ASSESSMENT OF FISH SPECIES USING ENVIRONMENTAL DNA METABARCODING AND CATCH SURVEY IN THE SATELLITE LAKES OF LAKE VICTORIA, KENYA

Joab Jared Ochingo[1], Paul Meulenbroek[2] , Geoffrey Ong'ondo[3]

[1]Egerton University, Kenya, [2]University of Natural Resources and Life Sciences (BOKU), Austria, [3]Institute of Water Education (IHE-DELFT), Netherlands

Background

1. Introduction (or educational background)

- Freshwater systems host high biodiversity but are under pressure from pollution, overfishing, habitat degradation, and climate change.
- Satellite lakes (Kanyaboli, Namboyo, Sare, Bob) are part of the Yala Wetland ecosystem and are key fish habitats.
- Traditional fish survey methods are labor-intensive and may miss cryptic or rare species.
- eDNA metabarcoding offers a non-invasive, highly sensitive tool for biodiversity assessment

2. Problem statement

- Declining fish populations and lack of up-to-date species composition data hinder effective fisheries management.
- There is a need for efficient, non-invasive tools like eDNA metabarcoding to enhance fish biodiversity assessments.

Fig. 1 *Anthropogenic activities in L. Kanyaboli*

Current Work

1. Specific Objectives

- To determine the fish species composition in Lakes Bob, Kanyaboli, Namboyo and Sare using fish Catch surveys.
- To evaluate the fish species composition in Lakes Bob, Kanyaboli, Namboyo and Sare using environmental DNA metabarcoding.
- To analyze the morphometric characteristics of the fish species in Lakes Bob, Kanyaboli, Namboyo and Sare.

2. Methodology

eDNA Sampling

1. Water volumes filtered: Kanyaboli (3.2L), Namboyo (4L), Bob (4.7L), Sare (8.7L)
2. Filters preserved in buffer, followed by DNA extraction, PCR amplification, and sequencing- using Teleo primers-12SrRNA gene region
3. Bioinformatic analysis to identify taxa from reads
4. Length-weight relationship and condition factor analysed
5. Sorensen similarity index used to compare datasets

Fig. 2 *eDNA sampling*

3. Results

- eDNA detected 31 taxa while catch survey found 20 taxa
- Detected *O. niloticus, esculentus, variabilis, leucostictus, C. gariepinus, P aethiopicus, Pundamilia nyererei, Pundamilia pundamilia, A. argentus, H. maxillaris, astatotilapia nubilus,*
- Invasive species detected (e.g., *Gambusia affinis* and *Lates niloticus*-Nile perch).
- Sorensen similarity index = 0.57
- LWR of *O.niloticus* in Kanyaboli showed an isometric growth pattern

Fig. 3 *fish diversity indices.*

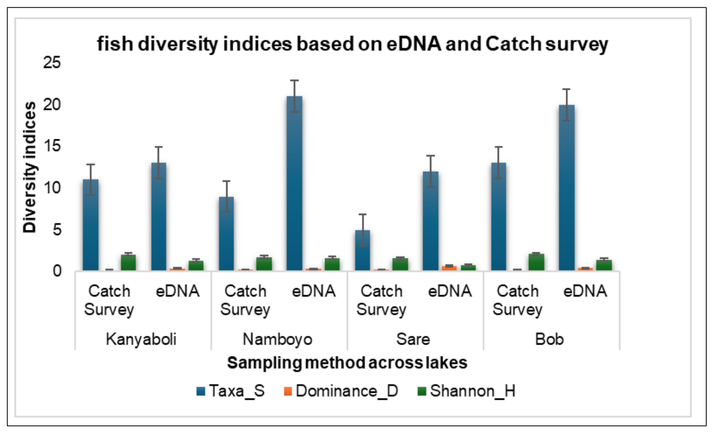
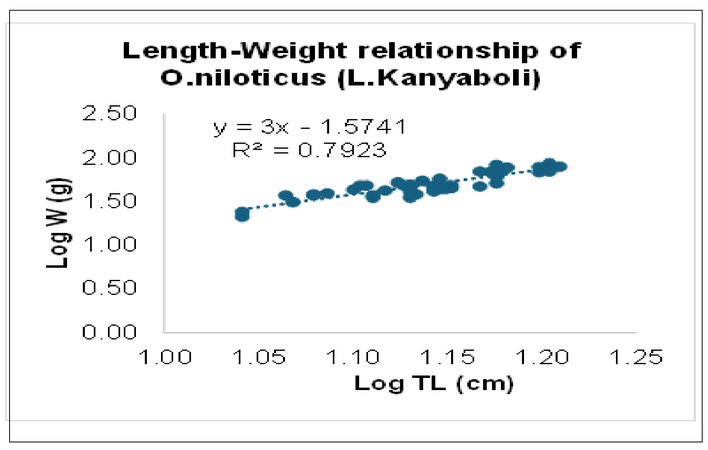


Fig. 4 *LWR of O.niloticus*



Conclusion & Expectations

- The eDNA metabarcoding detected more fish taxa, including rare and invasive species, complementing traditional catch survey data.
- The integration of both methods enhances biodiversity assessment and supports better conservation and fisheries management decisions.
- The findings will guide evidence-based management, conservation, and policy formulation to protect the ecological integrity of Yala Wetland satellite lakes..

Contact: joabjared1@gmail.com
P.O. Box 536 - 20115, Egerton-Njoro