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Assessment of Fish Biodiversity in Oni River, Ogun State, Nigeria

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Abstract

For the purpose of sustainable exploitation of the fishery resources of Oni River, Ogun State, Nigeria, the fish biodiversity assessment was carried out. This was conducted by enumerating and identifying fish species composition, measuring the fish length, fish weight, assessing the fish abundance and biomass, determining the length-weight relationships and the length-frequency of the fishes. Altogether, 592 fishes were sampled comprising twenty-eight (28) species belonging to sixteen (16) families. The families identified included: Cichlidae, Mormyridae, Clariidae, Channidae, Malapteruridae, Gymnarchidae, Bagridae, Mochokidae, Polypteridae, Pantodontidae, Schilbeidae, Anabantidae, Osteoglossidae, Characidae, Notopteridae and Distichodontidae. The family Mormyridae was the most abundant with 163 members followed by Cichlidae with 161 members. The least represented family was Schilbeidae with only two (2) members. On the species level, *Tilapia zillii* had the greatest number of representation with seventy (70) members, followed by *Oreochromis niloticus* with fifty-eight (58) members.

Keywords:
Fish biodiversity, Oni River, Sustainable exploitation.

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INTRODUCTION

Fish is a first-class animal protein for human consumption which is cheap and easily digestible. It is rich in oil and other essential mineral requirements which the body needs for sound and healthy growth and also has low cholesterol level. It is therefore in high demand the world over.

The rapid increase in world population has resulted in a huge increase in the need for animal protein and other nutritional requirements which make demand far exceeds the supply and this deficiency of protein is most noticeable in underdeveloped countries (Akinola, 1982).

Nigeria, a coastal country with 850km coastline, 200 nautical miles of Exclusive Economic Zone (EEZ) of marine water and territorial sea of 30 nautical miles has numerous inland and marine water bodies (Faturoti, 2000). FAO (2000) reported that Nigeria has about 1,280km^2 marine area and about 124, 878.2km^2 of inland waters. The inland water bodies are rich in fresh water fishes while the marine waters, though poor in fin fish resources have been found to be rich in shrimp and tuna resources (Faturoti, 2000).

Despite the rich fish diversity potential of Nigerian waters, there has been a decline in production over the years with a reduction in global fish production rising from 27.54 million tonnes in 1990 to 31.48 million tonnes in 1995, a total of 3.94 million tonnes reduction (FAO, 1996). This could be due to a number of reasons which could be natural and man-made such as pollution, irrational exploitation of water resources and poor management among other things.

There are considerable potentials for fresh water fish production in Nigeria. Fish, as a renewable natural resource, if carefully exploited, can be utilized to meet part of the nation's animal protein requirements.

MATERIALS & METHODS

Location, description and history of the study area Oni River takes its source from Ile-Ife, Nigeria on latitude $7^0 20^1$N and longitude $4^0 55^1$E and empties into the Lagos Lagoon, on latitude $6^0 30^1$N and longitude $4^0 09^1$E, spanning four States in Nigeria namely Osun, Ondo, Ogun and Lagos States.

The study area falls within the Ogun State section of the river in Ogun Waterside Local Government Area (LGA) which lies between latitude $6^0 30^1$ and $6^0 32^1$N and longitude $4^0 22^1$ and $4^0 25^1$E (FDI, 1987). This study area covers the river course running through Idakun, Sunmoge, Igele and Tabati fishing communities/camps in Ogun State. These four fishing camps form the point of study from which samples were collected.

The river passes under the Orita J4 bridge/road as it flows from Igele to Tabati; Orita J4 road makes a T-junction further up from the study area with the Lagos/Benin express road at Ogun Waterside LG junction across the road from Omo Forest Reserve, J4 section.

The river is a fresh water habitat and is located in the humid tropical region with seasonal variation in temperature and rainfall patterns. The water is brownish in colour with whitish sandy bottom soil. Fauna found in the water include fishes, water snails, shrimps, aquatic insects and amphibians. Ogun Waterside LG is bounded in the West by Ijebu East LG, in the North and the East by Ondo State and in the South by Lagos State and the Atlantic Ocean.

The major occupation of the people is fishing with a little fraction engaging in farming and hunting. A reconnaissance survey of the study area was carried out twice before data collection

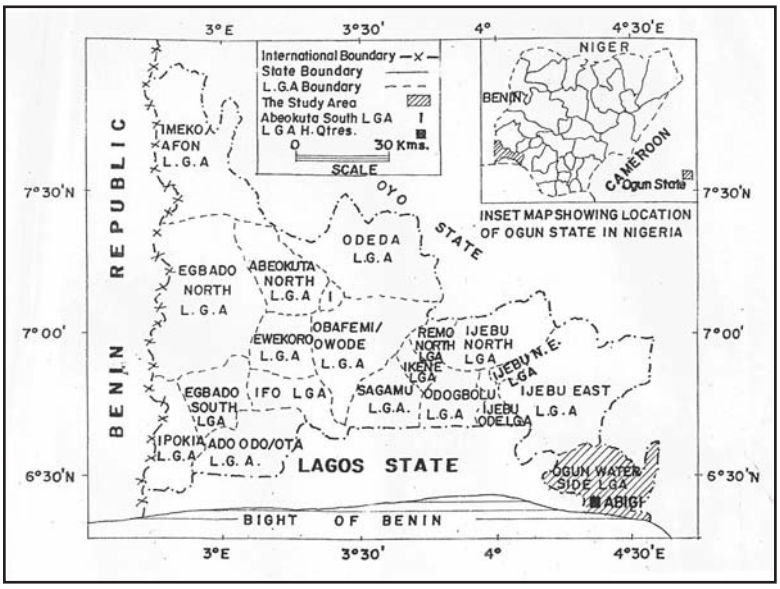

Figure 1 :Map of Ogun State showing Study Area
(Ogun Waterside L.G.A). Better quality picture now supplied below.

commenced. Fish samples were collected at selected landing sites for each of the four fishing camps. Sampling was done twice a month within the period of study which spanned three months.

Collection of data

Fish identification was made to the lowest taxonomic level using identification guide books prepared by Holden and Reed (1972) and Olaosebikan and Raji (1998). The fish abundance was calculated as the total number of fish sampled. Sampled fish were counted for each species and recorded. Relative abundance of species was calculated by dividing number making up a species by the total number of fish sampled multiplied by 100% while relative abundance of families is the number of each fish family divided by total number of fish sampled multiplied by 100%. The total and standard length of fish sampled were measured using measuring board graduated in centimetres. Range of the length frequency was determined and recorded. The weight of different fish species were measured using a weighting balance and the weight was taken to the nearest grammes.

The equation describing the relationship of the length and weight for different fish species is given by the linear equation:

$$\log W = a+b \log L$$

The percentage biomass was calculated with the formulae: $\frac{W1x100\%}{W2}$

Where W1= weight of all samples of a particular fish species

W2 = total weight of the entire fish sample collected.

Length frequency distribution is the number of times a particular length class occurred. This was obtained by counting the number of length of fishes falling within the same range or class.

Statistical analysis

Regression and correlation analyses were used to establish the relationship between the body weight and standard length while descriptive analysis i.e. scatter diagram was used to show the length-weight relationship of the fish.

RESULTS

Table 1: List of identified fish by families, genera and species in Oni River and their relative abundance

S/N	FAMILY	GENUS	SPECIES	NO SAMPLED BY FAMILIES	NO SAMPLED BY SPECIES	RELATIVE ABUNDAN -CE (%)
1	ANABANTIDAE	CTENOPOMA	*Ctenopoma kingsleyae*	008	008	1.35
2	BAGRIDAE	CHRYSICHTHYS	*Chrysichthys nigrodigitatus*	009	009	1.52
3	CHANNIDAE	CHANNA	*Parachanna obscura*	039	039	6.59
4	CHARACIDAE	HYDROCYNUS	*Hydrocynus vittatus*	016	011	1.86
		ALESTES	*Alestes spp*		005	0.84
5	CICHLIDAE	OREOCHROMIS	*Oreochromis niloticus*	161	058	9.80
		TILAPIA	*Tilapia zillii*		070	11.82
		HEMICHROMIS	*Hemichromis fasciatus*		033	5.57
6	CLARIIDAE	CLARIAS	*Clarias gariepinus*	049	049	8.28
7	DISTICHODONTIDAE	ICHTHYBORUS	*Ichthyborus monody*	003	003	0.51
8	GYMNARCHIDAE	GYMNARCHUS	*Gymnarchus niloticus*	008	008	1.35
9	MALAPTERURIDAE	MALAPTERURUS	*Malapterurus electricus*	007	007	1.18
10	MOCHOKIDAE	SYNODONTIS	*Synodontis nigrita*	022	022	3.71
11	MORMYRIDAE	HYPEROPISUS	*Hyperopisus bebe*	163	030	5.07
		GNATHONEMUS	*Gnathonemus petersii*		037	6.25
			Gnathonemus abadii		016	2.70
		MORMYRUS	*Mormyrus rume*		017	2.88
		MORMYROPS	*Mormyrops deliciosus*		004	0.68
		PETROCEPHALUS	*Petrocephalus bane*		046	7.77
		MARCUSENIUS	*Marcusenius psittacus*		013	2.20
12	NOTOPTERIDAE	PAPYROCRANUS	*Papyrocranus afer*	047	008	1.35
		XENOMYSTUS	*Xenomystus nigri*		039	6.59
13	OSTEOGLOSSIDAE	HETEROTIS	*Heterotis niloticus*	011	011	1.86
14	PANTODONTIDAE	PANTODON	*Pantodon buchholzi*	030	030	5.07
15	POLYPTERIDAE	CALAMOICHTHYS	*Calamoichthys calabaricus*	017	012	2.03
		POLYPTERUS	*Polypterus senegalus*		005	0.84
16	SCHILBEIDAE	SILURANODON	*Siluranodon auritus*	002	001	0.17
		SCHILBE	*Schilbe mystus*		001	0.17
	TOTAL			**592**	**592**	**100**

Table 2: Length and weight of sampled fish in Oni River

S/N	Species	No sampled	Mean weight (g)	Mean total length (cm)	Mean standard length (cm)
1	*Oreochromis niloticus*	058	543.81	22.29	17.93
2	*Tilapia zillii*	070	495.71	23.94	19.13
3	*Hemichromis fasciatus*	033	61.97	17.63	14.97
4	*Clarias gariepinus*	049	145.31	23.15	20.92
5	*Hyperopisus bebe*	030	55.00	12.92	11.15
6	*Gnathonemus petersii*	037	57.35	17.60	15.44
7	*Mormyrus rume*	017	102.32	20.00	18.12
8	*Mormyrops deliciosus*	004	200	28.68	26.13
9	*Petrocephalus bane*	046	24.34	11.15	9.69
10	*Gnathonemus abadii*	016	133.12	18.64	16.25
11	*Marcusenius psittacus*	013	66.92	19.51	17.82
12	*Malapterurus electricus*	007	82.86	14.29	12.17
13	*Parachanna obscura*	039	574.36	30.39	25.88
14	*Gymnarchus niloticus*	008	812.50	51.30	47.75
15	*Chrysichthys nigrodigitatus*	009	150.00	17.68	14.52
16	*Calamoichthys calabaricus*	012	25.00	18.69	17.98
17	*Synodontis nigrita*	022	180.00	20.60	16.00
18	*Pantodon buchholzi*	030	20.00	14.57	13.83
19	*Siluranodon auritus*	001	20.00	12.00	11.50
20	*Schilbe mystus*	001	60.00	7.50	6.30
21	*Ctenopoma kingsleyae*	008	130.00	14.33	11.91
22	*Heterotis niloticus*	011	3131.82	51.16	46.41
23	*Hydrocynus vittatus*	011	368.18	31.57	25.38
24	*Alestes sp.*	005	16.00	8.42	8.08
25	*Papyrocranus afer*	008	785.00	42.5	39.64
26	*Xenomystus nigri*	039	18.46	12.68	12.21
27	*Ichthyborus monodi*	003	26.67	12.63	10.57
28	*Polypterus senegalus*	005	20.00	15.88	15.46
	TOTAL	**592**			

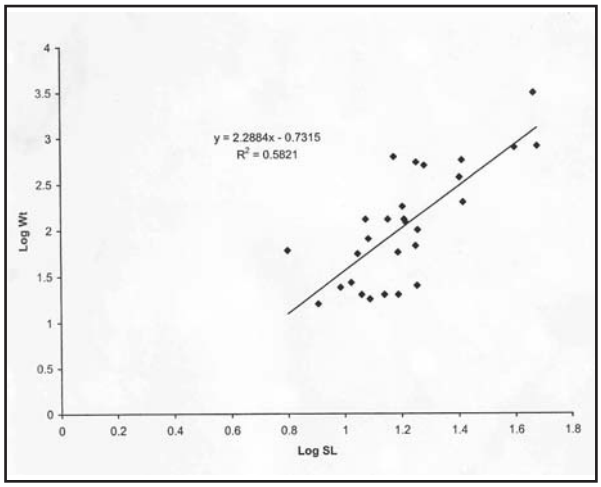

Figure 2: Scatter diagram with fitted line for length– weight relationship.Better quality picture now supplied below

DISCUSSION

During the period of study, twenty eight (28) species of fishes belonging to sixteen (16) families were identified in Oni River. Table 1 gives the list of identified fishes by family, genera and species, number sampled and their relative abundance. These fish families have been observed by many fisheries workers and researchers and found to constitute the major fisheries of inland waters in Nigeria due to their ability to adapt to various water conditions (Ita *et al.,* (1986), Akinyemi, (1987), Ita *et al.*, (1984, 1985) cited by Ita (1993).

The fish family with the highest species composition and abundance was the Mormyridae. This is in contrast with the work of Akinyemi (1987) on Eleiyele River and Asejire Lake and Olaniran (2000) on IITA reservoir that recorded Cichlidae as the dominant family. The higher occurrence of Mormyrids could be due to the environment in which found. River Oni, which is a wild environment, possesses features which make the fish to thrive better because it conforms

to their basic biological requirements. According to Holden and Reed (1972), they prefer to live around fallen trees in water where the current is less swift, they also feed on worms and detritus which occur more in the wild.

The Cichlidae family was the next most abundant family. This could be due to their ability to utilize a wide range of foods in the lower trophic level as herbivores as well as their high fecundity and prolific nature. They are largely believed to be the most abundant fish family in West Africa due to their hardiness, ability to withstand low dissolved oxygen level etc.

The fish composition on the species level shows the species *Tilapia ziillii* as the dominant species followed by *Oreochromis niloticus* and thirdly *Clarias gariepinus*. This shows that on the species level, the study agrees with the work of Akinyemi (1987) which reported that Cichlidae and Claridae are the most dominant fish species. They were also represented throughout the study period.

The families Clariidae, Channidae and Notopteridae had a high representation in the catch. This could be due to their hardy nature and higher susceptibility to catch.

Some ornamental fishes were identified in the study area which have attracted export interest as it was observed that people come weekly to buy these ornamental fishes for export purposes. These ornamental fishes include: *Pantodon buchholzi*, *Gnathonemus abadii* and *Hemichromis fasciatus*. This highlights the importance of the River in ornamental fisheries.

Fish families such as Distichodontidae, Anabantidae, Bagridae, Gymnarchidae, Malapteruridae and Schilbeidae were poorly represented in the catch. Most of these species require high water level to thrive well which was not available during the period of study as it was the dry season.

Table 3: Length frequency distribution of sampled fish

Mean Standard Length range (cm)	Frequency of occurrence	Percentage of occurrence
0.01-10.00	3	10.71
10.01-20.00	19	67.86
20.01-30.00	3	10.71
30.01-40.00	1	3.57
40.01-50.00	2	7.14
Total	28	100.00

Table 2 gives the length and weight of sampled fishes and Table 3 gives the length-frequency distribution of sampled fish. Analysis of size ranges of fish species showed the mean standard length varied from 6.3cm to 47.8cm while the mean weight has a range of 16g to 3,130g. The scatter diagram of weight against standard length (fig 2) showed a linear relationship which means that as the length of the fishes increased, their body weight also increased. The standard length-weight relationship equation of this study is given as log wt= 2.29 log SL-0.73. The coefficient of determination (R^2) was calculated to measure the degree of relationship between length and weight and it was found out that 58% of the variation in weight is accounted for by the standard length as R^2 had a value of 0.58. The length-weight relationship followed the trend as described by Bagenal (1978). Table 3 also shows that fish species of mean standard length range of 10.0.1-20.00 has the highest level of occurrence making 67.86% of occurrence.

CONCLUSIONS

This study was conducted on the fish composition of Oni River in Ogun State, Nigeria. Oni River is an important river in Ogun Waterside LG of Ogun State contributing highly to the inland fishery of the State. The research shows that there is high composition of fish species in the river which is an evidence of its high pro-

ductivity. The presence of some priced ornamental fishes of export status such as *Gnathonemus abadii* and *Pantodon buchholzi* further highlights the potential of the river.

The wide coverage of the river which covers Osun, Ondo, Ogun and Lagos States of Nigeria makes the river to be of particular interest and with proper management, it could be developed for multi-usage purposes such as transportation, electricity generation etc.

Problems observed in the study area included pollution of the water with agricultural chemicals, use of small sized mesh nets, lack of social amenities such as drinkable water and schools, human activities such as sand mining, logging and waste disposal into the water. These have negative impacts on the quality of the water and need to be addressed and corrected.

It is hoped that the information gathered from this study will be very useful in formulating management policies that would be useful in future management of Oni River. For if properly managed, the River will go a long way in boosting the economic status of the State and also the nation.

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