



Conference Abstract

# Applicability of diatom metabarcoding in the ecological status assessment of Hungarian lotic and soda pan habitats

Mónika Duleba<sup>‡</sup>, Angéla Földi<sup>‡</sup>, Adrienn Micsinai<sup>§</sup>, Anita Mohr<sup>§</sup>, Rita Sipos<sup>§</sup>, Gyula Szabó<sup>§</sup>, Zsuzsa Trábert<sup>‡</sup>, Tibor Bíró<sup>‡</sup>, Krisztina Buczkó<sup>‡</sup>, Gábor Várbíró<sup>¶</sup>, Éva Ács<sup>‡,¶</sup>

<sup>‡</sup> Centre for Ecological Research, Danube Research Institute, Budapest, Hungary

<sup>§</sup> Biomi Ltd., Gödöllő, Hungary

<sup>¶</sup> University of Public Service, Faculty of Water Sciences, Department of Water and Environmental Policy, Budapest, Hungary

<sup>¶</sup> Centre for Ecological Research, Danube Research Institute, Tisza River Research Group, Debrecen, Hungary

Corresponding author: Mónika Duleba ([duleba.monika@ecolres.hu](mailto:duleba.monika@ecolres.hu))

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## Abstract

Diatoms, eukaryotic algae with silica cell wall have been proved to be reliable bioindicators and are applied in ecological status assessment of aquatic ecosystems using indices calculated from pollution sensitivity and indicator values of species. Traditional method of identification of diatom species is based on morphological features of frustule that requires in-depth taxonomical knowledge and expertise. Metabarcoding that combines barcodes and high-throughput sequencing offers a promising alternative. In this pilot study we tested the applicability of metabarcoding of benthic diatom assemblages for ecological status assessment of water bodies in Hungary comparing its performance to that of morphology-based identification of species. Samples from 78 rivers and streams arranged along a trophic gradient and 14 soda pans representing unique types of habitats were investigated. Sequences of the barcode region of *rbcL* gene suggested by Vasselon et al. (2017) were acquired revealing 1135 diatom amplicon sequence variants (ASVs) of which 54% could be assigned at species level using Diat.barcode (Rimet et al. 2019) as reference database. Morphological investigation detected more species and intraspecific taxa in the lotic and lentic samples (413 and 78, respectively) than metabarcoding (190 and 75).

Correspondence between taxa detected based on morphology and DNA sequences was relatively low (on average 24% in lotic and 26% in lentic samples) but considerably increased (on average 66% and 56%, respectively) when taking into account only the taxa reaching higher than 5% relative abundance in microscopy counting. The differences mainly derived from that a considerable portion (59% and 32%, respectively) of the morphologically identified taxa were not recorded in the reference database. Community structure of samples from both running and standing waters based on microscopy and DNA sequence analysis showed significant correlation as revealed using Mantel test. For rivers and streams diatom index IPS (Specific Pollution Sensitivity Index, (Coste in Cemagref, 1982) for soda pans indices H (Ziemann et al., 2001) and IBD (Indice Biologique Diatomées, Lenoir and Coste, 1996) were calculated from the results of the two aspects. Strong correlation was found between morphology- and sequence-based indices and in about half of the samples, the ecological status class obtained with the two methods coincided. Our results suggest that metabarcoding inheres a great opportunity and could be successfully applied in benthic diatom-based ecological status assessment of Hungarian waters after the reference database is supplemented with taxa frequently occurring in these habitats.

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## Keywords

benthic diatoms, morphology, metabarcoding, rivers and streams, soda pans

## **Presenting author**

Mónika Duleba

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