

FISH BIODIVERSITY AND ABUNDANCE IN RIVER TARABA, TARABA STATE, NIGERIA

***DANBA, E.P.,¹ JA'AFARU, A.,² ABUBAKAR, K.A.,² ZIRA, J.D.,³ KEFAS, M.⁴ AND BARAU, B.W.¹**

¹Department of Biological Science, Taraba State University, PMB 1167 Jalingo,

²Department of Zoology, Modibbo Adama University of Technology Yola, PMB 2076.

³Department of Fisheries Adamawa State Ministry of Environment, PMB 2170 Yola.

⁴Department of Fisheries, Modibbo Adama University of Technology Yola, PMB 2076

*Corresponding author's email: elizabethdanba@gmail.com

Abstract

The fish fauna of River Taraba, Taraba State, Nigeria was studied from November 2017 to April 2019. The catch composition assessment was conducted at the landing sites once a month and fish species were identified. Descriptive statistical tools and Shannon –Weiner index were used to analyze the data collected. A total of 60,574 fishes belonging to 20 families and 50 species were identified in the local fishers catch. The family Cichlidae dominated the catch in number with 22.96%, followed by Clariidae (14.26%), Distichodontidae (12.61%), Morchochidae (10.55%), Characidae (9.57%), Schilbeidae (7.29%), Bagridae (6.11%), Mormyridae (5.79%), Alestidae (2.52%), Claroteidae (2.43%), Cyprinidae (1.33%), Protopteridae (1.23%), Osteoglossidae (1.20%) while the families Polypteridae, Citharinidae, Centropomidae, Hepsitidae Gymnarchidae, Channidae, and Malapteruridae each contributed less than 1% to the total fishes caught. Mormyridae was the most diversified family and was represented by 7 species; Mormyrus rume (3.88%), Petrocephalus bane (0.52%), Hyperopisus bebe (0.42%), Marcusenius abadii (0.30%) Mormyrus anguilloides (0.25%), Mormyrus macrothalmus (0.23%), Hippopotamyrus psittacus (0.19%). The study showed that the most abundant species was Tilapia galilaeus (10.13%) while the least are Labeo coubie and Malapterurus electricus which contributed (0.12%) each to the total catch. The Diversity parameters of Shannon-Weiner Index showed that Tella landing site was more diverse and evenly distributed $H'3.3973$; $E 0.3659$ while the least was Wurbo with $H'3.1128$; $E 0.3177$. Wurbo landing site stood out in terms of species richness with 17,964 while the least was Gayam landing site with 9,993. It is recommended that fishers should adopt approved mesh size that will allow fingerlings of threatened fish species such as Lates niloticus for future catch.

Key Words: Fish, Catch, Biodiversity, Abundance and River Taraba

Introduction

Fish are important because they contribute as much as 17% of the global animal protein (Food and Agricultural Organization, 2018). Tropical freshwater small scale artisanal fisheries provide cash income and animal proteins to many people in rural and urban areas of developing countries (Amos and Linus, 2017). Fish and fisheries have been increasingly threatened or even disrupted by man-made induced environmental changes, such as pollution: clearance for farmlands and cutting of trees for firewood (deforestation), habitat alteration like river impoundment, poor management and over exploitation, these decrease in resources availability, does not only resulted in poor income but also in well- being of fishing households and community (Amos and Linus, 2017).

Taraba State is well endowed with abundant surface water which includes ponds and rivers. These Rivers include Benue, Taraba and Donga and their tributaries. The State has about 500,000 hectares of water body and 142 natural ponds (TSEEDS, 2004). River Taraba passes through Gashaka, Bali and Gassol Local Government Areas (LGAs) before emptying into Benue system. The average production of fish in the state is about 1,987 metric tonnes per annum (Oruonye, 2014). Daily catch in some LGAs like Ibi, Lau and Donga is about 3000 kg. The State has over 30,000 fishing families fully engaged in daily fishing (Oruonye, 2014).

Overfishing can change species composition and abundance and this has important implication on the fisheries (Peter *et al.*, 2015). An estimation of the species composition is important to the study of a stock's dynamics and in the management of species. Diversities

indices of stocks are often used in the stock assessment in multi-species assessment, ecosystem studies and in studies of economically and environmentally important fish species, it is often necessary to the absolute size of the stock (Ahmad *et al.*, 2014).

Species richness and relative species abundance describe key elements of diversity. Biodiversity is a measure of species that make up a biologic community and is considered to be one of the most important aspects of community organization and structure (David *et al.*, 2016). According to Nolan and Callaban (2005), species richness, evenness and diversity are all used in the study of biology and can be used to compare different populations. Biodiversity has become prominent in recent years as a result of world- wide high rate of extinction of some species of animals including fish. The diversity of fishes mainly depends upon the biotic and abiotic factors and types of ecosystem (Abiodun and John, 2017). Age of water body, mean depth, water level fluctuation and morphometric features have great ecological implications. Fish biodiversity can shift over time though the shift may not be clearly related to factors such as increased water clarity, macrophyte growth or benthic invertebrate communities (Trumpickas *et al.*, 2012). Investigations into the biodiversity of fish species of Nigerian inland water bodies have been carried out by various scientists. These include the works of Kwaji *et al.* (2015); David *et al.* (2016); Abiodun and John (2017); Amos and Linus (2017) and Iber and Ojutiku (2018). Species diversity encompasses variety of species be it wild or domesticated within a geographical area (Abiodun and John, 2017).

The objective of this work is to identify fish species biodiversity and relative abundance which will help in the management and fishery development of River Taraba.

Materials and Methods

Study Area

River Taraba is a river in Taraba State, Nigeria, a tributary of the River Benue. River Taraba is at latitude of 8° 34' 0" N and longitude of 10° 15' 0" E. River

Taraba takes its source from the high altitude of the Alantica hills on the Nigeria-Cameroon border in the mid-eastern part of the State and flows westwards, covering a distance of about 265km before entering the River Benue (Akogun, 1999). The major economic activities along River Taraba are fishing and farming of rice, millet, guineacorn, groundnut. The major tribes on the River sides are Jukun, Osobo and Wurbo.

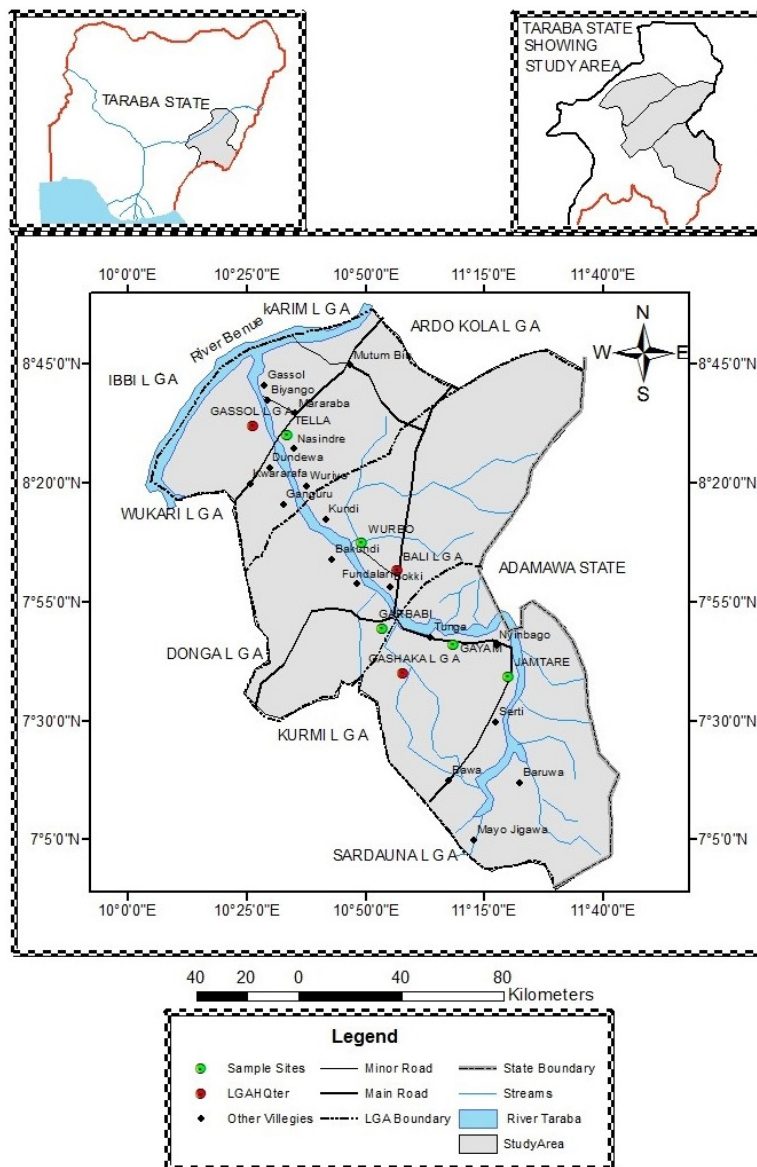


Fig. 1: Map of River Taraba showing study sites

Methods of Data Collection

Data for the study was collected once a month for the period of eighteen months from November 2017 to April 2019 at the various landing sites and it involved detailed examination, actual counting and recording of all fishes caught by the local fishers. Fish were caught using Traps (Gura), Gillnet (Kelle-kelle), Hook and line (kugiya). The other fishing gears used in the study area included Dragnet (Taro), Cast net (Birgi), Long line (Mari-mari) and Clap net (Homa). The only craft used in the study area as at the time of study was plank canoe. All fish landed were sorted according to species and counted. Genus and species identification of all fishes caught were carried out using field guide to Nigerian Freshwater fishes by Olaosebikan and Raji (2004) and Reed *et al.* (1967).

Data Analysis

The species of fish and number of individuals were recorded. Fish species relative abundance were analyzed using descriptive statistical tools to calculate frequency and simple percentage while fish species diversity of landing sites were analyzed using Shannon-Weiner diversity index.

Result

The result from River Taraba shows a total of 60,574 fishes belonging to twenty (20) families and fifty (50) species were identified. Mormyridae had the highest diversity with seven (7) species followed by the family Mochochidae with six (6) species, Cichlidae with five (5) species, Clariidae and Cyprinidae with four (4)

species each, Claroteidae, Alestidae and Schilbeidae were represented by three (3) species each, Bagridae, Characidae and Distichodontidae were represented by two (2) species each while the families Gymnarchidae, Hepsitidae, Citharinidae, Protopteridae, Polypteridae, Osteoglossidae, Channidae, Centropomidae and Malapteruridae are represented by one (1) species each as shown in table 1.

The percentage occurrences of each species caught is presented in table 2. The percentage occurrence of the families are; Cichlidae (22.96%), Clariidae (14.26%), Distichodontidae (12.61%), Mochochidae (10.55%), Characidae (9.57%), Schilbeidae (7.29%), Bagridae (6.11%), Mormyridae (5.79%), Alestidae (2.52%), Claroteidae (2.43%), Cyprinidae (1.33%), Protopteridae (1.23%), Osteoglossidae (1.20%), Polypteridae (0.98%), Citharinidae (0.30%), Hepsitidae (0.24%), Centropomidae (0.20%), Gymnarchidae (0.18%), Channidae (0.16%) and Malapteruridae (0.12%). The dominant fish species are *Tilapia galilaeus* which contributed 10.13% by number.

The Diversity parameters of Shannon-Weiner Index showed variation among the landing sites. However, Tella landing site was more diverse and evenly distributed $H' 3.3973$; $E 0.3659$ while the least was Wurbo with $H' 3.1128$; $E 0.3177$. Wurbo landing site stood out in terms of species richness with 17,964 while the least was Gayam landing site with 9,993 as shown in table 3.

Table 1: Fish species identified in River Taraba

Family	Fish Species	English name	Hausa name
Clariidae	<i>Clarias gariepinus</i>	Sharp tooth African catfish	Tarwada
	<i>Clarias anguillaris</i>	Mudfish	Tarwada
	<i>Clarias albopunctatus</i>	Catfish	Tarwada
	<i>Heterobranchus bidorsalis</i>	Catfish	Ramboshi
Cichlidae	<i>Tilapia galilaeus</i>	Mango tilapia	Gargaza
	<i>Tilapia dageti</i>	Tilapia	Gargaza
	<i>Oreochromis niloticus</i>	Nile Tilapia	Gargaza
	<i>Tilapia zilli</i>	Red belly Tilapia	Gargaza
	<i>Hemichromis fasciatus</i>	Banded Jewelfish	Kulkula
Claroteidae	<i>Auchenoglanis occidentalis</i>	Bubu	Buro
	<i>Clarotes laticeps</i>	Silver catfish	Maigo
	<i>Chrysichthys auratus</i>	Silver catfish	Warushe
Mormyridae	<i>Mormyrus rume</i>	Bottlenose	Milligi
	<i>Hyperopisus bebe</i>		Kuma
	<i>Mormyrus anguilloides</i>	Trunkfish	Milligi
	<i>Mormyrus macrothalmus</i>	Trunkfish	Milligi
	<i>Hippopotamyrus psittacus</i>	Trunkfish	Bakin lali
	<i>Marcusenius abadii</i>	Trunkfish	
	<i>Petrocephalus bane</i>		Faya
Bagridae	<i>Bagrus docmak</i>	Semutundu	Dinko
	<i>Bagrus bayad</i>	Bayad	Dinko
Cyprinidae	<i>Labeo coubie</i>	Labeo	Bakin Dumi
	<i>Labeo senegalesis</i>	Labeo	Farin Dumi
	<i>Labeo parvus</i>	Labeo	
	<i>Barbus bynni occidentalis</i>	Niger Barb	Dorawa
Alestidae	<i>Alestes baremose</i>	Silversides	Shemani
	<i>Alestes macrolepidotus</i>	African tetras	Kawara
	<i>Brycinus nurse</i>	African tetras	Kawara
Characidae	<i>Hydrocynus vittatus</i>	Tigerfish	Zawai
	<i>Hydrocynus forskalii</i>	Tigerfish	Zawai
Distichodontidae	<i>Distichodus rostratus</i>	Grasseaters	Chihaki
	<i>Distichodus brevipinnis</i>	Grasseaters	Chihaki
Citharinidae	<i>Citharinus citharinus</i>	Moonfish	Falia
Protopteridae	<i>Protopterus annectans</i>	West African lungfish	Bodami
Polypteridae	<i>Polypterus s senegalensis</i>	Sengal Bichir	Gwando
Schilbeidae	<i>Schilbe mystus</i>	African Butterfish	Nalanga
	<i>Siluranodon auratus</i>	Flagfins	Maigashi

	<i>Parailia pellucida</i>	Glass catfish	Maigashi
Gymnarchidae	<i>Gymnarchus niloticus</i>	Aba	Dan sarki
Hepsetidae	<i>Hepsetus odoe</i>	African pike	Zagundumi
Mochochidae	<i>Synodontis schall</i>	Wahrindi	Kurungu
	<i>Synodontis nigrita</i>	Squeaker	Kurungu
	<i>Synodontis budgetti</i>	Squeaker	Kurungu
	<i>Synodontis membranaceous</i>	Squeaker	Kurungu
	<i>Synodontis clarias</i>	Squeaker	Kurungu
	<i>Synodontis ocellifer</i>	Squeaker	Kurungu
Osteoglossidae	<i>Heterotis niloticus</i>	Heterotis	Bali
Channidae	<i>Parachanna obscura</i>	Snakehead	Tufi
Centropomidae	<i>Lates niloticus</i>	Nile perch	Giwan ruwa
Malapteruridae	<i>Malapterurus electricus</i>	Electric catfish	Mijiriya

Table 2: Percentage occurrence Fish Species in River Taraba

Family	Fish Species	Freq.	(%)
Clariidae	<i>Clarias gariepinus</i>	2136	3.53
	<i>Clarias anguillaris</i>	2780	4.59
	<i>Clarias albopunctatus</i>	592	0.98
	<i>Heterobranchus bidorsalis</i>	3124	5.16
	Sub-total	8632	14.26
Cichlidae	<i>Tilapia galilaeus</i>	6134	10.13
	<i>Tilapia dageti</i>	478	0.79
	<i>Oreochromis niloticus</i>	5386	8.89
	<i>Tilapia zilli</i>	1321	2.18
	<i>Hemichromis fasciatus</i>	587	0.97
Sub-total	13906	22.96	
Claroteidae	<i>Auchenoglanis occidentalis</i>	378	0.62
	<i>Clarotes laticeps</i>	682	1.13
	<i>Chrysichthys auratus</i>	413	0.68
	Sub-total	1473	2.43
Mormyridae	<i>Mormyrus rume</i>	2348	3.88
	<i>Hyperopisus bebe</i>	257	0.42
	<i>Mormyrus anguilloides</i>	149	0.25
	<i>Mormyrus macrothalmus</i>	138	0.23
	<i>Hippopotamyrus psittacus</i>	113	0.19
	<i>Marcusenius abadii</i>	179	0.3
	<i>Petrocephalus bane</i>	317	0.52
Sub-total	3501	5.79	
Bagridae	<i>Bagrus docmak</i>	1296	2.14
	<i>Bagrus bayad</i>	2407	3.97
	Sub-total	3703	6.11
Cyprinidae	<i>Labeo coubie</i>	73	0.12
	<i>Labeo senegalesis</i>	225	0.37
	<i>Labeo parvus</i>	174	0.29
	<i>Barbus bynni occidentalis</i>	331	0.55
	Sub-total	803	1.33

Alestidae	<i>Alestes baremose</i>	1206	1.99
	<i>Alestes macrolepidotus</i>	149	0.25
	<i>Brycinus nurse</i>	172	0.28
	Sub-total	1527	2.52
Characidae	<i>Hydrocynus vittacus</i>	3011	4.97
	<i>Hydrocynus forskalii</i>	2785	4.6
	Sub-total	5796	9.57
Distichodontidae	<i>Distichodus rostratus</i>	3517	5.81
	<i>Distichodus brevipinnis</i>	4118	6.8
	Sub-total	7635	12.61
Citharinidae	<i>Citharinus citharinus</i>	184	0.3
Protopteridae	<i>Protopterus annectans</i>	744	1.23
Polypteridae	<i>Polypterus s senegalensis</i>	594	0.98
Schilbeidae	<i>Schilbe mystus</i>	1910	3.15
	<i>Siluranodon auratus</i>	2357	3.89
	<i>Parailia pellucida</i>	152	0.25
	Sub-total	2246	3.7
Gymnarchidae	<i>Gymnarchus niloticus</i>	107	0.18
Hepsitidae	<i>Hepsetus odoe</i>	146	0.24
Mochochidae	<i>Synodontis schall</i>	975	1.61
	<i>Synodontis nigrita</i>	642	1.06
	<i>Synodontis budgetti</i>	1258	2.08
	<i>Synodontis membranaceous</i>	1587	2.62
	<i>Synodontis clarias</i>	1009	1.67
	<i>Synodontis ocellifer</i>	916	1.51
	Sub-total	6387	10.55
Osteoglossidae	<i>Heterotis niloticus</i>	726	1.2
Channidae	<i>Parachanna obscura</i>	97	0.16
Centropomidae	<i>Lates niloticus</i>	121	0.2
Malapteruridae	<i>Malapterurus electricus</i>	73	0.12
Total	Grand total	60574	100%

Table 3: Shannon-Weiner Diversity Parameters of the Landing Sites

Diversity Parameters	Jamtari	Gayam	Garbabi	Wurbo	Tella
H'	3.2904	3.2763	3.3500	3.1128	3.3973
E	0.3563	0.3557	0.3578	0.3177	0.3659
S	10236	9993	11645	17964	10764

H' = Shannon Entropy; E = Evenness; S = Richness (Abundance)

Discussion

The result from River Taraba showed a total of 60,574 fishes from 20 families and 50 species. The result produce higher values than those of Kwaji *et al.* (2015) who presented 5,572 fishes belonging to 15 families and 29 species caught between June to August, 2015 at Lake Ribadu Adamawa State, North East, Nigeria.

Findings of David *et al.* (2016) from two lacustrine wetlands of the upper Benue Basin, showed 5,044 fishes belonging to 15 families and 44 species caught between June and August, 2014. Abiodun and John (2017) gave a report of forty two (42) species from eighteen (18) families of fish caught between November 2014 and June 2015 from lower Niger River Idah, Kogi

State, Nigeria. Amos and Linus (2017) reported an estimate of seventeen (17) species from fifteen (15) families caught between June and August, 2014 at Njoboliya Lake, Adamawa State, Nigeria. Zira *et al.* (2017) observed forty seven (47) species of fish belonging to fifteen (15) families from Kiri Reservoir caught between June 2016 and May, 2017 in Shelleng, Adamawa State, Nigeria. Iber and Ojutiku (2018) gave a report of Twenty eight (28) species belonging to Twenty-Three (23) families caught between January and December, 2016 from River Fete, Benue State, Nigeria. The reason for the high species 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 Rivers. The riparian vegetation cover and macrophytes seen in River Taraba provided good shelter for the fishes to thrive. A lot of insects were seen in and around the river which served as food for the insectivores. Decay organic matter seen in the river provided a good breeding environment for the fishes.

River Taraba is a fish multi-species water resource with the family Cichlidae dominating the catch. The dominance of the family Cichlidae in the study area agree with what was reported by many authors. The dominance of Cichlidae family was reported in Lake Ribadu, Adamawa State, Nigeria (Kwaji *et al.*, 2015). Lower Usama Reservoir (Dan-Kishiya, 2012), Tagwai Lake (Ayanwale *et al.*, 2013) and River Fete, Benue State, Nigeria (Iber and Ojutiku, 2018). Their dominance could be attributed to their adaptation to lotic environment, productivity and changes in the

hydrological regime of the River habitat, their high prolific breeding nature coupled with good parental care gave the fishes a considerable advantage in the colonization of this River. *Tilapia galilaeus* tops the Cichlidae family in number. The dominance of *Tilapia galilaeus* was also reported in Lake Ribadu (Kwaji *et al.*, 2015). The dominance could be as a result of their ability to protect their fertilized eggs by mouth brooding, thus producing more fries than other fishes. The presence of *Protopterus annectans* in the River could be due to their adaptive nature to macrophytes acting as shelter and provide food by decaying vegetation. The presence of the family Schilbedae in the river could be as a result of abundance detritus, insects and fish. The family Mochochidae recorded high number. This might be due to their diverse feeding habits, low predation and good spawning ground in the river for their breeding. The population of *Clarias albopunctatus*, *Tilapia dageti*, *Hemichromis fasciatus*, *Auchenoglanis occidentalis*, *Chrysichthys auratus*, *Mormyrus anguilloides*, *Mormyrus macrothalmus*, *Hippopotamys myrus psittacus*, *Marcusenius abadii*, *Petrocephalus bane*, *Labeo coubie*, *Labeo senegalensis*, *Labeo parvus*, *Alestes macrolepidotus*, *Brycinus nurse*, *Citharinus citharinus*, *Polypterus senegalensis*, *Parailia pellucida*, *Gymnarchus niloticus*, *Hepsetus odoe*, *Parachanna obscura*, *Lates niloticus* and *Malapterurus electricus* recorded below 1.0%. The result support what was reported by Ekundayo *et al.* (2014) on the low number of some of these fishes. Their very low abundance could be as a result of heavy exploitation which is known to cause a delay in maturity 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 fishing laws. The degradation of water body such as removal of water for irrigation and domestic use, herbicides washed into the river could affect the population of these fishes and hence be described as threatened and endangered fish species in River Taraba.

The Diversity parameters of Shannon-Weiner Index showed Tella landing site was more diverse and evenly distributed $H'3.3973$; $E 0.3659$, this could be due to downstream migration of fishes from Atlantica hills on the Nigeria-Cameroon border and upstream migration of fishes from River Ibi and River Benue while the least was Wurbo with $H'3.1128$; $E 0.3177$. This could be because of high exploitation of fishes around that area of the river which lead to reduction or extinction of some species. Wurbo landing site stood out in terms of species richness with 17,964, this could be as a result of abundant vegetation and sufficient organic matter which provided a good habitat for their reproduction, while the least was Gayam landing site with 9,993, this could be due to the fact that the vegetation cover around Gayam area of the river was less compared to Wurbo area of River Taraba. This finding is in agreement with what was reported by Iber and Ojutiku (2018) that variation exist in fish species among the stations in River Fete, Benue State, Nigeria.

Conclusion

From the study, it can be concluded that River Taraba has about 20 families of fish which belonged to 50 species. The

most dominant family was Cichlidae followed by Clariidae, Distichodontidae and Mochochidae. Tella landing site was more diverse and evenly distributed while Wurbo landing site stood out in terms of species richness. This shows that River Taraba in Taraba State, Nigeria is blessed with abundant fish species like most freshwater bodies in Nigeria and Africa at large.

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