

FISH BIOLOGY

Abundance, Species Diversity, Length-Weight Relationship and Condition Factor of Family Mormyridae in Lower River Niger, Lokoja, Kogi State

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Abstract

This study investigated the species composition, diversity, and length-weight relationships of Family Mormyridae assemblages in the lower River Niger at Lokoja, Kogi State, Nigeria, to provide insight into their ecological status and population structure. A total of 208 individuals representing 11 species and six genera were collected between June and December 2024 and were identified. *Mormyrus rume* (19.7%) and *Hippopotamyrus psittacus* (13.9%) were the most abundant species, reflecting their adaptive success in the habitat. Diversity indices revealed moderate to high heterogeneity (Simpson's index = 0.90; Shannon-Wiener index $H' = 2.3$; Margalef's richness = 1.8; Evenness = 0.9), indicating a relatively balanced fish community. The length-weight relationship exhibited interspecific variation, with regression coefficients (b) ranging from 1.29 to 3.36. Most species displayed negative allometric growth ($b < 3$), suggesting that increase in weight was disproportionate to length increment, possibly due to environmental stress or food limitation. The condition factor (K) ranged between 0.72 and 1.44, implying variable well-being among species. Length and weight frequency distributions were skewed toward smaller size classes, which may reflect recruitment dominance or selective fishing pressure. These findings demonstrate that the Family Mormyridae assemblage in the lower River Niger is under moderate ecological stability but exhibits signs of anthropogenic stress. Continuous monitoring, enforcement of size-limit regulations, and habitat conservation are recommended to sustain population balance and biodiversity integrity within the system.

Keywords: abundance; diversity index; length-weight relationship; condition factor; Mormyridae

1 Introduction

Ocean, lakes, and watercourses provide essential food, employment, and economic benefits, supplying over 70% of the proteins for the African population (FAO, 2018). Tropical rivers have a vast diversity of ichthyology, which is not well known taxonomically or in terms of species biology and ecology (Byanikiro et al., 2017). Elephant fishes, Mormyridae, exclusively occur in freshwater habitats of Africa and are well known for their additional sensory system, electroreception (Fricke et al., 2023). They have gained significant scientific interest due to their unique biological characteristics and ecological importance. Mormyrids are known for their electroreception and electro communication abilities, which play crucial roles in their behavior, feeding, and reproduction (Abowei et al., 2021).

The Lower River Niger is home to a wide variety of fish Species, including many members of the family Mormyridae. The body is elongate to deep, laterally compressed and covered by small cycloid

scales (Lévêque et al., 2005; Adjibade et al., 2019). The fishes show a non-protrusible mouth with a snout of variable forms (Adjibade, 2018). Currently there are 228 described species (Fricke et al., 2023). Complete knowledge on the community indices is crucial to document and to characterize the structure of the fish biodiversity in order to design and to implement an appropriate management scheme that includes habitat protection, species conservation and valorization (Gbaguidi et al., 2016).

Fish abundance is used to describe how common or rare a species is relative to other species in a given community, and is usually described for a single trophic level (Lawson and Olusanya, 2010). Accurate fisheries statistics of the rivers and adjoining flood plains is a vital tool for provision of information for a sound fisheries management programme and for development of a plan for fishing industry (Solomon et al., 2012).

The Length-weight relationship (LWR) is a crucial tool for learning about the growth trends of different fish species (Ighwela et al., 2011). According to Fafioye and Ayodele (2018), b-values in length-weight relationships have been used to analyse fish growth patterns, which are said to vary between stocks of the same species. Population size structure, length, and weight can influence responses to other physiological stressors (Bald'e,etal2019).

The condition factor is an index that illustrates how biotic and abiotic factors interact to affect the physiological state of fishes. The condition factor (K) is used in fisheries to compare the „condition“ health of the fish (Alex and Adeyemo, 2021). The condition factor is the index used to understand maturity, survival, health status, and reproduction of fish, indicating the quality of a water body and the overall fitness of a population residence in a specific ecosystem (Tsoumani et al., 2016; Sabbir et al., 2020). It gives a quick overview of any aspect of its life in the laboratory (Ugwumba, 2018)

There is little specific information on diversity of the family Mormyridae in Nigeria especially in lower river Niger, Lokoja. In these general circumstances, this scientific study was carried out to investigate the abundance, diversity, length – weight relationship and condition factor of the family Mormyridae and their contribution to species richness of lower river Niger, Lokoja.

2 Materials and methods

2.1 Study area

This study was conducted along the River Niger in Lokoja, the capital city of Kogi State, Nigeria. Lokoja is located in the central region of the country at approximately latitude 7°49' N and longitude 6°44' E, with an elevation ranging from 45 to 125 m above sea level on the western bank of the River Niger. The city lies about 160 km south of Abuja, Nigeria's Federal Capital Territory, and occupies a strategic position connecting major road networks to five of the six geopolitical zones of the country.

The landscape of Lokoja is characterized by dissected undulating plains and prominent hill masses and mesas. The town is geographically positioned between the River Niger and Mount Patti, a star-shaped plateau ridge rising to approximately 400 m. This unique topography has influenced the predominantly linear settlement pattern of the city.

Lokoja experiences a tropical wet-and-dry climate, with an annual rainfall of about 1150 mm. Rainfall typically commences in March and peaks between June and September, while the dry season begins around November. Mean monthly temperatures remain close to 30°C, and the area is generally humid. The River Niger and its major tributaries exhibit perennial flow patterns with annual flooding

events. Flooding in Lokoja usually begins in July, peaks in October, and recedes by December. Smaller streams in the region exhibit flash flows, especially following short-duration, high-intensity rainfall.

Groundwater in the area is largely perched, contributing to a high rate of well and borehole failure. Lokoja has an estimated population exceeding 886,000, with fishing serving as a major livelihood activity due to the River Niger. Other economic activities include agriculture, mining, plastic production, and various manufacturing enterprises.

The sampling was conducted at **Ganaja**, a riverside community in Lokoja Local Government Area, situated along the bank of the River Niger. Ganaja lies within the metropolitan reach of Lokoja, flanked by the high plateau ridge of Mount Patti on the upland side and the Niger floodplain on the river side. The area features a tropical savanna climate with distinct wet and dry seasons; seasonal flooding of the Niger periodically affects Ganaja and its environs. The local economy is heavily reliant on fishing and flood-plain agriculture, and the village's proximity to the river and human activities (agriculture, waterworks, and settlement) makes Ganaja a representative site for ecological investigations. Water and aquatic fauna collected from this location hence reflect prevailing environmental and anthropogenic conditions influencing aquatic ecosystems in central Nigeria. Ganaja was selected for this study because it falls to the lower end of River Niger and River Benue.

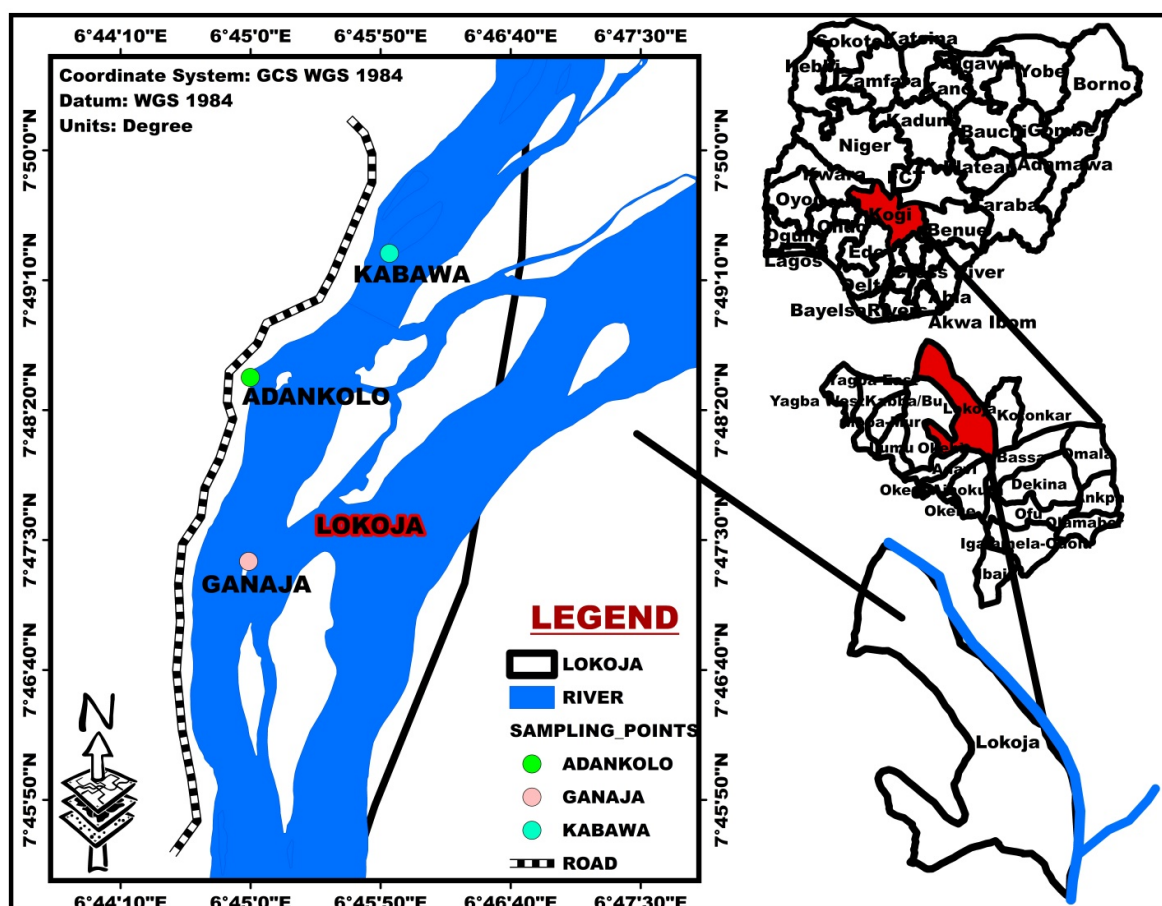


Figure 1. Map of the study area on the Lower River Niger at Lokoja, Kogi State, Nigeria, showing the sampling points (Adankolo, Ganaja and Kabawa).

2.2 Sample collection

A total of 208 samples were collected from the catches of the fishermen. The fishing gears used were gill net and dragnet, the frequency of sampling is bimonthly, every fortnight for the duration of 6

months. Collection was done in the morning around 7:30 - 8:30 am; samples were transported to the laboratory in a bucket container filled with ice. Left over samples was preserved in 10% formalin for further analysis to prevent post-mortem.

2.3 Identification of fish samples

Samples collected were identified immediately according to the guide provided by Olaosebikan and Raji (2004). The weights of the samples were taken using a top load weighing balance and each fish samples were given a serial number. Standard length (SL), total length (TL) was measured using a meter rule and weight (W) of the specimens were measured using a top load weighing balance to the nearest 0.1 cm and 0.1 g respectively.

2.4 Estimation of condition factor

The condition factor (K) of each individual specimen was estimated by applying the formula described by Fulton (1911):

$$K = \frac{100W}{L^3} \quad (1)$$

where K is the condition factor, W is the weight of the fish (g) and L is the standard length of the fish (cm).

2.5 Data analysis

2.5.1 Diversity index

The species diversity (H') of the mormyrids was determined following the Shannon–Wiener index of species diversity (Shannon and Wiener, 1963):

$$H' = - \sum p_i \log_2 p_i \quad (2)$$

where H' is the index of species diversity, $p_i = n_i/N$ is the proportion of the total sample belonging to species i , n_i is the number of individuals of each species in the sample and N is the total number of individuals of all species in the sample. The evenness measure (J) of Shannon and Wiener (Shannon and Wiener, 1963) was computed following the formula:

$$J = \frac{H'}{\log_2 S} \quad (3)$$

where J is the evenness measure, H' is the Shannon–Wiener index of diversity and S is the number of species in the sample. The Simpson's index (d) was used to evaluate species richness.

2.5.2 Length–weight relationships

The morphometric characters used in the LWR were standard length (SL) and body weight of the samples. SL was taken along the antero-posterior body axis, from the mouth tip to the mid-point of the caudal fin origin, using a metre rule. The body weight was measured using a digital top-loading electronic weighing balance (Acculab model). SL values were recorded in centimetres (cm) while the body weight values were recorded in grams (g). The association between length and weight was established using the equation (Le Cren, 1951):

$$W = aL^b \quad (4)$$

where W is the weight of the specimen (g), L is the standard length of the specimen (cm), a is the coefficient associated with body form and b is the exponent expressing the relationship between length and weight. The data were transformed to logarithms to obtain a linear equation (Kahraman et al., 2014):

$$\log W = \log a + b \log L \quad (5)$$

The degree of association between length and weight was estimated by computing the coefficient of determination (R^2) through linear regression analysis.

3 Results

3.1 Length–frequency distribution of mormyrid species in River Niger, Lokoja

The length–frequency distribution of the mormyrid species collected from River Niger at Lokoja is shown in Figure 2. A wide variation in length classes was recorded across the eleven species identified, ranging from 6.5 cm to 42.5 cm. *The M. rume* showed the highest representation within the 11.5–16.5 cm class, while a few individuals extended into the 16.5–21.5 cm range. *H. bebe* was predominantly distributed in the 11.5–16.5 cm class, with notable frequencies also in the 6.5–11.5 cm range, indicating a dominance of smaller-sized individuals. *M. abadii* occurred more frequently within the 11.5–16.5 cm range but was also represented in higher length classes up to 21.5–26.5 cm. *The M. hasselquistii* exhibited a broader spread, occurring from 11.5 cm up to 26.5 cm, with peak abundance at 16.5–21.5 cm. Similarly, *M. mento* and *M. macrophthalmus* were largely concentrated between 16.5–26.5 cm, with *M. macrophthalmus* showing relatively higher frequency in the 16.5–21.5 cm class. *C. tamandua* was also distributed across multiple size classes but peaked around 16.5–21.5 cm. *M. senegalensis* and *P. bane* on the contrary were less frequently encountered, occurring mostly within the lower length classes (6.5–16.5 cm). *H. psittacus* was exceptional, showing a distinct peak in the largest size group (37.5–42.5 cm), with over 20 individuals recorded in that class.

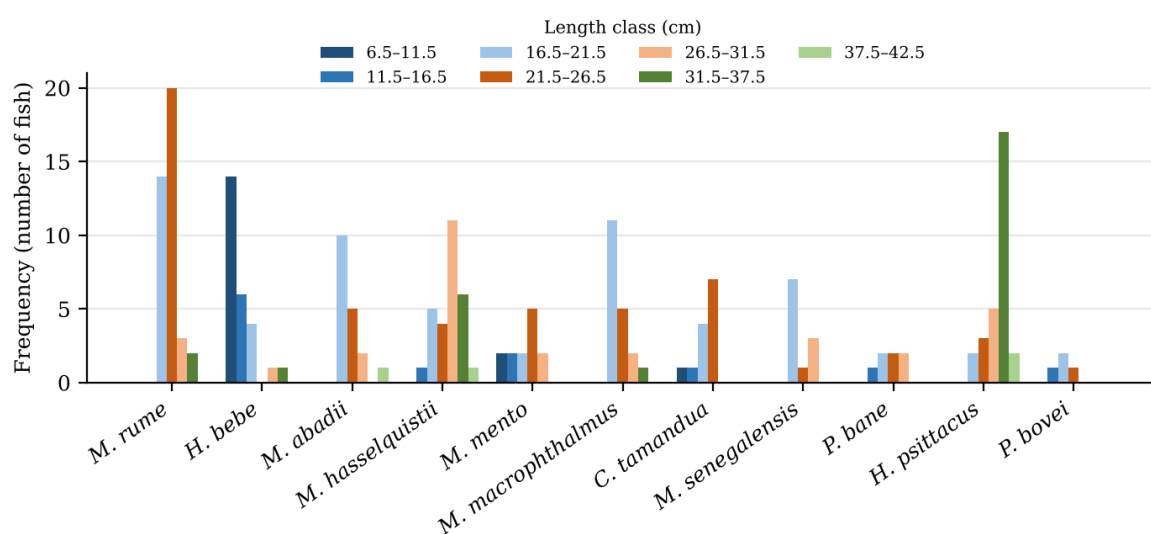


Figure 2. Length–frequency distribution of family Mormyridae collected from River Niger, Lokoja.

3.2 Weight–frequency distribution of mormyrid species in River Niger, Lokoja

The weight–frequency distribution of the mormyrid species collected from River Niger at Lokoja is shown in Figure 3. The species exhibited a wide weight range, spanning from 5.5 g to over 355 g, with distinct interspecific variations in their modal weight classes. The *M. rume* recorded the highest abundance in the 55.5–105.5 g class, with more than 25 individuals, while smaller numbers were distributed across lower and higher weight classes. *H. bebe* was predominantly represented in the 5.5–55.5 g category, with over 20 individuals, indicating the dominance of smaller-sized individuals within this species. *M. abadii* showed moderate representation, largely concentrated within 55.5–105.5 g and 105.5–155.5 g ranges, while *M. hasselquistii* displayed a broader spread, peaking at 155.5–205.5 g. The *M. mento* and *M. macrophthalmus* were widely distributed across several weight classes, with *M. macrophthalmus* particularly abundant in the 105.5–155.5 g category. *C. tamandua* occurred more frequently within 105.5–205.5 g, showing evidence of medium-sized individuals being dominant. The *M. senegalensis* and *P. bane* on the other hand were less abundant and mostly restricted to the lower weight ranges of 5.5–105.5 g. Interestingly, *H. psittacus* stood out with a strong representation in higher weight classes, particularly 205.5–305.5 g, with a peak exceeding 15 individuals, suggesting it is one of the larger-bodied species within the assemblage. The *P. bovei*, though relatively scarce, was also represented in the upper weight categories, with occurrences up to 305.5–355.5 g.

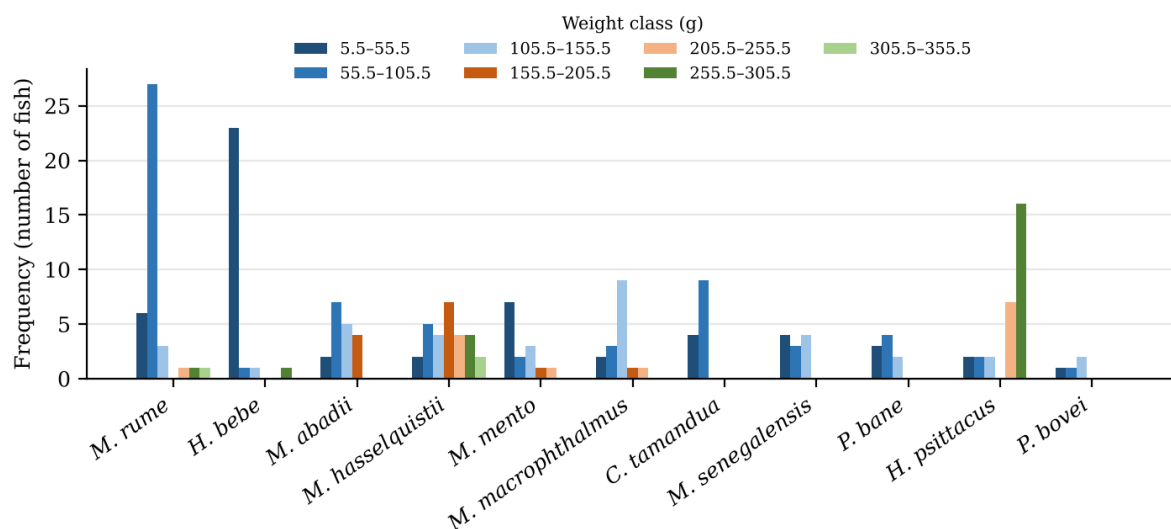


Figure 3. Weight–frequency distribution of family Mormyridae collected from River Niger, Lokoja.

3.3 Mormyrid diversity and abundance in River Niger, Lokoja, Kogi State

The abundance of family Mormyridae encountered in lower River Niger, Lokoja is shown in Table 1. A total of 208 individuals belonging to six genera and eleven species of Mormyrids were recorded from the Lower River Niger in Kogi State. The most abundant genus was *Mormyrus*, which contributed 40.9% of the total catch. Among its species, *M. rume* was the dominant with 41 individuals (19.7%), followed by *M. hasselquistii* (13.5%) and *M. macrophthalmus* (7.7%). The genus *Marcusenius* accounted for 21.2% of the total catch, with *M. abadii* (8.7%) as the most abundant within the group, while *M. mento* and *M. senegalensis* contributed 7.2% and 5.3%, respectively. *Hyperopisus bebe* contributed 12.5% of the total abundance, while *Hippopotamyrus psittacus* accounted for 13.9%, making it the second most abundant single species after *M. rume*. *Campylomormyrus tamandua* constituted 6.3%, while the genus *Petrocephalus* had the lowest abundance overall, represented by *P. bane* (3.4%) and *P.*

bovei (1.9%). Sex distribution across species showed a relatively balanced composition, with 102 males and 106 females. The slight female dominance was most pronounced in *H. psittacus* (20 females vs. 9 males) and *M. abadii* (13 females vs. 5 males).

Table 1. Percentage abundance of family Mormyridae in lower River Niger, Kogi State.

Species	Male	Female	Total	Abundance (%)
<i>Mormyrus</i>				
<i>Mormyrus rume</i>	23	18	41	19.7
<i>Mormyrus hasselquistii</i>	16	12	28	13.5
<i>Mormyrus macrophthalmus</i>	9	7	16	7.7
Total	48	37	85	40.9
<i>Hyperopisus</i>				
<i>Hyperopisus bebe occidentalis</i>	16	10	26	12.5
Total	16	10	26	12.5
<i>Marcusenius</i>				
<i>Marcusenius abadii</i>	5	13	18	8.7
<i>Marcusenius mento</i>	7	8	15	7.2
<i>Marcusenius senegalensis</i>	8	5	11	5.3
Total	20	26	46	21.2
<i>Campylomormyrus</i>				
<i>Campylomormyrus tamandua</i>	5	8	13	6.3
Total	5	8	13	6.3
<i>Petrocephalus</i>				
<i>Petrocephalus bane ansorgei</i>	2	5	7	3.4
<i>Petrocephalus bovei</i>	2	2	4	1.9
Total	4	7	11	
<i>Hippopotamyrus</i>				
<i>Hippopotamyrus psittacus</i>	9	20	29	13.9
Total	9	20	29	13.9
Grand total	102	106	208	100

3.4 Diversity indices

The diversity analysis revealed a relatively structured and moderately heterogeneous fish community. The **Shannon–Wiener diversity index ($H = 2.24$)** indicated a **high level of species diversity** within the sampled population. Similarly, the **Simpson's index ($1 - D = 0.86$)** showed a **low probability of dominance by a single species**, suggesting that no species overwhelmingly dominated the assemblage. Evenness analysis further demonstrated the distribution pattern of individuals among species. The calculated **Evenness value ($e^H/S = 0.76$)** implied a **moderately even spread of individuals**, with most species well represented in the community.

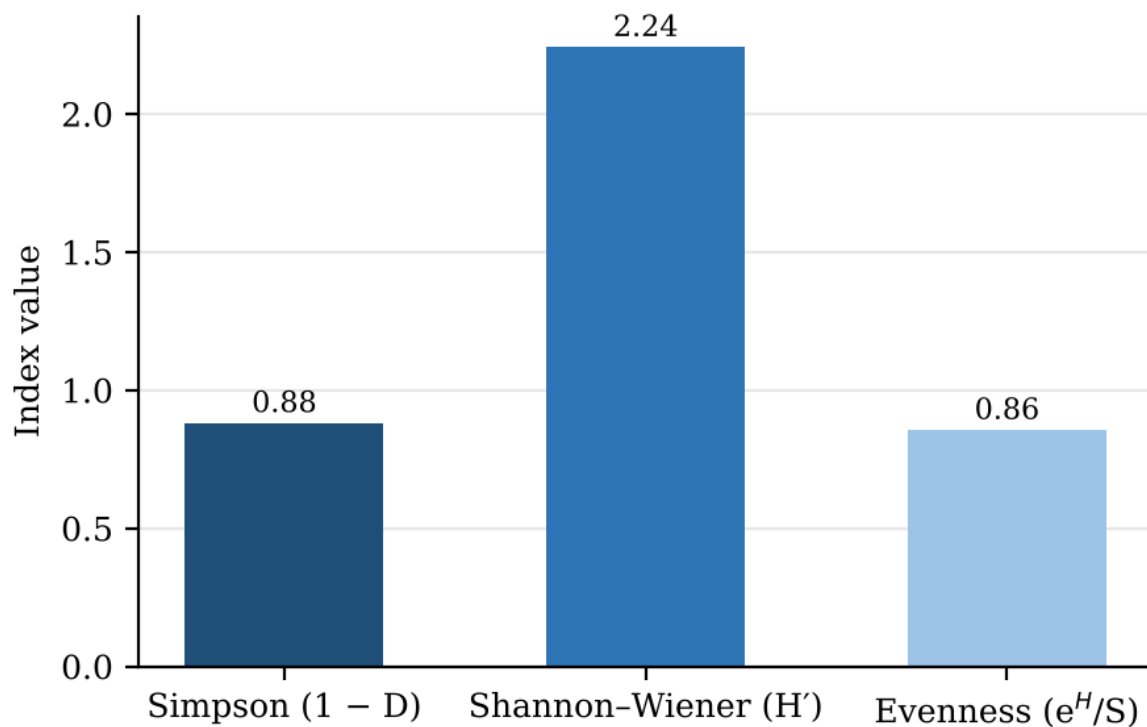


Figure 4. Diversity indices of the eleven mormyrid species in lower River Niger, Lokoja, Kogi State.

3.5 Length–weight relationship

The regression analysis of log-transformed weight against log-transformed total length for 11 species of *Mormyrus* revealed notable variation in growth patterns, goodness-of-fit, and condition factors among species is shown in Table 2. The allometric coefficient (b) ranged from 1.29 in *Marcusenius abadii* to 3.36 in *Mormyrus senegalensis*. Species such as *Mormyrus rume* ($b = 2.90$, $R^2 = 0.94$) and *Marcusenius senegalensis* ($b = 3.36$, $R^2 = 0.86$) exhibited strong positive allometric growth with high coefficients of determination. Conversely, *Marcusenius abadii* ($b = 1.29$, $R^2 = 0.32$) and *Campylomormyrus tamandua* ($b = 1.47$, $R^2 = 0.50$) displayed weak fits with negative allometry.

The condition factors (K) varied across species, ranging from 0.72 in *Hippopotamyrus psittacus* to 1.44 in *Hyperopisus bebe*, with most species showing values near unity. Notably, *Hyperopisus bebe* ($K = 1.44$) and *Petrocephalus bovei* ($K = 1.18$) demonstrated relatively higher condition factors, while *Hippopotamyrus psittacus* ($K = 0.72$) and *Mormyrus rume* ($K = 0.73$) exhibited lower condition values.

Table 2. Length–weight relationship and condition factor of Mormyridae species collected from River Niger, Lokoja.

Species	a	b	R ²	Condition factor K	Status
<i>M. rume</i>	-2.04	2.9	0.94	0.73	Poor condition
<i>H. bebe</i>	-0.61	1.76	0.82	1.44	Very good condition
<i>M. abadii</i>	0.26	1.29	0.32	0.88	Poor condition
<i>M. hasselquistii</i>	-0.69	2.03	0.75	0.92	Poor condition
<i>M. mento</i>	-1.92	2.84	0.87	1	Good condition
<i>M. macrophthalmus</i>	-0.14	1.6	0.41	0.93	Poor condition
<i>C. tamandua</i>	-0.14	1.47	0.5	0.79	Poor condition

Species	a	b	R ²	Condition factor K	Status
<i>M. senegalensis</i>	-2.59	3.36	0.86	0.9	Poor condition
<i>P. bane</i>	-0.24	1.66	0.67	0.89	Poor condition
<i>H. psittacus</i>	-1.74	2.72	0.86	0.72	Poor condition
<i>P. bovei</i>	-0.18	1.6	0.91	1.18	Good condition

4 Discussion

The fishes of the family Mormyridae are of high commercial and fisheries importance and display a very large distribution in tropical Africa. These weakly electrical fishes are endemic in African riverine ecosystems and among the Osteoglossiformes, the Mormyridae is the most speciose family comprising 22 genera and about 228 species (Hopkins et al., 2007; Kisekelwa et al., 2016; Rich et al., 2017). A total of 29 mormyrid species have been described in the Nigerian freshwaters (Adesulu and Sydenham, 2007). Adjibade et al. (2019) reported that the Mormyrids widely occurred in top rivers such as the Nile, Niger, Volta, Senegal, Zambezi, Gambia, Ouene, etc. In this present work, the result showed that eleven (11) species belonging to 6 genera were identified of which *M. rume*, *H. psittacus*, *M. hasselquistii* and *H. bebe* were more abundant with the value 41, 29, 28 and 26 respectively with *M. rume* as the most abundant while *P. bane* and *P. bovei* were less abundant with 7 and 4 samples respectively. The result obtained is similar to the result reported by Adjibade et al. (2019) where 11 species was assessed but they encountered nine (9) genera in the Niger River at Malavillien Northern Benin. The difference in the numbers of genera encountered could be because they explore 5 different sites for collection of samples. Also, The result showed that *M. rume* is the most abundant, this result agreed with another report given by Olopade (2013) in the preliminary observations on the family Mormyridae in Oyan dam lake where he encountered 11 species across 6 genera of family Mormyridae, *M. rume* was the most dominant, despite encountering the same number of species and genera, this study does not encounter Mormyrops genera and *M. ihuysi* during investigation. Souley et al. (2024) in First Assessment of Mormyridae diversity and abundance in the Niger River at Niamey, Niger recorded 15 species across 9 genera. The genera encountered in this study were among the 9 genera of Mormyrids they encountered. *M. rume* and *M. cyprinoides* which was not encountered in this study are the most represented species. The high number of species and genera is attributed to the large number of samples of 1279 individuals collected for investigation while this study investigated 208 samples. Oumarou (2018) recorded 14 species in restored fisheries by the PLCE/BN on the Niger River in Niger. Ibrahim (2018) and Hamadou (2019) reported Mormyridae as the most abundant family in their study areas, with 7 species in Boubon fisheries and 11 species in Say fisheries in Niger, respectively. Other various studies also highlight Mormyridae's prevalence: Alphonse et al. (2019) reported 12 species in the Ouémé river, 10 species in the Coémé basin in Burkina Faso, 21 species in the Pendjari river, 13 species in the Baoulé river basin in Mali, 7 species in the Ziga dam in Burkina Faso, and 11 species in the Niger river at Malenville and Gaya.

Onimisi et al. (2025) in Growth Allometry and Condition Factor of Some Mormyrids in Lower River Niger at Idah, Kogi State, Central Nigeria recorded a different result. In their findings, a total of three hundred and thirty-two samples belonging to six selected Mormyrids species were used with *H. bebe* the most abundant. This could be as a result of the variation of season and the species used for the study were selected. Sampling duration and study scope likely influenced this discrepancy. Also, it is observed in this study that *P. bane* and *P. bovei* of the genus *Petrocephalus* are the least abundant

which is similar to the result obtained by Olopade (2013) where *Petrocephalus bane* is the least abundant, this indicated that species of the genus are endangered and conservative measures should be put in place to ensure fishes of the genus do not go extinct.

Figure 4 shows the estimate of the diversity indices which shows that the fish species are evenly distributed in lower river Niger, Lokoja, Kogi State. This result is related to the study carried out by Souley et al. (2024). In their findings, Mormyridae species richness at the three stations was moderate ($H' = 2.96$), with no dominant species ($Eq = 0.76$). Differences and decrease between Mormyridae species towards the atlantic ocean could be as a result of time of sampling. Souley et al. (2024) collected samples between August to November while collection of samples was done in this study between October to March coinciding with species migration to spawning grounds. Most Mormyridae (73.3%) in the River Niger are classified as “Least Concern” by IUCN, like findings in Aghien Lagoon (Assi, 2019). Conservation status is dynamic and requires regular reassessment due to changing threats (IUCN, 2018).

The length-weight relationship in fish is a crucial metric for assessing various biological factors such as fat reserves, overall health, and reproductive maturity. Generally, fish that are heavier for a given length are considered to be in better condition (Nwani et al., 2008). The parameter (b), which ranges between 2 and 4 (Hile, 1936), is used to evaluate the predominance of length or weight. A fish with perfect dimensional balance would have an isometric (b) value of 3 (Thomas et al 2003). The Length-weight relationship (LWR) is a crucial tool for learning about the growth trends of different fish species (Ighwela et al., 2011). According to Fafioye and Ayodele (2018), b -values in length-weight relationships have been used to analyse fish growth patterns, which are said to vary between stocks of the same species (Ndome et al., 2012). Negative allometric growth in fish is indicated when the “ b ” value is less than 3. A value of more than 3 denotes a positive growth pattern (Alam et al., 2014). Venu and Kurup (2003) noted that for an ideal fish, which maintain dimensional equality, the isometric value of b would be 3. In this study, the regression analysis of log-transformed weight against log-transformed total length for 11 species of *Mormyrus* revealed notable variation in growth patterns, goodness-of-fit, and condition factors among species is shown in Table 2. The allometric coefficient (b) ranged from 1.29 in *M. abadii* to 3.36 in *M. senegalensis*). *M. senegalensis* ($b = 3.36$, $R^2 = 0.86$) exhibited strong positive allometric growth with high coefficients of determination. The positive allometric growth exhibited by this species suggests that as they increase in length they gain weight at a faster rate, resulting in a bulkier body. This growth pattern can be advantageous, reflecting favorable environmental conditions such as abundant food resources or optimal habitat features that support rapid growth. The regression coefficient of the length and weight relationship of *M. rume*, *H. bebe*, *M. abadii*, *M. hasselquistii*, *M. mento*, *M. macrophthalmus*, *C. tamandua*, *P. bane*, *H. psittacus*, and *P. bovei* indicates negative allometric growth pattern with ‘ b ’ values of 2.9, 1.8, 1.3, 2.0, 2.8, 1.6, 1.5, 1.7, 2.7 and 1.6 respectively indicative of negative allometric growth. This means that these species tend to grow longer without gaining weight as rapidly, resulting in a more elongated and less bulky body compared to species with positive allometric growth. This is consistent with findings in other West African rivers, where similar growth patterns have been linked to factors such as high competition for food or seasonal variations in resource availability (Adepo-Gourene et al., 2019). This growth pattern may reflect adaptive responses to environmental pressures, allowing *M. rume*, *M. mento* and *H. psittacus* to optimize their energy use under varying ecological conditions. Positive allometric growth, as seen in *M. senegalensis*, suggests that the species benefit from conditions that promote rapid weight gain, possibly due to abundant food or optimal habitat structures that support their growth. This observation aligns with the findings of Jibrin and Shu’aibu (2023) in

Assessments of some morphometric parameters of *M. rume* (Valenciennes, 1846) from Lake Geriyo, Adamawa, Nigeria where $b' < 3$ ($b = 2.9$). This also align with the result obtained by Onimisi et al. (2025) in Growth Allometry and Condition Factor of Some Mormyrids in Lower River Niger at Idah, Kogi State, Central Nigeria where species such as *H. bebe* showed negative allometry growth. Muslim et al. (2024) in Length-weight relationship and condition factor of *Trichopodus trichopterus* from Ogan Ilir peat swamp, South Sumatra, Indonesia showed negative allometry. The variations in growth patterns among the Mormyrid species studied reflect the complex ecological interactions and adaptive strategies that each species employs to survive in the lower River Niger.

Condition factor reflects variance and offers information on the physiological state and welfare of fish (Olanrewaju et al., 2017). The condition factor is an index that illustrates how biotic and abiotic factors interact to affect the physiological state of fishes. The condition factor (K) is used in fisheries to compare the „condition“ health of the fish (Alex and Adeyemo, 2021). The K value is used to assess the health condition of fish (Ahmadi 2018; Basak and Hadiuzzaman 2019). The Fulton condition factor is generally used to assess the health of the fish, indicating the nutritional and physiological status of the fish (Muchlisin et al 2017; Oktaviani et al 2020). In this study, *H. bebe* had the highest condition factor 1.4 which is similar to the study carried out by Souley et al. (2025) in Length-weight relationships and condition factors of Mormyridae species in the Niger River: implications for conservation and management where *H. bebe* also had the highest condition factor followed by *M. mento* and *P. bovei*. All other species are in poor condition. These results differ from Nwani et al. (2008), who found *M. rume* to have the best condition in the Anambra River, Nigeria, also Onimisi et al. (2025) who found *Mormyrus rume* to have good condition. All species exhibited negative allometric growth, which could be attributed to the sampling period. As Paugy and L  v  que (2006) noted, most fish species in the Sudan-Sahelian regions reproduce during the flood season, leading to increased energy expenditure at the expense of weight growth. This phenomenon has also been observed by Hamani (2015) and Oumarou (2018) in the ichthyological communities of the S   River in southern Benin and the Mormyridae communities in the Niger River. The condition factor (K) values for fish in the Niger River during the study period were generally low, indicating suboptimal living conditions. Zerbo (2004) reported that runoff water could affect the physico-chemical parameters of the water body, impacting the physiological conditions of the fish.

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