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Assessment of Fish Fauna In Oguta Lake, Imo State, Niger Delta, Eastern Nigeria

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Abstract

A fifty-seven (57) week investigation was carried out from September, 2019 to September, 2020 covering wet and dry seasons, to determine the fish fauna and its nomenclature in the Oguta Lake, Imo state, Niger Delta, eastern Nigeria. This research work was aimed at providing information on the fish stock and fish identification. During the assessment, fish samples were randomly collected from fishers twice weekly from five sampling stations along the River. The fishes collected were counted, and identified with identification keys. Species diversity and catches were analyzed using analysis of variance (ANOVA $P<0.05$) and Pearson correlation (2 tailed). The diversity and relative abundance were determined using standard methods. Results revealed that, the River was composed of 43 fish species belonging to 18 families, 10 orders and 29 genera from a total catch of 4,250. Fish species diversity was reported highest in the family Cichlidae (18.60%), Characidae (13.95%), Mormyridae and Bagridae (9.30%), Mochokidae (6.98%), Citharinidae; Clariidae; Schilbeidae; Polypteridae and Channidae (4.65%), Cyprinidae; Distichodontidae; Notopteridae; Hepsetidae; Malapteruridae; Osteoglossidae; Protopteridae and Gymnarchidae (2.33%). Fishing gears used were cast nets , gill nets, gura net traps, seine nets, drag nets, dugout canoe, drift nets, longlines, hooks and lines, baskets; spears. This river showed high fish species

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diversity, although some species showed higher diversity values than others due to fish gear types, mesh size, duration and station. There was a very high correlation of fish species in station 2, 3 and 4; there was no correlation of species in station 5 with stations 4, 3, 2 and 1. This study could serve as a baseline data to relevant bodies in the management and sustainability of the fisheries resources. The human activities along the Oguta Lake should be checked to avoid undue alteration of the ecosystem and subsequently the fishing grounds and fish species habitats. The fish species of this lake is said to be endangered of its fish species abundance and distribution.

Keywords: Taxonomy, Anthropogenic Activities, Fish Biology, Biodiversity, Conservation and Management

INTRODUCTION

Taxonomy is the science of classification and naming of living organisms. The classification of organisms attempts to reflect relations between them and work on a hierarchical system by which an organism is placed in categories of decreasing level, from kingdom to species. These categories are known as taxa: singular: taxon; hence taxonomy (Nelson, 1996). The word taxonomy originated from a Greek word "*taxis"*, meaning arrangement, and nomos, meaning law. The science of biological taxonomy is responsible for discovering, describing, classifying, naming and treating each species as the basic unit. Species are given names in accordance to the protocol set by Linnaeus' binomial nomenclature system (Enghoff, 2009). Fishes are animals that live and swim in the water, cool blooded, breathe using gills, have backbones and have various fins instead of limbs. Fish fauna is all of the fish life present in a particular region, habitat, or geographical area. Fishery resources play important role in the development of nations that are endowed with lots of natural marine and fresh water ecosystems like Nigeria, since fishes are obligate aquatic organisms. Apart from being a cheap source of safe animal protein, fishery resources contain other essential nutrients required by the body for healthy living (Sikoki and Otobotekere, 1999).

Oguta Lake, is the largest natural lake in southern Eastern Nigeria, is located in a depression within extended east floodplain of the river Niger downstream of Onitsha, in the Oguta Local Government Area in Imo state of Nigeria. It is within the rain forest although the archetype forest around the lake has since been replaced by oil palm trees and other agro forestry species such as Irvingia musa etc. The town of Oguta has a population of 2, 298 million according to the National Census of 2006; it is situated on the east bank

of the lake. Oguta Lake is a fresh water lake. It receives perennial drainage from River Njaba, Utu and Awbuna, which have their source in the Awka-Orlu Costa in north central Imo state. It also receives outflow from the central Niger. Oguta Lake drains into the river orashi, a main river on the east bank flood plain at the Niger and which conveys river Niger's flood water directly to the Niger delta (Ita, 1993). Oguta Lake has the maximum depth of 8.0m and a mean depth of 5.5m, with a water surface area that varies from 180 ha in the dry season to 300 ha at the peak of the raining season. Water level varies over a range of 2.7m between these two seasons (Ita, 1993). The lake contains 258 species of phytoplankton in 107 genera. The lake supports 40 fish species such as *Chrysichthys sp., Alestes sp., Coptodon sp., Citharinus sp., Moryrus sp., Synodontis sp., Schille sp., Hemichromis sp., Sarotherodon sp*. The lake is of immerse importance to the people of Oguta and the state government. It is the source of municipal and domestic water supply especially during the dry season, fishing and other economic activities, such as sporting activity, transport and tourism development, while some community members worship a deity associated with it, god of the lake (Omin, 1993).

Gillnets constitute over 96% of the total gear developed in the region. In Oguta lake, gillnets constitute the dominant gear deployed in the water body (Ohaturuonye *et al.,* 2017). As the human population increases, the demand for fish protein increases even in exponential manner with the concomitant increase in the exploitation of the natural fish stock in the wild which often leads to in appropriate and unfriendly fishing technique which exacerbate the declining fish yield. Despite the negative impact of this scenario in management and sustainable development of fish resources in the lake, data on fish taxonomy is largely non- existent. However, studies on fish have been mostly on fisheries ecology, biology and distribution but little is known on fish systematic. There is therefore a wide gap in our knowledge of Nigerian inland water fishes in terms of taxonomic content (Chindah and Osumkpe, 1994; RPI. (1985); Wright, 1986).

Aim of the Study

The main aim of this research was to undertake the taxonomic study on fish fuana in Oguta Lake in Imo state.

Objectives of the Study

In achieving this aim the following specific objectives are to:

i. Conduct comprehensive fish sampling in all habitats in Oguta Lake.

ii. Identify fish species in Oguta Lake.

iii. Ascertain new fish species in Oguta Lake.

iv. Determine fish Abundance and fish species diversity in Oguta Lake.

Fish Species Taxonomy and Systematics

Adaka *et al.* (2016) researched on the diversity and distribution of freshwater fishes in Oguta Lake, Southeast Nigeria. They reported a total of 1,989 fish species comprising 6 orders, 22 genera, and 32 species spread into 18 families. The Perciformes, Cichlidae and Tilapia zillii were the most abundant fish order, family and species, respectively. They also stressed that the Lake is of ecological significance in accommodating some threatened species like Erpetoichthys calabaricus and serving as a source of broodstock of Clarias gariepinus for fish farming (aquaculture).

Igbani and Uka (2019) researched on the fish diversity, abundance and fishing activities in the upper Ekole River, Bayelsa state, Niger Delta, Nigeria. They identified a total of 70 fish species belonging to 37 families, 16 orders and 52 genera. *Kryptopterus bicirrhis* (16.42%), *Sierrathrissa leonensis* (15.06%), *Chrysichthys nigrodigitatus* (7.09%), *Brycinus macrolepidotus* (4.11%), *Macrobrachium macrobrachion* (2.58%), *Eutropius niloticus* (2.51%), *Mormyrus macropthalmus* (2.22%), *Citharinus citharus* (2.04%), *Schilbe mystus* (1.96%), *Synodontus budgetti* (1.94%), *Distichodus rostratus* (1.77%), *Mormyrus rume* (1.76%), *Tilapia zillii* (1.69%), *Synodontus membranaceous* and *Bagrus filamentosus* (1.55%), *Cyprinus barbus* (1.53%), *Xenomystus nigri* (1.41%), *Erpetoichthys calabaricus* and *Mormyrus anguilloides* (1.34%), *Marcusenius deboensis* (1.29%), *Protopterus annectens* (1.26%), *Synodontis gambiensis* (1.22%), *Oreochromis niloticus* (1.21%), *Ctenopoma petherici* (1.18%), *Hyperopisus bebe* (1.15%), *Gnathonemus petesii* (1.13%), *Caranx hippos* and *Hepsetus odoe* (1.10%), *Homarus americanus* (1.09%), *Alestes baremoze* (1.08%), *Parachanna africana* (0.99%), *Mastacembelus longicuada* (0.94%), *Marcusenius senegalensis* (0.88%), *Synodontis batensoda* (0.87%), *Sarotherodon melanotheron* (0.85%), *Parachanna obscura* (0.82%), *Hemichromis fasciatus* (0.80%), *Phractolaemus ansorgii* (0.77%), *Gnathonemus tamandua* (0.69%), *Hippopotomyrus psittacus* (0.67%), *Hippopotomyrus pictus* (0.65%), *Oreochromis aureus*

(0.64%), *Labeo senegalensis* (0.63%), *Synodontis nigrita* (0.62%), *Tilapia guineensis* (0.58%), *Polypterus senegalus* (0.56%), *Macrobrachium vollenhovenii* (0.55%), *Gymnallabes typus* (0.53%), *Clarias gariepinus* (0.46%), *Chrysichthys aluuensis* (0.41%), *Heterosis niloticus* (0.39%), *Sarotherodon galilaeus* (0.38%), *Eleotris senegalensis* (0.35%), *Pantodon buchholzi* (0.34%), *Heterobranchus bidorsalis* (0.33%), *Polycentropsis abbreviata* (0.30%), *Gymnarchus niloticus* (0.26%), *Marcusenius cyprinoides* (0.22%), *Clarias anguillaris* (0.18%), *Malapterurus electricus* (0.14%), *Aplocheilichthys spilauchen* (0.12%), *Lates niloticus* (0.11%), *Pila globosa* (0.07%), *Bellamya bengalensis* (0.06%), *Cynoglossus senegalensis* and *Bostrychus africana* (0.04%), Iphigenia brasiliensis (0.03%), *Eleotris vittata* (0.02%), *Tagelus peruvianus* and *Chaceon maritae* (0.01%).

Nwadukwe, (2000) researched on biometry composition and abundance of fish species in River Nun, Niger Delta. The fish samples were taken from the catch of the fishermen operating in the river. He recorded 14 fish species: *Mormyrus rume, Mormyrus macrophthalamus, Oreochromis niloticus, Malepterus electricus, Clarias gariepinus, Clarias angullaris, Parachanna obscura, Synodontis bateroda, Heterobranchus longifillis, Alestes dentexseithente, Auchenoglanis occidentalis, Sarotherodon galililalus, Heterotis niloticus, and Tilapia zilli* belonging to seven families.

Francis *et al.* (2014) researched on the fish families of Oguta Lake, South Eastern Nigeria, and sustainability Issues. They reported fish catch consist of 5 orders, 15 families, 21 genera and 28 species. Bagridae, Characidae, Anabantidae, Citharinidae and Notopteridae were dominant families in terms of numbers; in terms of species, Cichlidae was most dominant (5 species). In descending order number of species identified were: three each, for Mormyridae, Characidae and Mochokidae; and a species or two for each of the remaining 11 families, indicating that there could be high risk of complete wipe out of such families under sudden adverse environmental conditions. They observed a potential source of socio-economic development to surrounding communities the anthropogenic activities on this lake should be defined in order to forestall the gradual and continuous loss of its useful services. They recommended the management of Oguta Lake to curtail the negative impacts of anthropogenic activities on the lake's aquatic resources through appropriate management approaches, such as Eco-Community-Based Approaches, including Integrated and Adaptive management measures, as there seemed to be some kind of shift, to a reduction in the lake's fish assemblage.

Nwadiaro, (1989) studied and described 98 species of fish occurring in Lake Oguta, Imo State, and South-Eastern Nigeria. The fisheries potential of this lake includes *Cichlidae,*

Bagridae, Notoptenidae, Characidae, Hepsetidae, and Claridae. Others were *Mormyridae* and *Eliotridae*. The major species included *Tilapia zilli, Tilapia mariae, Hemichromis spp, Chrysichthys nigrodigitatus, Hepsetis odoe, Alestes nurge, and Mormyrus spp*. Nwadiaro, 1984 also reported 67 species of fish comprising 52 genera and 37 families in River Sambriero. Young, 1990 carried out a systematic study of rivers Sambriero and Orashi and reported 453 fishes belonging to 25 families, 30 genera distributed unevenly into 36 species from both rivers. She noted that only families- *Clupeidae, Characidae, Bagridae, Cichlidae, Polynemidae, and Scliaenidae* were common to both rivers.

Akari, (2002) studied the distribution, abundance, food and feeding habits of *Chrysichthys nigrodigitatus* in the upper Orashi River. They observed that the fish species are very common, abundant and of major commercial importance. A fish species 457 weighing 76.9kg were used during the time of the research. The fishes were more populated in the wet period to the sunny period. The actual length ranged from 10cm to 46cm while the body weight is between 50g and 900g.

MATERIALS AND METHODS

Location

The study was conducted at Oguta Lake, also known as Ohamiri, is one of the inland fresh water drainage basins within South-Eastern Nigeria. It lies approximately within (Latitudes $5^{0}42^{1}24^{11}$N) and (Longitudes $6^{0}47^{1}33^{11}$E). About linear in shape, the lake receives inputs from Rivers Njaba, Awbana and Orashi, while the fourth river, Utu flows in only during the rainy season (April to November). A relatively small and shallow water body, the water volume increases tremendously during the rains; its maximum surface area being 2.48 km^2 with a depth of 9.30m (Ogunkoya, 2007).

Experimental Procedure

Sampled Location

The study is designed to have five sampling stations covering the upper part of Oguta Lake as shown in Fig.3.1. The selected stations were numbered, thus: Station 1-Onu Utu, Station 2-Onu Okposha, Station 3-Ogbe Hause, Station 4-Osemotor, and Station 5-Ede Ngwugwu.

Collection of Fish Samples/Specimens

Fish specimens were collected two (2) times weekly working with local fisher folks during low and high tide and catch were collected on landing sites. The stations were sampled for fish with the fisher folks twice a week (Tuesdays and Saturdays) using nets of different mesh types and traps. The study was carried out from September, 2019 to September, 2020 (52 weeks) covering wet and dry seasons.

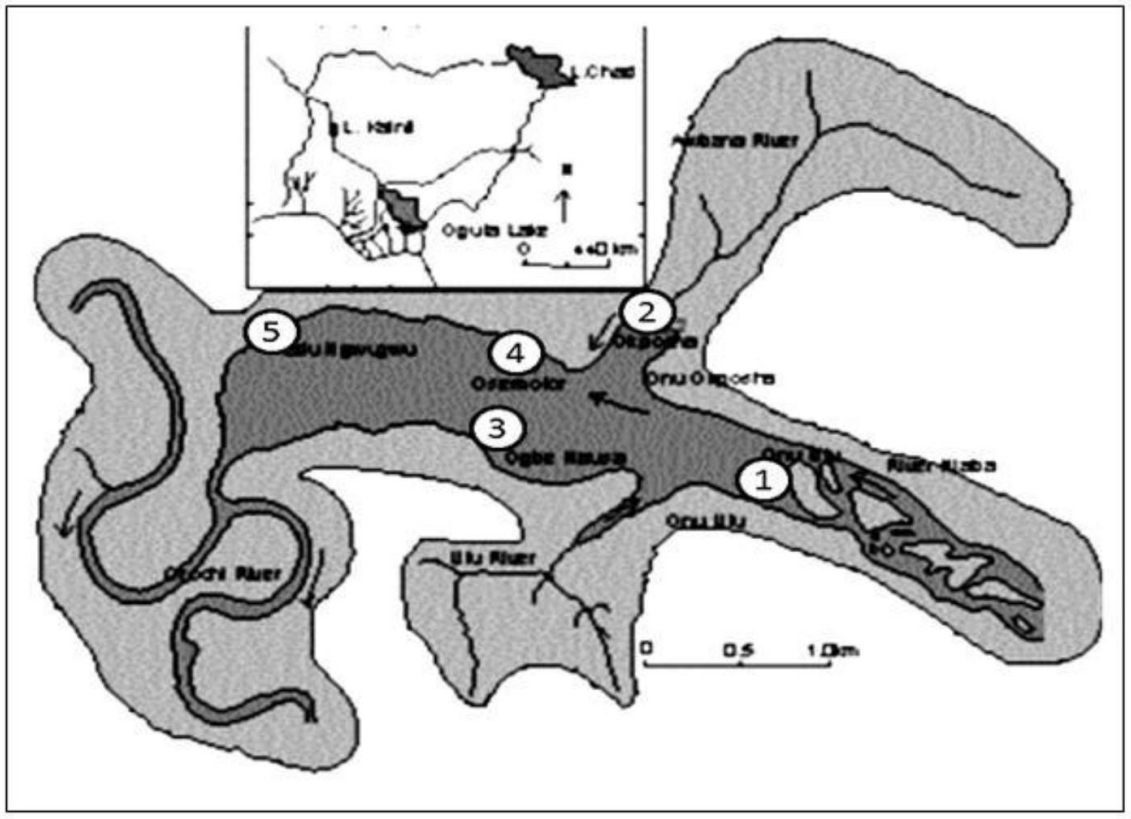


Figure 1: Map of Oguta showing the Associated Rivers and sampling stations.

Fish Gear Used

The fishing gears used by the fishermen during the study period are Gillnets, Cast nets of different mesh types as well as fish traps.

Fishing Craft Employed

The fishing craft was used by the engaged fishermen are one-man dugout canoe (Kayak) and unmotorized planked canoe, widely used among the fishermen in Oguta Lake.

Fish Species Identification

After the collection of the fish, the fish specimen was immediately photographed, noting it colors, and weight at the sampling site before preserving in 10% formalin and 90% of water, then transported to the Laboratory for further analysis where the species identification were performed by using keys from relevant authorities such as pictures and other recent websites (Froese and Pauley, 2013; Daget *et al.*, 1992).

Laboratory Procedure

In the laboratory, Morphometric measurements (Total length, Standard length and Weight) was taken and recorded to the nearest 0.1cm and 0.1g respectively, and Meristic counts (fins, scales, barbel, gills rakers, etc) were also taken and recorded.

Fish Diversity Index

Fish diversity index was determined using:

Igbani and Uka (2019)**:** derived formula below:

$$\text{Fsi (\%)} = \frac{Si}{\Sigma fsi} \chi \frac{100}{1}.$$

Where F = family or number of species families,

Si = individual number of fish species family.

Fish Species Abundance Determination

Abundance were determined by relative abundance method which involved counting the total number of fish species caught per sample site per time which were recorded and the relative abundance score of the species were estimated, thus: 1-50 = Rare (R), 51-100 = Few (F), 101-200 = Common (C), 201-400 = Abundant (A) and > 400 = Dominant (D) Allison *et al.*, (2003).

Physico-Chemical Parameter Determination

Water samples of the study area were collected during visits made, to determine various physical and chemical parameters of the study area. This was carried out using plastic containers with covers (sample bottles) in which the water samples were taken to the

laboratory for analysis. Parameters determined were: Water temperature, pH, Salinity/Conductivity; Dissolved Oxygen were measured in-situ (Igbani and Uka, 2019; Salcon, 1997).

Data Analysis

Analysis of Variance (ANOVA: $P < 0.05$), Factorial Experimental Layout, Randomised Completely Block Design (RCBD) and Pearson correlation (at 0.01 level, (2-tailed) were used to analyse the species distribution among locations/stations.

RESULTS AND DISCUSSION

Fish Species Diversity

The species diversity (Table 1) showed a total of 43 fish species belonging to 18 families, 10 orders and 29 genera. The species diversity amongst the families found in the lake during the research work was reported in as Cichlidae (18.60%), Characidae (13.95%), Mormyridae and Bagridae (9.30%), Mochokidae (6.98%), Citharinidae; Clariidae; Schilbeidae; Polypteridae and Channidae (4.65%), Cyprinidae; Distichodontidae; Notopteridae; Hepsetidae; Malapteruridae; Osteoglossidae; Protopteridae and Gymnarchidae (2.33%). This showed that the fish diversity in this upper end of the river was high, although some species reported higher diversity values than others (Igbani and Uka, 2019; Abiodun and John, 2017; Adaka *et al*., 2016; Francis *et al*., 2014).

Table 1: Fish Species Family Diversity of Oguta Lake, South East Nigeria

S/N	Species	Family	Order	Number of Fish Caught	Percentage Diversity (%)
1.	*Papyrocranus afer*	Notopteridae	Osteoglossiformes	108	2.33
2.	*Heterotis niloticus*	Osteoglossidae	Osteoglossiformes	62	//
3.	*Mormyrus rume*	Mormyridae	Mormyriformes	95	9.30
4.	*Marcusenius ihuysi*	Mormyridae	Mormyriformes	87	//
5.	*Petrocephalus bane*	Mormyridae	Mormyriformes	141	//
6.	*Mormyrops deliciosus*	Mormyridae	Mormyriformes	94	//
7.	*Gymnarchus*	Gymnarchidae	Mormyriformes	48	2.33

	niloticus				
8.	*Polypterus senegalus*	Polypteridea	Polypteriformes	99	4.65
9.	*Polypterus bichir lapradei*	Polypteridea	Polypteriformes	89	//
10.	*Citharinus cithathus*	Citharinidae	Characiformes	212	//
11.	*Citharinus latus*	Citharinidae	Characiformes	40	//
12.	*Alestes baremoze*	Characidae	Characiformes	128	13.95
13.	*Hydrocynus vittatus*	Characidae	Characiformes	83	//
14.	*Hydrocynus forskahlii*	Characidae	Characiformes	87	//
15.	*Hydrocynus brevis*	Characidae	Characiformes	92	//
16.	*Brycinus nurse*	Characidae	Characiformes	86	//
17.	*Brycinus leuciscus*	Characidae	Characiformes	94	//
18.	*Distichodus rostratus*	Distichodontidae	Characiformes	117	2.33
19.	*Labeo Senegalensis*	Cyprinidae	Cypriniformes	134	//
20.	*Parailia pellucid*	Schilbeidae	Siluriformes	127	4.65
21.	*Schilbe mystus*	Schilbeidae	Siluriformes	100	//
22.	*Clarias gariepinus*	Claridae	Siluriformes	152	//
23.	*Clarias anguillaris*	Claridae	Siluriformes	92	//
24.	*Auchenoglanis biscutatus*	Bagridae	Siluriformes	55	9.30
25.	*Auchenoglanis occidentalis*	Bagridae	Siluriformes	80	//
26.	*Chrysichthys nigrodigitatus*	Bagridae	Siluriformes	101	//
27.	*Chrysichthys auratus*	Bagridae	Siluriformes	88	//
28.	*Synodontis nigrita*	Mochokidae	Siluriformes	84	6.98
29.	*Synodontis budgetti*	Mochokidae	Siluriformes	76	//
30.	*Synodontis membranaceous*	Mochokidae	Siluriformes	134	//
31.	*Malapteruridae electricus*	Malapteruridae	Siluriformes	150	2.33
32.	*Chromidotilapia guentheri*	Cichlidae	Perciformes	185	18.60
33.	*Hemichromis faciatus*	Cichlidae	Perciformes	213	//
34.	*Coptodon mariae*	Cichlidae	Perciformes	161	//
35.	*Coptodon zillii*	Cichlidae	Perciformes	78	//

36.	*Coptodon guineensis*	Cichlidae	Perciformes	44	//
37.	*Oreochromis niloticus*	Cichlidae	Perciformes	114	//
38.	*Oreochromis aureus*	Cichlidae	Perciformes	57	//
39.	*Sarotherodon galilaeus*	Cichlidae	Perciformes	101	//
40.	*Protopterus annectens*	Protopteridae	Lepidosireniformes	163	2.33
41.	*Hepsetus odoe*	Hepsetidae	Gonorynchiformes	129	//
42.	*Parachanna obscura*	Channidae	Ophiocepaliformes	145	4.65
43.	*Parachanna africanus*	Channidae	Ophiocepaliformes	75	//
	TOTAL			**4,250**	

Fish Species Abundance

A total of 4,250 fishes were caught along the Oguta Lake during the period of sampling. The relative abundance (Table 2) of all species is as reported in a descending numerical order. *Hemichromis faciatus* (5.01), *Citharinus citharus* (4.99), *Chromidotilapia guentheri* (4.35), *Protopterus annectens* (3.84), *Coptodon mariae* (3.79), *Clarias gariepinus* (3.58), *Malapteruridae electricus* (3.53), *Parachanna obscura* (3.41), *Petrocephalus bane* (3.32), *Labeo Senegalensis* and *Synodontis membranaceous* (3.15), *Hepsetus odoe* (3.04), *Alestes baremoze* (3.01), *Parailia pellucid* (2.99), *Distichodus rostratus* (2.75), *Oreochromis niloticus* (2.68), *Papyrocranus afer* (2.54), *Chrysichthys nigrodigitatus* and *Sarotherodon galilaeus* (2.38), *Schilbe mystus* (2.35), *Polypterus senegalus* (2.33), *Mormyrus rume* (2.24), *Mormyrops deliciosus* and *Brycinus leuciscus* (2.21); *Clarias anguillaris* and *Hydrocynus brevis* (2.16), *Polypterus bichir lapradei* (2.09), *Chrysichthys auratus* (2.07), *Hydrocynus forskahlii* and *Marcusenius ihuysi* (2.05), *Brycinus nurse* (2.02), *Synodontis nigrita* (1.98), *Hydrocynus vittatus* (1.95), *Auchenoglanis occidentalis* (1.88), *Coptodon zillii* (1.84), *Synodontis budgetti* (1.79), *Parachanna africanus* (1.76), *Heterotis niloticus* (1.46), *Oreochromis aureus* (1.34), *Auchenoglanis biscutatus* (1.29), *Gymnarchus niloticus* (1.13), *Coptodon guineensis* (1.04), *Citharinus latus* (0.94).

The highest species abundance is in *Hemichromis faciatus* (5.01%), while the least is in *Citharinus latus* (0.94%) (Igbani and Uka, 2019; Adaka *et al.*, 2016; Francis *et al.*, 2014).

Table 2: Fish Species Abundance of Oguta Lake, South East Nigeria

S/N	Species	Family	Order	Number of Fish Caught	Relaative Abundance	Abundance Scores
1.	*Papyrocranus afer*	Notopteridae	Osteoglossiformes	108	2.54	**C**
2.	*Heterotis niloticus*	Osteoglossidae	Osteoglossiformes	62	1.46	**F**
3.	*Mormyrus rume*	Mormyridae	Mormyriformes	95	2.24	**F**
4.	*Marcusenius ihuysi*	Mormyridae	Mormyriformes	87	2.05	**F**
5.	*Petrocephalus bane*	Mormyridae	Mormyriformes	141	3.32	**C**
6.	*Mormyrops deliciosus*	Mormyridae	Mormyriformes	94	2.21	**F**
7.	*Gymnarchus niloticus*	Gymnarchidae	Mormyriformes	48	1.13	**R**
8.	*Polypterus senegalus*	Polypteridea	Polypteriformes	99	2.33	**F**
9.	*Polypterus bichir lapradei*	Polypteridea	Polypteriformes	89	2.09	**F**
10.	*Citharinus citharus*	Citharinidae	Characiformes	212	4.99	**A**
11.	*Citharinus latus*	Citharinidae	Characiformes	40	0.94	**R**
12.	*Alestes baremoze*	Characidae	Characiformes	128	3.01	**C**
13.	*Hydrocynus vittatus*	Characidae	Characiformes	83	1.95	**F**
14.	*Hydrocynus forskahlii*	Characidae	Characiformes	87	2.05	**F**
15.	*Hydrocynus brevis*	Characidae	Characiformes	92	2.16	**F**
16.	*Brycinus nurse*	Characidae	Characiformes	86	2.02	**F**
17.	*Brycinus leuciscus*	Characidae	Characiformes	94	2.21	**F**
18.	*Distichodus rostratus*	Distichodontidae	Characiformes	117	2.75	**C**
19.	*Labeo Senegalensis*	Cyprinidae	Cypriniformes	134	3.15	**C**
20.	*Parailia pellucid*	Schilbeidae	Siluriformes	127	2.99	**C**
21.	*Schilbe*	Schilbeidae	Siluriformes	100	2.35	**F**

	mystus					
22.	*Clarias gariepinus*	Claridae	Siluriformes	152	3.58	**C**
23.	*Clarias anguillaris*	Claridae	Siluriformes	92	2.16	**F**
24.	*Auchenoglanis biscutatus*	Bagridae	Siluriformes	55	1.29	**F**
25.	*Auchenoglanis occidentalis*	Bagridae	Siluriformes	80	1.88	**F**
26.	*Chrysichthys nigrodigitatus*	Bagridae	Siluriformes	101	2.38	**C**
27.	*Chrysichthys auratus*	Bagridae	Siluriformes	88	2.07	**F**
28.	*Synodontis nigrita*	Mochokidae	Siluriformes	84	1.98	**F**
29.	*Synodontis budgetti*	Mochokidae	Siluriformes	76	1.79	**F**
30.	*Synodontis membranaceous*	Mochokidae	Siluriformes	134	3.15	**C**
31.	*Malapteruridae electricus*	Malapteruridae	Siluriformes	150	3.53	**C**
32.	*Chromidotilapia guentheri*	Cichlidae	Perciformes	185	4.35	**C**
33.	*Hemichromis faciatus*	Cichlidae	Perciformes	213	5.01	**A**
34.	*Coptodon mariae*	Cichlidae	Perciformes	161	3.79	**C**
35.	*Coptodon zillii*	Cichlidae	Perciformes	78	1.84	**F**
36.	*Coptodon guineensis*	Cichlidae	Perciformes	44	1.04	**R**
37.	*Oreochromis niloticus*	Cichlidae	Perciformes	114	2.68	**F**
38.	*Oreochromis aureus*	Cichlidae	Perciformes	57	1.34	**F**
39.	*Sarotherodon galilaeus*	Cichlidae	Perciformes	101	2.38	**C**
40.	*Protopterus annectens*	Protopteridae	Lepidosireniformes	163	3.84	**C**
41.	*Hepsetus odoe*	Hepsetidae	Gonorynchiformes	129	3.04	**C**
42.	*Parachanna obscura*	Channidae	Ophiocepaliformes	145	3.41	**C**
43.	*Parachanna africanus*	Channidae	Ophiocepaliformes	75	1.76	**F**
	Total Number of catches			**4,250**		

Abundance scores: 1-50 = Rare (R), 51-100 = Few (F), 101-200 = Common (C), 201-400 = Abundant (A) and > 400 = Dominant (D) Allison *et al.* (2003).

Data Analysis

Table 3: Pearson Correlation for Fish Species Across The Stations

STATIONS	1	2	3	4	5
1	1	0.502 (**)	0.448 (**)	0.300	0.346
2	0.502 (**)	1	0.594 (**)	0.422 (**)	0.333
3	0.448 (**)	0.594 (**)	1	0.528 (**)	0.351
4	0.300	0.422 (**)	0.528 (**)	1	0.215
5	0.346	0.333	0.351	0.215	1

**The correlation is significant at the level 0.01, (2-tailed).

Correlation was analyzed using the Pearson correlation at 0.01 level as shown in (Table 3) amongst locations (stations). There was a very high correlation of fish species in station 2, 3 and 4; there was no correlation of fish species in station 5 with stations 4, 3, 2 and 1.

Table 4: Mean values within stations of Fish Species and Fish Species Families on the Oguta Lake (P<0.05)

STATIONS	FISH SPECIES	FISH SPECIES FAMILIES
1	122.07 ± 63.76^{c}	105.31 ± 47.32^{c}
2	115.48 ± 156.94^{b}	138.41 ± 144.05^{b}
3	223.70 ± 212.09^{a}	218.30 ± 213.41^{a}
4	67.80 ± 144.16^{b}	111.84 ± 48.06^{c}
5	125.31 ± 63.38^{c}	106.54 ± 48.06^{c}

Means within the rows with different superscripts differ significantly @P<0.05.

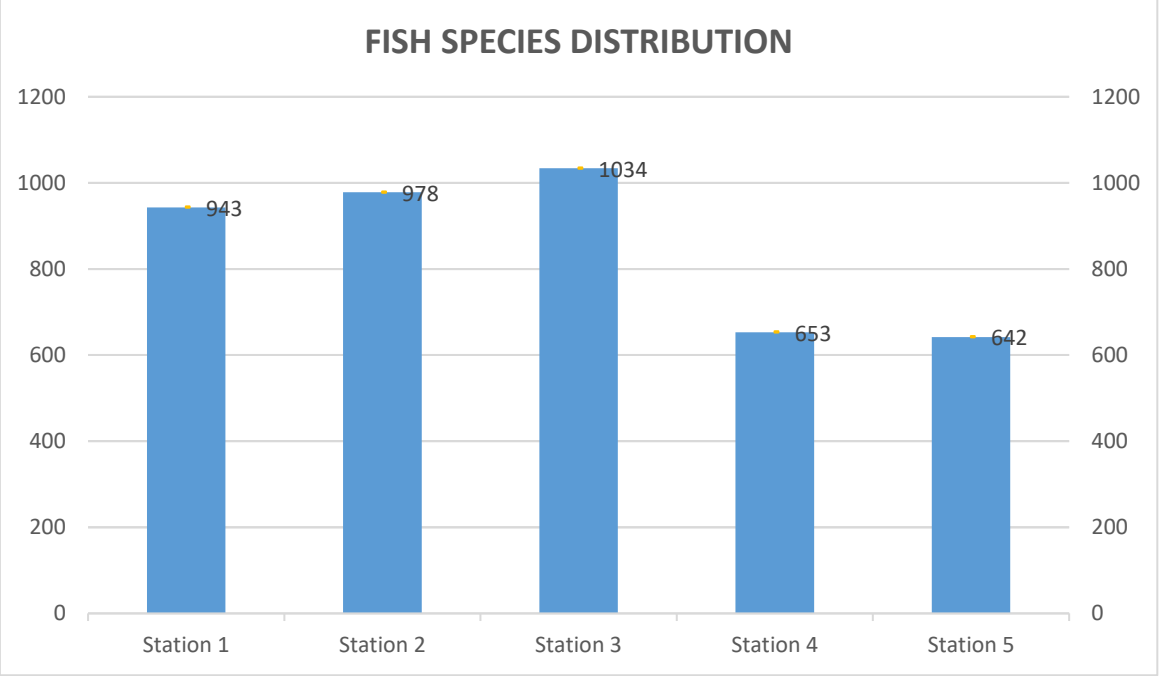


Figure 2: Bar chart showing fish distribution in the Oguta Lake amongst sampled stations

Results are expressed as Mean±SD for double measurements. Values on the same row with same superscript do not differ significantly at $P<0.05$. The result of the analysis (table 4) shows the highest mean (223.70) in station 3 and the least mean (63.38) in station 5 of Fish Species; while Fish Species Families the highest mean (218.30) in station 3 and the least mean (47.32) in station 1. An analysis of variance (ANOVA) at a probability, $P<0.05$ as shown in (Appendix II) was carried out within stations for species relative abundance and catches in their significant levels. It shows that there was a significant difference in species abundance/distribution within groups (stations). There was a clear difference of fish species distribution between the stations as shown in the bar chart above (figure 2), the highest catches were observed in station 3 with 1,034 fish species, followed by station 5 with the lowest catches with 642 fish species.

CONCLUSION

The Oguta Lake could be said to be rich in fish species fauna as there are relative fish species represented in this assessment in spite of its human activities. The diversity amongst families like Cichlidae is high, although, this is not so for others like the Notopteridae, Osteoglossidae, Gymnarchidae, Distichodontidae, Cyprinidae, Protopteridae

and Hepsetidae. All the same, it is clear that there is low diversity of fish species in this lake due to the duration of the research and the fish species are said to be endangered. The abundance of fish species reported was low based on the duration of species sampled along the lake. Nevertheless, this seems to be associated more with fish exploitation in relationship to gear types and mesh size (cast nets , gill nets, gura net traps, seine nets, drag nets, dugout canoe, drift nets, longlines, hooks and lines, baskets; spears), human activities such as fishing, dredging, river dumping, gear mesh size and fish adaptation to their individual natural ecosystem. This study could serve as a baseline data to relevant bodies in the taxonomy, Fedearl Ministry of Fisheries; Ministry of Agriculture and water Resources, conservation and management of the fisheries resources. The fish species identified could be used as a fish taxonomy catalogue or key for zoology, fisheries and aquaculture students and scientists. The fisheries of this river should be monitored from illegal fishing and overexploitation of its biodiversity.

Recommendations

The identified fish species could be used as a working document for fish identification key. More elaborate and longer research work should be done on the fisheries in the Oguta Lake, in order to identify more fish species. The human activities along the Oguta Lake should be monitored and checked to avoid undue alteration of the fisheries ecosystem and subsequently the fishing grounds in relationship with fish species habitats and breeding grounds.

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