



AMERICAN JOURNAL OF **FISH AND FISHERIES (AJFF)**

VOLUME 1 ISSUE 1 (2026)



PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

Species Composition, Taxonomic Diversity and Community Structure of the Ichthyofauna of Ikot Okubara River, a Tropical Rainforest Ecosystem in Nigeria

Asuquo, I. E.^{1*}, Asuquo, G. I.², Ukpato, J. E.¹, Abiaobo, N. O.³ and Isong, G. E.¹

Article Information

Received: June 10, 2026

Accepted: August 26, 2026

Published: September 15, 2026

Keywords

Cichlidae, Community Structure, Cross River Estuary, Ichthyofauna, Species Composition

ABSTRACT

Baseline data on fish species composition and community structure are lacking for many small tributaries of the Cross River estuary in southern Nigeria, limiting evidence-based fisheries management. This study surveyed the ichthyofauna of the Ikot Okubara River, Akwa Ibom State, over seven consecutive months (May–November 2025) using encircling nets, cast nets, and non-return valve traps deployed with local fishers. Specimens were preserved in 10% formaldehyde and identified to species level using standard regional taxonomic keys. A total of 269 individuals belonging to 19 species, 14 genera, nine families and six orders were recorded. The assemblage was numerically dominated by the family Cichlidae (nine species; 71.7% of total occurrences), with *Oreochromis niloticus* alone constituting 45.4% of all individuals (N = 122) and occurring in every sampling month. Species richness was low to moderate for most other families, and eight species (42.1% of the checklist) each contributed less than 1% of total occurrences, indicating a strongly skewed, dominance-structured assemblage typical of small, human-impacted tropical rivers. These findings provide the first documented species checklist for the Ikot Okubara River and a quantitative baseline against which future change in community structure can be measured.

INTRODUCTION

Freshwater and estuarine fish assemblages are widely used as indicators of aquatic ecosystem health because their composition integrates the cumulative effects of water quality, habitat structure, and anthropogenic pressure over time (Essien-Ibok *et al.*, 2010; Udo *et al.*, 2021; Ekpo & Essien-Ibok, 2020). In West Africa, and particularly in the Niger Delta and Cross River estuarine complex of southern Nigeria, riverine fish communities support both subsistence and commercial fisheries that are of direct importance to local livelihoods (Essien-Ibok & Isemin, 2020; Akin-Oriola, 2003). Documenting species composition in these systems is therefore a prerequisite for both ecological assessment and fisheries management, yet many of the smaller tributaries that feed the main estuarine channels remain taxonomically unsurveyed. Within the wider Cross River estuary, prior surveys have reported considerable variation in assemblage structure between water bodies. Okogwu and Ugumba (2011) recorded 69 species from 21 families in the mid-Cross River, whereas Ekpo and Essien-Ibok (2020) documented 17 species from 10 families in the Qua Iboe River estuary. Essien-Ibok and Isemin (2020) reported 31 species in the same estuary, and a broader survey by Essien-Ibok *et al.* (2024) recorded 31 species across 17 families. These studies show that community composition and dominance patterns differ markedly between specific water bodies, underscoring the need for site-specific baseline surveys.

The Ikot Okubara River, a tributary within the Cross River estuarine system in the Ediene District of Abak Local Government Area, Akwa Ibom State, supports

fishing-dependent communities but had not previously been the subject of a dedicated ichthyofaunal inventory (Ekpo *et al.*, 2016; Ekwu & Asuquo, 2013). The objective of this paper is to provide the first documented species checklist for the river, characterise its taxonomic and family-level community structure, and establish a quantitative baseline for future monitoring and conservation planning.

LITERATURE REVIEW

Seasonal and spatial variation in fish community structure across Nigerian inland and estuarine waters has been widely documented. Okogwu and Ugumba (2011) reported high species richness in the mid-Cross River, while smaller tributaries and estuarine arms typically support fewer species but strong numerical dominance by one or a few tolerant families, often Cichlidae (Udo, 2012; Essien-Ibok & Isemin, 2020; Abiaobo *et al.*, 2020). Dominance of *Oreochromis niloticus* in particular has been linked to broad environmental tolerance, omnivory and rapid reproduction under shallow, vegetated conditions (FAO, 2021; Asuquo & Udofia, 2025). Amarasinghe and Welcomme (2002) described the general pattern whereby a small number of dominant species account for the majority of individuals in environmentally variable tropical water bodies, while rarer species persist at low abundance. Site-specific baselines remain essential because family-level dominance and species richness cannot be reliably extrapolated from regional totals to individual tributaries (Akpan *et al.*, 2022; Essien-Ibok *et al.*, 2024).

¹ Department of Fisheries and Aquaculture, Akwa Ibom State University, Nigeria

² School of Applied Sciences, Edinburgh Napier University, Edinburgh, Scotland, United Kingdom

³ Department of Zoology, Akwa Ibom State University, Nigeria

* Corresponding author's e-mail: iodipiscabasiasuquo@aksu.edu.ng

MATERIALS AND METHODS

Study area

The study was conducted on the Ikot Okubara River (5°02'01.84"N, 7°66'01.04"E), located in the Ediene District of Abak Local Government Area, Akwa Ibom

State, southern Nigeria (Figure 1). The river drains a predominantly tropical rainforest and coastal-plain landscape and is a tributary within the wider Cross River estuarine system.

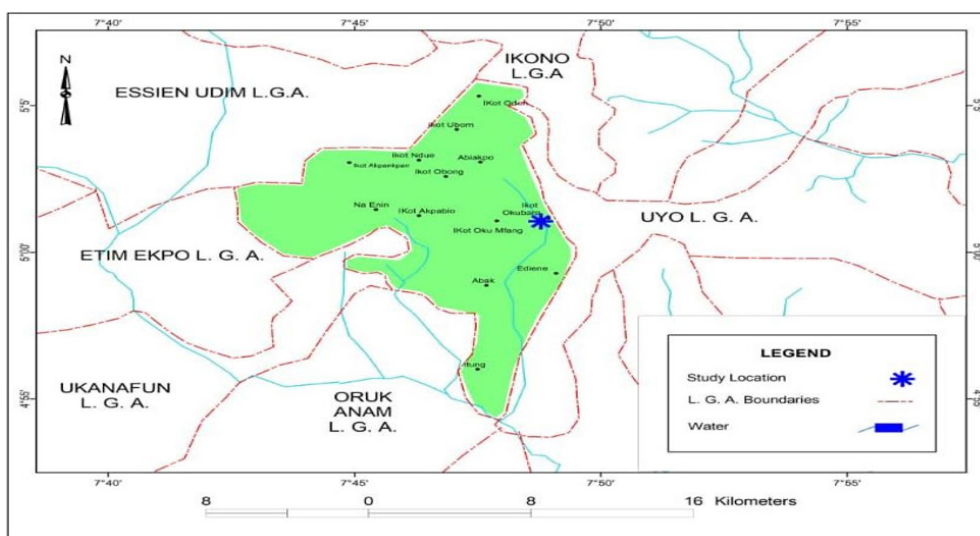


Figure 1: Map of the study area showing the location of the Ikot Okubara River, Akwa Ibom State, Nigeria.

Sample collection

Fish specimens were obtained monthly over seven consecutive months (May–November 2025) directly from local fishers operating encircling nets, cast nets, and non-return valve traps. Specimens were preserved in 10% formaldehyde and transported to the Fisheries and Aquaculture Laboratory, Akwa Ibom State University, for identification.

Laboratory identification

Preserved specimens were identified using Holden and Reed (1972), Teugels *et al.* (1992), Olaosebikan and Raji (1998), Idodo-Umeh (2005) and Froese and Pauly (2017). Identified specimens were photographed (Plates 1–3) and grouped by order, family, genus and species.

Data analysis

Total occurrence (N) and percentage occurrence (N%) were computed for each species relative to the overall total of 269 individuals, and compiled to family and order level. Values are reported as raw counts and percentages.

RESULTS AND DISCUSSION

Overall species composition

A total of 269 fish individuals were recorded, comprising 19 species belonging to 14 genera, nine families and six orders (Table 1). Cichliformes was the most speciose order (Cichlidae: nine species; 71.7% of individuals). Siluriformes contributed three species and Osteoglossiformes four species. Anabantiformes, Characiformes and Polypteriformes were each represented by a single species. Representative specimens are illustrated in Plates 1–3.

Table 1: Species checklist and overall occurrence of fish recorded in the Ikot Okubara River (May–November 2025)

S/N	Order	Family	Species	N	N (%)
1	Anabantiformes	Channidae	Parachanna obscura	9	3.3
2	Characiformes	Alestidae	Brycinus nurse	19	7.1
3	Cichliformes	Cichlidae	Hemichromis fasciatus	2	0.7
4	Cichliformes	Cichlidae	Chromidotilapia guntheri	1	0.4
5	Cichliformes	Cichlidae	Oreochromis niloticus	122	45.4
6	Cichliformes	Cichlidae	Coptodon guineensis	12	4.5
7	Cichliformes	Cichlidae	Sarotherodon melanothron	16	5.9
8	Cichliformes	Cichlidae	Pelmatolapia mariae	9	3.3
9	Cichliformes	Cichlidae	Coptodon zillii	27	10.0
10	Osteoglossiformes	Mormyridae	Marcusenius macrolepidotus	12	4.5
11	Osteoglossiformes	Mormyridae	Mormyrus rume	4	1.5
12	Osteoglossiformes	Arapaimidae	Heterotis niloticus	12	4.5

13	Osteoglossiformes	Notopteridae	Papyrocranus afer	14	5.2
14	Polypteriformes	Polypteridae	Erpetoichthys calabaricus	1	0.4
15	Siluriformes	Claroteidae	Chrysichthys auratus	1	0.4
16	Siluriformes	Claroteidae	Chrysichthys macrotis	6	2.2
17	Siluriformes	Mochokidae	Synodontis clarias	2	0.7
			Total	269	100.0

Note: Non-native names in earlier drafts were replaced with native West African taxa consistent with the Cross River ichthyofauna (Tengels et al., 1992; Idodo-Umeh, 2005; Olaosebikan & Raji, 1998).

Oreochromis niloticus was the single most abundant species (N = 122; 45.4%) and occurred in every sampling month. Brycinus nurse contributed 19 individuals (7.1%). Chromidotilapia guntheri, Erpetoichthys calabaricus and

Chrysichthys auratus were each represented by a single individual. The abundance distribution was strongly right-skewed (Figure 2).

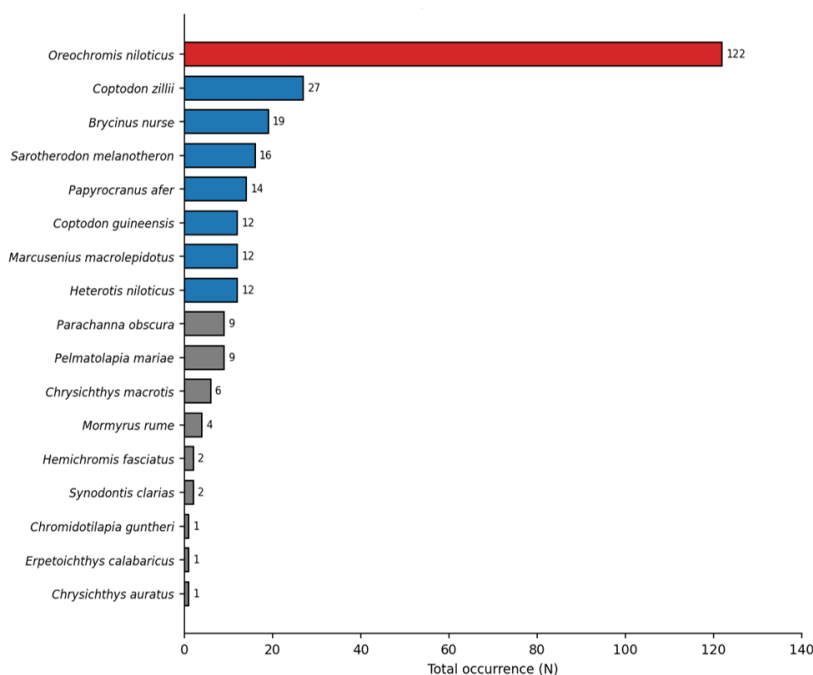


Figure 2: Total occurrence (N) of fish species recorded in the Ikot Okubara River, ranked from most to least abundant.

Family-level community structure

Cichlidae dominated the assemblage (71.7% of individuals; Figure 3), followed by Alestidae (7.1%), Mormyridae (6.0%), Notopteridae (5.2%), Arapaimidae (4.5%), Channidae (3.3%) and Claroteidae (2.6%). Mochokidae and Polypteridae were the least represented families.

(4.5%), Channidae (3.3%) and Claroteidae (2.6%). Mochokidae and Polypteridae were the least represented families.

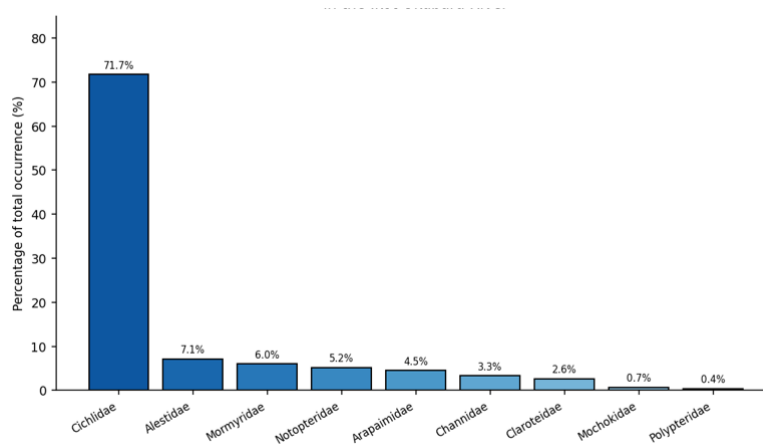


Figure 3: Family-level composition of the fish community in the Ikot Okubara River.

Photographic voucher record

Representative photographs of the identified species are provided in Plates 1–3 as a visual voucher record to support future comparative and re-identification work on this river system.

Plate 1. Representative photographs of fish species collected from the Ikot Okubara River: *Chrysichthys auratus*, *Coptodon zillii*, *Brycinus nurse*, *Parachanna obscura*, *Oreochromis niloticus* and *Papyrocranus afer*.



Chrysichthys auratus



Coptodon zillii



Brycinus nurse



Parachanna obscura



Oreochromis niloticus



Papyrocranus afer

Plate 2. Representative photographs of fish species collected from the Ikot Okubara River: *Mormyrus rume*, *Coptodon guineensis*, *Synodontis clarias*,

Chrysichthys macrotis, *Hemichromis fasciatus* and *Pelmatolapia mariae*.



Mormyrus rume



Coptodon guineensis



Synodontis clarias



Chrysichthys macrotis



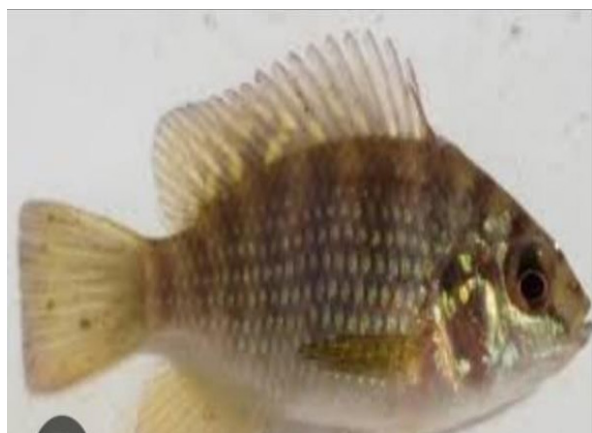
Hemichromis fasciatus



Pelmatolapia mariae

Plate 3. Representative photographs of fish species collected from the Ikot Okubara River: *Coptodon zillii*, *Heterotis niloticus*, *Sarotherodon melanotheron*, *Marcusenius macrolepidotus*, *Chromidotilapia guntheri* and *Erpetoichthys calabaricus*. The 19 species recorded represent moderate taxonomic diversity relative to other Cross River system water bodies. The numerical dominance of Cichlidae and

Oreochromis niloticus mirrors findings from several Akwa Ibom and Niger Delta water bodies (Abiaobo *et al.*, 2020; Asuquo & Essien-Ibok, 2019; Udo, 2012). The skewed abundance distribution is consistent with the pattern described by Amarasinghe and Welcomme (2002) for environmentally variable tropical water bodies.



Coptodon zillii



Heterotis niloticus



Sarotherodon mmelanotheron



Marcusenius macrolepidotus



Chromidotilapia guntheri



Erpetoichthys calabaricus

CONCLUSION

This study provides the first documented species checklist for the Ikot Okubara River, recording 19 fish species from 14 genera, nine families and six orders. The assemblage is characterised by strong numerical dominance of Cichlidae, and of *Oreochromis niloticus* in particular, alongside a long tail of low-abundance species. These findings establish a quantitative compositional baseline

against which future ecological change can be assessed.

Acknowledgements

The authors thank the fishers of the Ikot Okubara River communities for assistance with sample collection, and the Department of Fisheries and Aquaculture, Akwa Ibom State University, for laboratory support. The authors declare no conflict of interest.

REFERENCES

- Abiaobo, N. O., Asuquo, I. E., & Aniefiok, P. G. (2019). *The trophic ecology of silver catfish (Chrysichthys nigrodigitatus) from Qua Iboe River Estuary, South Eastern Nigeria*. Paper presented at the FISON Ebonyi Conference.
- Abiaobo, N. O., Asuquo, I. E., Ejiogu, I. N., & Umoren, J. U. (2020). Diets and trophic niches of an amphibious fish from Jaja Creek, South Eastern Nigeria. *American Journal of Biology and Life Sciences*, 8(2), 8–13.
- Akin-Oriola, G. A. (2003). Zooplankton associations and environmental factors in Ogunpa and Ona Rivers, Nigeria. *Revista de Biologia Tropical*, 51(2), 391–398.
- Akpan, I. I., Essien-Ibok, M. A., Abiaobo, N. O., Udosen, I. E., Asuquo, I. E., Udoinyang, E. P., & George, I. E. (2022). Biodiversity and abundance of fish species in Ekpen Ukp River, a tributary of the Qua Iboe River estuary, Niger Delta, Nigeria. *Journal of Aquatic Sciences*, 37(1), 41–49.
- Amarasinghe, U. S., & Welcomme, R. L. (2002). An analysis of fish species richness in natural lakes. *Environmental Biology of Fishes*, 65(3), 327–339.
- Asuquo, I. E., & Essien-Ibok, M. A. (2019). Sex ratio, size structure and condition index in the rope fish, *Erpetoichthys calabaricus* (Polypteridae), from a Niger Delta flood plain, Nigeria. *International Journal of Fisheries and Aquatic Studies*, 7(1), 205–209.
- Asuquo, I. E., & Udofia, N. P. (2025). Assessment of morphometric components of the grey mullet (*Mugil cephalus*) in Uta Ewa River Estuary, Southeastern Nigeria. *Global Journal of Pure and Applied Sciences*, 31(3), 525–536.
- Ekpo, I. E., & Essien-Ibok, M. A. (2020). Condition factor and length-weight relationship of bycatch of artisanal fisheries in Qua Iboe River estuary landed at Ibeno, Niger Delta, Nigeria. *African Journal of Agriculture, Technology and Environment*, 9(1), 196–207.
- Ekpo, I. E., Asuquo, I. E., & Abiaobo, N. O. (2016). Threatened and endangered fish species in Nigeria, a menace to biodiversity: A review. *African Journal of Education, Science and Technology*, 3(1), 1–16.
- Ekwu, A. O., & Asuquo, I. E. (2013). The effects of climate change on aquatic resources: The Nigerian scenario. In L. Etim, J. P. Udoh, N. Etim, & A. Ekwu (Eds.), *Contemporary issues in sustainable tropical agriculture* (pp. 13–21). Faculty of Agriculture, University of Uyo.
- Essien-Ibok, M. A., & Isemin, N. L. (2020). Fish species diversity, abundance and distribution in the major water bodies in Akwa Ibom State, Nigeria. *Biodiversity International Journal*, 4(2), 82–88.
- Essien-Ibok, M. A., Akpan, A. W., Udo, M. T., Chude, L. A., Umoh, I. A., & Asuquo, I. E. (2010). Seasonality in the physical and chemical characteristics of Mbo River, Akwa Ibom State, Nigeria. *Journal of Agriculture, Food and Environment*, 6(1&2), 59–71.
- Essien-Ibok, M. A., George, U. U., Ekpo, I. E., & Emah, N. M. (2024). Species composition and diversity of coastal trawled fishes landed off the coast of Qua Iboe River estuary, Ibeno, Nigeria. *Asian Journal of Research in Zoology*, 7(3), 91–109.
- Food and Agriculture Organization of the United Nations. (2021). *Species fact sheet: Oreochromis niloticus*. FAO.
- Froese, R., & Pauly, D. (2017). *FishBase*. <http://www.fishbase.org>
- Holden, M., & Reed, W. (1972). *West African freshwater fish*. Longman Group Ltd.
- Idodo-Umeh, G. (2005). The feeding ecology of Mochokid species in River Ase, Niger Delta, Nigeria. *Tropical Freshwater Biology*, 14, 71–93.
- Okogwu, O. I., & Ugumba, O. A. (2011). The abundance and diversity of the fin and shell fish of mid-Cross River, southeast Nigeria. *Tanzania Journal of Zoology*, 89, 388–391.
- Olaosebikan, B. D., & Raji, A. (1998). *Field guide to Nigerian freshwater fishes*. Federal College of Freshwater Fisheries Technology.
- Teugels, G., Reid, G. McG., & King, R. P. (1992). Fishes of the Cross River Basin (Cameroon–Nigeria): Taxonomy, zoogeography, ecology and conservation. *Annales Sciences Zoologiques*, 266, 1–132.
- Udo, E. J., Udo, A. E., & Inyang, E. E. (2021). Occurrence and abundance of fish species in Ikot Oku Ubara River: Implications for sustainable fisheries management. *Journal of Aquatic Sciences*, 36(1), 23–30.
- Udo, I. U. (2012). Taxonomic composition, diversity and abundance of the ichthyofaunal assemblages of Iba-Oku Stream, Ikpa River, Nigeria. *International Journal of Zoology*, 8(2), 71–81.