***Original Research Article***

# FISH SPECIES COMPOSITION AND MORPHOLOGICAL DESCRIPTIONS OF FIVE DOMINANT FAMILIES FROM INLAND WATERS OF KEBBI STATE-NIGERIA




## ABSTRACT

A study was conducted on fish species composition and morphological features of five dominant fish families from the inland waters of Kebbi state, Nigeria between January and December 2017. Three major fishing communities (Argungu, Sabiyel and Yauri) were selected for the study. Fish samples were qualitatively collected using gill nets. The total length and depth of the gill net was 150m and 3m respectively. The mesh size of the minimum 30m net was 1.25 inches, while the medium 30m net was 1.50 inches and maximum 30m net was 1.75. The analysis of the distribution of fish species were analyzed using Microsoft Excel software and statistical Package for the Social Science (SPSS) software version 22.0. In total 18 fish species belonging to 10 families were identified from the inland waters of Kebbi state. Viz: *Bagridae, Cichlidae, Claridae, Mormyridae, Citharacidae, Characidae, Mochokidae, Melaptaruridae, Schilbeidae* and *Cyprinidae*. Among the 10 families identified, two families *Bagridae* (22.22%) and *Mormyridae* (16.66%) were the most abundance, each comprising of four and three species respectively.


**Comment [RA1]:** This should be in M&M

**Comment [RA2]:** How did you apply SPSS to get the results presented in this work.

**Comment [RA3]:** What is your inference base on the results presented.

**Keywords:** fish species, morphological features, inland waters, Kebbi state Nigeria

## INTRODUCTION

Fish and fishing is an essential business in many countries globally, through the provision employment, income and it plays a significant role in assisting livelihood globally and also formulate a significant source of diet aimed at over one billion people [1]. Nwafili Sylvanus and Gao [2] classified the Nigeria inland water fishery resource as the lucrative in fish diversity in the whole West African sub-region with above 311 species. Nigeria has the largest natural aquatic environment that brings spawning and feeding habitats for a huge amount of freshwater and brackish water fish species [3]; [4]. These aquatic environments with above 270 fish species diversities are outstanding in terms of richness in West Africa [3]. The diversity and conservation of fish in inland water has attracted the attention of many researchers over the periods. There are only a few documented records of fish species composition in spite of the fact that they constitute the bulk of animal protein source. Only a small fraction of inland aquatic ecosystems

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have been scientifically investigated [5]. Ogundiwin [6] discovered about 36 families and 243 species mainly from freshwater, in Niger basin a region of high fish abundance in Nigeria. Similarly, Ita [5] found out that, there are about 268 diverse fish species in 34 well recognized Nigeria freshwater Lakes, rivers and reservoirs, with a surface of about 98,185, kilometer square are equivalent to 12% of the Nigeria entire area. Despite the considerable importance of small-scale fishing in Kebbi state, information on species available in the waters is not known. The present study was design as to identify fish species available nowadays in the inland waters of Kebbi state, Nigeria.

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## Materials and Methods

### Study area

Kebbi state is situated in the extreme north-western of Nigeria. It is lies between latitude 13°5458.93' - 11°727.00" N and longitude 3°3258.00' - 4°53'19.71"E (Fig.1). It covers approximately 18.591 $Km^2$ and with a population of about 2.757.544 million people almost [7]. The mean annual temperature is between 35°C to 40°C, annual rain fall range of 450-1050mm and relative humidity ranges from 51-79% and 10-25% during rainy and dry seasons respectively. The main economic activity is agriculture and over 70% of the people practice one form of agriculture or the other [8].

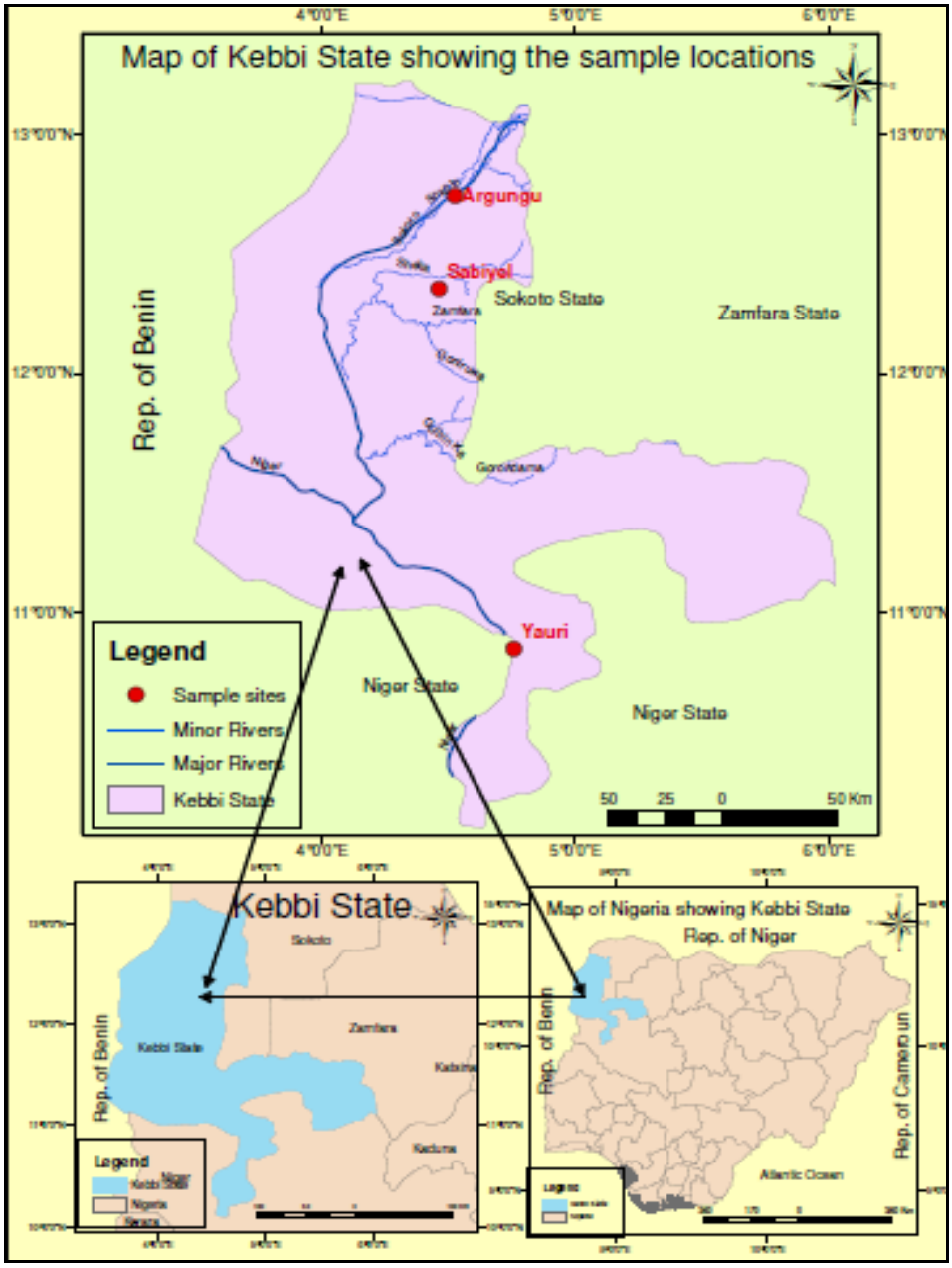


Figure.1: Map of study area and sampling stations (• dots)

### Fish samples collection

Fish sample were collected from three different landing centers namely Argungu, Sabiyel and Yauri during the months of January to December 2017. These three sampling sites cover the fishing grounds of Kebbi State and were chosen to represent the geographical locations of the fishery and the targeted stocks and to account for geographical differences in species availability and composition. The frame survey involved going round the entire three selected landing sites recording of the content of a canoe that had landed on return from a fishing trip. The commercial catch was acquired from fishermen working within the inland waters of Kebbi State and the raw data contained monthly catch returns (kg) per species, location and date were recorded [9]. These fishermen used the gill net with the mesh size of the minimum 30m net was 1.25 inches, while the medium 30m net was 1.50 inches and maximum 30m net was 1.75. The gill nets were regularly set in between 5pm and 6pm (evening) and pick up between 7am and 9am (morning). Earlier experience Ikomi and Odum [10] revealed that setting the nets in the mornings and removing them up in the afternoons or evening had continuously resulted in very poor catches.

**Comment [RA6]:** Which of this is A, B, C as indicated in your table. Include same in your map.

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### Species identification

The fishes trapped at the night were removed from the nets the following morning and preserved in polythene bags. In the laboratory, the fish caught was examined, arranged, and sorted according to the family and species and the amount of each species captured was recorded. The identities of the specimen were determined through keys and description in the existing literatures of [11]; [12]; [13].

**Comment [RA9]:** What is the distance to the laboratory, what is the reason for this method of preservation. Photograph in-situ will also help.

## RESULTS AND DISCUSSION

### Fish species composition

In total of 18 species representing 10 families were identified from the inland waters of Kebbi State, Nigeria (Table 1).

**Table 1: Composition and Relative Abundance of Fish Species and Families from inland waters of Kebbi state Nigeria.**

| FAMILY | SPECIES | Stations | | | QUANTITY | % |
|---|---|---|---|---|---|---|
| | | A | B | C | | |
| | *Bagrus bayad* | ● | ● | ● | | |
| Bagridae | *Chrysichthys nigrodigitatus* | ● | ● | ● | 4 | 22.22 |
| | *Clarotes lateceps* | | | ● | | |
| | *Bagrus docmac* | ● | ● | ● | | |
| Cichlidae | *Oreochromis niloticus* | ● | ● | ● | 1 | 5.56 |
| | *Clarias anguilaris* | | | ● | | |
| Claridae | *Heterobranchus bidorsalis* | ● | ● | ● | 2 | 11.11 |
| | *Gnatonemus tamandua* | | | ● | | |
| Mormyridae | *Hyperopsis bebes occidentalis* | ● | | ● | 3 | 16.66 |
| | *Mormyrus rume* | | ● | ● | | |
| Citharacidae | *Citharinus citharus* | ● | | ● | 1 | 5.56 |
| | *Hydrocynus forskalii* | ● | | ● | | |
| Characidae | *Alastes macrolepidotus* | | | ● | 2 | 11.11 |
| | *Synodontis nigrita* | ● | ● | ● | | 11.11 |
| Mochokidae | *Hemisynodontis membranaceous* | ● | | ● | 2 | |
| Melaptaruridae | *Melaptarurus electricus* | ● | ● | ● | 1 | 5.56 |
| Schilbeidae | *Schilbe mystrus* | | ● | ● | 1 | 5.56 |
| Cyprinidae | *Labeo coubie* | ● | | ● | 1 | 5.56 |

Note: (●) represent presence of fish species in a station

All the18 fish species present in the inland waters of Kebbi state were found in station A the second most fish species abundance station is station B with a total number of 12 fish species while station C has the least number of fish species as only 9 species were recorded as the time of this report (Table 1). The family *Bagridae* was the most abundance (22.22%) is similar to a study conducted on Fish composition and diversity assessment of Apodu reservoir, Malete, Nigeria were *Bagridae* was dominant [14]. The five fish families that were present and dominant throughout the study period in inland waters of Kebbi state are likely due to the relative abundance of the species in northern Nigeria, as indicated by Ataguba, et al. [15] and Adeosun, et al. [16] noted that the *Mormyridae, Cichlidae, Characidae, Mochokidae,* and *Claridae* were more common in northern Nigeria and likewise, the type of harvesting method as indicated by Allison and Okadi [17].

**Comment [RA10]:** Rewrite this statement

**Comment [RA11]:** and is

**Comment [RA12]:** Scanty discussion on the composition.

**Morphological description**

**Comment [RA13]:** Your descriptions of the morphological features are not detailed. Did all the species have the same features. There is need for comparing the different species and what make belong to the same family.

*Bagridae*: This family is one of the most diverse in the study area (Table 1). It is found in fresh water; Africa and Asia to Japan and Borneo. The body is moderately elongated and relatively large head with protruding, oval-shaped, bulbous eyes. Bagridae family dorsal fin proceeded by a spine, typically with 6 or

7 soft rays (rarely 8-20); adipose fin present and highly variable in size between species; pectoral spine jagged; usually 4 pairs of well-developed barbels including a pair from the nostrils. Snout is pointed, slightly longer than, or equal to the width of the mouth; fins are pointed, spines acute and body naked not covered by a thick epidemics tissue the color is silvery, with adipose fin has a dark blotch on it. Maximum length about 2 meters attained in for example *Chrysichthys nigrogiditatus* (Figure 2A). This study agrees with the study conducted on Sungai Teris fish fauna and Sungai Rengit, Krau Game Reserve, Pahang, Malaysia [18].

**Comment [RA14]:** Check your current literature about the family where Chrysichthys nigrogiditatus belong. Description is based on which author and year? Comparing your work with Malaysia shows no such work had been done in Nigeria or Africa.

*Mormyridae*: The anal, caudal and pelvic fins are present, caudal penduncle is narrow, caudal fin extremely forked while the teeth are present on parasphenoid and tongue. It has 6-8 branchois-tegal rays; dorsal fin rays 12-91 and anal fin rays 20-70. The dorsal and anal fins are frequently opposite and positioned back on body, the mouth is very variable in *Mormyrids* in some there is a very lengthen proboscis like snout with terminal mouth and in few there is extend lower jaw, whereas in others there is a rounded snout with an undershot mouth. Length can be up to 1.5m, the maximum length in some species is 9-50 cm [19]. Example, *Mormyrus rume* (Figure 2B) can be found in freshwater of tropical Africa and Nile [20, 21].

*Claridae*: The greatest diversity occurs in Africa where there are 12 genera and 74 species. Dorsal fin base very long situated close to occipital process, usually with additional 30 rays, not preceded by a spine, separate or continuous with caudal fin and distance between both is small. Pectoral and pelvic fins are constantly absent in some species, caudal fin is rounded, gill opening wide with typically 4 pairs of barbels and air-breathing labyrinthic organ arising from gills arches. Anal fin originates closer to caudal fin than to tip of the snout, the pectoral fin extends from operculum to base of first dorsal fin rays. The vomerine teeth are mostly pointed, forming a band not broader than that of the pre maxillary. The dorsal fin has 66-77 and the anal fin 52-61. (Figure 2C *Clarias anguillaris*) Several members of this family can travel short distances over land. It can found in freshwater of Africa, Syria and southern and western Asia. This study is similar to the study of fishes of the inland waters of Southeast Asia [12, 22]; [23].

**Comment [RA15]:** Who told you or you work on it.

**Comment [RA16]:** It can be

**Comment [RA17]:** In what way is it similar?

*Characidae*: The body is long and slender with a deeply forked tail. The adipose dorsal fin is very small. Dorsal fins are uniformly greyish, caudal without black edge, and adipose fin is grey. (Some characins lack the adipose fin). The nostrils are close together near the eye and the eye has a well-developed adipose eyelid. The body is grey on the back, sides are silvery and there are dark longitudinal stripes along each row of scales above the lateral line. The dorsal fin is grey, the upper lobe of the caudal is grey lower one bright red. Maximum lengths about 1.4m, at the extreme, many members of the family are under 3 cm and the smallest reach a maximum size of about 13cmm. This is the only entirely freshwater

fish families native to both Africa and South America [24-26]. *Hydrocynus forskalii* is an example and can be seen in (Figure 2D).

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*Mochokidae*: Adipose fin typically very large, anal fin with fewer than 10 rays, dorsal and pectoral fin spine usually short, slightly curved, strong and with a locking mechanism. It has 3 pairs of barbels, nasal barbel is absent and mandibular barbels may have many branches, some with lips and part of barbels modified into an oral sucker. The upper edge of the small adipose dorsal fin is more or less horizontal and forms a straight line with that of the back. The forked caudal fin usually has lobes of equal length. The pectoral spines are lightly serrated on the exterior edge and deeply toothed on the interior edge. Adipose fin ¼ of the standard length and external mandibulary barbel with few short ramifications, inner mandibulary barbel with short, thicken and tubular ramification. The body is brownish-grey in color with many small round black spots on the body and fins [27] *Synodontis nigrita* (Figure 2E).

**A- *Chrysichthys nigrogiditatus* (*Bagridae*)**

**B-*Mormyrus rume* (*Mormyridae*)**

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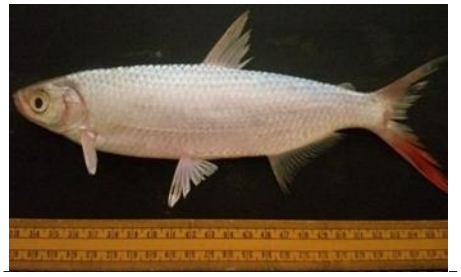
**C-*Clarias anguilaris* (*Clariidae*)**



**D-*Hydrocynus forskalii* (*Characidae*)**

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**E-*Synodontis nigrita* (*Mochokidae*)**

**Figure 2(A-E): Photograph of five dominant fish families collected from the inland waters of Kebbi State, Nigeria.**

## CONCLUSION

The intentions of the study were set to detect the fish species composition and morphological descriptions of five dominant fish families from inland waters of kebbi state-Nigeria. A total of 18 species belonging to 10 families were accounted and acknowledged from inland waters of Kebbi state , amongst them *Bagridae* were the most dominant family with 4 (four) species present in the inland waters of Kebbi state followed by *Mormyridae* 3 (three) species, *Claridae, Characidae* and *Mochokidae* has 2 (two) species each. Other contributing families are *Cichlidae, Citharacidae, Melaptaruridae, Schilbeidae* and *Cyprinidae* of which each family belong to one species. Not all the species recorded were equally obtainable throughout the study, as a result of geographical change, habitat degradation, overfishing, pollution and illegal fishing therefore; fish biodiversity is becoming degrading rapidly in the inland waters of Kebbi state. Diverse types of fishing gears were witnessed to catch fish during the study, though only traditional fishing is been practiced in the study area where as certain small-scale fishing was done also in profitable purposes.

In a nutshell, effective management committee as well as policy for these inland waters was inadequate. Therefore, certain management strategies, guidelines, plans, approaches and policies ought to be implemented. With the growth and proliferation of fish production the socio-economic conditions of fishermen will be enhanced. For this, governmental and Non-governmental organization should be come accelerative and supported fishermen to go ahead.

**Comment [RA21]:** Objectives

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**Comment [RA24]:** What about seasonal changes?

**Comment [RA25]:** Diversity. What could cause the degrading

**Comment [RA26]:** Your recommendations should be based on the research work.

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