

CURRICULUM VITAE

Personal information

- Full name: Bastiaan Willem Ibelings
- Position: Full Professor (Professeur Ordinaire) - Département F.-A. Forel for Environmental and Aquatic Sciences and Institute for Environmental Sciences, University of Geneva
- Research field: Effects of environmental change on freshwater ecosystems
- Languages at C1 or C2-level: Dutch, English, French; German at B1-level
- Google Scholar: <https://scholar.google.ca/citations?user=9HGPs6MAAAJ&hl=en>; H-index 55

Education

- 1984. **Bachelor Science**, Radboud University, The Netherlands
- 1987. **Master Science**, Radboud University, The Netherlands
- 1992. **PhD**, University of Amsterdam, The Netherlands

Employment history

- 2012- present. **Full Professor Microbial Ecology**, University of Geneva, Switzerland
- 2009 - 2012. **Senior Scientist** (tenured), Netherlands Institute of Ecology (NIOO-KNAW), The Netherlands
- 2007 – 2009. **Group Leader** (tenured), Swiss Federal Institute Aquatic Science and Technology (EAWAG), Switzerland
- 2001- 2007. **Senior Scientist** (tenure track), Netherlands Institute of Ecology (NIOO-KNAW), The Netherlands
- 1998 – 2001. **Program Leader** Lake Ecology and Restoration, Institute for Inland Water Management and Waste Water Treatment (RIZA), The Netherlands
- 1996-1997. **Project Leader** Plankton Research, Institute for Inland Water Management and Waste Water Treatment (RIZA), The Netherlands
- 1995-1996. **Aquatic ecologist** Royal HASKONING – consulting engineers, The Netherlands
- 1992-1995. **Post-doctoral research associate**, University of Bristol, U.K.
- 1987-1991. **PhD student**, University of Amsterdam, The Netherlands

Main institutional responsibilities University of Geneva

- 2021 - present. Director Département F.-A. Forel
- 2021 – present. Member Comité de Direction, Institute for Environmental Sciences
- 2018 - 2021. Head of the Biodiversity Specialization, Institute for Environmental Sciences
- 2015–2018. Director Pole Sciences, Institute for Environmental Sciences
- 2012–2016. President Master in Environmental Sciences (MUSE)

Main approved Research Projects while at UniGe

- Swiss National Science Foundation, Co-Fish, a co-created citizen science project for evolution understanding, conservation and scientific literacy, 239,908 CHF, with Prof Bruno Strasser.
- Australian Research Council, Next generation models cyanobacterial blooms, ca 500,000 CHF, with Profs Hamilton and Burford, Griffith University
- Swiss National Science Foundation – Scientific exchange dr Savina Gjoni, Cross community scaling relationships, 18,500 CHF
- EPFL Limnology Centre. Trophic bottlenecks in Lake Geneva., ca. 100,000 CHF.
- EU Marie-Curie ITN MANTEL (Management of Climatic Extreme Events in Lakes and Reservoirs for the Protection of Ecosystem Services), 3.05 million EUR.
- China Scholarship Council: Chytrids and harmful blooms of cyanobacteria, PhD grant for Mr Xujian Xu, ca 108,000 CHF.
- Swiss National Science Foundation. On the role of bioactive compounds in the co-evolutionary struggle

between toxic cyanobacteria and their chytrid parasites, 268,140 CHF.

- SNF Sinergia, A flexible underwater distributed robotic system for high resolution sensing of aquatic ecosystem (with Profs Martinoli and Wuest, EPFL), 1,600,000 CHF
- China Scholarship Council: Using microalgae to improve freshwater quality, PhD grant for Mrs Ziyu Guan, ca 108,000 CHF.
- Fondation pour l'étude des eaux du Léman. Lake Ladoga life under ice, 606,000 CHF (Lead EPFL, partners UNiGE, Eawag, INRA-CARTELE and others)
- SNF R`Equip. LÉXPLORE, Léman Exploitation, 340,000 CHF + Matching funds for 355,000 CHF from Federal Government, UniGe, COMAD and EPFL (with Prof Wuest)
- EU-COST NETLAKE, co-PI with Eleanor Jennings, ca. 950,000 EUR.
- State Secretariat for Education, Research and Innovation (SERI) Understanding and managing cyanobacterial blooms of the future: learning from past and present day dynamics, PhD Position 180,000 CHF.
- SERI. Automated monitoring of plankton in lakes: what controls biodiversity? Advancing ecology and sharing the knowledge, Postdoc Position 180,000 CHF.

PhD supervision at University of Geneva

At the University of Geneva I supervise(d) **15 PhD students over last 5 years**: Alonso Cartuche, Fabio Correia, Naresh Devarjan, Ardiadne Frossard, Ziyu Guan, Claire Loudon, Evanthia Mantzouki, Jorrit Mesman, Sophie Moisset, Julio Stelzer, Ena Suarez, Michael Thayne, Joren Wierenga, Xuijan Xu, Ana Zamora. Over the years I supervised more than 35 PhD students and postdocs.

Teaching University of Geneva

- Biologie Fondamentale, Biology Bachelor, 1st year
- Ecologie, Biology Bachelor, 3d year (56 h) + travaux pratiques
- Ecologie, Earth and Environmental Sciences Bachelor, 3d year (56 h) + travaux pratiques
- Evolution of Life, Earth and Environmental Sciences Bachelor, 1st year
- Environnement alpin, MUSE - Master Environmental Sciences
- Ecologie Fondamentale, MUSE, Master Environmental Sciences
- Freshwater Ecology, lake ecosystem restoration MUSE Master Environmental Sciences
- Evolution of biodiversity MUSE Master (24 h)

Main memberships of panels, boards

- Chair of GLEON (Global Lake Ecology Observatory Network (www.gleon.org))
- Member of Board International Association Ecology INTECOL (www.intecol.org)
- Vice-chair NETLAKE COST Action (2013-2017)
- Associate editor Inland Waters, Aquatic Ecology, Frontiers

Organization of conferences

- INTECOL 2021 Geneva, Chair Scientific committee (<http://intecol2021.org/>)
- Symposium European Freshwater Sciences, 2015, Geneva, Chair organizing committee

Prizes, awards, fellowships

- 2012 Luigi Provasoli Award for outstanding paper in Journal of Phycology
- 2019 Visiting researcher fellowship, Griffith University, Australia
- 2021 Best paper award Toxins (BWI senior author)

Career breaks

For seven years I worked outside academia to explore the "world outside". I first worked at a large consultancy firm (<https://www.royalhaskoningdhv.com/>). Then I worked for the Dutch Ministry of Water management (<https://www.rijkswaterstaat.nl/english/index.aspx>).

Major scientific achievements

I am a microbial ecologist with a primary interest in (lake) phytoplankton and an emphasis on cyanobacteria, microalgae and parasitic chytrid fungi. Over the years I have also studied the main grazers of lake phytoplankton, *Daphnia* and *Dreissena* (zebra mussels). My studies on phytoplankton biodiversity vary from the population to the community and whole ecosystem level. Whenever possible I integrate processes in ecology and evolution and my interests range from the evolutionary origin of new microbial species, through population genetics, and community assembly up to the crucial role of phytoplankton diversity for lake ecosystem services like drinking water, inland fisheries and recreation. Identifying the ecological and evolutionary processes that determine plankton community assembly and biodiversity is an important precondition to understand and ultimately predict the effects of environmental change on aquatic ecosystems. Because of the direct link between functional diversity and ecosystem functioning, our efforts are focused on studying trait diversity in plankton communities.

I believe that the most recent developments in instrumentation and IT-technology will allow us to study environmental change where it unfolds, the lake ecosystem, at the fine temporal and spatial scales that are relevant to plankton. We need to modernize the ways we collect information from our ecosystems (Pomati Ibelings et al. *Env Sci Technol* 2011, Marce, Ibelings et al *Env Sci Technol* 2016). In this I work intensively collaborate with colleagues worldwide, united in the grassroots network GLEON (www.gleon.org) (Hamilton, Ibelings et al *Inland Waters* 2015), where I have been elected co-chair in 2017. This interest has led to the deployment of the LÉXPLORE platform in Lake Geneva in 2018 (www.lexplore.info). LÉXPLORE, for which I took the initiative together with Prof Wuest from EAWAG/EPFL, is the most advanced lake research platform worldwide. It brings together many disciplines from all over Switzerland and France-voisine, each with their own suite of instruments for the automated, high frequency observation of the dynamics of Lake Geneva. In our research efforts we reach out to the lake users, like professional and amateur fishers (new SNF funded project on co-created citizen science with Dr Jenkins and Prof Strasser), sailors, local inhabitants etc. One of the challenges we face in Swiss peri-alpine lakes is the interaction between re-oligotrophication (lake restoration) and climate change effects, mainly enhanced watercolumn stability and reduced mixing. What are the effects for carrying capacity of higher trophic levels, including fish and waterfowl, and what are the consequences for ecosystem services like fisheries (Pomati, Ibelings et al. *Oikos, Freshw Biol, Hydrobiol* 2012, 2015, 2017, Sarpe, Ibelings et al *Inland Waters* 2014). In collaboration with EAWAG and EPFL we are studying the possible occurrence of trophic bottlenecks in the foodweb of Lake Geneva, caused by increases in C:P of the phytoplankton (poor food quality).

Years of working with GLEON also has inspired me to believe in the strength of team science: bringing – young – researchers from many countries together to study lakes worldwide. This broad view is essential to move beyond the idiosyncratic results of studying your isolated “pet” ecosystem. Also the message about lake ecosystem degradation. going out to the public from bringing 100s of lakes on five continents together is much stronger (Leach, Ibelings et al *Limnol Oceanogr* 2018, Donis, Mantzouki, Ibelings et al, *Limnol Oceanogr, minor revision*). For this work my PhD student dr Mantzouki was awarded the 2020 best paper award by the journal *Toxins*.

One of the biggest threats to aquatic systems worldwide is still eutrophication, which is devastating for biodiversity of wetland ecosystems. Most of my applied research efforts focuses on the consequences of harmful cyanobacterial blooms for nature, as well as for humans. I am internationally recognized as one of the leaders in the study of harmful algal blooms of freshwater ecosystems and the effects on ecosystem functioning and risks for human health. I have studied the transfer of cyanobacterial toxins in lake foodwebs (Ibelings et al *Microb Ecol* 2005) and the risk of consumption of freshwater seafood and fish for public health (Ibelings & Chorus *Env Poll* 2007). I am involved in setting international guidelines to minimize risks of toxins for

humans, for instance when they swim in lakes (Ibelings et al *Harmful Algae* 2014). In this, I work with the WHO to set "Tolerable Daily Intakes" of cyanobacterial toxins, I am leading author of the 2nd edition of the WHO handbook Toxic Cyanobacteria in Water (2021). Of particular interest are the links between eutrophication and climate change in promoting blooms (Huisman, Ibelings et al, *Nature Rev Microbiol* 2018).

I will now briefly list **6** ongoing research projects to illustrate the diversity of the research in my team. All topics, however are thematically linked, studying biodiversity at increasing scales of environmental complexity. **(i)** Adaptive radiation of microorganisms – what is the evolutionary basis of biodiversity? Experimental evolution of *Pseudomonas fluorescens* on environmental gradients of varying slope created by the activity of the evolving bacteria themselves in a process known as niche construction (Ibelings, Rainy et al, *PNAS*, *in prep*; Loudon Ibelings et al, *Evol Ecol*, 2016). **(ii)** Cythrid infections – what role do strain specific parasites play in the genetic (e.g. Gell, Ibelings et al., *ISME-J* 2013) and phenotypic diversification of phytoplankton hosts? Have some bioactive compounds produced by cyanobacteria evolved as defense mechanisms against fungal parasites? What is the role of a changing lake environment, temperature, light, nutrients, on host parasite interactions (Wierenga, Ibelings et al, *Appl. Env Microbiol. in prep*) **(iii)** Functional phytoplankton diversity – which traits allow phytoplankton to co-exist in the community, be it neutrally or niche based interactions? How do niche difference and fitness difference interact to promote biodiversity? Is cell-size the master trait that determines phytoplankton community assembly and biodiversity? (Gallego, Venail, Ibelings, *ISME-J* 2018), **(iv)** Spatio-temporal lake heterogeneity – what is the impact of environmental change on shaping temporal and spatial niche segregation? Therefore, what is the foreseen impact on co-occurrence patterns and future plankton biodiversity in lakes? (e.g. Pomati, Ibelings et al., *Hydrobiol*, 2017; Suarez, Ibelings et al, *Limnol. Oceanogr*, *in prep*), **(v)** Toxic cyanobacteria in a warmer future - will blooms expand as predicted by the "Blooms like it hot" paradigm? Or is that too simple? We have recently performed team-science projects with 100s of collaborators to study cyanobacterial blooms over continental scale gradients, in the believe that for meaningful extrapolations to the future, a space for time swap is a very useful instrument (Mantzouki, Ibelings et al, *Front Ecol Evol* 2018). We found that in heatwave summers blooms were larger and toxins more variable in the cooler north than the warmer south of Europe (Mantzouki, Ibelings et al, *Toxins* 2018). **(vi)** How do lake ecosystems recover from disturbance and how is this dependent on ecosystem resilience, here defined as the distance to a potential tipping point? (Stockwell, Ibelings et al, *Global Change Biol.*, 2020; Thayne, Ibelings et al., *Limnol. Oceanogr.*, *accepted*). Can we predict the occurrence of impending regime shifts by studying critical slowing down in lake ecosystems (Stelzer, Ibelings et al., *Ecol, Indicators*, *under review*).

The common thread in all these research themes are the questions what determines phytoplankton diversity, what allows species to co-exist and how does biodiversity determine the functioning and resilience of lake ecosystems? What are the consequences of a changing lake environment for plankton biodiversity, lake ecosystem functioning and lake ecosystem services?