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ASSESSMENT OF SPECIES COMPOSITION AND ABUNDANCE OF THE ICHTHYOFAUNA OF IKERE GORGE DAM, ISEYIN, NIGERIA.

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ABSTRACT

Accurate data collection is most difficult for inland fisheries like Ikere because of the artisanal nature and the rural location of the fisher folks and the rivers. Species composition and abundance studies were conducted at three sampling points (SP) based on hydrological characteristics of the dam. The wider and deepest part of the main Dam was designated,

INTRODUCTION

The contribution of fisheries resources to human food security cannot be overstated. From time immemorial, the animal protein needs of man had been largely sourced from wild caught fish from the inland fresh waters or from the sea (FAO,2015). Fish also have served as a source of recreational pleasure for many people. The catches from sports fisheries are far larger than commercial catches from most fresh waters and in marine waters close to large population centres especially in industrialized economies (Ye et al.,2020)

Inland water catches contribute significantly to the global fish production, (Fluet-chouinard et al., 2013). Fish catch from inland water recorded a steady year-in-year-out growth on the global scale reaching over 12 million tons in 2018 with the highest growth recorded in Asia (FAO, 2020). Similarly, the share of inland waters in the total for global captures also increased from 8.0 percent in

SP-A, the broad mid part as SP-B and the narrow shallow upper (inlet) as SP-C. Nine passive graded experimental gill nets (mesh sizes 25.4mm to 177.8mm) measuring 30 meters in length and 3 meters depth each arranged randomly were used for catching fish from the shore; surface and bottom habitat. Eleven fish families consisting of thirty-three species were identified from experimental catch. Nine hundred and fifty-nine (959) fishes (850.09kg) was recorded the first year (yr1) and 6891fishes (1181.07kg), the second year (yr2). The mean weight of each fish was 0.3kg ±0.04kg. Nine (9) families were recorded along the shore, seven (7) from the surface and ten (10) from the bottom.

Keywords: *Specie composition, experimental Catch, Gorge dam*

the late 1990s to 12.5 percent in 2018, offsetting the decline in marine captures since the late 1990s. However, this observed trend might have been a consequence of better documentation especially in developing countries and not necessarily an increase in production. In Nigeria, like many developing countries the data collection systems for inland waters are unreliable, or in some cases non-existent (World Bank, 2012). Nigeria like many countries of the sub-Saharan region has massive freshwater systems, including lakes, rivers, reservoirs, dams and floodplains which support extensive artisanal fisheries. The River Niger which rises in Sierra Leone and has a total length of 4,184 kilometers, flows through West Africa, enters Nigeria in the northwest and runs southwards to join the River Benue at Lokoja, before traveling the remaining 547 kilometers to the sea. These two major rivers and the many smaller rivers support large freshwater artisanal fisheries in the country. A study by the National Special Programmed for Food Security (NSPFS) 2004, identified about 2,658 fish farms and 937 Dams and Reservoirs in Nigeria. Ita (1985) identified about 365 lakes and reservoirs and 687 ponds and floodplains totaling over 13 million hectares of water bodies. Despite this potential and the consequent growth in the aquaculture sector, there is a persistent wide gap between demand and supply with the consequent drain of the nation's foreign reserve through fish importation. Current annual demand for fish is 3.3 million metric tons, whereas local production stands as 1.2 million metric tons. the fish import bill is estimated at US$ 800 million (NBS, 2018). This relatively low production and the consequent drain on the nation's foreign reserve is of concern to the managers of the economy and a challenge to all in the fisheries sector. FAO (2020) reported that 13 million Nigerian children are affected by chronic malnutrition, While Guardian (2020) reported that 59 million Nigerians are macronutrient deficient and about 45%death among children under the age of 5 are linked to malnutrition which could be ameliorated through improved protein diet from fish. Fish and fisheries products are actually recognized not only as some of the healthiest foods on the planet, but as some of the less impactful agricultural practices in animal protein production. In order to ameliorate the ravaging effect of climate change, Inland fishery development must be given higher priority in the national, regional and global food security and nutrition strategies (Willows et al., 2003).

. Inland fisheries are predominantly from the North East and North West of Nigeria. The insecurity that has befallen these production hubs had adversely affected fish supply to the populace. However, Nigeria still has some production capabilities which had not been fully tapped. One of these is Ikere Gorge dam with an underdeveloped fishery occasioned by lack of data. The collection of accurate data is most difficult for inland fisheries because of the artisanal nature and the rural location of the inland fishermen and the rivers, hence, most of the freshwater catches are not accounted for. However, there is a great potential for increased fish production in freshwaters with a little input of required resources (Finlayson et al., 2000).

Some inland waters like Lake Chad has been well studied for the past three decades and production statistics well documented. Thus, the potential yield of the lake is estimated at 200,000 m.t (GIWA, 2004). The current actual production is at an abysmal level because of the shrinking size of lake Chad and the insecurity in the area. The Nigerian side of the Lake produces 60,000 m.t. annually, representing about 33% of Nigerian freshwater fish production with a monetary value in excess of $22 million. Unfortunately, this type of data is not available for other water bodies.

Materials and Method

STUDY AREA

Ikere gorge dam is situated between latitude $8^{o}10^{'}$ and 9^{o}N and longitude $3^{o}45$ and$4^{o}43$'E ^{in} Iseyin Local of Oyo State, South West of Nigeria covering a total area of 53sq.kmm. (Figures 1) The Dam is an earth fill embankment of 660 m length with a center height of 47.5m, crest elevation of 277.50 m.a.s.l. and capacity of 265 million cubic metres.

Methodology

Sample were collected for two consecutive years covering two wet season (April-October) and two dry Seasons (November to March). Study site was divided into three stations based on hydrological characteristics: the narrow shallow (6.38m) upper (inlet) part of the lake as Station 1; the broad mid part (9.84m) as Station 2 and the wider and deepest part called the main Dam site as Station 3. Experimental gill nets with graded stretched mesh sizes 1", 1½", 2", 2½", 3", 3½", 4", 5" and 7" inches which are equivalent to 25.4, 38.1, 50.8, 63.5, 76.0, 88.5, 101.6, 126.4 and 177.2 millimeters respectively, were set to catch fish specimens for stock assessment. Each mesh size of the experimental gill net measuring 30 meters in length and 3 meters depth were arranged randomly and joined together to form a fleet giving a total surface area of 810m^2 per fleet. The catch per fleet was extrapolated to catch per 1000m$^{2\ i.e.}$ (1000 for 810) for standardization. The nets were mounted at 50 % hanging ratio. 1" and 1½" meshes were included in the fleet in order to have an all-inclusive catch and to conform to what fishermen were using to exploit the fishery. Water depth was taken. Sampling was carried out for three evenings at each of the sampling Stations fortnightly between 18.00hrs and 21.00hrs GMT. The fleet of nets were lifted for fish catch checking in the mornings between 7.00 and 9.00 GMT. The retrieved fish were then carried to the shore where the number, weights and species were recorded.

Fish species were identified from their local names by using field guide by Olaosebikan and Raji (1998). The fishes were identified to specie level and recorded.

RESULTS AND DISCUSSION

Results of fish samples collected by weight and number for the first and second year are presented in tables 1. Eleven fish families were identified consisting of thirty-three species. The total number of fish caught in the first sampling year was 9591 with a total biomass of 850.09kg while in the 2nd sampling year a total number of 6891 with a total biomass of 1181.07kg (table 16)In the first sampling year the dominant species were *Lates niloticus* (8.7%),*Chrysichtys nigrodigitatus*(7.7%) and *Auchenoglanis occidentalis*(5.8%).In the second year dominant s species were *Mormyrus delicousus* (16.6%),*Lates niloticus* (9.0%) and *Auchenoglanis occidentalis* (6.0%).

Nine fish families were identified along the shore, seven families from the surface and ten families from the bottom. (tables 3 and 4). The Statistical relationship between fish family abundance and occurrence along the shore, the surface and the bottom were presented in tables 4 and 5. Analysis of variance obtained shows the p-value of 0.26908 for number of fish in Group (Shore, Surface & Bottom) and 0.440113 for Weight of Fish Groups (Shore, Surface & Bottom). Since the p-values are

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greater than 0.05, it means, there is no sufficient linear relationship of fish groups to numerical abundance and weight at a 95% confidence level.

Table1: Species Occurrence and Abundance in Yr1 &Yr2.

FISH SPECIES	First sampling year No.	% No.	Wt(g)	%Wt	Second sampling year No.	% No.	Wt (g)	% Wt
CICHLIDAE								
Oreochromis niloticus	875	9.1	3325	3.9	114	1.7	2802.2	2.4
Sarotherodon galileae	912	9.5	3399.3	4.0	513	7.4	4120.9	3.5
Sarotherodon niloticus	743	7.7	3658.8	4.3	641	9.3	4215.3	3.6
Tilapia zillii	1811	18.9	4788.3	5.6	608	8.8	4551.3	3.9
Tilapia mariae	114	1.2	2960.7	3.5	311	4.5	3364.0	2.8
Pelmatochromis guentheri	181	1.9	4316.7	5.1	55	0.8	3931.5	3.3
CHARACIDAE								
Alestes brevis	178	1.9	331.13	0.4	114	1.7	386.1	0.3
Alestes nurse	302	3.1	1762.3	2.1	259	3.8	1397.6	1.2
Alestes leuciscus	88	0.9	1480.3	1.7	93	1.3	1457.1	1.2
Hydrocynus vittatus	115	1.2	1232.2	1.4	118	1.7	915.3	0.8
Alestes macrolepidotus	256	2.7	889.58	1.0	163	2.4	972.0	0.8
Alestes champeri	62	0.6	1272.3	1.5	104	1.5	1164.4	1.0
CLARIDAE								
Clarias gariepinus	312	3.3	2587.9	3.0	479	7.0	2117.3	1.8
Clarias anguillaris	624	6.5	3476.7	4.1	443	6.4	3586.0	3.0
CHANNIDAE								
Channa obscura	14	0.1	2034.1	2.4	14	0.2	4146.6	3.5
BAGRIDAE								
Chrysichtys nigrodigitatus	617	6.4	6576.5	7.7	715	10.4	5789.1	4.9
Auchenoglanis occidentalis	395	4.1	4961.2	5.8	333	4.8	7140.1	6.0
MORMYRIDAE								
Gnathonemus senegalensis	41	0.4	1013.7	1.2	49	0.7	3821.3	3.2
Mormyrus rume	75	0.8	1285.2	1.5	67	1.0	3251.5	2.8
Gnathonemus cyprinoides	68	0.7	1276.2	1.5	41	0.6	193.5	0.2
Mormyrus deliciousus	71	0.7	1907.1	2.2	72	1.0	19610	16.6
Heperopiscus bebe	46	0.5	1645.5	1.9	31	0.4	3522.4	3.0
Macusenius psittacus	37	0.4	1918.9	2.3	60	0.9	1741.9	1.5
MOCHOKIDAE								
Synodontis gambiensis	61	0.6	1221	1.4	76	1.1	2011.2	1.7
Synodontis nigrita	111	1.2	1211.6	1.4	114	1.7	974.2	0.8
Synodontis membraneous	48	0.5	2013.1	2.4	112	1.6	1981.2	1.7
CENTROPOMIDAE								
Lates niloticus	275	2.9	7425.4	8.7	317	4.6	10575.0	9.0
SCHLIBIDAE								
Schlibe mystus	869	9.1	3695.5	4.3	689	10.0	4091.5	3.5

HEPSETIDAE								
Hepsitus odoe	14	0.1	2339.1	2.8	14	0.2	4378.4	3.7
CYPRINIDAE								
Labeo senegalensis	43	0.4	2349.1	2.8	48	0.7	2121.9	1.8
Garra waterloti	78	0.8	2178.9	2.6	51	0.7	3011.7	2.5
Labeo coubie	108	1.1	2792.1	3.3	31	0.4	2983.4	2.5
Barbus occidentalis	47	0.5	1683.8	2.0	42	0.6	1781.3	1.5
Total	9591	100	85009.0	100	6891	100	118107.5	100

Table 2: Family occurrence and abundance in yr1

Family/species	Shore No.	%	Wt(g)	%	Surface No.	%	Wt(g)	%	Bottom No.	%	Wt(g)	%
Bagridae	95	8.4	4113.9	9.3	105	7.6	3245.8	18.4	812	19.5	4178	17.0
Cichlidae	501	44.5	15854.9	36.0	630	45.5	3398.9	19.3	1075	25.8	4328	17.7
Characidae	112	10.0	2587.0	5.9	83	6.0	1443.2	8.2	645	15.5	3019	12.3
Claridae	38	3.4	1087.9	2.5	-	-	-	-	801	19.2	4977	20.3
Centropomidae	57	5.1	6162.3	14.0	97	7.0	1445.6	8.2	121	2.9	1831	7.5
Cyprinidae	44	3.9	2285.9	5.2	153	11.0	6035.4	34.2	71	1.7	683.6	2.8
Hepsetidae	7	0.6	1986.8	4.5	-	-	-	-	7	0.2	1564	6.4
Schilbeidae	31	2.8	752.5	1.7	217	15.7	1008.5	5.7	621	14.9	3146	12.8
Momyridae	237	21.1	7986.6	18.1	101	7.3	1064.6	6.0	-	-	-	-
Channidae	3	0.3	1248.2	2.8	-	-	-	-	11	0.3	785.9	3.2
Total	1125	100.0	44066.0	100.0	1386	100.0	17642	100.0	4164	100.0	24511	100.0

Table3: Family occurrence and abundance in yr2

Family/species	Shore No.	%	Wt(g)	%	Surface No.	%	Wt(g)	%	Bottom No.	%	Wt(g)	%
Bagridae	107	8.5	5011.0	4.5	209	14.9	4532.7	20.8	732	15.0	3385.5	11.8
Cichlidae	612	48.3	13458.5	12.1	598	42.6	4725.4	21.7	1132	23.1	4863.3	16.9
Characidae	113	8.9	2476.7	2.2	83	5.9	1107.4	5.1	655	13.4	2643.8	9.2
Claridae	44	3.5	1112.1	1.0	-	-	-	-	878	17.9	4591.3	16.0
Centropomidae	71	5.6	7112.2	6.4	101	7.2	1522.8	7.0	221	4.5	1930.0	6.7

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Cyprinidae	38	3.0	2309.4	2.1	126	9.0	7046.1	32.4	58	1.2	542.7	1.9
Hepsetidae	5	0.4	1541.9	1.4	-	-	-	-	9	0.2	3810.7	13.3
Schilbeidae	44	3.5	987.3	0.9	189	13.5	1032.9	4.7	682	13.9	2171.3	7.6
Momyridae	222	17.5	71250.3	64.2	98	7.0	1784.3	8.2	-	-	-	-
Channidae	7	0.6	4382.6	3.9	-	-	-	-	11	0.2	3756.2	13.1
Osteoglossidae	3	0.2	1321.7	1.2	-	-	-	-	-	-	-	-
Mochokidae	-	-	-	-	-	-	-	-	517	10.6	1059.6	3.7
Total	**1266.0**	**100.0**	**110963.76**	**100**	**1404.0**	**100.0**	**21751.7**	**100**	**4895.0**	**100.0**	**28754.5**	**100.0**

Table 4: ANOVA FOR Number of fish in Each Group (Shore, Surface & Bottom) Yr1

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1750509	2	875254.4	1.378691	0.26908	3.354131
Within Groups	17140803	27	634844.6			
Total	18891312	29				

Table 5: ANOVA For Weight of Fish Groups (Shore, Surface & Bottom)

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.47E+08	2	73342183	0.846186	0.440113	3.354131
Within Groups	2.34E+09	27	86673839			
Total	2.49E+09	29				

Ikere Gorge dam host an aquatic fauna rich in fish species with thirty-eight (38) identified, but low in endemism. The dam contains only six (6) endemic fish species namely *Sarotherodon niloticus, Sarotherodon galileae, Clarias gariepinus, Chysichtys nigrodigitatus, Mommmyrus delicosus and Alestes nurse*. Dominant fish families include *Bagridae, Cyprinidae, Cichlidae,* and *Mormyridae.* The successional changes that artificial impoundments seem to undergo (Peter 1978) has been repeated in Ikere Gorge dam after a first phase of high productivity as abundant submerged vegetation decomposed, there was a second phase characterized by low productivity and diversity as the riverine species adjusted to lacustrine environment. In the Upper Ogun River, research suggests that the fish community exhibits seasonal variation in species composition (Adebisi 1988). At the onset of flooding, an increased relative abundance of fishes has been observed, whereas omnivores were more dominant as floodwaters receded, and herbivores and insectivores dominated during periods of low water level. Fishes, such as Cyprinidae and Mormyridae, depend on main river channels for breeding, and often migrate extensively to breed at the onset of floods (Lévêque 1997). Fish species such as Channidae, and Clariidae, live in the floodplain or marshy river fringes, and often have adaptations to resist harsh environmental conditions such as anoxic waters. fish, such as Cichlidae, Citharinidae, and Mochokidae, live in fringing vegetation, backwaters, and the edges of flood plain lakes during the wet season and inhabit the main river channel during the dry season.

Recommendation and **Conclusion**

Ikere Gorge dam is rich in fish fauna, which could substantially cater for the fish protein needs of Oyo State. Because of the rural nature of the dam's location, enforcement of appropriate fisheries management laws is laxed. The need to educate fisherfolks on sustainable fishing practices is an imperative if the fisheries of the dam is to remain sustainable.
Fish stock monitoring at regular intervals is necessary to keep up with possible changes and to determine the appropriate management tools for use from time to time. This should include identification of specific niches for different fish species within the lakes and changes in stock composition. Identified vacant niches can be stocked with local or tested and proven exotic fish species.

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