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Zoological Research Museum Koenig

Extensive practical guide to DNA-based biodiversity assessment methods published as a ‘living’ document by DNAqua-Net

DNA-based methods are a game changer when it comes to holistic assessment of aquatic biodiversity and ecological monitoring. However, large-scale adoption has been hindered by a lack of standardisation and official guidance. Recognising the urgent need to scale up ecological monitoring as we respond to the biodiversity and climate crises, the DNAqua-Net international network published a guidance document for the implementation of DNA-based biomonitoring tools. Available in an Advanced Book format, the guidelines will be updated as the technology continues to evolve, in order to outline general principles and to help users to navigate the choices and trade-offs that must be made.

Between 2016 and 2021, over 500 researchers collaborated within the [DNAqua-Net](#) international network, funded by the European Union's European Cooperation in Science and Technology programme ([COST](#)), with the goal to develop and advance biodiversity assessment methods based on analysis of DNA obtained from the environment (e.g. river water) or from unsorted collections of organisms.

Such innovative methods are a real game changer when it comes to large-scale assessment of biodiversity and ecological monitoring, as collecting environmental samples that are sent to the lab for analysis is much cheaper, faster and non-invasive, compared with capturing and examining live organisms. However, large-scale adoption has been hindered by a lack of standardisation and official guidance. Recognising the urgent need to scale up ecological monitoring as we respond to the biodiversity and climate crises, the DNAqua-Net team published a [guidance document](#) for the implementation of DNA-based biomonitoring tools. Dr. Sarah Bourlat, Head of metabarcoding section at the Leibniz Institute for the Analysis of Biodiversity Change in Bonn (LIB Bonn), also contributed to the handbook.

The guide considers four different types of samples: water, sediments, invertebrate collections and diatoms, and two primary analysis types: single species detection via qPCR and similar targeted methods; and assessment of biological communities via DNA metabarcoding. At each stage of the field and laboratory process the guide sets out the scientific consensus, as well as the choices that need to be made and the trade-offs they entail. In particular, the guide considers how the choices may be influenced by common practical constraints such as logistics, time and budget. Available in an [Advanced Book](#) format, the guidelines will be updated as the technology continues to evolve.

Leaders of DNAqua-Net are Prof. Dr. Florian Leese of the University of Duisburg-Essen (Germany) and Dr. Agnès Bouchez of the French National Institute for Agriculture, Food, and Environment (INRAE). The core writing team for the present guide book involves Dr. Micaela Hellström (MIX Research AB, Sweden), Dr. Kat Bruce (NatureMetrics Ltd., UK), Dr. Rosetta Blackman (University of Zurich and EAWAG, Switzerland), Dr. Sarah Bourlat (LIB Bonn/Zoological Research Museum Koenig, Germany), and Prof. Kristy Deiner (ETH Zurich and SimplexDNA AG, Switzerland).

The DNAqua-Net team invites fellow researchers and practitioners to provide their feedback and personal contributions using the contacts below.

Source

Bruce K, Blackman R, Bourlat SJ, Hellström AM, Bakker J, Bista I, Bohmann K, Bouchez A, Brys R, Clark K, Elbrecht V, Fazi S, Fonseca V, Hänfling B, Leese F, Mächler E, Mahon AR, Meissner K, Panksep K, Pawlowski J, Schmidt Yáñez P, Seymour M, Thaling B, Valentini A, Woodcock P, Traugott M, Vasselon V, Deiner K (2021) A practical guide to DNA-based methods for biodiversity assessment. Advanced Books.
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About the LIB

The LIB is dedicated to researching biodiversity and its changes, the results of which are disseminated to the wider society in an educational manner. In order to better understand the current mass extinction of flora and fauna, researchers are looking for connections and causes of – often – man-made changes. The goal is to develop solutions for the preservation of ecosystems and species in order to maintain the basis of current life.

About the Leibniz-Association

The Leibniz Association combines 96 independent research institutes. Their focus ranges from the natural, engineering, and environmental sciences to the humanities and the business, space, and social sciences. The Leibniz institutes focus on relevant social, economic, and ecological issues. They perform knowledge-oriented and applied research (also among the cross-disciplinary Leibniz research alliances), are or support scientific infrastructures, and offer research-based services.

Additional information

About COST:

COST (European Cooperation in Science and Technology) is a funding organisation for research and innovation networks. Our Actions help connect research initiatives across Europe and beyond and enable researchers and innovators to grow their ideas in any science and technology field by sharing them with their peers. COST Actions are bottom-up networks with a duration of four years that boost research, innovation and careers. The COST Action DNAqua-Net involved researchers from 49 nations and was funded from 2016-2021.



Caption: Water eDNA collection and filtration methods.
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