FISH SPECIES COMPOSITION IN A TROPICAL LENTIC FRESHWATER ECOSYSTEM, UMUDIKE, UMUAHIA, ABIA STATE, NIGERIA

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ABSTRACT

Fish species composition of a tropical lentic freshwater ecosystem (Umudike Water Reservoir, Umuahia, Nigeria) belonging to the National Root Crops Research Institute (NRCRI) was investigated from July 2004 to December 2004. The fishes were sampled twice every week using cast nets, traditional baskets traps (drum type), and hook-and-line of various sizes. A total of 896 fish approximately 500 kilogramme by weight were sampled. The sampled fish species belonged to fifteen (15) families, twenty-four (24) genera and thirty-two (32) species. Family cichlidae topped the list in number and weight with 665 (74.2%) fishes and 400, 900 g (82.8%) respectively; while the families Anabantidae and Hepsetidae had the least number, 7 (0.8%) each; 1,400 g (0.8%) and 1,500 g (0.3%) respectively. There was significant difference among the different species composition. The reservoir, with the fish species composition could be utilized for fisheries.

Keywords: Fish composition, Lentic freshwater ecosystem, Umudike, Nigeria

INTRODUCTION

The investigation of the potentiality of the reservoir as an ecosystem with various fish populations is of paramount importance. This is partly because aquaculture, with its great and as yet not fully exploited potentials in Nigeria as a whole, and Umudike in particular, is playing an ever-increasing role in sustaining the total fish supply in Nigeria. In order to exploit fully Nigeria's land and water reservoirs for the production of animal protein, a large amount of fish must be cultivated in a relatively small volume of water, located on small areas of land (ponds and reservoirs).

Nigeria is blessed with abundant inland water resources, made up of major lakes, rivers, ponds and floodplains (Ezenwaji, 2002; 2004). Some man-made lakes and reservoirs are created to solve the problems of drought. It is of interest to note that some of these reservoirs created have not only served for irrigation, but for aquacultural purposes. These reservoirs harbour various types of fishes of economic importance (Ita, 1993). This is exemplified by the Kainji, the Jebba, the Shiroro, the Tiga, the Kiri, the Bakoloir, and the IITA reservoirs, all in Nigeria (Ita, 1993).

The majority of people who live in Nigeria as a whole, and Umudike in particular, partly depend on fish for their livelihood. Fish is a source of income to inhabitants of the riverine areas in Nigeria. Fish is also known to constitute more than 50% of the animal protein in-take in many countries and in fact, serves as an important component of the total human food consumption (Shangi, 1981). Over the years, the demand for fish has been in the increase. As a result, the supply often lags behind the demand (Okoh *et al.,* 2007). At the prevailing increase in population (of about 2,000,000 per annum), an increase of 1 million tons of fish per annum is required to meet the demand of fish protein in Nigeria (Ugwumba and Ugwumba, 2003). Therefore there is the need to increase production in order to bridge the gap. In an attempt to bridge the gap in supply, Africa in including Nigeria is very dependent upon import of fish (Holden and Raitt, 1974). In the same vain, Ugwumba and Ugwumba (2003) reported that in the year 1992 alone, Nigeria imported 378,414 tonnes of fish i.e. 35,336 tons more

than the annual production and approximately 190 million dollars was spent on the importation. It was argued that importation was not the answer, rather there was need to reduce importation and increase domestic production (Okoh *et al.,* 2007). There are many inland water bodies with an estimated area of 125,470.82 km^2 (Tobor, 1982). The contribution of inland waters such as lakes, reservoirs and rivers to the fishery sub-sector of the economy is quite significant (Moses, 1983). The bulk of domestic fish production (327,931 tons) constituting 86.4% of the total production between 1991 and 2000 came from inshore coastal, brackish and inland waters (Ugwumba and Ugwumba, 2003). The Umudike water reservoir is a component of the inland waters in the Eastern part of Nigeria and its role to the fishery of the area is significant.

The NRCRI water reservoir as a source of irrigation is under-utilized. The reservoir may be a potential fishing ground which the Institute has not been able to explore. Therefore, it is envisaged that the reservoir, after identifying the fish composition, could be utilized for fisheries. This could be of much benefit to the Institute. The present investigation was aimed at establishing fish species composition of Umudike Water Reservoir, Umuahia, Nigeria.

MATERIALS AND METHODS

Study Area: The National Root Crops Research Institute (NRCRI), Umudike, where the water reservoir is located is 8 kilometers Southeast of Umuahia in Abia State. Umudike is in Ikwuano L.G.A. with Isiala as the headquarters. Abia State lies between longitude 04°45′ and 06°17′ North, and latitude 07°00′ and 08°10′ East (Anon, 2005) while the Institute is situated on longitude $7^1/_2$°00′ East and latitude $5^1/_2$°00′ North (Figure 1) (Anon, 1973).

The reservoir was impounded from a tributary (Anya River) of the Qua-Iboh River in Akwa Ibom State, which passes through the Institute, in 1965 for irrigation of farms during dry seasons. The reservoir has an estimated surface area of 11.5 km^2 with minimum, maximum and mean depths of 0.5 m, 3.0 m and 1.5 m respectively (Anon, 1973). However, as a result of the long existence of the reservoir, and erosion of the banks, it has become a large body of water (Avoaja, 2005).

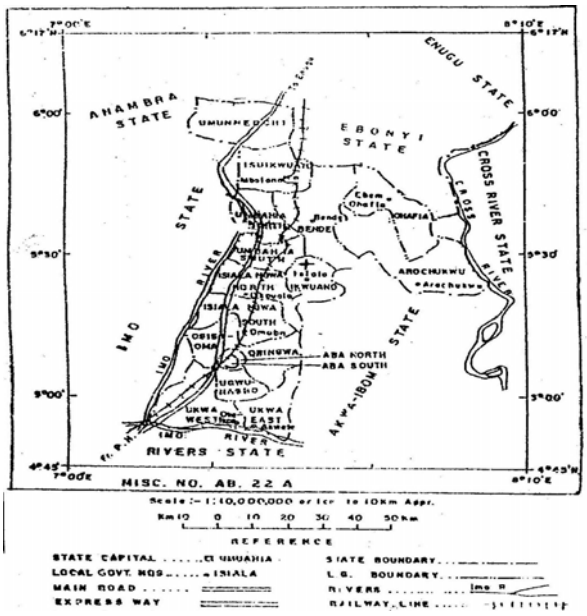

Figure 1: Map of Abia State Showing Ikwuano L.G.A and Umudike Sampling Location

Fish Samplings: Samplings of fishes started from June, 2004 to December 2004. Samples of fishes were collected from the reservoir twice every week (Mondays and Thursdays). On each sampling day, the irrigation subordinate officer set gears overnight. Two nets (meshes 3.5 cm and 4.0 cm) and four traditional baskets traps (drum type) were set between 1600 h and 1800 h. The fishes caught were removed from the gears between 0600h and 0800h the next day. Another two fishers were deployed to join the irrigation worker during the period, to fishes using hook-and-line. The total number of fishes caught on each day was recorded. Those specimens of fish were transported to the laboratory in containers of water. The samples were sorted and identified up to species level using keys (Reed *et al.,* 1967; Holden and Reed, 1991; Teugel *et al.,* 1992; Olaosebikan and Raji, 1998). The body weights (to the nearest gramme) were determined using a Mettler weighing balance (Model PC 2000) where applicable.

Statistical Analysis: SPSS version 10 employing sample percentiles were used in analysing the population of fishes of the

reservoir. Analysis of variance was used to determine the differences among species. $P < 0.05$ was regarded as an acceptable level of significance.

RESULTS

A total of 896 fish samples, belonging to 15 families, 24 genera and 32 species were collected from the reservoir. The total weight of all the fishes collected was approximately 500 kilogramme (Table 1). The family Cichlidae, represented by for genera – *Hemichromis, Tilapia, Sarotherodon and Oreochromis* topped the list both in number, 665 (74.2%) and weight, 400,900 g (82.8%). The Clariidae, represented by *Clarias* and *Heterobranchus* came second with 58 (6.5%) and 25,793 g (5.3%) in number and weight respectively. Cyprinidae, represented by *Labeo* and *Barbus* followed with a total number of 24 (2.7%) and weight of 9,450 g (2.0%). The family Bagridae, represented by *Chrysichthys* and *Bagrus* had a total of 21 (2.3%) and weight of 7,300 g (1.5%), and was followed closely by Mochokidae 20 (2.2%) which was represented by *Synodontis.* The other families, Characidae 16 (1.8%) represented by *Hydrocynus* and *Brycinus*; Mormyridae 15 (1.6%) represented by *Mormyrus*, *Carylomormyrus* and *Gnathonemus*; Distichodontidae 14 (2.0%) represented by *Distichodus*; Gymnarchidae 14 (2.0%) represented by *Gymnarchus;* and Citharinidae 11 (1.2%) represented by *Citharinus* had small numbers and weights. The remaining 5 families, Osteoglossidae, 9 (1.0%); Schilbeidae 9 (1.0%); Malapteruridae 8 (0.9%); Hepsetidae 7 (0.8%) and Anabantidae 7 (0.8%) had low catches (Figure 2).

the numbers recorded for each species in descending orders were 238 *Tilapia zilli* Gervais, 1848; 192 *Orechromis niloticus* Linne, 1758; 170 *Sarotherodon galilaeus* Linne, 1758; 65 *Hemichromis fasciatus* Peters, 1852; 47 *Clarias gariepinus* Burchell, 1822; 15 *Synodontis robianus* Smith, 1875; 14 *Distichodus rostratus* Günter, 1864; 12 *Gymnarchus niloticus* Cuvier, 1829; 10 *Barbus macrops* Boulenger, 1911 and 10 *Heterobranuchus macronema* Blecker, 1863. The remaining species of fish sampled were very low in number and weight (Table 1).

DISCUSSION

Various families and species of fishes were identified in twelve major reservoirs in Nigeria (Ita, 1993). Similarly, some species in Southern Nigeria (Victor and Meye, 1994). This is in agreement with the Umudike water reservoir where families, genera and species of fish have been identified. The family Cichlidae which topped the list of fishes in the Umudike water reservoir was in agreement with the findings of Ita (1993) in the major reservoirs he studied. It also agrees with the findings of Nedelee and Prado (1990) for river ecosystems.

As regards to the fishing gears used, King (1996) reported that only detailed and seasonal study employing various gears would reveal the piscifauna of the Cross River. This explains the additional use of baskets and hook-and-line to catch those fishes that may be attracted to bait. Idowu and Eyo (2005) from a study in Lake Alau observed that the cast net was more effective in catching the willy *Tilapia* that avoided most gears. The cast net was used in shallow waters and needed high skill to manipulate (Okoh *et al.,* 2007). This implies that the cast net as a single gear is limited in its use in assessing the fisheries of a water body (Okoh *et al.,* 2007). The mesh sizes of the cast nets (3.5cm and 4.0cm), compares with the findings of Eyo and Akpati (1995) who reported that cast nets of average mesh size of 3.5cm were used in Anambra River fisheries. The size of the net varied, and agrees with Reed *et al*. (1967) who noted that the size of cast nets varied among the fishing units according to individual performances and the fishers ability to manipulate the net.

It is therefore certain that the Umudike water reservoir which was built to supply water for irrigation harbours some fish communities. Probably, the fish species migrated from the Qua Iboh river into the Anya river, and then to the reservoir. It could be possible as Olaosebikan and Raji (1998), identified similar species well distributed in Cross River which is close to Qua Iboh River.

Table 1: Fish species composition of the Umudike water reservoir

Family		Genera	Species	Number of Fish (%)	Species weight (g)	Family weight (g) (%)	Mean weight (g)
1.	Osteoglossidae	*Heterotis*	*H. niloticus*	9 (1.0)	3,800	3,800 (0.78)	3,800
2.	Mormyridae	*Mormyrus*	*M. rume*	6	160	400 (0.08)	133.3
		Comylomormyrus	*C. tamandua*	7 } 15 (1.6)	186.67		
		Gnathonemus	*G. petersii*	2	53.33		
3.	Gymarchidae	*Gymnarchus*	*G. niloticus*	12 (1.3)	4,850	4,850 (1.0)	4,850
4.	Hepsetidae	*Hepsetus*	*H. odoe*	7 (0.8)	1,500	1,500 (0.3)	1,500
5.	Characidae	*Hydrocynus*	*H. vittatus*	7	2,668.75	6,100 (1.3)	1,525
			H. forskalii	3 } 16(1.8)	1,143.75		
		Brycinus	*B. nurse*	3	1,143.75		
			B. macrolepidotus	3	1,143.75		
6.	Distichodontidae	*Distichodus*	*D. rostatus*	14(2.0)	5,000	5,000 (1.3)	5,000
7.	Citharinidae	*Citharinus*	*C. citharus*	7 } 11(1.2)	2,672.73	4,200 (0.9)	2,100
			C. latus	4	1,527.27		
8.	Cyprinidae	*Labeo*	*L. coubie*	7	2,756.25	9,450 (2.0)	3,150
			L. senegalensis	7 } 24(2.7)	2,756.25		
		Barbus	*B. macrops*	10	3,937.5		
9.	Bagridae	*Chrysichthys*	*C. longifilis*	9	3,128.58	7,300 (1.5)	243.3
			C. aluuensis	6 } 21(2.3)	2,085.71		
		Bagrus	*B. docmak*	6	2,085.71		
10.	Schilbeidae	*Schilbe*	*S. mystus*	9(1.0)	3,300	3,300 (0.7)	3,300
11.	Clariidae	*Clarias*	*C. gariepinus*	47	17,827.59	25,793 (5.3)	8,597.7
		Heterobranchus	*H. longifilis*	11 } 58(6.5)	4,172.41		
			H. macronema	10	3,793.10		
12.	Malapteruridae	*Malapterurus*	*M. electricus*	8(0.9)	2,800	2,800 (0.6)	2,800
13.	Mochokidae	*Synodontis*	*S. loppei*	3	1,117.5	7,450(1.5)	2,483.3
			S. robianus	15 } 20(2.2)	5,587.5		
			S. gambiensis	2	745.0		
14.	Cichlidae	*Hemichromis*	*H. fasciatus*	65	39,185.71	400,900 (82.8)	100,225
		Tilapia	*T. zilli*	238 } 665(74.2)	143,480.0		
		Sarotherodon	*S. galilaeus*	170	102,485.72		
		Oreochromis	*O. niloticus*	192	115,748.57		
15.	Anabantidae	*Ctenopoma*	*C. kingseye*	7(0.8)	1,400	1400 (0.3)	1,400
TOTAL	**15**	**24**	**32**	**896**	**499,900**	**484,243**	**141,107.6**

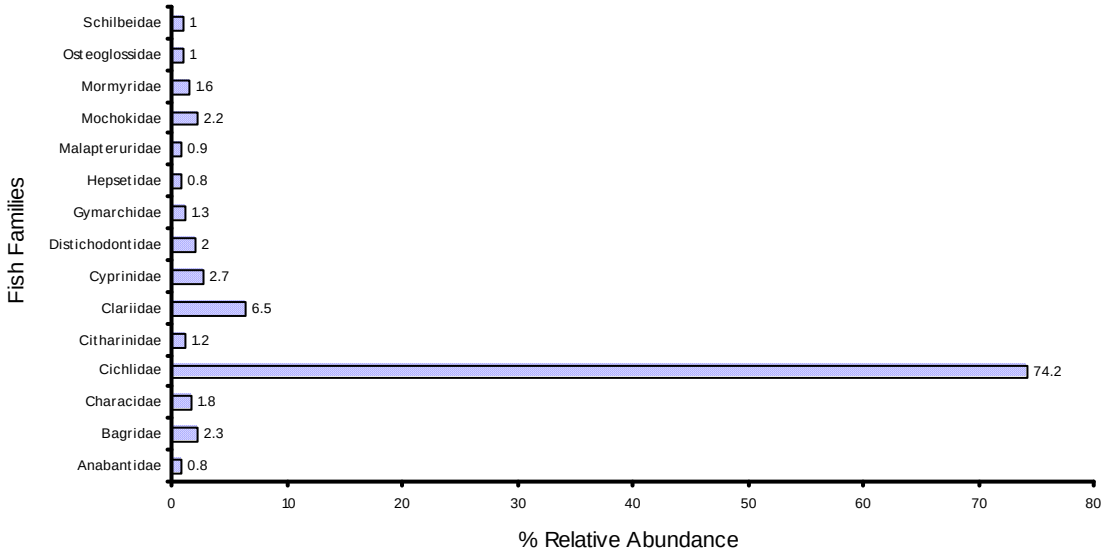

Figure 2: Relative abundance of fish families in the Umudike water reservoir

Since the reservoir will constitute an enormous asset for the production of fish protein, it is highly desirable that attention should be paid to the reservoir in terms of fishery so that opportunities for the economic exploitation of its biota will not be missed. It is envisaged that if more attention is given to the reservoir, in terms of fishery, it would produce adequate fish to supply the protein dietary supplement of the inhabitants of the Institute and its environ.

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