
*STUDIES ON THE FISH ABUNDANCE OF OBUTU LAKE IN
OMOGHO, ORUMBA NORTH LOCAL GOVERNMENT AREA,
ANAMBRA STATE NIGERIA*

BY

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ABSTRACT

Study on the fish abundance of Obutu Lake in Omogho, Orumba North Local Government Area, Anambra State, Nigeria was conducted bimonthly over a period of 6 months stretching both wet and dry season. Fish samples were collected using gill nets (mesh size 9 inches), hooks (size 2 inches) and lines, monofilament gill net and three layered gill net. Four stations were selected for the study. A total of 723 fishes belonging to 5 orders, 11 families and 19 species were collected. *Tilapia zilli* (106) was the most abundant species with percentage composition of 14.66% while *Barbus accidetalis* and *Polypterus senegalus* were least in abundance with percentage composition of 3.18 % each. The study reveals that fish abundance was highest at station 1 and station 4 has the least fish abundance. The highest number of fish was caught in October (168) and the lowest number of fish was caught in July (87). The study also shows that fish abundance was higher in dry season than in rainy season ($p \leq 0.05$). Factors that affect the fish abundance and other biological interactions within the lake are pH, temperature, dissolved oxygen, alkalinity and turbidity, were assessed using standard procedures. The study recommends that the relevant stakeholder charged with management of the lake should carry out a sensitization campaign to educate the people on the danger associate with loading of the lake with toxic waste from washing disinfectant or herbicides spraying machine in the lake, while household should be restricted from washing in the lake and a community based monitoring program should be developed to capture value.

Keywords: Abundance, *Tilapia zilli*, *Barbus accidetalis*, *Polypterus senegalus*, Obutu lake.

INTRODUCTION

Fish is very important source of protein which is needed by the body for growth, repairs and replacement of worn out tissue. Therefore inland capture fisheries for sustainable development are a priority to Nigeria today because it provides employment, income and food security (Ibiwoye *et al.*, 2006). Fish is mainly composed of water, protein, is normally eaten after it has been cooked and seasoned or processed in a variety of ways. Fish is one of the most important animal protein and other vital nutrients sources that are widely consumed by all races and classes of people (Ibiwoye *et al.*, 2006). Fish meat contains significantly low lipids and high water compared to that of beef or chicken and is favored over other white or red meats. As members of the phylum Chordata, fish share certain features with other vertebrates. These features are gill slits at some point in the life cycle, a notochord, or skeletal supporting rod, a dorsal hollow nerve cord, and a tail (Hewitt *et al.*, 2008). Fishes are of interest to humans for many reasons, the most important being their relationship with and dependence on the environment. A more obvious reason for interest in fishes is their role as a moderate but important part of the world's food supply. This resource, once though unlimited, is now realized to be definite and in delicate balance with the biological, chemical and physical factors of the aquatic environment (Dudgeon *et al.*, 2006). Fishes are the main source of protein for the people living around Orumba North Local Government. Lakes are complex ecosystems that require monitoring and care to stay healthy. People living near the lakes dump waste materials from home and their environment inside the water. This leads to algal blooms. Algal blooms are one of the most common problems encountered by lake and some of these algae may harbor toxins substance which affects the living organisms such as fish that live inside the lake. Almost all natural bodies of water bear fish life, the expectations being very hot thermal ponds and extremely salt – alkaline lakes, such as the Dead Sea in Asia and the great salt lake in North America the present distribution of fishes is a result of the geological history and development of Earth as well as the ability of fishes to undergo evolutionary change and to adapt to available habitats (Froese, *et. al.*, 2009). Fish are very diverse animals and can be categorized in many ways. Although most fish species have probably been discovered and described, about 250 new ones are still discovered every year. According to Fish Base, 33,100 species of fish had been described as of April 2015 (Connolly, 2006). Fish species diversity is roughly divided equally between marine (oceanic) and freshwater ecosystems. Coral reefs in the indo-pacific constitute the centre of diversity for marine fishes. Whereas, continental freshwater fishes are most diverse in large river basins of tropical rainforests, especially the Amazon, Congo and Mekong basins. Fish are abundant in most bodies of water. They can be found in nearly all aquatic environments from high mountain stream (e.g. char and gudgeon) to the abyssal and even hadal depths of the deepest oceans (e.g. cusk – eel and snail fish), although, no species has yet been documented in the deepest 25% of the ocean (Yancey *et al.*, 2014) with 34,300 described species, fish exhibit greater species diversity than any other group of vertebrate. Fish are an important resource for humans worldwide especially as food. Commercial and subsistence fishers hunt fish in wild fisheries or farm them in pond or in cage in ocean (in aquaculture). They are also caught by recreational fishers, kept as pets, raised by fish keepers and exhibited in public aquaria. The study was aimed at understanding the fish abundance in the lake.

EXPERIMENTAL

Study Area

Obutu Lake is in Iwolo village, Omogho town in Orumba North Local Government Area of Anambra state, Nigeria. The lake is an inland freshwater lake that is situated within a vast agricultural area of Omogho. Obutu lake is about 10 km from Ekwulobia, on the Ekwulobia / Umunze Federal Road. Obutu Lake stretches from its eastern end at the Omogho / Ndikelionwu boundary, then runs north - eastwards and finally gives out an outlet into the Ota-Alu River. The study area is located in the rainforest region. Two seasons namely dry season (October-April) and rainy season (May-September) operate in the area.

ACTIVITIES IN THE LAKE

Obutu Lake serves as a source of water for domestic purposes and freshwater ecosystem for most aquatic organisms. The domestic activities in the lake include fermenting and processing of cassava, washing of clothes, breadfruits, mashing of bitter leaf, bathing in the water, collection of water snail, fishing farming using their local canoe, collection of leaves for wrapping and farming around the water bodies. It is believed that these activities may affect the lives of the fishes and organisms in the water.

SAMPLING STATIONS

The stream was divided into four sampling stations namely; Station 1, Station 2, Station 3 and Station 4 along its stretch. Each station was sampled once in two weeks for 6months (July to December). The stations were chosen base on their accessibility, type of soil, their vegetation etc.

SAMPLE COLLECTION

Fish samples were collected using gill nets (mesh size 9 inches), cast nets (mesh size 9 inches), hooks size 2 inches and lines, monofilament gill net and three layered fill net. The monofilament gill net consisted of four different mesh sizes (2.5 cm, 5.1 cm, 7.0 cm and 10.3 cm) and each had a length of 43.0 m. The three layered gill net had mesh size of 14.0 cm, 3.6 cm and 13.0 cm with a length of 64.0 mm. In each sampling trip, equal numbers of net were placed using local canoe and left for two nights in each segment and the nets were checked twice daily in morning and evening. The fish specimen collected was fixed in 10% formalin for preservation. Fish specimens collected were sorted and labeled according to the sampling stations. The fish specimens were transported to the laboratory for identification. The fish species were identified in the laboratory according to the taxonomic keys, Roberts (1989) and Jenkin, *et. al.*, (2005)

RESULTS

From Table 1 and 2, a total of 723 fishes were collected and identified into 19 species, 11 families, and 5 orders. The most abundance species was *Tilapia zilli* (106) with percentage composition of 14.66, followed by *Tilapia mariae* (61) with percentage composition of 8.44. This showed that fishes in the order of Perciformes and family Cichlidae are most abundance and with highest percentage composition. *Polypterus senagalus* specie was least (23) with percentage composition of 3.18. The order Siluriformes had the highest number of species (seven species) followed by Perciformes (five species), whereas Polypteriformes has the least number of fish species (one) with Charaniformes and Cypriniformes with 4 (four) and 2 (two) species respectively. The most abundant family is Cichlidae (195) with a total percentage composition of 26.97. Next in

abundance was Mochokidae (140, 19.36), followed by Cyprinidae (57, 7.89) and Citharinidae (52, 7.19), whereas other families have one specie each.

Table 1: Fish species collected in Obutu Lake

	Order	Family	Species
1	Siluriformes	Claridae Malapteruridae Mochokidae	<i>Clarias anguillaris</i> <i>Malapterus electricus</i> <i>Syndontis clarias</i> <i>Syndontis eupterus</i> <i>Syndontis ocellifer</i> <i>Syndontis resupinatus</i>
2	Perciformes	Claroteidae (Bagridae) Cichlidae	<i>Chrysichthy nigrodigitatus</i> <i>Tilapia zilli</i> <i>Oreochromis niloticus</i> <i>Tilapia mariae</i>
3	Characiformes	Channidae Centropomidae Characidae	<i>Parachanna obscura</i> <i>Latis niloticus</i> <i>Brycinus nurse</i>
4	Cypriniformes	Citharinidae Cyprinidae	<i>Hydrocynus forskalis</i> <i>Citharinus citharus</i> <i>Citharinus latus</i> <i>Cynprinus carpio</i> <i>Babus accidentalis</i>
5	Polypteriformes	Polypteridae	<i>Polypterus senegalus</i>

Table 2: Composition and abundance of fish species in Obutu Lake

Fish species	Total number collected	Percentage of total
<i>Clarias anguillaris</i>	43	5.95
<i>Malapterus electricus</i>	42	5.81
<i>Syndontis clarias</i>	36	4.98
<i>Syndontis eupterus</i>	38	5.26
<i>Syndontis ocellifer</i>	33	4.56
<i>Syndontis resupinatus</i>	33	4.56
<i>Chrysichthy nigrodigitatus</i>	48	6.64
<i>Tilapia zilli</i>	106	14.66
<i>Oreochromis niloticus</i>	28	3.87

<i>Tilapia mariae</i>	61	8.44
<i>Parachanna obscura</i>	36	4.98
<i>Latis niloticus</i>	28	3.87
<i>Brycinus nurse</i>	31	4.29
<i>Hydrocynus forskalis</i>	28	3.87
<i>Citharinus citharus</i>	25	3.46
<i>Citharinus latus</i>	27	3.73
<i>Cynprinus carpio</i>	32	4.43
<i>Babus accidentalis</i>	25	3.46
<i>Polypterus senegalus</i>	23	3.18
Total	723	100

VARIATION IN RELATION TO STATIONS

From 3, a total of 19 species were recorded in the study. The study revealed great variation in abundance of major families among the study stations. *Tilapia zilli* species was represented in all the stations with the highest abundance in station 1, followed by station 2 and the least of *Tilapia zilli* abundance was observed in station 4. Station 1 has total fish abundance of 216, followed by station 2 with 192 and station 4 with 151 has the least fish abundance.

Table 3: Abundance of fish species in relation to study stations

Fish species	Stations			
	1	2	3	4
<i>Clarias anguillaris</i>	15 (6.94)	8 (4.17)	11(6.71)	9 (5.96)
<i>Malapterus electricus</i>	16 (7.40)	10 (5.21)	11 (6.71)	5 (3.31)
<i>Syndontis clarias</i>	6 (2.78)	12 (6.25)	9 (5.49)	9 (5.96)
<i>Syndontis eupterus</i>	9 (4.17)	11 (5.73)	12 (7.32)	6 (3.97)
<i>Syndontis ocellifer</i>	6 (2.78)	12 (6.25)	11 (6.71)	4 (2.65)
<i>Syndontis resupinatus</i>	13 (6.02)	4 (2.08)	5 (3.05)	11 (7.29)
<i>Chrysichthy nigrodigitatus</i>	20 (9.26)	9 (4.69)	8 (4.88)	11 (7.29)
<i>Tilapia zilli</i>	39 (18.06)	28 (14.58)	20 (12.20)	19 (12.58)
<i>Oreochromis niloticus</i>	5 (2.32)	5 (2.60)	10 (6.10)	8 (5.30)
<i>Tilapia mariae</i>	20 (9.26)	18 (9.28)	13 (7.93)	10 (6.62)
<i>Parchanna obscura</i>	4 (1.85)	11 (5.73)	10 (6.10)	11 (7.29)
<i>Latis niloticus</i>	3 (1.39)	12 (6.25)	5 (3.05)	8 (5.30)
<i>Brycinus nurse</i>	8 (3.70)	11 (5.73)	5 (3.05)	7 (4.64)
<i>Hydrocynus forskalis</i>	11 (5.09)	9 (4.69)	6 (3.66)	2 (1.32)

<i>Citharinus citharus</i>	6 (2.78)	6 (3.13)	6 (3.66)	7 (4.64)
<i>Citharinus latus</i>	8 (3.70)	5 (2.60)	7 (4.27)	7 (4.64)
<i>Cynprinus carpio</i>	9 (4.17)	9 (4.69)	7 (4.27)	7 (4.64)
<i>Barbus accidentalis</i>	9 (4.17)	6 (3.13)	5 (3.05)	5 (3.31)
<i>Polypterus senegalus</i>	9 (4.17)	6 (3.13)	3 (1.83)	5 (3.31)
Total	216 (100)	192 (100)	164 (100)	151 (100)

MONTHLY VARIATION OF FISH POPULATIONS.

The monthly variation of fish population was showed in table 4 below. During the study period, the higher numbers of fishes were recorded in the month of October, November and December than the lower numbers recorded in the month of July, August and September.

4: Monthly Variation of Fish Populations

Fish species	Months						Range
	July	August	Sept	Oct	Nov	Dec	
<i>Clarias anguillaris</i>	3	6	6	13	10	7	3-13
<i>Malapterus electricus</i>	7	5	6	9	8	8	5-9
<i>Syndontis clarias</i>	4	4	4	7	5	6	4-7
<i>Syndontis eupterus</i>	5	4	5	9	6	7	4-9
<i>Syndontis ocellifer</i>	6	5	4	7	8	6	4-8
<i>Syndontis esupinatus</i>	3	7	6	7	7	7	3-7
<i>Chrysichthy nigrodigitatus</i>	4	8	7	14	9	8	4-14
<i>Tilapia zilli</i>	10	12	13	24	19	20	10-24
<i>Oreochromis niloticus</i>	-	4	6	9	4	7	4-9
<i>Tilapia mariae</i>	4	9	11	11	9	15	4-15
<i>Parachanna obscura</i>	6	5	7	10	5	7	5-10
<i>Latis niloticus</i>	6	3	6	7	4	7	3-7

<i>Brycinus nurse</i>	3	3	3	7	6	7	2-7
<i>Hydrocynus forskalis</i>	3	5	4	6	5	4	3-6
<i>Citharinus citharus</i>	3	2	1	6	5	6	1-7
<i>Citharinus latus</i>	6	6	=	7	7	6	1-7
<i>Cynprinus carpio</i>	6	3	3	8	8	7	3-8
<i>Barbus accidentalis</i>	3	1	2	5	6	5	1-6
<i>Polypterus senegalus</i>	3	2	3	5	5	4	2-5
Total	87	96	91	168	146	149	

SEASONAL VARIATION OF FISH POPULATION IN OBUTU LAKE.

During the study, fish abundant was higher in dry season than rainy season with total fish abundance of 449 while 274 numbers of fishes was recorded in rainy season according to table 5. Among all the fish species, only *Citharinus latus* in the family Citharinidae and order of Characiformes was abundant in dry season with number of 18 fishes. Thus, of 19 species of fish recorded during the study, all were seasonal in occurrence.

Table 5: Seasonal Variation of Fishes in Obutu Lake.

Fish species	Rainy season	Dry season
<i>Clarias anguillaris</i>	15	30
<i>Malapterus electricus</i>	18	25
<i>Syndontis clarias</i>	12	18
<i>Syndontis eupterus</i>	14	22
<i>Syndontis resupinatus</i>	16	20
<i>Chrysichthy nigrodigitatus</i>	19	31
<i>Tilapia zilli</i>	30	60
<i>Oreochromis niloticus</i>	08	22
<i>Tilapia mariae</i>	22	37
<i>Parachanna obscura</i>	16	27
<i>Latis niloticus</i>	13	20
<i>Brycinus nurse</i>	08	13
<i>Hydrocynus forskalis</i>	12	15
<i>Citharinus citharus</i>	06	17
<i>Citharinus latus</i>	14	18
<i>Cynprinus carpio</i>	12	23
<i>Barbus accidentalis</i>	08	14
<i>Polypterus senegalus</i>	09	13
Total	274	449

DISCUSSION AND CONCLUSION

Obutu Lake support diverse fish species. The Mochokidae family dominated the Obutu Lake in terms of species of each family recorded in study period. In terms of species richness, mainly *Tilapia zilli* dominated the fish population. The relative percentage abundance of different species reveals that Obutu Lake favors the growth and survival of *Tilapia zilli*, *Tilapia mariae*, *Clarias anguillaris*, *Malapterus electricus*, *Parachanna obscura* mostly. This may be because they have better adaptations that permit them to survive in the lake. Although factors which influence the abundance and distribution of aquatic animals include habitat area, tropic condition, prey, physical and chemical properties of water as reported by Oscarson, (1987). The total number of fish species observed from this research is quite abundant which is in agreement with the report of Nazeef and Abubakar, (2013), who ascertained 15 different types of species under 11 families in DadinKowa reservoir, Gombe state. The abundance of fish species may be as a result of conducive physiochemical characteristics for the multiplication, continual existence and growth of fish species. In addition water bodies found in tropical region tend to increase the number of fishes rapidly by multiplying the rate of reproduction and relatively high primary productivity has been insinuated as factors responsible. The abundance of Tilapia family may be due to their capability to acclimatize with varying environmental conditions. The dominance by the family Mochokidae with four (4) numbers of species in Obutu Lake could be that ecological resources in the lake favored the species. Fish especially tilapias and crustaceans form part of the diet for higher organisms while young fishes in the family feed on benthic invertebrates mostly aquatic insects Kouamela, *et. al.*,(2000). The increase in the dynamisms in the physical condition, the higher the species abundance and various microhabitats available which finally reduced competition as a result of resource portioning Jafaru and Abubakar, (2015). David *et al.*, (2015) also ascertained that dynamism in fish diversity and abundance has been attributed to quality of aquatic system, nutrients availability and exploitation. A total of 723 fish specimens belonging to 19 species and 11 families and 5 orders were recorded in this study.

RECOMMENDATION

Since most farmers and households bordering the lake by disposing both their organic and inorganic waste into the lake direct or indirect, it is recommended that the relevant stakeholder charged with management of the lake should carry out a sensitization campaign to educate the people on the danger associate with loading of the lake with toxic waste from washing disinfectant or herbicides spraying machine in the lake, while household should be restricted from washing in the lake and a community based monitoring program should be developed to capture valuable.

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