Nathan Jay Baker

CONTACT INFORMATION

Address	Akademijos Str. 2, Vilnius LT-08412, Lithuania
Tel. no.:	+370 620 250 11
E-mail:	nathan.baker@gamtc.lt
	orcid.org/0000-0001-7948-106X
	researchgate.net/profile/Nathan-Baker-2
	linkedin.com/in/dr-nathan-jay-baker-78829ab9/
	webofscience.com/wos/author/record/H-9706-2019
	nathan93baker.wixsite.com/nathan-jay-baker

EDUCATION AND ACADEMIC DEGREE

2018 – 2022 **Doctorate (Ph.D.) in Community Ecology (Magna Cum Laude)**
Institute: University of Duisburg-Essen; Senckenberg Research Institute and Natural History Museum Frankfurt
Dissertation: Disentangling the effects of environmental drivers on the structure and function of macroinvertebrate communities within boreal streams (Advisor: Peter Haase)
Research area: Ecology, Community Ecology, Temporal Ecology, Data Science, Freshwater, Riverine ecosystems, Functional Diversity, Biodiversity Research, Macroinvertebrates

2016 – 2018 **Masters (M.Sc.) in Aquatic Science (Cum Laude)**
Institute: University of Johannesburg
Dissertation: An assessment of the aquatic macroinvertebrate diversity within the Nyl River floodplain system, Limpopo, South Africa (Advisor: Richard Greenfield).
Research area: Ecology, Community Ecology, Spatial Ecology, Riverine ecosystems, Freshwater, Biodiversity Research, Macroinvertebrates

2015 **Bachelor of Science Honours (B.Sc. Hons) in Zoology (Cum Laude)**
Institute: University of Johannesburg
Research Project: Metal accumulation in House Sparrows (Passer domesticus) from Thohoyandou, Limpopo Province, South Africa (Advisors: Richard Greenfield, John Maina)
Research area: Ecotoxicology, Ornithology, Metal Accumulation, Heavy Metals, Feathers

2012 – 2014 **Bachelor of Science (B.Sc.) in Zoology & Environmental Management**
Institute: University of Johannesburg

2011 **National Senior Certificate (Matric)**
Institute: The Training Academy (TTA)
Subjects Completed: English, Afrikaans, Mathematics, Physical Sciences, Life Sciences, Computer Applications Technology, Life Orientation.

PROFESSIONAL EXPERIENCE

2023 03 – Present **Senior Researcher**
Institute: State Scientific Research Institute Nature Research Centre
City, Country: Vilnius, Lithuania

2022 11 – 24 10 **Post-Doctoral Researcher**
Institute: Nature Research Centre
City, Country: Vilnius, Lithuania

2022 03 – 2023 02	**Researcher** *Insitute:* Nature Research Centre *City, Country:* Vilnius, Lithuania
2018 06 – 2018 02	**Full time PhD candidate** *Insitute:* Senckenberg Research Institute & Natural History Museum, Frankfurt *City, Country:* Frankfurt am Main, Germany
2018 02 – 2018 06	**General Assistant (non-research assistant)** *Insitute:* University of Johannesburg *City, Country:* Johannesburg, South Africa
2016 08 – 2016 10	**Field Consultant** *Institute:* Natural Science Services (NSS) *City, Country:* Johannesburg, South Africa
2015 02 – 2017 12	**Practical Demonstrator & Tutor** *Institute:* University of Johannesburg. *City, Country:* Johannesburg, South Africa
2012 01 – 2018 12	**Full Time Student** *Institute:* University of Johannesburg *City, Country:* Johannesburg, South Africa

RESEARCH INTERESTS

Research Area: I investigate how and why riverine invertebrate communities are changing through time and space. The main goals of my research are to (i) integrate taxonomic, functional and [phylo]genetic diversity using statistical models and ecological explorations, (ii) add to our understanding of how anthropogenic processes are driving changes in biodiversity, and (iii) provide updated information as to the status of Lithuanian riverine ecosystems and the biodiversity they harbour, making this data more freely available for use in future meta-analyses. I use biomonitoring data retrieved from the environmental agencies and other sources as well as the R statistical environment to explore spatial and temporal patterns of biodiversity in an attempt to identify how changes are linked to anthropogenic practices and both known and unknown stressors.

PUBLICATIONS

Scientific articles published in journals (books), indexed in „Clarivate Analytics Web of Science" database (with citation index):

1. Kudlai, O., Binkienė, R., Rakauskas, V. & Baker, N.J. (2026). Comparison of historic and novel data reveals higher contemporary diversity of trematode metacercariae in freshwater fish. Parasite, 33, 10.1051/parasite/2025067.
2. Sinclair, J. S., Stubbington, R., Welti, E.A.R., Aroviita J., **Baker, N.J.**, et al. (2025). Protected areas promote recovery in degraded European rivers. Nature Ecology & Evolution 16, 11146. 10.1038/s41467-025-67125-5.
3. Rakauskas, V., Kaupinis, A., Binkienė, R., **Baker, N.J.**, Virbickas, T. & Kudlai, O. (2025). First records of the black bullhead Ameiurus melas (Rafinesque, 1820) and its parasites in Lithuania. BioInvasions Records, 14, 929–943, 10.3391/bir.2025.14.4.14
4. Cardoso, P., **Baker, N.J.**, Boieiro, M., Bonte, D., Borges, P.A. v., Braby, M.F., Branco, V., Chobanov, D., Correia, L., Dalton, D.T., Damas-Mora, M., Didham, R.K., Forster, L., Glatz, R., Gorneau, J.A., Hochkirch, A., Kirse, A., Lichtenberg, E.M., Macías-Hernández, N., … Scherber, C. (2025). Toward a global repository of insect traits (GRIT). Insect Conservation and Diversity. 10.1111/ICAD.70035
5. Enns, D., **Baker, N.J.**, Oehlmann, J., & Jourdan, J. (2025). Stream baseline conditions shape functional responses to wastewater: evidence from insect-dominated sites. PeerJ, 13, e20193. 10.7717/PEERJ.20193
6. Mittag, D.C., **Baker, N.J.**, Antão, L.H., Kuczynski, L., Haase, P. & Welti1, E.A.R. Increases in interspecific but mixed trends in intraspecific body sizes in German stream macroinvertebrates across two decades. Oikos, e11596. 10.1002/oik.11596

7. Kudlai, O., Rakauskas, V., **Baker, N.J.**, Pantoja, C., Lisitsyna, O., & Binkienė, R. (2024). Helminth parasites of invasive freshwater fish in Lithuania. Animals, 14, 1-25. 10.3390/ani14223293
8. Kabus, J., Hartmann, V., Cocchiararo, B., Dombrowski, A., Enns, D., Karaouzas, I., Lipkowski, K., Pelikan, L., Shumka, S., Soose, L., **Baker, N.J.**, & Jourdan, J. (2024). Cryptic species complex shows population-dependent, rather than lineage-dependent tolerance to a neonicotinoid. Environmental pollution, 362, 1-10. 10.1016/j.envpol.2024.124888
9. **Baker, N.J.**, Pilotto, F., Welti, E.A.R., Osadčaja, D. & Palinauskas, V. (2024). Recovery or reorganisation? Long-term increases in riverine taxonomic and functional diversity are confounded by compositional dynamics. Hydrobiologia. 10.1007/s10750-024-05665-5
10. Welti, E. A. R. Bowler, D. E., Altermatt, F., Álvarez-Cabria, M. Amatulli, G., Angeler, D. G., Archambaud, G., Jorrín, A. I., Aspin, T., Azpiroz, I., **Baker, N.J.**, et al. Time series of freshwater macroinvertebrate abundances and site characteristics of European streams and rivers. Scientific Data. 11, 601. 10.1038/s41597-024-03445-3
11. Sinclair, J. S., Welti, E. A. R., Altermatt, F., Álvarez-Cabria, M., Aroviita, J., **Baker, N.J.** et al. 2024. Multi-decadal improvements in the ecological quality of European rivers are not consistently reflected in biodiversity metrics. Nature Ecology & Evolution. 10.1038/s41559-023-02305-4
12. Stoltefaut, T., Haubrock, P.J., Welti, E.A.R., **Baker, N.J.**, Haase, H. 2023. A long-term case study of river restoration effects on floodplain biodiversity. Ecological Engineering, 198, 1−12. 10.1016/j.ecoleng.2023.107143
13. Haase, P., Bowler, D.E., **Baker, N.J.**, … & Welti, E.A.R. 2023. The recovery of European freshwater biodiversity has come to a halt. Nature, 620, 582−588. 10.1038/s41586-023-06400-1
14. Enns, D., Cunze, S., **Baker, N.J.**, Oehlmann, J. & Jourdan, J. 2023. Flushing away the future: The effects of wastewater treatment plants on aquatic invertebrates. Water Research, 243, 1−10. 10.1016/j.watres.2023.120388
15. **Baker, N.J.**, Welti, E.A.R., Pilotto, F., Jourdan, J., Beudert, B., Huttunen, K., Muotka, T., Paavola, R., Göthe, E, & Haase, P. 2023. Seasonal and spatial variation of stream macroinvertebrate taxonomic and functional diversity across three boreal regions. Insect Conservation and Diversity, 00, 1−19. 10.1111/icad.12623
16. Zajicek, P., Welti, E.A.R., **Baker, N.J.**, Januschke, K., Brauner, O. & Haase, P. 2021. Long-term data reveal unimodal responses of ground beetle abundance to precipitation and land use but no changes in taxonomic and functional diversity. Scientific Reports 11, 17468. 10.1038/s41598-021-96910-7
17. **Baker, N.J.**, Pilotto, F., Haubrock, P.J., Beudert, B. & Haase, P. 2021. Multidecadal changes in functional diversity lag behind the recovery of taxonomic diversity. Ecology and Evolution, 11, 17471−17484. 10.1002/ece3.8381
18. **Baker, N.J.**, Pilotto, F., Jourdan, J., Beudert, B. & Haase, P. 2021. Recovery from air pollution and subsequent acidification masks the effects of climate change on a freshwater macroinvertebrate community. Science of the Total Environment, 758, 143685. 10.1016/j.scitotenv.2020.143685
19. Haubrock, P.J., Cuthbert, R.N., Veselý, L., Balzani, P., **Baker, N.J.**, Dick, J.T.A. & Kouba, A. 2020. Predatory functional responses under increasing temperatures of two life stages of an invasive gecko. Scientific Reports, 10, 10119. 10.1038/s41598-020-67194-0
20. **Baker, N.J.** & Greenfield, R. 2019. Shift happens: changes to the diversity of riverine aquatic macroinvertebrate communities in response to sewage effluent runoff. Ecological Indicators, 102, 813−821. 10.1016/j.ecolind.2019.03.021
21. Dahms-Verster, S., **Baker, N.J.** & Greenfield, R. 2018. A multivariate examination of 'artificial mussels' in freshwater ecosystems. Environmental Monitoring and Assessment, 190. 10.1007/s10661-018-6764-6
22. Dahms, S., **Baker, N.J.** & Greenfield, R. 2017. Ecological risk assessment of metals in sediment: A case study from Limpopo, South Africa. Ecotoxicology and Environmental Safety, 135, 106−114. 10.1016/j.ecoenv.2016.09.036
23. **Baker, N.J.**, Dahms, S., Gerber, R., Maina, J. & Greenfield, R. 2017. Metal accumulation in House Sparrows (Passer domesticus) from Thohoyandou, Limpopo Province, South Africa.

African Zoology, 52, 43−53. 10.1080/15627020.2017.1293491

Scientific articles published in conference proceedings, indexed in „Clarivate Analytics Web of Science" database:

1. **Baker, N.J.**, Maina, J. & Greenfield, R. 2015. Zinc and Cadmium concentrations in the House Sparrow (*Passer domesticus*), Thohoyandou, Limpopo, South Africa. Proceedings of the 7th International Toxicology Symposium in Africa. Johannesburg, South Africa, 31 August 2015. pp: 51-52. ISBN: 978-0-620-66287-1 (e-book)

Scientific articles published in journals (books), indexed in „Clarivate Analytics Web of Science" database (without citation index):

1. Haubrock, P.J., Fribbi, I., Balzani, P., Johovic, I., **Baker, N.J.**, Inghilesi, A.F., Tricarico, E. & Nocita, A. 2018. Age determination in the channel catfish *Ictaluruus punctatus* (Rafinesque, 1818) using pectoral spines: a technical report. Fishes in Mediterranean Environments, 2018.003. 10.29094/FiSHMED.2018.003

Scientific articles under preparation:

1. **Baker, N.J.** & Palinauskas, V. Ecological integrity drives increased abundances of dipteran insects (Culicidae, Simuliidae, Ceratopogonidae). Ecology & Evolution (Submitted).
2. Pelikan, L., Kabus, J., Enns, D., Karaouzas, I., Lipkowski, K., Shumka, S., Soose, L., **Baker, N.J.** & Jourdan, J. Morphological convergence but functional divergence? Investigating the ecological role of cryptic amphipod decomposers. Freshwater Biology (Submitted).
3. Enns, D., **Baker, N.J.**, Oehlmann, J. & Jourdan, J. Urban land use and related infrastructure limit ecological status in freshwater streams. Environmental Science Europe (Submitted).
4. **Baker, N.J.**, Jourdan, J., Pilotto, F., Wagner, R., Awad, J., Caruso, V., Chimeno, C., Höcherl, A., Ivković, M., Moser, M., & Baranov, V. Comparing species accumulation within taxonomically well- and poorly-resolved insect groups over 37-years. Insect Conservation & Diversity (Submitted).
5. Osadčaja, D. & **Baker, N.J.** Standardizing freshwater macroinvertebrate taxonomy: a Lithuanian operational taxalist for ecological quality assessments and biodiversity research. Hydrobiologia (Submitted).

PARTICIPATION IN INTERNATIONAL AND NATIONAL SCIENTIFIC PROGRAMMES AND PROJECTS

2024 09 – 2027 08	**Project leader** in the Lithuanian Research Council (LMT) funded project „ Modernizing and optimizing biomonitoring of Lithuanian rivers" (Project no: S-MIP-24-61).
2022 11 – 2024 11	**Project leader** in the Lithuanian Research Council (LMT) funded project „How changes in biodiversity change biodiversity: Long-term trends of freshwater invertebrates as vectors for haemosporidian parasites" (Project no: S-PD-22-72).
2022 11 – 2023 12	**Researcher** in the LMT funded project „Reviving fish parasitology in Lithuania: assessing the current helminth diversity in fish and the impact of non-native fish in Lithuanian freshwaters" (Project no: S-MIP-22-53).

MANAGERIAL EXPERIENCE

2025 - Present	**Central European Symposium for Aquatic Macroinvertebrate Research** *Role:* Organizing committee member *Institute:* State Scientific Research Institute Nature Research Centre, Vilnius, Lithuania
2024 - Present	**Early Career Researcher Committee** *Role:* Chairperson

Institute: State Scientific Research Institute Nature Research Centre, Vilnius, Lithuania

2022 - 2024 **Early Career Researcher Committee**
Role: Committee member
Institute: State Scientific Research Institute Nature Research Centre, Vilnius, Lithuania

2018 - 2021 **Senckenberg Young Scientists Committee**
Role: Committee member
Institute: Senckenberg Research Institute and Natural History Museum Frankfurt

MENTORING EXPERIENCE

2025 - Present **Ph.D project of Bianca J. Boshoff:** The development of realiable and cost-effective DNA and microbial bioassesment methods for monitoring Lithuania‘s freshwater ecosystems
Role: Supervisor
Institute: State Scientific Research Institute Nature Research Centre & Vilnius University, Vilnius, Lithuania

2023 - Present **Ph.D. project of Diana Osadčaja:** Waterbody type-specific macroinvertebrate indicators for the assessment of water quality of the ecological status of Lithuanian surface waters.
Role: Co-supervisor (Consultant)
Institute: State Scientific Research Institute Nature Research Centre & Vilnius University, Vilnius, Lithuania

2022 - Present **Ph.D. project of Daniel Enns:** Understanding the impacts of wastewater on freshwater invertebrate communities.
Role: Co-supervisor (Consultant)
Institute: University of Frankfurt, Frankfurt, Germany

FIELD AND LABORATORY EXPERIENCE

2024 - present Environmental DNA sampling in Lithuanian rivers for macroinvertebrate, macrophyte, fish, and microbial communities | Macroinvertebrate sampling in Lithuanian rivers via multi-habitat kick sampling (WFD approved methodology) | Macrophyte sampling in Lithuanian rivers (WFD approved methodology) | Macroinvertebrate and macrophyte identification using microscopy, DNA-based methods, and identification guides | Parasitological assessments of fish using microscopy | Water quality analysis using spectrophotometry | Sediment composition analyses via mechanical separation | Statistical exploration of data using the R statistical environment | Manuscript writing and peer review | Reporting results at scientific conferences.

2018 - 2024 Curating, cleaning, and wrangling of macroinvertebrate data obtained from national environmental agencies within the EU | Statistical exploration of data using the R statistical environment | Manuscript writing and peer review | Reporting results at scientific conferences.

2016 - 2018 Macroinvertebrate collection via multi-habitat kick sampling | Macroinvertebrate identification using microscopy and identification guides | Water quality analysis using spectrophotometry techniques | Sediment composition and quality analyses using BCR sequential extraction and mechanical separation | Statistical exploration of data using Canoco and SPSS software | Manuscript writing and peer review | Reporting results at scientific conferences.

2015 - 2016 Bird feather preparation for metal analysis | Metal analysis using inductively coupled optical emission spectrophotometry (ICP-OES) | Statistical exploration of data using Canoco and SPSS software | Manuscript writing and peer review | Reporting results at scientific conferences.

INTERNSHIP AND TRAINING

2026	**eDNA Metabarcoding** (Online course) Institution: Physalia-courses
2025	**Regression models with spatial or spatial-temporal correlation using R-INLA** (Online course) Institution: Highland Statistics
2022	**Data Science Foundations - Data Mining in R** (Online course) Institution: LinkedIn learning **R Essential Training - Wrangling and Visualizing Data** (Online course) Institution: LinkedIn learning **R Essential Training – Modelling Data** (Online course) Institution: LinkedIn learning
2020	**Graphical Information Systems (GIS) using ArcGIS** (Short course) *Institute:* Goethe University Frankfurt Graduate School **Advanced Methods with ArcGIS** (Short course) *Institute:* Goethe University Frankfurt Graduate School **Transitioning from ArcGIS to QGIS** (Short course) *Institute:* Senckenberg Research Institute and Natural History Museum Frankfurt **Scientific Visualization with the ggplot Package in R** (Short course) *Institute:* Goethe University Frankfurt Graduate School **Perfecting Your Figures with Free Software** (Inkscape, Gimp, IrfanView) (Short course) *Institute:* Goethe University Frankfurt Graduate School **Nonlinear Regression with R** (Short course) *Institute:* Goethe University Frankfurt Graduate School
2018	**ANOVA & Linear Regression with R** (Short course) *Institute:* Goethe University Frankfurt Graduate School
2016	**Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) training course** (Short course) *Institute:* University of Johannesburg

PEER REVIEW

Funding proposals	Biodiversa+ (1 review)
Academic journals	Environmental Monitoring and Assessment (4 reviews) Ecological Indicators (4 reviews) Journal of Ecohydraulics (1 review) Ecoscience (3 reviews) BMC Ecology (1 review) Oikos (1 review) PLOS1 (3 reviews) Restoration ecology (1 review) Ecological Applications (1 review) Global Ecology and Biogeography (1 review)

PARTICIPATION IN SCIENTIFIC CONFERENCES

International scientific conferences:

1. Entomological Society of America Conference 2025 (EntSoc25), Portland, Oregon, USA, November 2025 – Workshop: Standardizing the collection of insect trait data to identify ecological functions. Unified insect trait database working group: Progress and future directions. Perry, KI, NJ Baker, D Dillard, E Lichtenberg, KA Roeder, EAR Welti, and EM Grames. 2025. Unified insect trait database working group: Progress and future directions. WORKSHOP: Standardizing the collection of insect trait data to identify ecological functions. Entomological Society of America, Portland, OR, November 9.
2. Entomological Society of America Conference 2025 (EntSoc25), Portland, Oregon, USA,

November 2025 – Oral presentation: Ecological drivers of vector abundance across Lithuania.
3. Symposium of European Freshwater Sciences (SEFS) 14, Bolu, Turkiyė, July 2025 – Oral presentation: Ecological quality drives an increased abundance of malaria insect vectors.
4. Symposium of European Freshwater Sciences (SEFS) 13, Newcastle Upon Tyne, England, June 2023 – Oral presentation: The seasonal continuum [concept]: short-term temporal taxonomic turnover does not alter ecosystem functioning in boreal streams.
5. 7th International Toxicology Symposium in Africa, Johannesburg, South Africa, August 2015 – Poster presentation: Zinc and Cadmium concentrations in the House Sparrow (Passer domesticus), Thohoyandou, Limpopo, South Africa.

National scientific conferences:

1. BioAteitis conference 2024, Vilnius, Lithuania, November 2024 – Plenary talk: The role of young researchers in shaping the future of biosciences: opportunities and challenges.
2. 12th Water Research Horizon Conference 2022, Essen, Germany, September 2022 – Invited speaker: Things are not always as they seem: a multidecadal trend analysis of freshwater invertebrate communities within Bavarian Forest National Park, Germany.
3. PhD Defence (Online), Vilnius, Lithuania, June 2022 – PhD Defense: Journey Through Time & Space: Disentangling the drivers of macroinvertebrate community structure & function within boreal streams.
4. Annual Grosse Ohe meeting, Grafenau, Germany, September 2021 – Oral Presentation: Eine Reise durch die Zeit: An exploration of the Große Ohe macroinvertebrate diversity and function through time.
5. Senckenberg evaluation 2020, Frankfurt am Main, Germany, June 2020 – Poster Presentation: Complex and nonlinear climate-driven changes in freshwater insect communities over 42 years.
6. Long Term Ecological Research Network – Deutschland (LTER-D) annual meeting 2020, Leipzig, Germany, March 2020 – Oral Presentation: Long-term (>30 years) macroinvertebrate community variability & the drivers thereof: Lessons from an LTER site in the Bavarian Forest National Park.
7. Annual Grosse Ohe meeting, Grafenau, Germany, September 2019 – Oral Presentation: Aquatic invertebrates in the Große Ohe River: A long-term temporal analysis.
8. Annual Grosse Ohe meeting, Grafenau, Germany, September 2018 – Oral Presentation: understanding the role of doc & its effects on macroinvertebrate communities in the mountainous streams of the Bavarian Forest National Park.
9. UJ Postgraduate School's Annual Inter-Faculty Postgraduate Symposium, University of Johannesburg, Auckland Park, South Africa, October 2017 – Oral Presentation: Asessing the water quality of the Nyl and Mogalakwena River system using macroinvertebrate communiyt assemblages.
10. 8th Annual Oppenheimer De Beers Group Research conference, Crown Mines, South Africa, October 2017 – Poster Presentation: Using macroinvertebrate community assemblages to determine water quality within drought conditions.
11. South African Society of Aquatic Scientists (SASAqS), Boksburg, South Africa, June 2017 – Poster presentation: Preliminary MSc results for an assessment of the aquatic macroinvertebrate diversity within the Nyl and Mogalakwena river systems, Limpopo, South Africa – **Prize winner for best student presentation.**
12. 7th Annual Oppenheimer De Beers Group Research Conference, Crown mines, South Africa, October 2016 – Poster presentation: Metal Accumulation in House Sparrows (Passer domesticus) from Thohoyandou, South Africa.