Robert Ladwig
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Homepage, Github, Gitlab, Google Scholar

I'M A *COMPUTATIONAL LIMNOLOGIST* INTERESTED IN

(i) Numerical modeling of surface water ecosystems, (ii) Climate change impact on lake mixing processes, stratification and primary production, (iii) Urban limnology, (iv) Groundwater management

PROFESSIONAL APPOINTMENTS

Postdoctoral Fellow since 2019
University of Wisconsin-Madison, Center for Limnology

- Aquatic ecosystem modeling of freshwater lakes in the US Midwest
- Oxygen depletion and stratification dynamics
- Technical development of numerical lake modeling tools
- Advisors: Assist. Prof. Hilary Dugan and Prof. Paul Hanson

Research Assistant 2015-2019
Leibniz-Institute of Freshwater Ecology and Inland Fisheries

- Field sampling, sediment column experiments, numerical modeling of lake systems, and multivariate statistical analysis of laboratory experiments
- Working group of Dr. Michael Hupfer 'Biogeochemical Processes in Sediments and Lake Management'

EDUCATION

Dr. rer. nat. (PhD) 2015-2019
Technische Universität Berlin and Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany

- Thesis: Adapting the water management to mitigate the impact of multiple stressors on an urban lake: Case study Lake Tegel, Germany
- Supervisors: Dr. Michael Hupfer and Prof. Dr.-Ing. Reinhard Hinkelmann
- Part of the Research Training Group 'Urban Water Interfaces' (DFG)

Master of Science in Hydrology 2012-2015
Technische Universität Dresden, Germany

- Thesis: Optimal management of arid coastal aquifers with the use of density dependent groundwater flow modeling and artificial neural networks
- Supervisors: Dr. Jens Grundmann, Prof. Dr. Niels Schütze and JProf. Dr. Marc Walther

Bachelor of Science in BioGeoSciences 2009-2012
Friedrich-Schiller University Jena, Germany

- Thesis: Spatiotemporal status of the heavy metal contamination in natural and contaminated test sites
- Supervisors: Prof. Dr. Kai Uwe Totsche and Dr. Dirk Merten

PEER-REVIEWED JOURNAL PAPERS

4. R. Ladwig, E. Matta, R. Hinkelmann and M. Hupfer (2018): "Numerical investigation of water exchange times and phytoplankton bloom formation in an urban lake after short-duration heavy rainfall events", *initial submission in October 2018* , in revision.

3. M. Hupfer, S. Jordan, C. Herzog, C. Ebeling, R. Ladwig, M. Rothe and J. Lewandowski (2019): "Chironomid larvae enhance phosphorus burial in lake sediments: Insights from long-term and short-term experiments", *Science of the Total Environment* **663**, 254-264.

2. R. Ladwig, E. Furusato, G. Kirillin, R. Hinkelmann and M. Hupfer (2018): "Climate Change Demands Adaptive Management of Urban Lakes: Model-Based Assessment of Management Scenarios for Lake Tegel (Berlin,Germany)", *Water* **10(2)**, 186.

1. R. Ladwig, L. Heinrich, G. Singer and M. Hupfer (2017): "Sediment core data reconstruct the management history and usage of a heavily modified urban lake in Berlin, Germanys", *Environ Sci Pollut Res.* **24**, 25166-25178.

FURTHER PUBLICATIONS AND PRESENTATIONS

12. New Features to the Trinity of GLM R-packages: glmtools, GLM3r and GRAPLEr, Poster presentation, *GLEON 21 All Hands' Meeting*, Huntsville, Canada, 04.-08.11.2019

11. What is driving the death zone of Lake Mendota?, Invited oral presentation, *Wisconsin Ecology 22nd Annual Fall Symposium*, Madison, USA, 15.10.2019

10. Simulating oxythermal habitats of fish in surrogate lake ecosystems, Oral presentation, *4th Science in the Northwoods Conference*, Woodruff, USA, 09.11.2019

9. Simulation of water exchange times for contaminant risk assessment in an urban lake using a depth-averaged 2D model, Conference paper, *E-proceedings of the 38th IAHR World Congress*, Panama City, Panama, 01.-06.09.2019

8. Adapting the water management to mitigate the impact of multiple stressors on an urban lake: Case study Lake Tegel, Germany , PhD thesis, Technische Universität Berlin, Berlin, Germany, 25.02.2019

7. How can we adapt urban lake management in times of climate change?, Invited oral presentation, *9th Water Research Horizon Conference*, Dresden, Germany, 03.-04.07.2018

6. From 1D to 2D: Impact of extreme weather events and climate change on the heavily stressed urban Lake Tegel in Berlin, Germany, Poster presentation, *EGU General Assembly*, Vienna, Austria, 09.-13.04.2018

5. Model-based assessment of urban water management strategies for a shallow dimictic lake, Poster presentation, *ELR2017NAGOA and ICLEE 8th Conference*, Nagoya, Japan, 22.-25.09.2017

4. Lake on life support: Evaluating urban lake management measures by using a coupled 1D-modeling approach, Oral presentation, *EGU General Assembly*, Vienna, Austria, 23.-28.04.2017

3. Abschlussbericht: Sedimentuntersuchungen am Tegeler See, Report, *on behalf of Berlin Senate Department for the Environment, Transport and Climate Protection*, Berlin, Germany, 2016

2. Qualitative Beurteilung von Bewirtschaftungsmaßnahmen im Sediment eines urbanen Sees mittels multivariater Statistik, Oral presentation (in German), *DGL Tagung Wien*, Vienna, Austria, 26.-30.09.2016

1. Urban Water Interfaces: Interfaces in Urban Surface Waters, Oral presentation, *6th German-Russian Week of the Young Researcher*, Moscow, Russia, 12.-16.09.2016

REVIEWER

- Limnology and Oceanography, Hydrology and Earth System Sciences, Environmental Modelling & Software, Environmental Pollution, Inland Waters, Ecological Informatics, Limnologica, Heliyon, Water

EXPERIENCE

Special research student (Visiting Researcher) 09-11/2017
Saitama University, Japan
Research internship at working group of Assoc. Prof. Eiichi Furusato: field investigations and numerical modeling of reservoirs; ecological modeling of phytoplankton

Research assistant 05-07/2015
Technische Universität Dresden
Modeling and economic evaluation of groundwater management scenarios; correction and evaluation of written exams in the modules 'Hydrological Models' and 'Climatology and Hydrology'

Student assistant 11-12/2013
Institut für Wasser und Boden Dr. Uhlmann, Dresden
Data analysis, field work (e.g. stream gauging)

Internship 09-10/2013
Helmholtz-Centre for Environmental Research, Halle
Isotope analysis, chemical analysis, field sampling

Internship 03-04/2012
KOWUG Kommunale Wasser- und Umweltanalytik GmbH, Gera
Chemical analysis, sampling

Student assistant 08/11-02/12
Max-Planck Institute for Biogeochemistry, Jena
Technical work

Internship 07-08/2009
JENA-GEOS-Ingenieurbüro GmbH, Jena
Data analysis, field work (e.g. groundwater sampling)

PROJECT COLLABORATIONS

- ABI Development funded by National Science Foundation: Building advanced numerical simulation technology for the lake ecology community at UW-Madison, *postdoctoral fellow in the project*

- Collaborative Research funded by National Science Foundation: Consequences of changing oxygen availability for carbon cycling in freshwater ecosystems at UW-Madison, *scientist in the project*
- Interdisciplinary Research Training Group 'Urban Water Interfaces' funded by Deutsche Forschungsgemeinschaft: joint project between Technische Universität Berlin and Leibniz-Institute of Freshwater Ecology and Inland Fisheries Berlin, 2015-2018, *Doctoral student in the project*
- The Inter-Sectoral Impact Model Intercomparison Project (ISIMIP): community-driven climate-impacts modeling initiative, *member of the GLM modeling (lakes) team*
- Coupled Natural and Human system (CNH Lakes): research project that explores the relationships between human behavior and lake water quality, *scientist in the project*
- Aquatic Ecosystem MOdelling Network Junior (AEMON-J): setting up a model library with a clear overview of existing aquatic ecosystem models, *member of the team setting up the model wikipedia*
- Improving the lake Status from Eutrophy towards Oligotrophy (ISEO): joint project to investigate the impact of mixing patterns in North Italian Lake Iseo, 2018, *member of the IGB team*
- Yamagusuku Pond, Kumejima Island, Japan: application of artificial bubble plume mixing technique to improve pond water quality, 2017, *member of Saitama University team*

MEMBERSHIPS

- Global Lake Ecological Observatory Network (GLEON)
- International Society of Limnology (SIL)
- Association for the Sciences of Limnology and Oceanography (ASLO)
- German Society for Limnology (DGL)
- European Geosciences Union (EGU)

TEACHING EXPERIENCE

- Co-Organizer of "Introduction to running, visualizing, and calibrating the General Lake Model (GLM)". 04.-08.11.2019, GLEON 21 All Hands' Meeting, Huntsville, Canada,
- Auxiliary instructor "Zoology 955: Seminar-Limnology - An introduction to lake modeling" at UW-Madison, Madison, USA, in 2019
- Guest lecture about "Modelling of surface water systems" in the graduate course *Water Resource and Environmental Engineering 2017* at Saitama University, Saitama, Japan

CO-SUPERVISED STUDENTS

2. Simon Heimann (Master thesis, 2017-2018): Modellgestützte Analysen zum Einfluss des globalen Klimawandels auf die Temperatur- und Sauerstoffverhältnisse in geschichteten Seen (in German). Soils, Inland Waters, Contaminated Land (M.Sc.), Osnabrück University

1. Lena Heinrich (Master thesis, 2015-2016): Impact of management measures on sediment stratigraphy and phosphorus fixation in Lake Tegel (Berlin). Technical Environmental Protection (M.Sc.), Technische Universität Berlin

OUTREACH

- Interview about lake turnover and anoxia for the Clean Lakes Alliance
- Part of the UW-Madison Postdoctoral Research Symposium 2019 Planning Committee
- Since June 2019: part of the UW-Madison University Apartments Assembly, Vice Chair of Communications and Newsletters

WORKSHOP PARTICIPATION

6. AEMON-J workshop for early career Aquatic Ecosystem Modellers. 29.11.-01.12.2016, Perth, Australia
5. Best Practices and future trend for urban rainwater management in European cities. 23.11.2016, Arcadis, Berlin
4. 13th PhD Workshop HydMod. 23.06.2016, Freie Universität Berlin
3. Spring School Physical Limnology (lecturers: Dr. Bertram Boehrer, Prof. Andreas Lorke, Prof. Daniel McGinnis and Dr. Martin Schultze). 04.04.2016 – 08.04.2016, Heidelberg University
2. Hochschulgruppe Simulation meeting (HSGSim, College working group dealing with the management of wastewaters). 29. – 31.10.2015, Antwerp, Belgium; 28. – 30.04.2016, Gelsenkirchen, Germany
1. PEST-Model Calibration, Uncertainty Analysis and PEST – A Brief Tour (lecturer: Dr. John Doherty). 19.09.2015, DHI-WASY Lecture, Berlin

COMPUTING

Selected software projects

LakeEnsemblR

R package that facilitates multi-model ensembles for lake thermodynamics, includes tools for calibration, sensitivity analysis and data visualization.

thermod

Simple two-layer water temperature model in R to teach students about heat fluxes, stratification dynamics and depletion of dissolved oxygen.

glmtools

Overhaul and feature addition, e.g. calibration, of the tools suite for interacting with the General Lake Model (GLM) in R.

simpleAnoxia

Simple two-layer dissolved oxygen model to simulate anoxia dynamics on the US continental scale using physics-guided machine learning.

Experience

- Programming: R (5 years), MATLAB/Octave (7 years), Python (2 years)
- Modeling: GLM-AED2, open TELEMAC-Mascaret, OpenGeoSys, FLake, GOTM, Simstrat, MyLake, MODFLOW-2005, PCLake, PHREEQC, HEC-RAS, AKWA-M, Hydrus
- Misc.: Container (Docker), Linux, Git, LaTeX, Microsoft Office, ArcGIS, QGIS, Experience on High-Performance Computing (HLRN Germany, HTCondor), ParaView, Inkscape, FileZilla

LANGUAGES

- German (native)
- English (fluent, level C1)