



Conference Abstract

Establishing (e)DNA-Methods for Governmental Biomonitoring Efforts and Ecological Assessment in German Federal Waterways

Saskia Schmidt[‡], Demetrio Mora[‡], Sascha Krenek[‡], Julia Kleinteich[‡], Franz Schöll[‡], Helmut Fischer[‡]

[‡] German Federal Institute of Hydrology, Koblenz, Germany

Corresponding author: Saskia Schmidt (saskia.schmidt@bafg.de), Demetrio Mora (mora@bafg.de)

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Abstract

The German Federal Institute of Hydrology (BfG, for its acronym in German) is the nationwide advising departmental research institution regarding hydrology, water use and quality, ecology and water protection of the German Federal Waterways that comprise inland waterways as well as marine coastal waters.

The Federal Waterways of Germany are important habitats and distribution corridors for aquatic biodiversity. However, the ecology of these large rivers is heavily impacted by shipping, hydromorphological alterations, chemical pollution and the distribution and establishment of invasive species. All these factors have led to a decline of native biodiversity and ecological status. Since the 1970s, tremendous efforts have been undertaken to restore water quality and biodiversity. Continuous monitoring and assessment of both chemical components and biological quality elements (BQEs) required by law should indicate the success or failure of restoration measures as well as ongoing and future ecological consequences of multiple stakeholders' interests and demands.

Standardized ecological assessment procedures are already in place for both rivers and streams. However, these widely used procedures have several shortcomings and require a high level of taxonomic competence, which is being lost at an increasing rate. DNA and environmental DNA (eDNA)-based methods, such as DNA barcoding and (e)DNA

metabarcoding, are promising alternatives to overcome the impediments to the morphology-based identification of organisms. But, these new methods need to be tailored to the challenges of large river bioassessment. The implementation of such state-of-the-art methods for future biomonitoring and ecological assessment efforts in large rivers should therefore ultimately serve the legal requirements regarding the EU Water Framework Directive (WFD) and promote the application of (e)DNA methods from basic and applied research to water managers and regulatory authorities.

Here we present the goals and approaches of our ongoing project that are 1) to create standard operation procedures (SOPs) for (e)DNA analyses for large rivers and 2) update or establish new methods for biodiversity assessment and biomonitoring (e.g. presence-absence analyses) of the federal waterways; and 3) to transfer the gained knowledge to water managers and practitioners. To accomplish these goals, the focus of our research relies on the BQEs fish and macrozoobenthos (led by Saskia Schmidt), as well as phytozoobenthos and phytoplankton (led by Demetrio Mora).

Keywords

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Presenting author

Saskia Schmidt

Demetrio Mora

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