Available online at: http://ejournal-balitbang.kkp.go.id/index.php/ifrj
e-mail:ifrj.puslitbangkan@gmail.com
INDONESIAN FISHERIES RESEARCH JOURNAL
Volume 29 Number 2 December 2023
p-ISSN: 0853-8980
e-ISSN: 2502-6569
Accreditation Number RISTEK-BRIN: 85/M/KPT/2020

ICHTHYOFAUNAL COMPOSITION OF OVIA RIVER, EDO STATE, NIGERIA

Olowo Ukpamufo Cyril [1], Egun Nkonyeasua Kingsley [1*], Omoruwou Precious E [2], Ijeoma P. Oboh[1]

[1]TETFUND Centre of Excellence in Aquaculture and Food Production, University of Benin, *Benin City, Edo State, Nigeria*
[2]Department of Animal and Environmental Biology, Delta State University of Science and Technology, *Ozoro, Delta State, Nigeria*

ABSTRACT

The increasing reduction in the quantity and diversity of fish catch from freshwater bodies, has become a global concern due to its impacts on human nutrition, economy, culture and zoological spectrum of the aquatic ecosystem. This study ascertained the ichthyofauna diversity of Ovia River, Edo State. Fish catch from April, 2021 to March 2022 showed that Ovia River is congenial for 26 fish species of commercial importance, belonging to 5 orders, 13 families, 19 genera and 26 species. This is indicative of a rich diversity with Mormyridae dominant with 7 species, Cichlidae with 6 species, Mochokidae and Characidae with 2 species each, Ariidae, Bagridae, Channidae, Cyprinidae, Hepsetidae, Malapterunidae, Notopteridae, Pantodontidae and Schilbeidae with 1 species each. Fish species abundance showed that Cichlidae was the highest 61 individuals (39.61%), while Ariidae and Hepsetidae with 1 individual each (0.65%) were the least. The dominance and abundance of the highly priced Mormyridae and Cichlidae species implies that the water body has the capacity to sustain artisanal fisheries activities. This study has provided useful data for fisheries management and ecological studies of inland freshwater resources in Nigeria.

Keywords: : **Ichthyofauna diversity; Artisanal fishing; Fisheries management; Species abundance; Aquatic food**

INTRODUCTION

Inland waters and freshwater biodiversity constitute a valuable natural resource in cultural, aesthetic, scientific research, economic, and sustainable development (Adaka et al., 2014; Egun and Oboh, 2022; Egun et al., 2022). Ichthyofaunal studies have utilized parameters such as species composition, species richness, and abundance in assessing the fish community structure and diversity of water bodies (Friedlander and Parrish, 1999; Hewitt et al., 2008; Amalesh et al., 2014). In Nigeria, about 268 different species of freshwater fishes inhabiting in over 34 well-known rivers have been identified (Ita, 1993). Over the years, the fish fauna composition of several inland freshwater systems in Nigeria has been researched (Victor and Tetteh, 1988; Odum,1995; Ikomi, 1996; Fapohunda and Godstates, 2007; Tawari-Fufeyin and Ekaye, 2007; Meye and Ikomi, 2008; Odiko et al., 2010; Meye and Ikomi, 2012; Agali and Edema, 2016). Inland fisheries practices are dominated by artisanal fishing and provides more than 82% of the domestic fish supply (Faturoti, 2010). However, with reports of declining fish yield in most Nigerian inland waters due to over-exploitation (Lawson and Olusanya, 2010) and aquatic pollution; the surveillance of fish fauna diversity of water bodies is needed to ensure the sustainability of capture fisheries and stability of the aquatic ecosystem.

The importance of fish as a rich source of food in the human diet and meeting nutritional deficiencies especially in rural communities in Nigeria (Egun et al., 2002), has necessitated the need to study the fish fauna diversity of lesser-known inland water bodies and stretches of major rivers transversing through rural communities, which are often neglected and yet they contribute significantly to local fish supply (Ayamre et al., 2016). With increasing human population and the exploitation of these lesser-known inland water bodies through increased artisanal for economic gains to meet the food demand of urban centres, there is need for the assessment of the fish fauna diversity of these water bodies. Ovia River in Edo State, Nigeria is an inland water body with several rural artisanal fishing communities situated along the watercourse.

correspondence author:
e-mail: kenegun@yahoo.com
DOI: http://dx.doi.org/10.15578/ifrj.29.2.2023.9-15

Previous studies on the water body have looked at the faunal resources at certain communities (Odiko et al., 2010), and fish biology of certain fish species (Oboh and Omoigberale, 2014). This present study is an assessment of the ichthyofauna diversity of Ovia River and to ascertain its capacity to sustain capture fisheries at Unuamen community which has in recent time become a major artisanal fishing site. As this information is needed formulate fisheries management programme for the river.

Materials and Methods

Study Area

The stretch of Ovia River (Latitudes 06Ú33'60'' N and 005Ú31'14'' E) at Unuamen Village where the study was conducted is located within the swamp forest region of Edo State, Nigeria. The River flows down south from Apkata Hills in Ekiti State into the Benin River, which empties into the Atlantic Ocean (Emeribe et al., 2016). The surrounding area comprises of secondary rainforest vegetation containing trees, grasses, shrubs and floating *Salvinia* species, *Lemna* species and water hyacinth (*Eichorrnia crassipes*). The climate is tropical and typified by two distinct seasons – wet (April to November) and dry (December to March) seasons (UNOCHA, 2018). Its serves as a source of freshwater for domestic usage and processing of agricultural products. Human activities along this stretch include farming, fishing, construction and maintenance of canoes and water transportation.

Data collection

Collection of fish samples: Fish samples were gotten from the stretch River forth-nightly for a period of twelve (12) months, April, 2021 to March 2022. Fishes were caught using fishing traps and gill nets of various mesh sizes with the assistance of two artisanal fishermen. Fishes were collected from two sampling sites. Site One was located 2km upstream from the fish landing site, while Site two was located 2km downstream of the fish landing site. Each fisherman operated three fishing traps and two gill nets, with data collected once per month. The fishes were immediately stored in an ice chest for preservation and transported to the Animal Biology Laboratory in the University of Benin, where proper identification and determination of species abundance was carried out.

Identification of fish species: Using standard keys and taxonomic descriptions by Idodo-Umeh (2003), all fish specimens collected were accurately identified to species level by various morphometric and meristic characters such as the mouth, teeth, nostrils, gills, fins, scales, lateral line and colour pattern. Each specimen was tagged and numbered for easy reference/retrieval and preserved in 10% formalin.

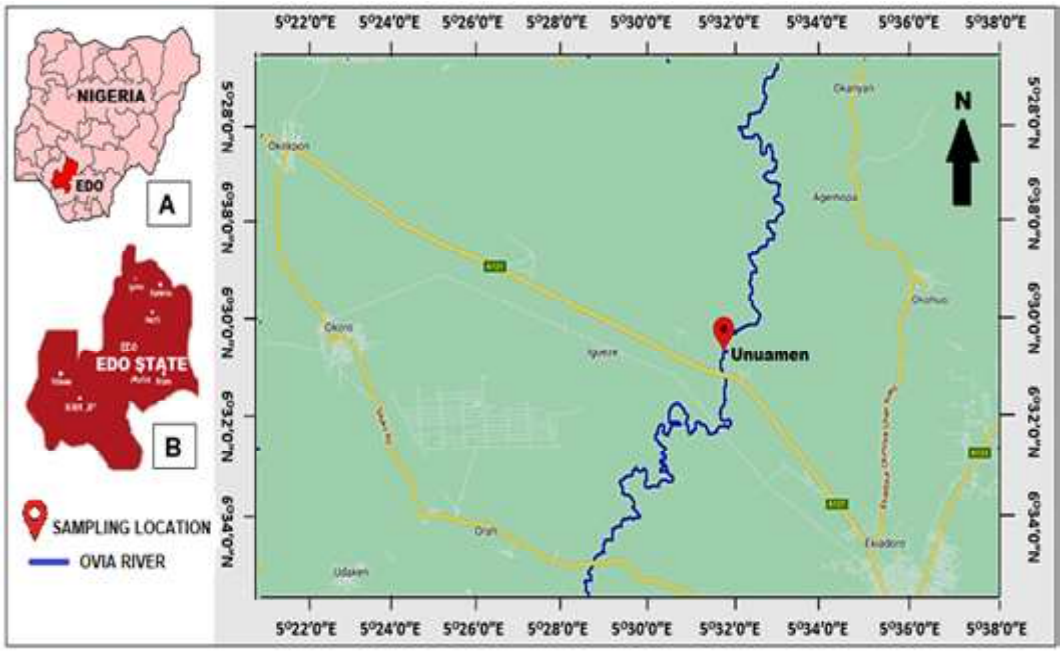

Figure 1. Ovia River showing sampling site in Unuamen Community, Edo State. Inset: Map of Nigeria (A), Map of Edo State (B)

Data analysis

All fish species collected were counted to determine species diversity and abundance. The relative abundance (%) of each species was calculated by the formula: R.A.= S.A. x 100/T.A.
Where:
R.A. = Relative abundance of each species
S.A. = Number of specimen of a particular species
T.A. = Total number of specimen for all species

RESULTS AND DISCUSSION

Results

The survey of the ichthyofauna of Ovia River revealed the occurrence of 26 fish species of commercial importance, belonging to 5 orders, 13 families, 19 genera and 26 species (Table 1). The order of species composition was Mormyridae with 7 species, Cichlidae with 6 species, Mochokidae and Characidae had 2 species each, while Ariidae, Bagridae, Channidae, Cyprinidae, Hepsetidae, Malapterunidae, Notopteridae, Pantodontidae and Schilbeidae were the least with 1 species each (Table 1). The highest contributing species in terms of number is *Synodontis nigrita* with 35 individuals, followed by *Tilapia. zilli* with 28 individuals while the least contributing species were *Arius gigas, Chrysichthys walker, Tilapia guineensis, Pelvicachromis pulcher, Hepsetus odoe, Synodontis sorex and Marcusenius isidori* with 1 individual each (Table 2). Influence of seasonal variation on fish catch showed that more species were caught in the rainy season (April – October) compared to the dry season (November – March), with *Tilapia zillii* present throughout the months of study. Species abundance was highest for the family Cichlidae 61 (39.61%), followed by Mochokidae 36 (23.38%), and Mormyridae 30 (19.48%) while Ariidae and Hepsetidae with 1 individual each (0.65%) were the least (Table 3).

Table 1. Fish Species Diversity of Ovia River

Family/Genus	Species
Ariidae	
Arius	*Arius gigas* (Boulenger, 1911)
Characidae	
Brycinus	*Brycinus macrolepidotus* (Valenciennes, 1849)
Hydrocenus	*Hydrocenus brevis* (Gunther, 1864)
Bagridae	
Chrysichthys	*Chrysichthys walkeri* (Gunther, 1899)
Channidae	
Parachanna	*Parachanna obscura* (Gunther, 1861)
Cichlidae	
Tilapia	*Tilapia dageti* (Thys Van De Audenaade, 1971)
	Tilapia guineensis (Bleeker, 1862)
	Tilapia mariae (Boulenger, 1899)
	Tilapia zilli (Gervais, 1848)
Hemichromis	*Hemichromis fasciatus* (Peters, 1857)
Pelvicachromis	*Pelvicachromis pulcher* (Boulenger, 1901)
Cyprinidae	
Labeo	*Labeo coubie* (Ruppel, 1832)
Hepsetidae	
Hepsetus	*Hepsetus odoe* (Block, 1794)
Malapterunidae	
Malapterus	*Malapterus electricus* (Gmeli, 1789)
Mochokidae	
Synodontis	*Synodontis nigrita* (Cuvier and Valenciennes, 1864) *Synodontis sorex* (Gunther, 1864)
Mormyridae	
Gnathonemus	*Gnathonemus petersii* (Gunther, 1862) *Gnathonemus senegalensis* (Steindachner, 1870)
Hyperopisus	*Hyperopsis bebe occidentalis* (Gunther, 1866)
Mormyrus	*Mormyrus rume* (Cuvier and Valenciennes, 1846) *Mormyrus hasselquisti* (Valenciennes, 1846)
Marcusenius	*Marcusenius isidori* (Cuvier and Valenciennes, 1846)
	Marcusenius psittacus (Boulenger, 1897)
Notopteridae	
Xenomystus	*Xenomystus nigri* (Gunther, 1868)
Pantodontidae	
Pantondon	*Pantondon bucholzi* (Peters, 1877)
Schilbeidae	
Schilbe	*Schilbe intermedius* (Ruppel, 1832)

Discussion

The ichthyofaunal diversity is a good indicator of health of an aquatic ecosystem and a good fish fauna diversity reflects a healthy and productive aquatic ecosystem (Nikam et al., 2014). Rivers have been renowned for conserving an opulent assortment of fish species which sustains artisanal and commercial fisheries. The fish diversity of any river basically characterizes the fish faunal variety and their abundance (Adaka et al., 2014). In this study, the 26 fish species of commercial importance, belonging to 5 orders, 13 families, 19 genera and 26 species recorded indicates that Ovia River at Unuamen Community is rich in ichthyo-fauna diversity. The high occurrence of *T. zilli, H. fasciatus* and *S. nigrita,* as well as fish species richness recorded, may be attributed to the increase in habitats available and the presence of variety of dietary items as fish catch increased in the month of March 2021 with the early rains. Species such as *A. gigas, C. walker, T. guineensis, P. pulcher, H. odoe, S. sorex and M. isidori*

Table 2. Monthly variation in Species Composition of fishes caught from Ovia River, Edo State

Species	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar.	Total
Arius gigas	--	--	--	1	--	--	--	--	--	--	--	--	1
Brycinus macrolepidotus	1	--	--	1	--	--	--	--	--	--	--	--	2
Chrysichthys walkeri	--	--	--	--	1	--	--	--	--	--	--	--	1
Hydrocenus brevis	--	--	1	--	--	1	--	--	--	--	1	1	4
Parachanna obscura	--	--	--	--	1	1	--	--	--	--	--	1	3
Tilapia dageti	--	1	--	--	1	--	--	--	--	--	--	--	2
Tilapia guineensis	--	1	--	--	--	--	--	--	--	--	--	--	1
Tilapia mariae	--	--	2	1	--	3	1	--	--	--	2	1	10
Tilapia zilli	2	3	4	2	2	3	2	4	1	1	2	2	28
Hemichromis fasciatus	1	3	2	2	1	2	1	1	3	1	2	--	19
Pelvicachromis pulcher	--	--	1	--	1	--	--	--	--	--	--	--	2
Labeo coubic	--	--	2	--	--	1	--	--	--	--	--	1	4
Hepsetus odoe	--	--	--	1	1	--	--	--	--	--	--	--	2
Malapterurus electricus	1	--	1	--	--	1	--	--	--	--	--	1	4
Synodontis nigrita	--	5	4	4	4	6	3	3	--	1	3	2	35
Synodontis sorex	--	--	--	1	1	--	--	--	--	--	--	--	2
Gnathonemus petersii	--	1	1	--	1	1	--	--	--	--	--	--	4
Gnathonemus senegalensis	1	--	1	2	--	1	--	--	--	--	--	--	5
Hyperopsis bebe occidentalis	--	1	--	1	1	--	1	--	--	--	--	--	4
Mormyrus rume	1	--	1	1	--	--	--	--	--	--	--	--	3
Mormyrus hasselquisti	1	1	--	1	1	1	--	--	--	--	--	--	5
Marcusenius isidori	--	--	--	--	1	--	--	--	--	--	--	--	1
Marcusenius psittacus	1	2	1	2	1	2	--	--	--	1	--	--	10
Xenomystus nigri	--	--	1	--	1	--	--	--	--	--	--	--	2
Pantondon bucholzi	--	1	--	--	--	--	--	--	--	--	1	--	2
Schilbe intermedius	--	1	--	1	--	--	--	--	--	--	--	1	3
Total	9	20	22	21	19	23	8	8	4	4	11	10	159

Table 3. Percentage Abundance of Fish Families in Ovia River

Family	Frequency	Percentage (%)
Ariidae	1	0.65
Characidae	2	1.30
Bagridae	5	3.25
Channidae	3	1.95
Cichlidae	61	39.61
Cyprinidae	4	2.60
Hepsetidae	1	0.65
Malapterunidae	4	2.60
Mochokidae	36	23.38
Mormyridae	30	19.48
Notopteridae	2	1.30
Pantodontidae	2	1.30
Schilbeidae	3	1.95

with single individuals may be due to seasonality or the duration of sampling.

The twenty-six (26) species of fish distributed in twelve (12) genera and nineteen (19) families identified in this study have been similarly reported by other studies for inland freshwater bodies in Nigeria. Adaka et al. (2014) recorded twenty-five (25) fish species, fifteen (15) genera, twenty-one (21) families) in Oramiri-Ukwa River; Agali and Edema (2016) reported ten (10) genera, fourteen (14) families and twenty-six (26) species in Obueyinomo River. Twenty (20) species from twelve (12) distinct families was recorded in River Dadin kowa (Bara'atu and Vandi, 2018); twenty-six (26) species in eleven (11) families was recorded in New Calabar River (Dienye et al., 2018), and twenty-one (21) species belonging to twelve (12) families) was reported in Osse/Ovia River (Ojo, 2020). Higher species diversity of one (1) orders, twenty-nine (29) families, forty-three (43) genera and sixty-nine (69) species in Omambala, Ezu and Ahommiri Rivers have been reported (Okeke et al., 2018). Conversely, relatively lower species diversity of eleven (11) species from ten (10) families and ten (10) genera in Igbesa, Itele and Iba tributaries of River Ore (Lawson and Olusanya, 2010); eleven (11) species and five (5) families in Lower Usuma Reservoir [30]; eighteen (18) species from six (6) families in Gubi dam (Ataguba et al., 2014); twelve (12) species in eleven (11) genera from six (6) families in Dogon Ruwa water body of Kamuku National Park (Oyewo, 2015); eleven (11) species from nine (9) families in River Okpokwu (Adadu et al., 2019), and eleven (11) species from five (5) families in Ogu River (Ugbomeh et al., 2020) have been reported.

In this study, the dominance of the families Cichlidae (39.61%), Mochokidae (23.38%) and Mormyridae (19.48%) and the small population of Ariidae and Hepsetidae (0.65%) may be attributed to

the often over fishing of competitively dominant fish species because of their prevention of subordinate fishes from access to fishing baits (McClanahan et al., 2010). Cichlids are known to exhibit brooding and parental care, which may be a contributing factor to their high dominance. As studies have reported the dominance of Cichlids in Nigerian Waters (Komolafe and Arawomo, 2008; Mustapha, 2009). The most diversified family was Mormyridae with 7 species (*Gnathonemus petersii*, *Gnathonemus senegalensis*, *Hyperopsis bebe occidentalis, Mormyrus rume, Mormyrus hasselquisti, Marcusenius isidori* and *Marcusenius psittacus* and dominated by *Marcusenius psittacus*. According to Odo et al. (2009), the observed trend in the fish community development and the order of variations in fish populations are complex, inconstant and often influenced by factors such as the nature of the water system, location or size of the water bodies, and seasonality.

CONCLUSION

Taking into cognizance of the need for the sustainable utilization of fish as resource for national development, an updated information on the fish species composition in Ovia River has been provided by this study. Results showed a rich ichthyo-diversity with a capacity to sustain artisanal fishing activities within the stretch of the river studied. It is recommended that similar studies be carried out on other stretches of the Ovia River, to provide a more recent data and also ascertain the impact of aquatic pollution on ichthyo-diversity at several locations along the Ovia River. These data are helpful tools for fisheries management and conservation for freshwater fishes.

ACKNOWLEDGMENT

The authors are grateful to Ehigiator Aisosa Precious and the laboratory technicians of the Department of Animal and Environmental Biology, University of Benin for their support in this work.

REFERENCES

Adadu MO, Garba AA, Mshelia JP. 2019. Diversity and abundance of fish species in river Okpokwu, Benue state, Nigeria. International Journal of Fisheries and Aquatic Studies, 7 (6), 55 – 60.

Adaka GS, Udoh JP, Onyeukwu DC. 2014. Freshwater Fish Diversity of a Tropical Rainforest River in Southeast Nigeria. Advances in Life Science and Technology, 1, 16 – 23.

Agali GN, Edema CU. 2016. Physico-chemical characteristics, diversity and relative abundance of fishes of Obueyinomo River, Southern Nigeria. European International Journal of Science and Technology, 5 (8), 15 – 24.

Amalesh B, Manojit B, Bidhan CP, Utpal KS. 2014. Ichthyofaunal Diversity and Water Quality in the Kangsabati Reservoir, West Bengal, India. Advances in Zoology, 2014 https://doi.org/10.1155/2014/674313

Ataguba GA, Tachia MU, Aminu G. 2014. Fish Species Diversity and Abundance of Gubi Dam, Bauchi State of Nigeria. Asian Journal of Conservation Biology 3 (1), 60 – 67.

Ayamre EU, Ekelemu JK. 2016. Abundance and Distribution of Fish Species in Three Water Bodies in Asaba Metropolis, Delta State, Nigeria. Journal of Agriculture and Environmental Sciences, 5 (1), 149 – 154.

Bara'atu A, Vandi P. 2018. Fish Species Diversity and Abundance in Dadin Kowa Reservoir, Gombe State, Nigeria. Journal of Agricultural Science and Food Technology, 4 (7), 145 – 150.

Dan-kishiya AS, Olatunde AA, Balogun JK. 2013. Ichthyofauna composition and diversity of a tropical water supply Reservoir: a case study of Lower Usuma Reservoir in Bwari, Abuja, Nigeria. American Journal of Research Communication, 1 (9), 188 – 203.

Dienye HE, Olopade OA, Toby SA. 2018. Species composition and diversity of cast net fisheries in New Calabar River, Niger Delta, Nigeria. J. biodivers. conserv. bioresour. Manag, 4 (1), 19 – 26.

Egun NK, Oboh IP. 2022. Freshwater Source Suitability for Aquaculture: A Case Study of Ikpoba Reservoir, Edo State, Nigeria. International Science and Technology Journal of Namibia, 15, 50 – 56. https://journals.unam.edu.na/index.php/ISTJN/article/view/1647

Egun NK, Olowo UC, Oboh IP. 2022. Potential contribution of selected wild fish species to the minerals intake of Pregnant and Lactating Women, Children and Adults in Rural Riverine Communities of Edo State: Insights and Outcomes. Measurement: Food, 8. https://doi.org/10.1016/j.meafoo.2022.100063

Emeribe CN, Ogbomida ET, Fasipe OA, Biose O, Aganmwonyi I, Isiekwe M, Fasipe IP. 2016. Hydrological Assessments of some Rivers in Edo State, Nigeria; for Small-Scale Hydropower Development. Nigerian J. Technol 35(3): 656 – 668. DOI: 10.4314/njt.v35i3.26

Fapohunda OO, Godstates R. 2007. Biometry and composition of fish species in Owena Reservoir, Ondo State, Nigeria. Journal of Central European Agriculture, 8 (1), 99 – 104.

Faturoti O. 2010. Nigeria: Fisheries contribute $US1 billion to economy. 25th Annual Conference of the Fisheries Society of Ngeria, Badagry, Lagos, Nigeria

Friedlander AM, Parrish JD. 1998. Habitat characteristics affecting fish assemblages on a Hawaiian coral reef. J. Exp. Mar. Bio. Ecol 24, 1 – 30.

Hewitt ML, Kovacs TG, Dube MG, MacLatchy DL, Martel PH. 2008. Altered reproduction in fish exposed to pulp and paper mill effluents: Roles of individual compounds and mill operating conditions. Environ. Toxicol. Chem, 27, 682 – 697.

Idodo-Umeh G. 2003. Fresh water Fishes of Nigeria (Taxonomy, Ecological Notes, Diet and Utilization). Idodo-Umeh Publisher Limited, Benin City.

Ikomi RB. 1996. Studies on the growth pattern, feeding habits and reproductive characteristics of the mormyrid Brienomyrus longianalis (Boulenger 1901) in the upper Warri River, Nigeria. Fisheries Research, 26 (1 – 2), 187 – 198. https://doi.org/10.1016/0165-7836(95)00381-9

Ita EO. 1993. Inland Fishery Resources of Nigeria. Central Institute of Freshwater Aquaculture Occassional Paper, 20, 120 – 126.

Komolafe OO, Arawomo GAO. 2008. Preliminary observations on Fish Species in a newly impounded Osinmo Reservoir. Turkish Journal of Fisheries and Aquatic Sciences, 8, 289 – 282.

Lawson OE, Olusanya OM. 2010. Fish diversity in three tributaries of River Ore, South West, Nigeria. World Journal of Fish and Marine Sciences, 2 (6), 524 – 531.

McClanahan TR, Kaunda-Arara B, Omukoto JO. 2010. Composition and diversity of fish and fish catches in closures and open-access fisheries of Kenya. Fisheries Management and Ecology, 17, 63 – 76. https://doi.org/10.1111/j.1365-2400.2009.00717.x

Meye JA, Ikomi RB. 2008. A study on the fish Fauna of Urie creek at Igbide, Niger Delta. The Zoologist, 6, 69 – 80.

Meye JA, Ikomi RB. 2012. Seasonal Fish Abundance and Fishing Gear Efficiency in River Orogodo, Niger Delta, Nigeria. World Journal of Fish and Marine Sciences, 4 (2), 191 – 200.

Mustapha MK. 2009. Fish Fauna of Oyun Reservoir, Offa, Nigeria. Journal of Aquatic Sciences, 25 (1), 106 – 144.

Nikam DS, Shaikh AL, Salunkhe PS, Kamble AB, 2014. Ichthyofaunal Diversity of Ashti Lake, Tal. Mohol, Dist. Solapur (M.S.), GJRA - Global Journal for Research Analysis, 3 (12), 1 – 5.

Oboh IP, Omoigberale MO. 2014. Length-weight Relationship and Fecundity of Parachanna obscura (Channidae) in Ovia River, Southern Nigeria. Centre point Journal (Science Edition), 20 (2), 53 – 66.

Odiko AE, Fagbenro OA, Fasakin EA. 2010. Fish Fauna Resources in River Ovia, Edo State. . Applied Tropical Agriculture, 15 (1&2), 12 – 17.

Odo GE, Didigwu NC, Eyo JE. 2009. The fish fauna of Anambra River basin, Nigeria: species abundance and morphometry. Rev. Biol. Trop., 57(1-2), 177 – 186.

Odum O. 1995. Fish distribution in Ethiope River, southern Nigeria. Tropical Freshwater Biology. 4, 53 - 64.

Ojo OBO. 2020. Assessment of Aqua-fauna diversity and abundance for tourism potentials in Osse/Ovia River, Okomu park Nigeria. International Journal of Fisheries and Aquatic Studies, 8 (6), 78 – 83.

Okeke JJ, Okoye CO, Ayadiuno RU, Nwosu MC, Ibemenuga KN, Arazu VN. 2018. Evaluation of the Ichthyofaunal Diversity of Some Sections of Omambala, Ezu and Ahommiri Rivers in Anambra State, Nigeria. International Journal of Forest, Animal and Fisheries Research 2 (1), 18 – 27. https://doi.org/10.22161/IJFAF.2.1.3

Oyewo SD. 2015. A survey of fish species diversity and abundance in Dogon ruwa water body of

Kamuku National Park, Birnin Gwari, Kaduna State, Nigeria. MSc thesis, Ahmadu Bello University, Zaria, Nigeria. 145pp.

Tawari-Fufeyin P, Ekaye SA. 2007. Fish species diversity as indicator of pollution in Ikpoba River, Benin City, Nigeria. Rev. Fish Biol. Fisheries 17, 21 – 30. https://doi.org/10.1007/s11160-006-9015-9

Ugbomeh AP, Kelsy CO, Bob-Manuel KNO, Nwosu OR. 2020. Eco-Morphological Patterns and Diversity of Some Fishes from the Ogu River in Rivers State, Niger Delta, Nigeria. 6 (3), 9 – 20 https://doi.org/10.9734/ajfar/2020/v6i330097

UNOCHA. 2018. Humanitarian Response Plan: Nigeria; United Nations Office for the Coordination of Humanitarian Affairs: Abuja, Nigeria.

Victor R. Tetteh JO. 1988. Fish communities of a perturbed stream in southern Nigeria. Journal of Tropical Ecology, 4, 49 - 59.