Jewel Journal of Scientific Research (JJSR) 6(1&2): 92–97, 2021
©Federal University of Kashere-Nigeria (Print ISSN: 2384 – 6267, Online ISSN 2756-651X)
jjsr.fukashere.edu.ng

Fish Composition and Diversity Assessment of Asa Dam, Kwara State, Nigeria

Junaid A. A.[1*], Nwazie, K.[1], Junaid O. Q.[2], Shuaib M. J.[1], Kolawole, A. A.[2], Adamu F.[3] and Omotosho, J. S.[1]

[1]Department of Zoology, Faculty of Science, University of Ilorin, Kwara State.
[2]Department of Biological Sciences, Faculty of Science, Federal University of Kashere, Gombe State.
[3]Fisheries Department, Bauchi State Agricultural Development Programme, Bauchi State.
*__Corresponding Author__: junaidazeezat@gmail.com; +2348154084401

Abstract
Sustainable exploitation of natural resources remains the indispensable tool to achieving food security, particularly with the gradual encroachment of species extinction and threating in their natural habitat. Moreover, knowledge of species present in natural and man-made water bodies will ensure a better management for future exploitation. The present study, therefore, examined the fish composition and diversity of the reservoir, in an attempt to provide baseline information on the present species for better management of the reservoir. A total of 240 fish specimen were collected randomly from the study area within a period of six months comprising of 10 families and 18 species. The family Cichlidae and Mormyridae were found to be the most abundant making up of 49.17% and 10.83% respectively of the total population, while Cyprinidae was the least abundant recorded during the sampling having 0.42% of the total population. Other families and their percentage contribution in the total catch were Bagridae (10.42%), Characidae (9.17%), Schilbedae (5.83%), Mochokidae (2.92%), Channidae (2.92%), and Osteoglossidae (0.83%). At the species level, *Tilapia zillii* were the most abundant of all the species making up of 22.08% of the total caught, followed by *Sarotherodon galilaeus* having 12.08%, while *Clarias anguilaris*, *Clarias angolensis*, and *Labeo senegalensis* were the least represented making 0.42% each of the total population. Based on the findings of this study, fish diversity and composition of the reservoir needs to be conserved as some species were observed to be threatened, thus management strategies for sustainability and future exploitation need to be adopted.

Keywords: Food security, Fish abundance, Fish diversity, Asa dam

Received: 6th March, 2021 *Accepted:* 19th Oct, 2021 *Published Online:* 22nd Nov, 2021

Introduction

Reservoirs are crucial ecological components that provide not only human needs but create a lot of opportunities that enhance our living on earth. This reason further justify why a large proportion of human lives near water bodies such as lakes, swamps, reservoir, among others; as they heavily depend on the resources of such water bodies for income and source of animal protein (Bolarinwa, *et al.*, 2017). Fish is by far one of the cheapest and readily available animal proteins contributing a quota as much as 17% of the world's animal protein. Given the inability of many low-income earners to afford the exorbitant price of imported fish, inland

fisheries play a significant role in providing the needed protein in diets of Nigerian with large population of about 178.5 million people (Federal Department of Fisheries, 2008).

A greater number of studies on fish biodiversity, abundance and distribution in Nigeria inland reservoirs have been restricted to large-sized water bodies (greater than 1000 ha) such as Kainji, Jebba, Shiroro, Tiga, Bakolore and Gorongo among others with a little attention on small and medium sized reservoirs (Balogun, 2006). Thus, for better management of fisheries in inland reservoirs regardless of their sizes, frequent studies on fauna components particularly fish diversity, abundance and distribution are very essential for sustainable exploitation of any fisheries resources (Mustapha, 2009).

In most man-made lakes, Asa reservoir inclusive, the formulation of effective and long term plan is often handicapped by lack of sufficient and adequate data of the pre-impoundment studies which should be the base-line for comparison with results obtained after impoundment (Otobo, 1978). This put the biologists and fisheries scientists at a serious disadvantage because the changes caused by the creation of the lake cannot be realistically assessed nor the endemic fish species ascertain (Omotosho, 1998).

A comprehensive knowledge of fish compositions and diversity is imperative to maintaining and achieving sustainable exploitations of freshwater resources in inland reservoirs (Petr, 1967). Thus, investigation on the fish species composition and the fisheries potential of Asa Reservoir is imperative at this period of serious national need for adequate protein inclusion in Nigerian diet. This study herein, therefore, assessed the fish composition and diversity of Asa Dam, Kwara state, Nigeria.

Materials and Methods

Study area

The study was carried out at Asa Dam in Ilorin, a city in Northern Nigeria and the capital of Kwara State, Nigeria. Asa reservoir was constructed between May 1975 and January 1977, with the sole aim of meeting the ever-increasing demand for pipe borne water for the rapidly growing population of Ilorin, the state capital of Kwara State. The dam lies at a point 5km south of Ilorin across the river Asa between latitudes 8° 25' - 8° 27N and longitudes 4° 32'- 4° 34E. The major tributaries are rivers Iwonte, Jia and Segbenkuke. The reservoir has a maximum length of 20km, a breadth of 7km and a depth of 14km, with a storage capacity of about 43million cubic meters. Asa dam could be said to be a body of tropical man-made lake that is fairly rich in both variety and abundance of fish species.

Fish Collection and Identification

A total of 240 fish specimen were collected randomly from the study area within a period of six months (September, 2014 – February, 2015). An average of 20 fishes was collected randomly bimonthly. The fishes were collected with the aid of fishermen using cast net and traps. Fishes were transported on ice-pack to laboratory (Department of Zoology, University of Ilorin, Kwara State), for identification, processing and examination. Fishes were identified to species level as described by Idodo-Umeh (2003) and Olaosebikan and Raji (2004).

Results

A total of two hundred and forty (240) fish specimens were collected during the sampling periods that span for six months. The samples were made of 10 families and 18 species (Table 1). The family Cichlidae and Mormyridae were found to be the most abundant making up of 49.17% and 10.83% respectively of the total population. The Cichlids were represented by four species which amount to 118 individuals and the Mormyrids were represented by four species with individual occurrence of 26 fishes of the total abundance of the sample respectively. The species in the genus *Tilapia* were presented in the family Cichlidae, but rarely encountered, representing 7.50% of the total population. The family Cyprinidae was the least abundant recorded during the sampling, represented by only one species and having 0.42% of the total population. The total number of individual species in other fish

families and the respective percentage of total population were as follows: Bagridae, 25 (10.42%), Characidae, 22 (9.17%), Schilbedae 14 (5.83%), Mochokidae, 7 (2.92%), Channidae, 7 (2.92%), and Osteoglossidae, 2 (0.83%).

Table 1: Composition and relative abundance of fish species and families in Asa Adam

Family	Species	Total Number	Species in family (%)	Species in population (%)
Cichlidae	*Tilapia zillii*	53	44.92	22.08
	Sarotherodon galilaeus	29	24.58	12.08
	Oreochromis niloticus	14	11.86	5.83
	Hemichromis fasciatus	22	18.64	9.17
Total		**118**	**100**	**49.17**
Characidae	*Brycinus nurse*	22	100.00	9.17
Total		**22**	**100**	**9.17**
Clariidae	*Clariasanguilaris*	1	5.56	0.42
	Clariassenegalensis	2	11.11	0.83
	Clariasangolensis	1	5.56	0.42
	Clariasgariepinus	14	77.78	5.83
Total		**18**	**100**	**7.50**
Mormyridae	*Mormyrusrume*	3	11.54	1.25
	Gnathonemuscyprinoides	21	80.77	8.75
	Mormyropsdeliciosus	2	7.69	0.83
Total		**26**	**100**	**10.83**
Bagridae	*Chrisichthysnigrodigitatus*	25	100.00	10.42
Total		**25**	**100**	**10.42**
Mochokidae	*Synodontisschall*	7	100.00	2.92
Total		**7**	**100**	**2.92**
Osteoglossidae	*Heterotis niloticus*	2	100.00	0.83
Total		**2**	**100**	**0.83**
Cyprinidae	*Labeo senegalensis*	1	100.00	0.42
Total		**1**	**100**	**0.42**
Channidae	*Chana obscura*	7	100.00	2.92
Total		**7**	**100**	**2.92**
Schilbeidae	*Schilbe mystus*	14	100.00	5.83
Total		**14**	**100**	**5.83**
Grand Total		**240**		**100**

The 18 species from 10 families observed in this study were *Tilapia zillii*, *Sarotherodon galileaus*, *Oreochromis niloticus* and *Hemichromis fasciatus* from family Cichlidae; *Brycinus nurse* from family Characidae; *Clarias anguillaris*, *Clarias senegalensis*, *Clarias angolensis* and *Clarias gariepinus* from family Clariidae; *Mormyrus rume*, *Gnathonemus cyprinoides* and *Mormyrops deliciosus* from family Mormyridae; *Chrisichthys nigrodigitatus* from Bagridae; *Synodontisschall* from Mochokidae; *Heterotis niloticus*, Osteoglossidae; *Labeo senegalensis* from Cyprinidae; *Channa obscura* from Channidae; and *Schilbe mystus* from Schilbedae (Table 2). The population index of the fish recorded in the dam was presented in Table 2. The species that are rarely caught was tagged rare, while moderately to frequently caught species were tagged common and abundant respectively. *Tilapia zillii* was the highly abundant specie recorded.

Table 2: Fish population index in Asadam

Family	Species	Population Index
Cichlidae	*Tilapia zillii*	Abundant
	Sarotherodon galilaeus	Common
	Oreochromis niloticus	Rare
	Hemichromis fasciatus	Common
Characidae	*Brycinus nurse*	Common
Clariidae	*Clarias anguilaris*	Rare
	Clarias senegalensis	Rare
	Clarias angolensis	Rare
	Clarias gariepinus	Rare
Mormyridae	*Mormyrus rume*	Rare
	Gnathonemus cyprinoides	Common
	Mormyrops deliciosus	Rare
Bagridae	*Chrisichthys nigrodigitatus*	Common
Mochokidae	*Synodontis schall*	Rare
Osteoglossidae	*Heterotis niloticus*	Rare
Cyprinidae	*Labeo senegalensis*	Rare
Channidae	*Chana obscura*	Rare
Schilbeidae	*Schilbe mystus*	Rare

Discussion

The present study assessed the compositions and diversity of the fish fauna in Asa dam. The fish composition observed in the study area is closely related with other reservoirs that have been previously examined in Kwara state including Apodu, Oyunand Moro Reservoirs (Mustapha, 2000; Omotosho, 1998). This study and many other studies reported Cichlidae as the most abundant family in terms of number of species and diversity in different reservoirs across Nigeria (Adeyemi et al., 2010; Etiese, 2015; Mustapha, 2010; Omotosho, 1998; Udoidiong, 1991). In contrast, Oladipo *et al.* (2018) recorded Characidae as the most abundant fish family on diversity of Apodu reservoir, similar to the work of Onuoha *et al.*(2010) at NtakInyang, Ikpa River, and this maybe as a result of the season in which the study was carried out which influence the cichlids habits and make them go deeper in water. However, Udo (2012) reported Malapteruridae as the dominant family at Iba Oku, Ikpa River. The Mormyrids which was the second most abundant family in this study was similar also to the observation of Oladipo *et al.* (2018) on Apodu reservoir.

The relative abundance of cichlids recorded throughout the study period indicated the availability of enough plankton in the reservoirs that form the food chain base. The presence of phytoplankton and zooplankton which serves as food for cichlids, their ability to adapt to varying environmental condition, and multiple habits could be the reason for their large number (Adeyemi *et al*., 2010; Mustapha, 2010).

The low abundance of *C. anguilaris, C. angolensis,* and *L. senegalensis,* maybe attributed to low breeding, low occurrence, susceptibility to parasitic infections and changes in environmental variables of the reservoir. These species are therefore ruled to be rare and calls for conservation in the reservoir. This can be achieved by regulating mesh size of fishing gears, capture-release method, as well as educating the fishermen on the importance of conservation (Mustapha, 2010). The moderate abundance and reoccurrence of five families of fish species including Cichlidae, Mormyridae, Characidae, Mochokidae, and Clariidae, observed throughout the sampling period in the present study is in accordance with the reports of previous workers (Oladipo*et al*., 2018) on Nigerian reservoirs; this indicated that the species are in abundance and native to Northern Nigeria as indicated by Adeosun *et al*. (2011) and Ataguba *et al*. (2014).

Conclusion

In conclusion, fish composition of the study area is low compared to previous workers on Nigerian reservoirs while some species were observed to be threatened; it is therefore necessary for improvement in water quality management, regulation of species harvest and management of sparse species in this reservoir is needed. This can be achieved by the maintenance of the reservoir qualities, conservation of sparsely encountered species, fishing gear mesh-size regulation and education to the fishermen.

References

Adeosun, F. I., Omoniyi, I.T. and Akegbejo-Samson, Y. (2011). The Fishes of the Ikere Gorge Drainage System in Ikere, Oyo State, Nigeria: Taxonomy And Distribution. *Asiatic Journal of Biotechnology*, 2(4): 374–383.

Adeyemi, S. O., Akombu, P. M., & Adikwu, I. A. (2010). Diversity and Abundance of Fish Species in Gbedikere Lake, Bassa, Kogi State. *Journal of Research in Forestry, Wildlife and Environment*, 2(1): 1-6.

Ataguba, G. A., Tachia, M. U., & Aminu, G. (2014). Fish Species Diversity and Abundance of Gubi Dam, Bauchi State of Nigeria. *Biyolojik Çeşitlilik ve Koruma*, *7*(2): 1-9.

Balogun, J. K. (2006). *Basic Fisheries Biology and Management For tertiary Institutions.* Ayo-Sule (NIG) Printers & Publishers, Zaria, Nigeria.

Bolarinwa, JB, Fasakin, EA. and Fagbenro, A. (2017). The Species Composition and Diversity of the Coastal Waters of Ondo State, Nigeria. *American Research Journal of Agriculture*, 2(3): 51–58.

Etiese, E. (2015). Abundance and Monthly Composition of Fish Species of Ikpa River at Ntak Inyang, Akwa Ibom State, Nigeria. *Journal for Studies in Management and Planning Abundance*, 1(11): 240–247.

Federal Department of Fisheries. (2008). *Fisheries Statistics of Nigeria Projected human population; fish demand and supply in Nigeria*.

Idodo-Umeh, G. (2003). *Freshwater fishes of Nigeria: taxonomy, ecological notes, diet and utilization.* Idodo Umeh Publishers.

Mustapha, M. (2009). *Limnology and fish assemblages of Oyun reservoir, Offa, Nigeria.* Ph. D Thesis, Department of Zoology, University of Ilorin.

Mustapha, M. (2010). Fish fauna of Oyun reservoir, Offa, Nigeria. *Journal of Aquatic Science*, *25*(1): 106–114.

Oladipo, S.O., Mustapha, M.K., Suleiman, L.K. and Anifowoshe, A. T. (2018). Fish composition and diversity assessment of Apodu reservoir, Malete, Nigeria. *International Journal of Fisheries and Aquatic Studies*, 6(2):

89–93.

Olaosebikan, B. D. and Raji, A. (2004). *Field guide to Nigerian freshwater fishes. Federal College of Freshwater fisheries technology.* New Bussa, Nigeria.

Omotosho, J. S. (1998). Ichthyofauna diversity of Asa reservoir, Ilorin, Nigeria. *Bioscience Biotechnology Research Communications*, 10(1): 75-81.

Onuoha, G. C., Ekpo, I. E., Chude, L. A. and, & Isangedighi, I. A. (2010). Composite preliminary ichthyofaunal survey of Ntak Inyang Stream, Ikpa River, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 6(1&2): 82–89.

Otobo, F. O. (1978). The reproductive biology of Pellonula afzeliusi Johnels, and Sierrathrissa leonensis thys Audenaerde in Lake Kainji, Nigeria. *Hydrobiologia*, 61(2): 99–112.

Petr, T. (1967). Fish population changes in the Volta lake in Ghana during its first sixteen months. *Hydrobiologia*, 30(2): 193–220.

Udo, I. U. (2012). Taxonomic composition, diversity and abundance of the ichthyofaunal assemblage of Iba-Oku stream, Ikpa River, Nigeria. *International Journal of Zoological Research*, 8(2): 71–80.

Udoidiong, O. M. (1991). The Impacts of land-use on headwater streams in Akwa Ibom State, Nigeria. *Transaction of Nigerian Society for Biological Conservation*, 2: 103–112.