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FISH BIODIVERSITY AND ABUNDANCE OF RIVER YOBE

By

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Abstract

River Yobe located in Yobe State Northeast part of Nigeria. Fish sampling was done for six in all four sampling stations from January to June 2026. Random samples of all fish were taken from catches of artisanal fishers, counted, identified and grouped based on their families and species. The identification of species was carried out by using field Guide to Nigerian fresh water fishes fish species diversity twenty five (25) species fish belong to twelve families were record , a total of 2335 fish were recorded in the river the family cichlidae has the highest number of the family with 449(19.2%) while the claridae family, however the family Characidae was the second 376 (18.5). but in term of species abundant Brycinus nurse was with 281(12.0%) while the family Malapteridae was lowest with a total of 23 (1.0%) the Shannon wiener index highest and lowest 4.4 and 1.53, while Simpson index 1.94 and 1.66 respectively, the need to monitor human activities and fishing intensity on the river, in order not to destroy the fish diversity is recommended regulation of number of fishermen operating on the river and the enforcement of using minimum mesh size was also recommended.

Keywords: diversity, Abundances,,Cichlidae, and Brycinus nurse

INTRODUCTION

Nigeria fall between longitude 2°49 and 14°37E and latitude 4°16 and 13°52 N of Equator it is blessed with vast expanse of inland fresh water and brackish ecosystems from the coastal area to the arid zone. Thirteen lakes and numerous reservoirs with a total surface area of 953600 ha representing about one percent of the country have been reported by (Olaosebikan and Raji 2013). They are of importance because they hold populations of diverse fish species. Species that are of great commercial value and importance vary in their composition depending on the water bodies and area. These species of fish serve as a protein source and food in the face of ever increasing population in the developing countries. In addition the lake fisheries had serve as a source of sustainable livelihood to the riparian communities and biodiversity of tremendous conservation values.

There are about 268 different freshwater fish species in Nigeria. They inhabit over 34 known freshwater bodies

(rivers, lakes and reservoirs) which constitute about 12% of Nigeria's total surface area put about 94,185,000 hectare. Fish stocks in rivers are generally fill up from their adjacent floodplain after each flood season during which fish breed. Therefore, any natural phenomenon as drought or artificial activities such as dam construction, which eventually affect the natural cycle of flooding, will certainly undermine fish species biodiversity both in lake, and wetlands considering these facts, therefore, that lakes, wetlands and reservoirs are supplied with by their inflowing rivers, the rivers will be characterized by higher species diversity. fish production from inland water resource (rivers, streams and lakes) is under threat from pollutions, habitat alteration and degradation, changes in rivers flows and exploitation, materials pollution of rivers is caused by toxic pollutants (heavy metal, insecticide pesticide etc) that have direct adverse effects aquatic biota and by pollutant that indirectly affects aquatic biota like human and animal waste which are nontoxic but due

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to bacterial action on them dissolved oxygen is used up which harms aquatic biota.

In Northern part of Nigeria numerous small and medium sized rivers exist. The earliest report was the preliminary study of the Fishery resources of the Lake, its impoundment, Bankole *et al*, (2003) reported on the diversity, abundance and distribution of fish species in the lake and identified ten fish species belonging to eight families with annual fish catch from 471.1 metric tons at low water tide to 584.9 metric tons at high water tide. And West African inshore water is rich in fish resources in quantities that can support commercial exploitation on a sustainable basis. However, later development in fisheries study has pointed to the depletion of the fish stock due to over exploitation, deterioration and water quality among other factors.

MATERIALS AND METHODS

Study area

The River Basin in Yobe State covers an estimated area of about 47,153 km and supports a human and livestock population of over 1.4 million and 1 million respectively (NPC 1991, RIM, 1992). The State shares border with the Niger Republic to the North, Jigawa and Bauchi States to the West, Borno State to the East and Gombe and Borno States to the South. The area of study, which is in the Northern part of the State is Sahelian in nature and is being threatened by desertification. The Yobe River is located between latitude 10°N and 13°N and longitude 9.45°E and 12.30°E (GIS, 2015). The Yobe River originates from the Jos Plateau and Kano and flows in to Lake Chad, the river was formed by the confluence of the Hadejia and Jamaare rivers. The distance between the confluence upstream of Gashua near Karage and the outlet at Yau is about 280 km but the length along the Yobe River is about 660 km due to the extensive river meanders (GIS, 2015). The curvature is of advantage because it provides a large increase in river, frontage and easier abstraction of irrigation water for a large area. The geological formation of the upstream part of the basin consists largely of impermeable basement complex rocks, which dips away to the east where it is covered by the permeable lakes sediments of the Chad formation. In some areas, the sediments are covered with oriented longitudinal dunes.

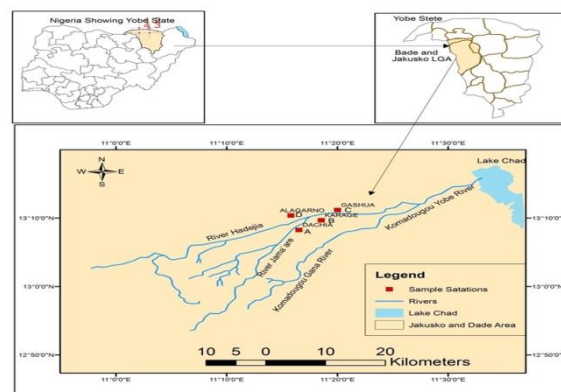


Figure 1 Map of the Study Area
(Source: GIS Laboratory Department of Geography, MAUTECH, Yola 2019)

Sampling station

After preliminary survey of the River, four sampling stations were established and marked at intervals based on fishing and public activities of the River:

Station A (Dachia): River Jamaare

Station B (Karage): confluence of Hadejia and Jamaare)

Station C (Gashua): River Yobe.

Station D (Alagarno): River Hadejia.

Materials/Equipment used

A field Guide to Nigerian fresh water fishes by (Olaosebikan and Raji, 2013) and Idodo-Umeh (2003) were used to identify the fish species,.

Survey of fish species composition

Fish Sampling

Fish sampling was done for Six months in all four sampling stations from January– June 2026. Random samples of all fish were taken from catches of artisanal fishers, counted, identified and grouped based on their families and species. They were then taken to the laboratory for further study and identification.

Fish Identification

The identification of species was carried out by using field Guide to Nigerian fresh water fishes (Olaosebikan and Raji, 2013), and illustrated keys by Idodo-Umeh (2003) and photographs of each fish species were taken after identification prior to preservation. Some samples were preserved in sampling bottles in 10% formalin according to Gupta and Gupta (2003) the scientific name, common name and local names, date and place of collection were indicated on each sampling bottle

Fish Abundance and Diversity

Diversity Index

Different diversity indices were determined as per standard method provided by Margalef (1958), Shannon and Weiner (1963)

Shannon – Weiner index (H):

This equation shows which sampling site has the greatest diversity of species. The higher the value the greater the diversity.

$$H = - \sum (n_i / N) \log (n_i / N)$$

Ni = Shannon – Weiner Index of general diversity

N = total number of individuals Shannon and Weiner, 1963)

Relative Abundance (RA) :

This equation for relative Abundance tells us what proportion of the total abundance is constituted by each species.

RA= SA/TA x 100%

RA = Relative abundance of each species (%)

SA = Species abundance

TA = Total abundance for all species (Meyer and Ikomi, 2008)

Statistical Analysis

The Data obtained from identification, counting and weighing of fish, The Shannon-Weiner index of general diversity (H) was used which revealed the rate of fish diversity in River Yobe and Simpson's index of dominance also determined the families and species dominance and Relative abundance for each station and month composition and distribution of fish fauna and recorded for the period 6 months were (January to June 2026)

RESULTS

Fish Species encounter in River Yobe

Twenty five fish species belonging to twelve families were recorded in River Yobe from January to June 2026. Table 1. The fish Families recorded were Bagridae, Centropomidae, Characidae, Cichlidae, Claridae, Cyprinidae, Malapteridae, Mochokidae, Mormyridae, Osteoglossidae, Protopteridae and Schlibidae. Mochokidae was represented by five species: *Gnathonemus senegalensis*, *Hyperopisus bebe occidentalis*, *Synodontis clarias*, *Synodontis flementous*, and *Synodontis nigrita* The family Bagridae was represented by following

species of fish *Auchenoglanis occidentalis*, *Bagrus bayad* and *Bagrus longifilis*. Mormyridae, was represented by three species. *Mormyrop deliciousus*, *Mormyrus rume* and *Petrocephalus bovei* Cyprinidae was represented by two species: *Barbus macrops* and *Labeo coubie*. The family Characidae was represented by two species *Brycinus nurse* and *Hydrocynus forkalii*. Claridae, was represented by two species, *Clarias anguillaris* and *Clarias gariepinus*. All the rest represented by one species Cyprinidae, was represented by *Lates niloticus*. Malapteridae was represented by *Malapterurus electricus*. Osteoglossidae was represented by *Heterotis niloticus*. Protopteridae was represented by *Protopterus annectens* and Schlibidae was represented by *Schlibe Myutus*.

Total Number of Fish Caught According to Family

A total of 2335 fish individuals were recorded in the river as presented in Table 1. The family Cichlidae has the highest number of individuals with 449 (19.2%) while Claridae family has number of 403 (17.3%). however the family Characidae, was the second number 119312.7 (23.94%). Going in that order and in term of family Malapteridae was lowest in abundance a total number of 23 (1.0%) table .1

However, in terms of monthly abundance table 1 shown that *Brycinus nurse* was the most abundant in March with 77 and 68 in July also *Clarias gariepinus* in April with 60 and 53 in June followed in by and *Oreochromis niloticus* Feb 42, but for *Tilapia zilli* was 40 in

The month of March. Nevertheless, *Malapterurus electricus*, *Lates niloticus*, *Protopterus annectens*, *Heterotis niloticus*, were the least abundance in every month. Thus, figure 2 shown the rank of abundance on the graph.

Table 1. Fish families and species encountered in River confluence between January to June 2026.

S/N	FAMILY	FISH SPECIES	COMMON NAME
1	Bagridae	<i>Auchenoglanis occidentalis</i>	Catfish
		<i>Bagrus bayad</i>	Silver Catfish
		<i>Bagrus longifilis</i>	Silver Catfish
2	Centropomidae	<i>Lates niloticus</i>	Niger perch
3	Characidae	<i>Brycinus nurse</i>	African tetras
		<i>Hydrocynus forkalii</i>	Tiger fish
4	Cichlidae	<i>Hemichromis bimaculatus</i>	Jewel fish
		<i>Oreochromis niloticus</i>	Nile tilapia
		<i>Tilapia zilli</i>	Red belly tilapia
5	Claridae	<i>Clarias anguillaris</i>	Mud fish catfish
		<i>Clarias gariepinus</i>	Sharp tooth catfish
6	Cyprinidae	<i>Barbus macrops</i>	Silver Catfish
		<i>Labeo coubie</i>	African catfish
7	Malapteridae	<i>Malapterurus electricus</i>	Electric catfish
8	Mochokidae	<i>Synodontis clarias</i>	Catfish
		<i>Synodontis flementous</i>	Red-tailed <i>synodontis</i>
		<i>Synodontis nigrita</i>	Upside-down catfish
	Mormyridae	<i>Gnathonemus senegalensis</i>	Trunk fish
		<i>Hyperopisus bebe</i>	Trunk fish
9		<i>mormyrop delicious</i>	<i>Mormyrid</i> fish
		<i>Mormyrus rume</i>	Elephant snout fish
		<i>Petrocephalus bovei</i>	Snout fish
10	Osteoglossidae	<i>Heterotis niloticus</i>	African lung fish
11	Protopteridae	<i>Protopterus annectens</i>	African bony tongue
12	Schlibidae	<i>Schlibe myutus</i>	Butter fish

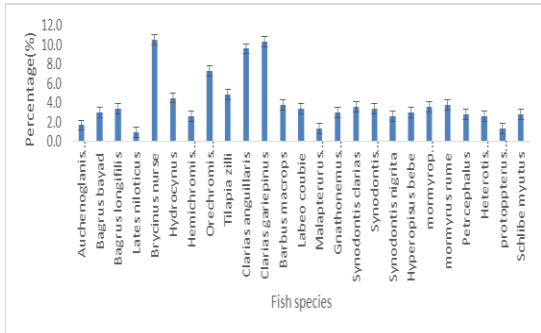


Figure 2. Abundance of fish species catch of sampling station A in River Yobe

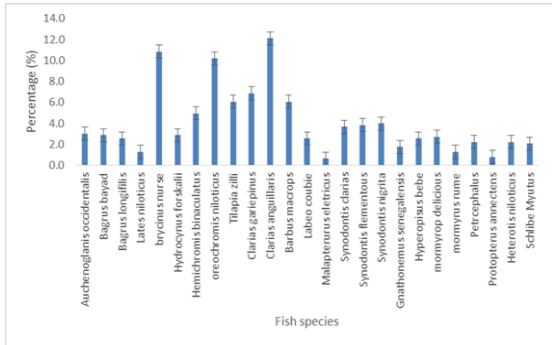


Figure 3. Abundance of fish species catch of sampling station B in River Yobe

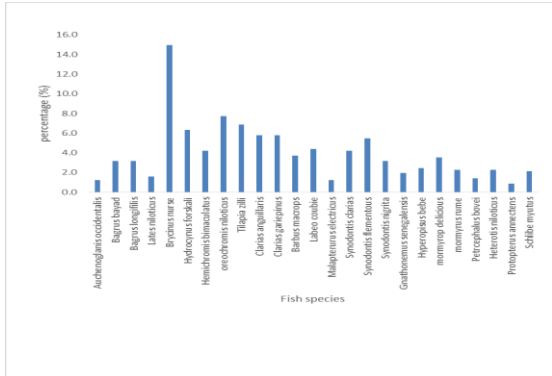


Figure 4. Abundance of fish species catch of sampling station C in River Yobe

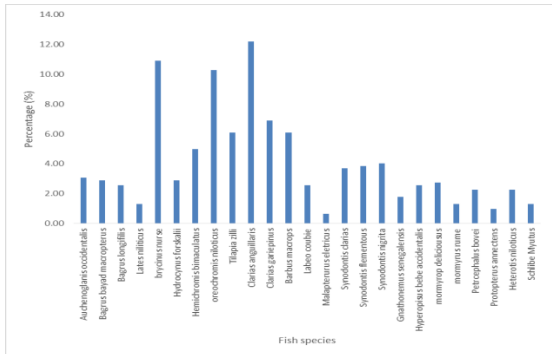


Figure 5: Abundance of fish species catch of sampling station D in River Yobe

The result of monthly species diversity indices shows or represented on graph in figure 3. The monthly trend of Shannon-Wiener index for River Yobe was delineated in table 2 as which recorded among sampling station in the month of June with station A exhibiting the highest diversity with 4.4 and January was least at station B. with 1.53. While in term of Simpson's index delineated in Table 3 among the various stations and months with highest and lowest values of 1.94 and 1.66 in January and March at Station A and C respectively

Table .2 Shannon-Weiner index general diversity in River Yobe January to June, 2026.

MONTH	SHANNON-WEINER			
	(A)	(B)	(C)	(D)
JAN	2.25	1.53	2.52	2.39
FEB	2.34	2.1	2.38	2.34
MAR	3.12	3.54	3.3	3.58
APR	2.34	2.52	2.28	2.4
MAY	2.03	2.34	2.33	2.33
JUN	1.78	4.4	2.27	2.24

Table 3: Station and monthly Simpson's index differences in fish abundance in River Yobe

MONTH	SIMPSON DOMINANCE			
	(A)	(B)	(C)	(D)
JAN	1.94	1.93	1.94	1.93
FEB	1.9	1.89	1.88	1.9
MAR	1.66	1.86	1.8	1.86
APR	1.85	1.83	1.89	1.84
MAY	1.89	1.74	1.86	1.84
JUN	1.84	1.83	1.87	1.83

Table 4: Distribution of Fish Species in Stations A, B C and D of River Yobe Jan. to Jun 2026

SCIENTIFIC NAME	TOTAL STA. A	PERCEN. (%)	TOTAL STA. B	PERCEN. (%)	TOTAL STA. C	PERCEN. (%)	TOTAL STA. D	PERCEN. %
<i>Auchenoglanis occidentalis</i>	9	1.7	19	3.1	7	1.2	19	3.05
<i>Bagrus bayad</i>	16	3.0	18	2.9	18	3.2	18	2.89
<i>Bagrus longifilis</i>	18	3.4	16	2.6	18	3.2	16	2.57
<i>Lates niloticus</i>	5	1.0	8	1.3	9	1.6	8	1.28
<i>Brycinus nurse</i>	52	9.9	68	11.0	85	15.0	68	10.91
<i>Hydrocynus</i>	24	4.6	18	2.9	36	6.3	18	2.89
<i>Hemichromis binaculatus</i>	14	2.7	27	4.4	24	4.2	31	4.98
<i>Oreochromis niloticus</i>	39	7.4	64	10.3	44	7.7	64	10.27
<i>Tilapia zilli</i>	26	5.0	38	6.1	39	6.9	38	6.10
<i>Clarias anguillaris</i>	51	9.7	43	6.9	33	5.8	76	12.20
<i>Clarias gariepinus</i>	55	10.5	76	12.3	33	5.8	43	6.90
<i>Barbus macrops</i>	20	3.8	38	6.1	21	3.7	38	6.10
<i>Labeo coubie</i>	18	3.4	16	2.6	25	4.4	16	2.57
<i>Malapterurus electricus</i>	7	1.3	4	0.6	7	1.2	4	0.64
<i>Gnathonemus senegalensis</i>	16	3.0	23	3.7	24	4.2	23	3.69
<i>Synodontis clarias</i>	19	3.6	20	3.2	31	5.5	24	3.85
<i>Synodontis flementous</i>	16	3.0	25	4.0	18	3.2	25	4.01
<i>Synodontis nigrita</i>	14	2.7	11	1.8	11	1.9	11	1.77
<i>Hyperopisus bebe</i>	16	3.0	16	2.6	14	2.5	16	2.57
<i>mormyrop delicious</i>	19	3.6	17	2.7	20	3.5	17	2.73
<i>Mormyrus rume</i>	20	3.8	8	1.3	13	2.3	8	1.28
<i>Petrcephalus</i>	15	2.9	14	2.3	8	1.4	14	2.25
<i>Heterotis niloticus</i>	14	2.7	5	0.8	13	2.3	6	0.96
<i>protopterus annectens</i>	7	1.3	14	2.3	5	0.9	14	2.25
<i>Schlibe myutus</i>	15	2.9	13	2.1	12	2.1	8	1.28
	525	100.0	619	100.0	568	100.0	623	100.00

Table 5: Number of Fish Species Caught on monthly basis in River Yobe Jan to Jun. 2026

S/N	SPECIES	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	%
1	<i>Auchenoglanis occidentalis</i>	5	8	9	16	4	12	53	2.3
2	<i>Bagrus bayad</i>	10	10	10	14	14	11	69	3.0
3	<i>Bagrus longifilis</i>	13	13	5	15	16	6	68	2.9
4	<i>Lates niloticus</i>	5	2	5	6	5	4	27	1.2
5	<i>Brycinus nurse</i>	7	15	86	81	55	37	281	12.0
6	<i>Hydrocynus forkalii</i>	11	15	10	33	15	11	95	4.1
7	<i>Hemichromis binaculatus</i>	14	14	29	17	12	12	98	4.2
8	<i>Oreochromis niloticus</i>	20	34	21	35	50	52	212	9.1
9	<i>Tilapia zilli</i>	3	18	55	22	22	19	139	6.0
10	<i>Clarias anguillaris</i>	16	21	22	38	34	35	166	7.1

11	<i>Clarias gariepinus</i>	14	25	37	76	24	61	237	10.1
12	<i>Barbus macrops</i>	16	8	11	31	23	27	116	5.0
13	<i>Labeo coubie</i>	11	12	15	10	14	14	76	3.3
14	<i>Malapterurus electricus</i>	4	2	2	7	3	5	23	1.0
15	<i>Gnathonemus senegalensis</i>	11	10	3	17	26	20	87	3.7
16	<i>Synodontis clarias</i>	12	11	11	18	31	16	99	4.2
17	<i>Synodontis flementous</i>	10	13	13	14	21	14	85	3.6
18	<i>Synodontis nigrita</i>	8	13	3	6	9	6	45	1.9
19	<i>Hyperopisus bebe</i>	10	8	10	13	12	9	62	2.7
20	<i>mormyrop delicious</i>	13	5	13	11	17	13	72	3.1
21	<i>Mormyrus rume</i>	7	7	5	17	10	3	49	2.1
22	<i>Petrcephalus</i>	6	7	2	10	17	8	50	2.1
23	<i>Heterotis niloticus</i>	5	8	5	8	8	5	39	1.7
24	<i>protopterus annectens</i>	5	7	5	7	9	5	38	1.6
25	<i>Schlibe myutus</i>	10	6	5	14	8	6	49	2.1
26	25	246	281	392	536	459	411	2335	100.0

DISCUSSION

Fish Composition and Diversity

The study on fish species diversity of River Yobe revealed that twenty five (25) species fish belonging to twelve families were recorded, total of 2335 fish individuals were recorded in the river as table 1 shows the all fish families and species encountered and their common names. The result of monthly species Biodiversity indices The result from River Yobe showed twelve families with twenty five species, the result produce lower values than those of Kwaji *et al.*, (2015) who presented 5,574 fishes belonging to 15 families and species caught between June to July at Lake Ribadu Adamawa state northeast Nigeria. Finding of David *et al.*, (2016) from two lacustrine wetlands of the upper Benue Basin showed 5044 fishes belonging to 15 families and 44 species caught between Junes to July 2014. Also Abiodum and Jonh (2017) gave a report of forty two (42) species from eighteen (18) families of fish caught between November to 2014 and 2015 from lower Niger Idah kogi state Nigeria. Amos and Linus (2017), reported an estimate of seventeen (17) species from fifteen (15) families caught between June and July, 2014 at Njoboliya Lake, Adamawa state, Nigeria. Zira *et al.*, (2017) observed forty seven (47) of fish belonging to fifteen (15) families from Kiri Reservoir caught between June 2016 and May 2017 in Shelleng, Adamawa state, Nigeria. Iber and Ojitiku (2018) gave a report of twenty eight (28) species belonging to twenty (23) families caught between January to December 2016, from River Fete, Benue state Nigeria. Also Danba *et al.*, (2020) reported a total of 60574 fishes from 20 families and 50 fifty species caught for the period of eighteen (18) months from November 2017 to April 2019, in River Taraba, Taraba state Nigeia. The authors stated that the reason the high specie found in River Taraba could be the long period of study which lasted for eighteen months that gave the opportunity to explore available species when compared to other studies that

were mostly done in three to six months and few that lasted for twelve months in other River. Similarly Adeosun *et al.* (2011) reported 34 species of fish in Ikere Gorge, 32 species of fish were reported in Umudike water reservoir (Avoaja, 2011). This Indicating that River Yobe is slightly rich species diversity when compared with other studies on some of the water bodies in Nigeria. Such as 19 species was reported in Erinle lake (Komolafe and Arawomo, 2011), 16 species reported in Ikwori lake (Offem *et al.* 2011) and 27 species in Asejere lake (Ipinmoroti, 2013). Hassan (2017) reported eleven (11) species from six (6) families in Doma reservoir Nasarawa state, Nigeria. Fourteen (14) species of fish were reported in Owena reservoir Godstates and Fapohunda (2007). Adedeji *et al.*, (2017) reported eighteen (18) specie from fourteen (14) families in Lake Geriyo Adamawa state Nigeria. Other works with a rich comparable results to what was obtained in River Yobe, for instance that of Ipinmoroti (2013) from Asejire Lake southwest Nigeria who reported twenty seven (27) species and also Adaka *et al.*, observed twenty five species from Oramini-Ukwa River southeast Nigeria.

The fish family Mormyridae was found to be dominant in all the stations, and months during the sampling period in River Yobe, followed by Cichlidae, Mochokidae, Bagridae, Characidae, Claridae, Cyprinidae, Centropmidiae, Osteoglossidae, Protopteridae and Schlibidae. Family Mormyridae was most diversified in term of species diversity with five species represented by (*Gnathonemus senegalensis*, *Hyperopisus bebe occidentalis*, *mormyrop delicious*, *Mormyrus rume* and *Petrcephalus bovei*). Followed by Cichlidae, with three species (*Hemichromis binaculatus*, *Oreochromis niloticus* and *Tilapia zilli*) also Mochokidae represented by three species (*Synodontis clarias*, *Synodontis flementous*, and *Synodontis nigrita*), Bagridae and was represented by three species (*Auchenoglanis occidentalis*, *Bagrus bayad* and *Bagrus longifilis*.) while the family Characidae was represented by two species (*Brycinus nurse*

and *Hydrocynus forkalii*). Cyprinidae was represented by two species :(*Barbus macrops* and *Labeo coubie*) and the family Clariidae was represented by two species (*Clarias anguillaris* and *Clarias gariepinus*) while other families were represented by one species, Cyprinidae was represented by *Lates niloticus*. Malapteridae was represented by *Malapterurus electricus*. Osteoglossidae was represented by *Heterotis niloticus*. Protopteridae was represented by *Protopterus annectens* and Schilbeidae was represented by *Schilbe Myutus*. As delineated in table 4. Adeosun *et al.* (2011), who noted that the Mormyridae, Cichlidae, Mochokidae, Characidae, Bagridae and Clariidae were more common in northern Nigeria. Allison and Okadi (2013) also reported that these six families of fish were common during their study on the Lower Nun River.

A total of 2335 fish individuals were recorded in the river as presented in Table 4.2. The family Cichlidae has the highest number of individuals with 449 (19.2%) while Clariidae family has the number of 403 (17.3%). however the family Characidae, was the second in number 376 (18.5). But in term of species abundant Brycinus nurse was the most highest with 281(12.0%) and weight of 74793.6 (15.01%) Going in that order and in term abundance was represented by family Schilbeidae 49 (2.1 %) and while the family Malapteridae was lowest in abundance with a total of 23 (1.0%) table 4.2

The most abundant species were family Cichlidae in the present study this could be attributed to the prolific and spontaneous breeding habit of the species of this family. Adedeji *et al* (2017) also reported from Lake Geriyo from Adamawa state, the authors added that the species from this family are known for their easy widespread even in are where they are not native or historically an important component of the catch. The abundance was family Characidae presented by two species has total number of 376 (18.5 %) of the total catch. Followed by Clariidae family with total number of 403 (17%) while least families were Malapteridae (*Malapterurus electricus*), Centropmidae (*Lates niloticus*), Protopteridae (*protoppterus annectens*) and Osteoglossidae (*Heterotis niloticus*) with total number of 23 (1.0%) and 27 (1.2%), 38 (1.6%), 39 (1.7%) respectively. The very low number of these species was reported by Ekundayo *et al.*,(2014) on the low number of some these fishes. Their very low abundance could be as a result of heavy exploitation which is known to cause a delay immaturity and abundance of many fishes. Similar observation were also made by Toyisi and Effiong (2005) low population of these fishes could also be as a result of poor management practices like using unapproved mesh sizes as seen used by the fishers, unrestricted fishing, use of poisonous leaves for fishing, non-enforcement of body as removal of water for irrigation and domestic use, herbicides washes into the river could affect the population of these fishes and hence be described as threatened and endangered fish species in the water bodies.

Result of Shannon Weiner index (H) of fish diversity in River Yobe (table 2) did not shown difference among sampling stations from January to June but shown significant difference among sampling station in the month of June with station B exhibiting the highest diversity of 4.4

Conclusion

Twenty five species of fish belonging twelve families which are of economical values are present in River Yobe. The family Mochokidae formed the dominant family in term of Biodiversity while the specie Brycinus nurse was the most abundant fish species recorded in the study of the river. There were monthly and seasonal variations in the fish species composition, also there were few specie abundance in the river which indicate that river may be over-exploited; as fishing was throughout the year in the river, different types of fishing gears employed by the local fishermen were gillnet, traps of different mesh sizes, hook and line, dragged net of sizes and mesh were used without proper monitoring by the appropriate authorities.

Recommendations

River Yobe desired a systematic approach towards management and development of the river for the sustainability of the fishery resources. For this reason the following measures are recommended:

- i. There is need to monitor human activities and fishing emotion on the river, in order not to destroy the fish Biodiversity.
- ii. The potential fishermen should be educated on the importance of the sustainability of fisheries resources of the river and number of fishermen operating on the river should also regulated and if possible registered by the authorities concern.
- iii. The fishermen should be advised to use approved gill net and dragged net of mesh size recommended by government for all inland gill net fishing to prevent the over exploitation.
- iv. The findings of this study should serve as base line information in assisting in the management and conservation of the fish and fisheries resources of the River Yobe.

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