Fish Species Composition in River Yadzaram, Mubi-North Adamawa State, Nigeria

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Abstract- ***Fish are important because they contribute 17% of the global animal protein. 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, this decreases resource availability, does not only resulted in poor income but also in well-being of fishing households and community. The aim of this study was to conduct a comprehensive investigation on the fish species composition in River Yadzaram, Mubi-North, Adamawa State, Nigeria, from May to July 2024-December 2024. A total of 11 species from 11 families were identified, with Oreochromis niloticus being the most abundant (70 individuals), followed by Citharinus citharus (54 individuals), while Clarias gariepinus and Schilbe uranoscupas were the least represented (3 individuals each). The highest species distribution was recorded in July, attributed to favourable environmental factors such as increased water volume and temperature, food availability, and breeding season. The findings suggest that Oreochromis niloticus plays a dominant ecological role in the river, reflecting similar trends observed in other Nigerian freshwater bodies. Seasonal variations significantly affected fish species abundance and distribution. The researcher highlights the need for further investigation into the factors influencing low species richness and also recommends habitat restoration, sustainable fishing practices, and a long-term monitoring program to preserve the river's biodiversity.***

Indexed Terms- ***Yadzaram mubi-north, Oreochromis***

I. INTRODUCTION

Fish are important because they contribute as much as 17% of the global animal protein (FAO, 2018). Tropical freshwater small scale artisanal fisheries provide cash income and animal proteins to many people in rural and urban areas of developing countries. 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). Adamawa State is well endowed with abundant surface water which includes ponds and rivers. These Rivers include three main rivers flow in the state, each with its own tributaries, these are River Benue, River Yadzeram and River Taraba, the River Benue is the major river in the state (TSEEDS, 2014).

The confluence of River Gongola and River Benue can be seen at Numan Bridge, Adamawa State. These rivers flow in close proximity, displaying different colours. The captivating blend of partly brown (Gongola River) and partly blue (Benue River) water. The average production of fish in the state is about 1,987 metric tonnes per annum. 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, (2015), 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., 2017). 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).

Nigeria is blessed with over 14 million hectares of reservoirs, lakes, ponds and major rivers that are capable of producing over 980,000 metric tonnes of fish annually. The fresh water bodies of Nigeria, with over 270 fish species, are the richest in fish diversity in West Africa (Tobor, 2018). The term “fish” most precisely describes any non-tetrapod craniates that have gills throughout life and whose limbs, if any, are in the shape of fins (NuN, 2021). Fish are important in that they contribute as much as 17% of the world’s animal protein (Olusola et al., 2018) and its consumption is highly desirable (Moses, 2015). Thus over the years, the demand for fish in most parts of Nigeria has continuously overweighed supply (Meye et al., 2018). Adamawa State is well endowed with abundant surface water including ponds and rivers. These rivers include Benue, Adamawa and Donga and their tributaries. Fish farming is gaining popularity and the business is attracting many people in the State where the average of 1,987 metric tonnes of fish is produced per annum. Fish represent about 40% of the total animal protein and the sub sector contributes greatly to the economy in income generation, provision of employment opportunity and food supply (Ibemenuga et al., 2017). Although there are notable fishery studies carried out by researchers in most parts of the country including that of Warri River, Imo River and Lake Geriyo (Adedeji et al., 2017). But there is little or no published information available about the ichthyofauna present in River Adamawa at Bali metropolis. However, a knowledge of the aquatic ecosystem of a River like that of Adamawa in Bali will not only be useful in assessing its productivity but will also give a better understanding of the fishes in the lotic fresh water ecosystem of the town. Hence, this present study is designed to provide a baseline information on the fish species composition and abundance in Adamawa State River.

The River Yadzaram in Mubi, Adamawa State, Nigeria, serves as a crucial ecosystem supporting various aquatic organisms, particularly fish species. However, despite its ecological significance, there is a lack of comprehensive understanding regarding the fish species composition within the river. There is insufficient data on the distribution of fish species inhabiting the River Yadzaram. A comprehensive inventory detailing the various fish species present, their abundance, and spatial distribution is lacking. The River Yadzaram may face anthropogenic threats such as pollution, habitat degradation, overfishing, and agricultural activities. These activities could significantly impact fish populations, leading to declines in species diversity and abundance.

Invasive fish species pose a threat to native biodiversity in many freshwater ecosystems. The presence and spread of invasive species within the River Yadzaram may alter the native fish community structure and ecosystem dynamics and conservation challenges: The lack of understanding of the fish species composition hampers effective conservation and management efforts. Without proper knowledge of the existing biodiversity, it is challenging to develop appropriate conservation strategies for

preserving the integrity of the River Yadzaram ecosystem. Hence the need for this study on fish species composition in River Yadzaram.

The significance of conducting a study on fish species composition in the River Yadzaram, Mubi, Adamawa State, Nigeria, is multifaceted and extends to various stakeholders including scientists, policymakers, local communities, and environmental conservationists. The significance of the study includes advancing ecological knowledge, guiding conservation efforts, promoting sustainable resource management, adapting to environmental changes, supporting local livelihoods, and fostering community engagement in conservation initiatives. This research work aimed at investigating the fish species composition in the River Yadzaram, Mubi, Adamawa State, Nigeria.

II. MATERIALS AND METHODS

The River Yadzaram is a vital freshwater ecosystem in the region, meandering through diverse landscapes that include plains, hills, and forests. The river's course may exhibit variations in width, depth, and flow rate, influenced by seasonal rainfall patterns and topographical features (Amos et al., 2019). The hydrology of the River Yadzaram is influenced by the region's seasonal rainfall patterns, with peak flows typically occurring during the wet season (May to October) and reduced flows during the dry season (November to April). The river may experience fluctuations in water levels, particularly in response to heavy rainfall events or anthropogenic activities (Stephen et al., 2019).

River Yadzaram is Located in North and South, Mubi Northern Senatorial zone of Adamawa state. Adamawa state is located within latitude 9.3265° N and longitude 12.3984° E in the North Eastern Nigeria, it has its borders with Borno, Gombe, Taraba and Cameroon as it's National border and has an elevation of 1906 feet above sea level situated at the foot of the Mandara Mountains separating Nigeria from the Republic of Cameroun (Boss et al., 2023).

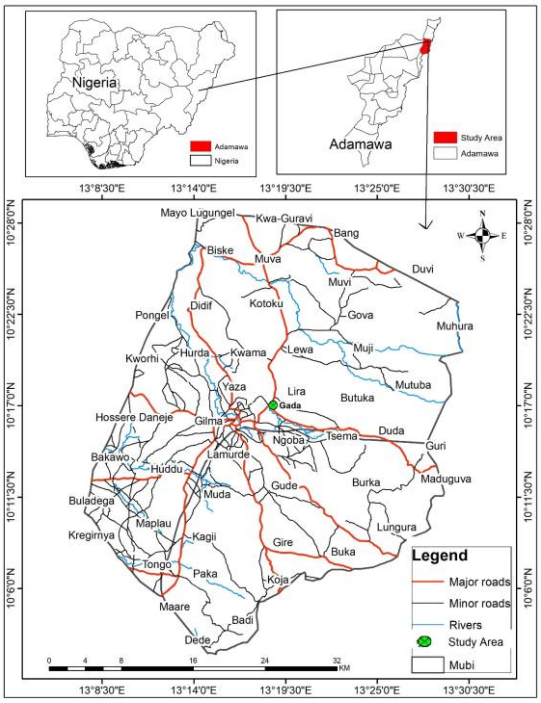

Fig.1: Map of Mubi-North Local Government Area showing the study Area (Gps 2024).

III. SAMPLE COLLECTION

Fresh fish samples were obtained (bought) bi-monthly between the months of May to July, 2024 from local fishermen who used different fishing gears including baited hooks and lines, gill net and cast net. The fishes were preserved immediately in a plastic cooler containing ice block and transported to the Department of Fisheries and Aquaculture Laboratory, Faculty of Agriculture, Adamawa State University, Mubi, for observation and identification. The preserved fishes were identified to species level by an expert on the basis of the shape of the body, colour pattern, specific marks or spots on the surface of the body, structure of various fins and shape of the head. This was done using standard taxonomic keys of (David et al., 2016).

IV. STATISTICAL ANALYSIS

The sample percentage was used to test for the fish species composition and the result was presented in tables and analysis of variance (ANOVA) was used to determine the diversity of different species of fish in months at P>0.05

V. RESULTS

Eleven (11) species of fish were collected, belonging to eleven (11) genera and eleven (11) families in River Yadzaram Mubi-North and South Local Government Area of Adamawa State, Nigeria.

Fish Species Composition in River Yadzaram Mubi North and South

The composition of Fish in River Yadzaram Mubi-North and South Local Government Area of Adamawa State, during the study period (May to July 2024) eleven (11) species were collected, belonging to eleven (11) genera and eleven (11) families as shown in Table1. It also shows that Oreochromis Niloticus has the highest number with value of seventy (70), followed by Citharinidae Citharius citharus with fifty-four (54) and the least species observed is Cliarias gariepinus and Schilbe uranoscupas with the value of three (3) each.

Monthly distribution of Fish Species in River Yadzaram from May to July 2024

For the monthly collection, month of July had the highest distribution of fish species followed by June and the least distribution was observed in the month of May. Based on fish species Oreochromis Niloticus had the highest distribution throughout the month of May, June and July, while Schilbe uranoscupas had the least distribution only found in the month of July. Citharius citharus distribution increased with moved in water volume apart from other species. The month of July had the highest distribution of fish species due to favorable environmental conditions that support fish biodiversity during this period.

Table 1: Fish Species Composition in River Yadzaram Mubi North and South

S/N	Families	Species identified
1	Clupeidae	*Pellonula leonesis*
2	Dorasomatidae	*S. leonensis*
3	Alestidae	*A. dentex*
4	Distichodontidae	*Nannocharax fasciatus*
5	Cyprindae	*Chelaethiops bibie*
6	Cyprindae	*Raiamas senegalensis*
7	Schilbeidae	*Schilbe uranoscupas*
8	Clariidae	*Heterobranchus bidorsalis*
9	Clariidae	*Cliarias gariepinus*
10	Citharinidae	*Citharius citharus*
11	Cichlidae	*Oreochromis Niloticus*

Source: Field Survey, 2024

Table 2: Monthly distribution of Fish Species in River Yadzaram from May to July 2024

S/N	Species	May /%	June /%	July/ %	Total
1	Pellonula leonesis	0 (00)	2 (33.3)	4 (66.7)	6
2	S. leonensis	5 (26.3)	6 (31.6)	8 (42.1)	19
3	A. dentex	0 (00)	7 (41.2)	10 (58.8)	17
4	Nannocharax fasciatus	6 (30)	10 (50)	4 (20)	20
5	Chelaethiops bibie	5 (33.33)	3 (20)	7 (46.7)	15
6	Raiamas senegalensis	3 (23.1)	4 (30.8)	6 (46.2)	13
7	Schilbe uranoscupas	0 (00)	0 (00)	3 (100)	3
8	Heterobranchus bidorsalis	2 (22.2)	4 (44.4)	3 (33.3)	9
9	Cliarias gariepinus	1 (33.3)	0 (00)	2 (66.7)	3
10	Citharius citharus	2 (3.7)	20 (37.0)	32 (59.3)	54
11	Oreochromis Niloticus	23 (32.8)	13 (18.6)	34 (48.6)	70
	Total	47 (20.5)	69 (30.1)	113 (49.3)	229

Source: Field Survey, 2024

III. DISCUSSION

The result of this study reveals that fish species composition in River Yadzaram, Mubi North and South Local Government Area of Adamawa State, Nigeria, shows a total of 11 species belonging to 11 genera and 11 families were identified, with the Cichlidae family being the most abundant. The study found significant differences in fish species

distribution across the three sampling months (May, June, and July), with July having the highest abundance and May the lowest, the River Yadzaram exhibited a relatively low species richness compared to other Nigerian freshwater bodies. This could be attributed to various factors, including habitat degradation, pollution, or the specific characteristics of the river's ecosystem, the Cichlidae family was the most dominant group, indicating its ecological significance within the river. This dominance might be due to factors such as adaptability, reproductive strategies, or the availability of suitable habitats for their growth and development. The study also revealed significant seasonal variations in fish species distribution. Which was influenced by factors such as changes in water temperature, water volume, availability of food resources, breeding season and reduced predation or human activity, this is in agreement with the findings of Amos and Linus, (2017) who stated that the distribution of fish species varies in respect of water temperature, water volume, and availability of food resources.

The composition of fish species found in river Yadzaram shows that there are eleven different species of fish in the study Area, with the total number of two hundred and twenty nine (229) during the study period, the result revealed that Oreochromis niloticus has the highest number of species (70) followed by Citharius citharus fifty four (54) and the least Cliarias gariepinus and Schilbe uranoscupas with the value of three (3) each. This is in line with the findings of Lierman., (2017) who reported that fish composition in various rivers in Nigeria, frequently identifies Oreochromis niloticus as the most abundant species, followed by others such as Citharus citharus and Clarias gariepinus, as seen in surveys conducted on different water bodies. A similar study in River Hadejia also showed Oreochromis niloticus as a dominant species, contributing significantly to the total fish population, followed by Clarias gariepinus (African catfish), which is often the second or third most common species depending on the local conditions.

CONCLUSION

The study on Fish species composition in River Yadzaram, Mubi, the results shows that Oreochromis niloticus had the highest number of species, followed by Citharius citharus and the least Cliarias gariepinus and Schilbe uranoscupas. There are eleven different species of fish in the study Area with total number of two hundred and twenty nine (229) fish composition during the period of study.

RECOMMENDATIONS

Based on the findings of this study, the researchers proffer the following recommendations:

i. Habitat restoration measures should be implemented to improve the ecological quality of the River Yadzaram. This could include removing obstructions, controlling pollution, and restoring degraded riparian areas.
ii. Sustainable fishing practices should be promoted among local communities to ensure the long-term viability of fish populations. This could involve implementing fishing regulations, promoting selective fishing techniques, and supporting community-based fisheries management to address food security.
iii. Monitoring program should be established to track changes in fish species composition, diversity, and abundance over time. This will help assess the effectiveness of conservation measures and identify emerging threats.

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