and developing the research RAS facilities at the Fisheries Research Station and I lead the aquaculture team.

<https://lazbw.landwirtschaft-bw.de/pb/Lde/Startseite/Themen/Fischereiforschungsstelle>



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## Christopher SHAW

*Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin*

Christopher Shaw is a second-year doctoral student at the Humboldt-University of Berlin (HU Berlin) and earned his B.Sc. in Geography from the University of Cologne and his M.Sc. in Fish Biology, Fisheries and Aquaculture from the HU Berlin. After working as the second farm manager at the land-based Atlantic salmon facility of Swiss Alpine Fish AG (Switzerland) he joined the aquaculture research team of Prof. Dr. Werner Kloas as a research assistant within the project CUBES Circle funded by the Federal Ministry of Education and Research as a part of the initiative Agricultural Systems of the Future. Within this project and his doctoral research, Christopher's interests lie primarily within the developing field of specialized aquaponic diets, and he investigates the potential of optimizing fish performance while enhancing nutrient provisioning to hydroponic plant production, particularly in the context of on-demand coupled aquaponic systems. His latest results (Shaw et al. 2023) illustrate this potential by showing that diets based on slaughter wastes from the poultry industry and freshwater fish processing can improve growth and feed conversion of African catfish compared to a commercial diet while increasing the excretion of soluble reactive phosphorus, a nutrient mostly deficient in aquaponics for optimal plant production. Christopher's strengths lie in meticulous experimental work in aquaculture trials, which he is able to transfer into a broader sustainability context in his publications, and due to his background in the recirculating aquaculture industry, always with consideration of practical relevance, implications and feasibility.

<https://www.igb-berlin.de/en>



### **Klement TOCKNER**

*Senckenberg Society for Nature Research, Frankfurt a.M.*

Klement Tockner is Director General of the Senckenberg Society for Nature Research and professor for Ecosystem Sciences at Goethe-University, Frankfurt am Main (since 2021). He was President of the Austrian Science Fund – FWF (2016-2020), full professor for Aquatic Ecology at the Free University Berlin (2007-2020) and director of the Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin (2007-2016). He received a PhD from the University of Vienna (1993) and a Titulary Professorship at ETH Zürich (2005). He is an internationally leading freshwater scientist, in particular in the research domains biodiversity, ecosystem science and environmental management. He is Co-Editor of the journal *Aquatic Sciences* and Subject Editor of the journal *Ecosystems*. He has published about 250 scientific papers including 179 ISI papers. In 2009, he edited a comprehensive book on European Rivers (*Rivers of Europe*, Elsevier; 2nd Edition in 2021). Klement Tockner has successfully managed large inter- and transdisciplinary projects such as the EC-funded project BioFresh. He is member of several scientific committees and advisory boards including the National Institute of Environmental Studies, Japan (NIES) and the Biology Research Centre (CZ). He is elected member of the Austrian Academy of Sciences and the German National Academy of Sciences Leopoldina.



### **José Galizia TUNDISI**

*Academia Brasileira de Ciências, Rio de Janeiro*

José Galizia Tundisi holds a BSc in Natural History from the University of São Paulo (1962), a MSc in Oceanography from the University of Southampton (1966) and a PhD in Botany-Estuarine Ecology from the University of São Paulo (1969). He has experience in ecology, having worked in the following subjects (including as a consultant in 40 different countries): limnology, water resources management, capacity building in water management, watershed conservation, reservoirs management, reservoirs limnology, and urban waters management. Tundisi is Member of the Brazilian Academy of Sciences (ABC) and of The World Academy of Sciences (TWAS). He is also Permanent Member of the Ecology Institute – Excellence in Ecology (Germany). He is the Brazilian focal point at the Water Program of the InterAmerican Network of Academies of Sciences (IANAS). President of the Brazilian National Council for Scientific and Technological Development (CNPq) from 1995 to 1999, Tundisi is a retired full professor of Environmental Sciences of the School of Engineering at São Carlos, University of São Paulo. In 2022, he received the Naumann-Thineman Medal, awarded by the International Society of Limnology (SIL) for his contributions to limnological studies in tropical and subtropical inland waters.

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## Adalberto Luis VAL

*Academia Brasileira de Ciências, Rio de Janeiro*

Adalberto Luis Val, a senior researcher at the Brazilian National Institute for Research of the Amazon (INPA) since 1981, studies biological adaptations of fish of the Amazon, including effects of climate changes, to support biodiversity conservation, food security and fish farming. He supervised 120+ students and authored 220+ articles and book chapters. Among his books are *Fishes of the Amazon*, Springer Verlag (1995) and *The Physiology of Tropical Fishes*, Academic Press (2006). He delivered 150+ seminars and conferences worldwide. He acted as a General Director of INPA/MCTI for eight years (2006-2014) and is coordinating the INCT ADAPTA Project. His laboratory has been supported by Brazilian funding agencies (CNPq, CAPES, FAPEAM) and foreign organizations (Copper Association, The Leverhulme Trust). He is member and Vice-President (North) of the Brazilian Academy of Sciences, member of The World Academy of Sciences, and has been awarded the Gran Cross of the National Order of Scientific Merit (Brazil) and the Award of Excellence of the American Fisheries Society-Physiology Section (USA), among others.

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## Evoy ZANIBONI-FILHO

*Federal University of Santa Catarina, Florianópolis*

Evoy Zaniboni-Filho graduated in Oceanography (1982); MSc in Freshwater Biology and Inland Fisheries (1985); Doctorate in Ecology and Natural Resources (1992). Sabbatical at the Department of Fisheries and Wildlife at Virginia Tech (USA, 2008-2009). Professor at the Federal University of Santa Catarina in undergraduate and graduate courses in aquaculture (1993-2019). Member of the Advisory Committee for Aquaculture and Fishery Resources of CNPq (2004-2006). Professional experience in the biology of freshwater fish reproduction, and in the application of this knowledge in the induced reproduction of fish and in the development of egg incubation and larval rearing techniques. Fish semen freezing studies and its use in fish reproduction, in addition to the implementation of “in vivo” germplasm banks (biobanks). Studies to evaluate the genetic variability of natural freshwater fish stocks and the application of genetic improvement techniques applied to aquaculture. Assessment of pollution caused by fish production in farming systems and tests in management and treatment of effluents. All these studies were focused on freshwater fish species native to South America, mainly migratory fish species. Currently, as a full professor and retired, in voluntary work at the Federal University of Santa Catarina.

<https://en.ufsc.br/>

# Organizers

The **Leopoldina** originated in 1652 as a classical scholarly society and now has 1,600 members from almost all branches of science. In 2008, the Leopoldina was appointed as the German National Academy of Sciences and, in this capacity, was invested with two major objectives: representing the German scientific community internationally, and providing policymakers and the public with science-based advice.

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Through innovative research on the structure and functioning of freshwaters, their biodiversity, ecosystem services and responses to global change, the **Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)** makes a relevant contribution to a better understanding of these ecosystems and to sustainable freshwater management.

Science at IGB covers a wide range of disciplines – from hydrology, physics, geography, ecology and evolution to socio-ecology, from molecular biology to the study of entire ecosystems and catchments, and from microbial ecology to fish behaviour. Our findings and methods provide an excellent basis to train young scientists and to promote an open knowledge exchange with society. IGB is a member of Germany's Leibniz Association, and closely collaborates with numerous national and international universities and other partners in science and society.

[www.igb-berlin.de/en](http://www.igb-berlin.de/en)

## Contact:

### **Academia Brasileira Ciências (ABC)**

*Brazilian Academy of Sciences*

Marcos Cortesão Barnsley Scheuenstuhl, Vitor Vieira

Rua Anfilóbio de Carvalho, 29, 3° andar

Rio de Janeiro, Brazil

Email: [abc@abc.org.br](mailto:abc@abc.org.br)

### **Deutsche Akademie der Naturforscher Leopoldina e.V.**

#### **Nationale Akademie der Wissenschaften**

*German National Academy of Sciences Leopoldina*

Dr Thomas Plötze, Dr Henning Steinicke

Jägerberg 1, 06108 Halle, Germany

Email: [international@leopoldina.org](mailto:international@leopoldina.org) | [politikberatung@leopoldina.org](mailto:politikberatung@leopoldina.org)

### **Leibniz-Institut für Gewässerökologie und Binnenfischerei (IGB)**

*Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)*

Prof Dr Werner Kloas (Secretariat Sylvia Kanzler)

Müggelseedamm 310, 12587 Berlin, Germany

Email: [sylvia.kanzler@igb-berlin.de](mailto:sylvia.kanzler@igb-berlin.de)