

Merging two eDNA metabarcoding approaches and citizen-science based sampling to facilitate fish community monitoring along vast Sub-Saharan coastlines

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Abstract

The coastline of Sub-Saharan Africa hosts highly diverse fish communities of high conservation value, which are also key resources for local livelihoods. However, many coastal ecosystems are threatened by overexploitation and their conservation state is frequently unknown due to limited monitoring budgets and challenges associated with their vast spatial extents. Here, we evaluated the potential of citizen science-based eDNA surveys to alleviate such chronic data deficiencies and assessed fish communities in Mozambique using two 12S metabarcoding primer sets. Samples were either collected by scientific personnel or trained local community members and results from the two metabarcoding primer sets were combined using a newly created data merging approach. Irrespective of the background of sampling personnel, a high average fish species richness was recorded (38 ± 20 OTUs sample⁻¹). Individual sections of the coastline largely differed in the occurrence of threatened and commercially important species, highlighting the need for regionally differentiated management strategies. A detailed comparison of the two applied primer sets revealed an important trade-off in primer choice with MiFish primers amplifying a higher number of species but Riaz primers performing better in the detection of threatened fish species. This trade-off could be partly resolved by applying our data-merging approach, which has the potential to provide a more robust baseline-data for decision-making processes. Overall, our study provides encouraging results but also highlights that eDNA-based monitoring will require further improvements of e.g., reference databases and local analytical infrastructure to facilitate routine applications in Sub-Saharan Africa.

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