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Fish Fauna Of A Tropical Southern Reservoir In Nigerian

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Abstract:

Five families of fish, Cichildae, Channidae, Hepsetidae, Clariidae and Mormyridae were encountered in the reservoir. The family Cichildae was the most abundant making up 52.1% of the total fish catch. The Clariidae were next in abundance, contributing 20.5% of the total fish abundance. While the Mormyridae were the least abundant making up 3.4% of the total fish catch. Fish composition and abundance was generally poor. However, abundance was significantly higher (p<0.05) in the rainy season months than in the dry season months.

Key words: *Fish, abundance, Egbe reservoir.*

1.Introduction

Egbe Reservoir is an important freshwater body for Egbe and Ode Ekiti communities in Gbonyin Local Government Area of Ekiti State, Nigeria. It serves as source of drinking water, domestic needs, swimming, artisanal fishing and irrigation of agricultural farms in its vicinity. The freshwater food fishes found in Nigeria are about 268 different species inhabiting over 34 well-known freshwater bodies including rivers, lakes, and reservation (Babatunde and Raji, 1998). But very little information is available on the ichthyofauna of Egbe Reservoir. This paper is therefore the first intensive study on the Egbe Reservoir fish population and it reports on the composition and distribution pattern of the fish species of this reservoir.

2.Materials And Method

2.1.Study Area

Egbe reservoir is situated across Egbe River, which is located in the suburb of Egbe Ekiti in Gbonyin Local Government area of Ekiti State in Western Nigeria. The Reservoir takes its source form Kwara State and runs through Ekiti to Ondo State, and eventually empty into the popular Osse river in Ondo-State. The reservoir lies between latitudes $7^0$36N and $7^0$39' North and longitude $5^0$32' E and $5^0$35' East of the equator as shown in Figure 1. The entire length of the reservoir is 26.5 acres and the depth is 64m. The reservoir is located on an undulating plane, surrounded by highlands from which runoffs also feed the reservoir during raining seasons. The reservoir is underlain by metamorphic rocks. Some of the physical and chemical conditions of the river have been investigated in previous studies.

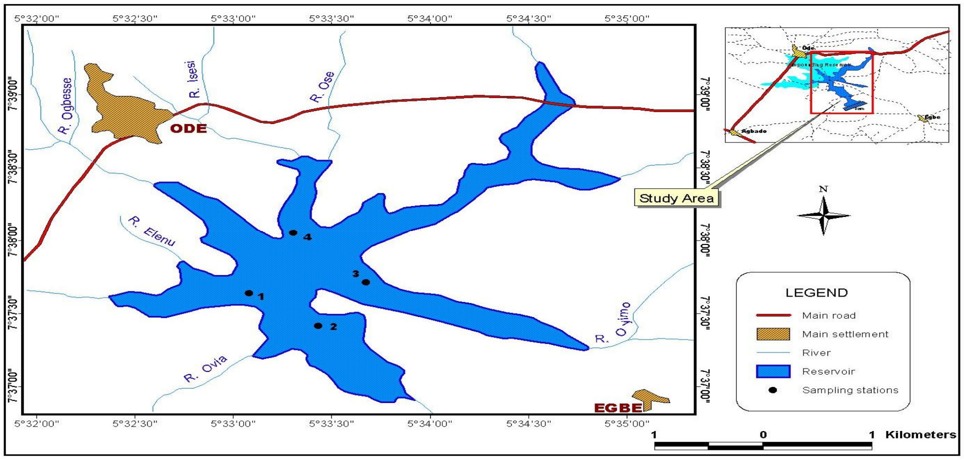

Figure 1: Map of Egbe reservoir showing sampling stations.

2.2.Fish Sampling

The data for this study was based on records of fish catches by local fishermen taken through the months of February and May, 2008. The fishing gears used was hooks and line, cast-nets, and cages. The species of fishes caught were identified and classified using the identification guides of Holden and Reed (1978), Maddison (1992), Babatunde and Raji (1998), and Idodo-Umeh (2003). The total number of individual species of fish caught from the reservoir was recorded; this enabled the determination of the relative abundance of the various species in the reservoir.

3.Results

A checklist of fish fauna, mean total abundance and percentage composition during the period of study was presented in Tables 1 and 2.

Table 1 shows that Oreochromis niloticus, Sarotherodon melanopteron, Tilapia zillii and Parachanna obscurus are not significantly difference in total abundance in the reservoir. Also, Sarotherodon melanopteron, T. zillii, P. obscurus, C. gariepinus and H. odoe are not significantly difference in abundance. However, the table indicated that Heperopisus bebe is significantly different from O. niloticus, S. melanopteron, T. zillii, P. obscurus, C. gariepinus and H. odoe, but not significantly different from C. anguillaris in abundance. This clearly indicated that the only significant difference in total abundance of fishes lies between Heperopisus bebe and the other species.

The total abundance and percentage composition of the fish fauna of Egbe Reservoir is presented in Table 2. The table revealed that the family Cichlidae is the most abundant fish species in the reservoir. This group of fish is mainly represented by Oreochromis niloticus which had the highest abundance (10,556 individuals and percentage composition (18.6%) followed by Sarotherodon melanopteron with 9,828 individuals and 17.3% percentage composition, while the least abundant in this group is Tilapia zillii with 9,176 individuals and 16.2% percentage composition. The Channidae, Parachanna obscurus was next in abundance with 7,560 individuals making up 13.3% of the total fish abundance. Clariidae was represented by two species; Clarias gariepinus and C. anguillaris. Among these two, C. gariepinus had the highest abundance 6,427 individuals and contributes 11.3% of the total fish abundance, while the other species C. anguillaris had 5,208 individuals and made up 9.2% of the total fish abundance. The family Hepsetidae was represented by only one species of Hepsetus odoe which had 6114 individuals with 10.8% of the total fish abundance. Mormyridae was also represented by only one species, Heperopisus bebe, having 1,903 individuals and contributing 3.4% of the total fish abundance.

As observed from above, the family Cichlidae made up the largest percentage, 52% of the fish composition of the reservoir. The Clariidae were next in abundance contributing 20.5% of the total fish catch. While Channidae comprises 13.3% and Hepsetidae, 10.8% of the total fish abundance, Mormyridae had the least percentage composition, 3.4% and abundance (1,903 individuals).

The pattern of variation in the monthly abundance of fish in Egbe Reservoir during the period of study was illustrated in Figure 2. It can be observed from this Figure that an increase in fish abundance was noticed from June to October 2006. However, the highest peak abundance was reached in September 2006, after which there was decline. Seasonally, mean abundance of fish was observed to be significantly higher 567.25 ± 46.3 in the rainy season than the dry season mean abundance 300.57 ± 27.4 at $P<0.05$.

Species	1st Sampling	2nd Sampling	Total
Oreochromis niloticus	341.4 ± 212a	318.31 ±216a	659.8±426a
Sarotherodon melanoteron	299.9±190ab	314.38±204a	614.3±388ab
Tilapia zillii	288.9± 207ab	284.63±197ab	573.5±398abc
Parachanna obscurus	222.5± 142ab	250.0±160ab	472.5±295abc
Clarias gariepinus	199.0± 149bc	202.69±139ab	401.7±280bc
Clarias anguilaris	168.3± 138bc	178.93±142ab	347.2±274cd
Hepsetus odoe	185.1± 131bc	197.00±139.ab	382.1±259bc
Heperopisus bebe	74.7 ± 88.5c	66.57±64.7c	141.3±145d

Table 1: Checklist and mean total abundance of fish fauna of Egbe Reservoir
Note: Means with the same letters are not significantly different at $P<0.05$.

Species	Abundance	Percentage (%)
Oreochromis niloticus	10,556	18.6
Sarotherodon melanoteron	9,828	17.3
Tilapia zillii	9,176	16.2
Parachanna obscurus	7,560	13.3
Clarias gariepinus	6,427	11.3
Hepsetus odoe	6,114	10.8
Clarias anguilaris	5,208	9.2
Heperopisus bebe	1,903	3.4
Total	**56,772**	**100.00**

Table 2: Total abundance and percentage of fish fauna of Egbe Reservoir

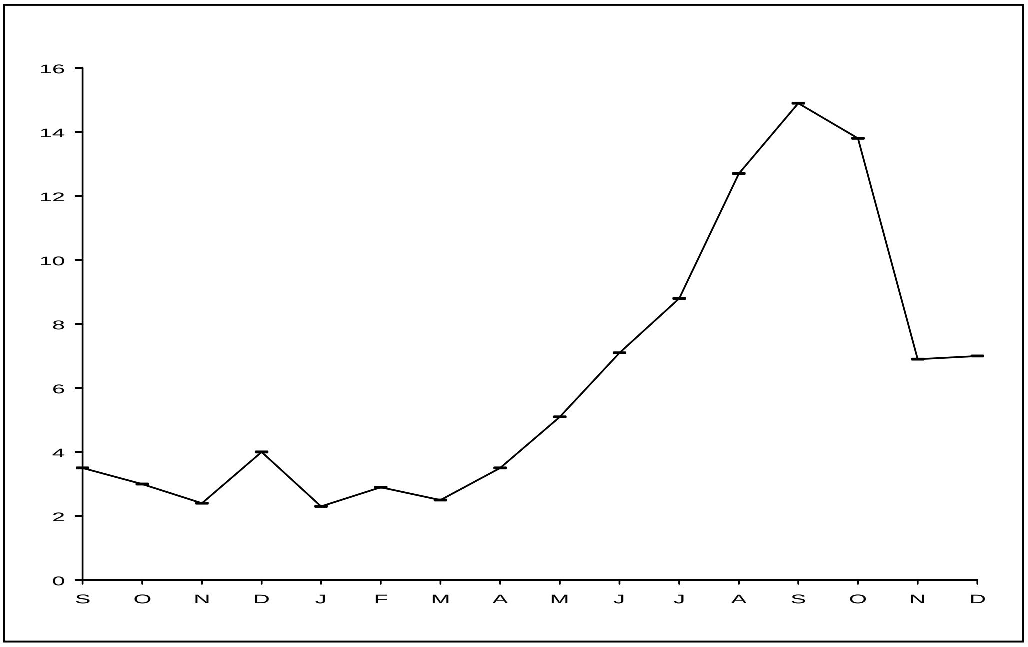

Figure 2: Monthly variations in the percentage abundance by number of fish fauna from Egbe Reservoir (September 2005 – October 2006)

Fish taxa	Temp	Cond.	AIK	DO_2	Na	K
O. niloticus	0.530*			0.696*		
S. melanopteron	0.529*			0.782*		
T. zillii				0.720*	0.555*	
P. obscurus	0.529*			0.778*		
C. gariepinus	0.608*			0.723*		
C. anguillaris			0.530*	0.783*		
H. .odoe		-0.582*		0.718*		0.531*
H .bebe		-0.638*		0.572*		

Table 3: Correlation coefficient (r) values between fish fauna and Physicochemical parameters of Egbe Reservoir

A result of correlation analysis between the fish fauna and physicochemical parameters of Egbe Reservoir was presented in Table 3. This table shows that all the fish species had a positive significant relationship with some of the physicochemical parameters. Exceptions to this general observation are *Hepsetus odoe* and *Heperopisus bebe* which had negative significant correlations with conductivity (r = -0.582 and r = -0.638), both at $P<0.05$ respectively. It was also observed that all the fish species generally had positive significant correlations with dissolved oxygen. *O. niloticus* and *S. melanopteron* had a positive significant correlation with temperature, r = 0.53 and r = 0.529 respectively, both at $P<0.05$. *T. zillii* also had a positive significant relationship with sodium (r = 0.555 $P<0.05$) in addition to its correlation with dissolved oxygen. *P. obscurus* and *C. gariepinus* had positive significant correlation with temperature (r = 0.529 and r = 0.608) respectively in addition to their correlation with dissolved oxygen (r = 0.778 and r = 0.723; $P<0.05$). *Clarias anguillaris* also had a positive significant correlation with alkalinity (r = 0.530, $P<0.05$) in addition to its significant positive correlation with dissolved oxygen (r = 0.783 $P<0.05$).

4.Discussion

Eight species of fish belonging to five families were encountered in Egbe Reservoir during the period of study. The reservoir is therefore considered to be poor or low in fish abundance when compared with other tropical inland water bodies. For instance, Awachie and Wolson (1978) recorded 23 fish species for Anambra River, Adebisi (1988) gave 36 for Ogun River and Odum (1995) recorded 60 species for Ethiope River. While amongst man-made lakes, Lake Kainji has the highest number of species 101, followed by Jebba with 52 species (Ita, 1993). A much lower number of species, though still richer than that recorded in this present study was encountered in Owena reservoir where Fapohunda and Godstates (2007) recorded 14 fish species belonging to seven families. The low fish abundance recorded in Egbe reservoir may be as a result of the fact that the reservoir was not at any point in times stocked with any fish species. The sole aim of government at the time of impounding Egbe River to form a dam seems to be production of water for municipal use. Therefore, the species of fish encountered in the reservoir may have come in through flood from its source and adjoining rivers.

However, distribution and abundance of fish in tropical water bodies have been variously attributed to several factors but principally depth (Chapman and Kramer, 1991), water temperature (Agrermier and Kar, 1983) water transparency (Fagade and Olaniyan, 1974), availability of food (Winemiller and Jepsen, 1998) and migratory behaviour of some of the fishes (Adebisi, 1988). In addition, the prevailing ecological conditions like the nutrient level current speed, and nature of the bottom deposits, may have acted singly or synergistically to influence the present status of fish abundance and distribution observed in Egbe reservoir. Where the bottom sand is fine and hard, such habitats are frequented by Alestes (Brycinus) and Cichlids (Odum, 1995). This factor may have accounted for the preponderance of the family Cichlidae in Egbe reservoir. They form an important part of the reservoir ichthyofauna, making up more than 50% of the total catch.

The dominance of the members of the family Cichildae in Egbe reservoir also goes to confirm that under uncontrolled conditions in most Nigerian Inland waters, the cichlids always dominate (Akintunde, 1976, Awachie and Wolson, 1978, Elliot, 1979; Ita and Balogun, 1983; Daddy et al., 1989; Ita, 1993; Olurin, 1994; and Ogueri, 2004). Fryer and Iles (1972) also attributed the preponderance of cichlids to their ability to thrive on a wide range of food items and their prolific breeding nature. Oreochromis niloticus is by far the most abundant of the cichlidae family. In rank order, the numerical abundance of this species was close to the observations of other workers, for example, Ita (1993). Next in abundance were the clariids which were known to occur in greater numbers where the bottom is muddy with a slower average current velocity of 40cm s^{-1} (Odum, 1995). The other species Parachanna obscurus, Hepsetus odoe, and Heperopsisus bebe, also found habitats in areas with floating vegetation and muddy bottoms (Orji and Akobuche, 1989). All these habitat patterns were observed to occur within Egbe Reservoir hence the availability of the various species encountered during the period of study. It therefore goes that if well managed and the necessary resources well harnessed, the reservoir can support sustainable yields of fish for consumption.

The result of this work also showed that fish were significantly more abundant in the reservoir during rainy season than in the dry season. This could be attributed to the breeding activities which takes place in the rainy seasons in most fish species, leading to an increase in their population during this period (Idodo-Umeh, 2003).

Temperature and dissolved oxygen appeared to have important significant influence on the trends in abundance of fish in Egbe reservoir. Abundance of some of the fish species (approximately 50%) positively correlated with the fluctuations in temperature, with all these correlations being significant ($P<0.05$). Temperature influences reproduction, respiration and feeding in fish (Ikebe and Oishi, 1996; Lyytikainen and Jobling, 1998). Increase in temperature leads to increase in activity index (Caddy and Sharp, 1986).

Significant positive correlation in the abundance of all the fish species with dissolved oxygen was also observed. Dissolved oxygen levels were high throughout the period of study in the reservoir. This indicates that as the water becomes well saturated with oxygen, there is consequent effective functioning of the fishes metabolic processes. Hepsetus odoe and Heperopsisus bebe had significant negative correlations with transparency. This implies that fish catch was higher during the rainy season when transparency is low. This may be due to the fact that the fish species probably could not clearly see the net which most likely enhanced their capture. All the eight species of fish were collected in the reservoir all the year round. Though, Heperopsisus bebe and Clarias anguillaris were scarce and so much lower in abundance than the other fish species. The dominant factors that influence fish relative abundance and distribution, particularly, choice of habitat has been a subject of investigation. According to Heggenes (1991), habitat selection by fish is a multivariate process, where fish choose their location based on several interacting variables.

Sluka et al. (2007) reported that the relationship between habitat and fish abundance is species dependent and is influenced by the spatial scale of investigation. However, effective management actions cannot be planned without a good understanding of the habitat requirements of the species to be recruited throughout its life cycle (Nykanen et al., 2001). It is therefore imperative to identify the factors, from the management point of view, underlying the periods, that limits the success of the fish population.

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