

Fish Species Diversity and Abundance in Dadin Kowa Reservoir, Gombe State, Nigeria

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ABSTRACT

The fish abundance of River Dadin kowa, Gombe state was studied for six months (July-December 2015). Fish samples caught from the three selected sites of the reservoir were identified using a standard taxonomical key and recorded. A total of 355 individual fish made of 20 species from 12 distinct families were recorded. The result also revealed that families *Bagridae* had the highest number of species, followed by families *Cichlidae*, *Citharinadnae*, *Clariidae*, *Mochochidae*, *Mormyridae* and *Polypteridae* with two (2) species each. The remaining families (*Cyprinidae*, *Gymnarchidae*, *Malapterudae*, *Osteoglosidae* and *Schilbiidae*) had only one species representing each of them. *Oreochromis niloticus*, *Clarias lazera* and *Bagrus bayad macropterus*, had 12.7%, 11.3% and 10.7% respectively, of the total fish species identified. *Auchenoglanis biscutatus*, *Synodontis batensoda* and *cithrinus citharus* had 8.7%, 7.3% and 7.0% identified respectively. *Cithrinuslatus* and *Mormyrus rume* had 6.5% and 5.4% species identified respectively. *Schilbe mytus* and *mormyrus macropthalmus* had 4.5% each. *Tilapia galileaus*, *Labeo senegalensis*, *clarias gariepinus*, *Heterotis niloticus* and *Bagarus docmac* had 4.2%, 3.4%, 2.8%, 2.3% and 1.7% respectively. The remaining fish species *Gymnarchus niloticus*, *polypterus senegalus* and *protepterus annectens* had 1.4% each. The lowest specie identified is *Malapterus electricus* with 1.1%. This could be explained by the fact that the lake ecology is yet to stabilize.

Keywords: Fish Species, Diversity, Dadin Kowa, *Oreochromis niloticus*, *Bagrus*, Gombe

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INTRODUCTION

The fish yields of most Nigerian inland waters are generally on the decline (Jamu and Ayinla, 2003). The decline of these fisheries has been attributed to a wide range of causes ranging from inadequate management of the fisheries resources to environmental degradation of the water bodies. The freshwater fish found in Nigeria is about 268 different fish species (Leveque et al., 1992). They inhabit over 34 well-known rivers; the rivers would be characterized by higher species diversity (Ita, 1993). Boulenger, (1916), publish a list of African freshwater fishes to include 976 species, referable to 185 genera and 43 families. But Welman, (1948),

produced a list of 181 species of fish that could be found in Nigerian inland waters. The report also revealed that Kaduna and Sokoto-Rima River have 22 and 28 species respectively. Ita, (1993), reported that an estimated 230 species of fish had been recorded from the rivers of Nigeria, but no record is available on the species present in Rivers Echi, Anambra, Oji and Adada, which all empty directly into the ocean via River Niger. Information is scanty on the biometry and relative abundance of the ichthyofauna of Anambra River (Gregory et al., 2009). Dankishiya, (1991), identified 31 species in Lake Geriyo. On the River Benue, 113

species were collected in the Mayo-kebbi (Blache et al., 1964) versus 128 in the Benue River (Stauch, 1966).

In Dadin Kowa Dam there was a complaint by local fishers about the decline in their catches. Investigating the fish abundance in River Dadin Kowa is necessary. There are increasing human and agricultural activities in Dadin Kowa Dam which may be responsible for the deterioration of the aquatic environment and affect the fishery resources. This study will sensitize the local fishermen and Dam managers about the available fish species present in the river. It will also help researchers' especially aquatic ecologist because it will serve as a guide on how and where to continue further research work.

MATERIALS AND METHODS

Study Area

Dadin Kowa Dam is located 5km North of Dadin Kowa village (about 37km from Gombe town, along Gombe-Biu Road) in Yamaltu Deba Local Government Area of Gombe State. The area lies within longitude 11° 30' E and 11° 32' E, and Latitude 10° 17' and 10° 18' N of the equator (UBRDA, 1980). The reservoir has a capacity of 800 million cubic meters of water and a surface area of 300 square kilometers and has potential as a source of fish.

Sampling procedure

Fish samples were collected from three stations (A, B, and C). Station A is located at the upstream where the river is dammed; the major activities are fishing and drinking water by animals. Station B is a midstream where there are high human activities such as washing, bathing and discharge of solid and sewage waste. While station C is downstream of the river, the major activities are irrigation and domestic activities.

Sampling of fish

Fish samples were collected from the fishermen fishing on the water body, where catch per fisherman and species caught were recorded. Sampling was carried out for six months (July-December). Fishing gears used by local fishermen includes: Top and bottom set foul hook line, gill and cast nets of different mesh size (2, 2.5, and 3 inches). Fish species identification was done with the aid of reference materials (Babatunde and Raji, 1998).

Data analysis

The data were subjected to Statistical Package for Social Sciences (SPSS), version 17.0, and presented in tables and percentages.

RESULT

The result of fish species identified is presented in Tables 1 and 2. A total of twenty (20) fish species, representing twelve (12) families were identified. The table also revealed that families Bagridae had the highest number of species, followed by families Cichlidae, Citharinadnae, Claridae, Mochochidae, Mormyridae, and Polypteridae with two (2) species each. The remaining families (Cyprinidae, Gymnarchidae, Malapterudae, Osteoglosidae and Shilbidae) had only one species representing each of them. Table 3 shows the percentage composition of the twelve (12) families of fish species identified throughout the six months samples were collected. Family Bagridae constitutes 15%. Families, Chichlidae, Citharinadae, Claridae, Mochokidae, Mormyridae and Polypteridae constituted 10% each. The remaining families constituted 5% each.

The percentage composition of fish species identified in Dadin kowa River is presented in Table 4. The table reveals that *Oreochromis niloticus*, *Clarias lazera* and *Bagrus bayad macropterus*, had 12.7%, 11.3% and 10.7% respectively, of the total Fish species identified. *Auchenoglanis biscutatus*, *Synodontis batensoda* and *cithrinus citharus* had 8.7%, 7.3% and 7.0% identified respectively. *Cithrinuslatus* and *Mormyrus rume* had 6.5% and 5.4% species identified respectively. *Schilbe mytus* and *mormyrus macrophthalmus* had 4.5% each. *Tilapia galileaus*, *Labeo senegalensis*, *clarias gariepinus*, *Heterotis niloticus* and *Bagarus docmac* had 6.4%, 4.2%, 3.4%, 2.8%, 2.3% and 1.7% respectively. The remaining fish species *Gymnarchus niloticus polypterus senegalus* and *protepterus annectens* had 1.4% each. The lowest specie identified is *Malapterus electricus* with 1.1%.

The table contains the relative abundance of various fish species identified throughout the period of study. The table indicates that the Dam recorded its high relative abundance in the month of October and its least relative abundance in the month of December.

DISCUSSION

The result has shown that the dam has a rich ichthyofauna complex with 20 species and 12 families compared with the report of Oguzie, (1982), who carried out similar studies in Gubi-reservoir Bauchi state and identified only seven species. The result of this study agrees with that of Ekeanyanwu, (1980), who reported the presence of 30 species in river Delimi Jos around Dadin Kowa area throughout the season before its impoundment was observed. Abdullahi, (2005), reported 26 species identified in river Benue around Boronji area. Dankishiya, (1991), identified 31 species in Lake Geriyo but Abubakar et al. (2005), reported 36

Table 1: Fish Biodiversity identified in Dadin Kowa Reservoir.

Families of Fish Species	
1. Family- Bagridae (sub-order Siluroidei)	<i>Bagrus domac niger</i> <i>Bagrus bayad macropterus</i> <i>Auchenoglanis biscutatus</i>
2. Family- Cichlidae (order perciformes)	<i>Oreochromis niloticus</i> <i>Tilapia galileaus</i>
3. Family- Citharinidae (sub order: Charcoidei)	<i>Citharinus citharus</i> <i>Citharinus latus</i>
4. Family- Claridae (sub order: Siluroidei)	<i>Clarias lazera</i> <i>Clarias gariepinus</i>
5. Family- Cyprinidae (sub order: Cyprinoidei)	<i>Ileus senegalensis</i>
6. Family- Gymnarchidae	<i>Gymnarchus niloticus</i>
7. Family- mochochidae (sub-order siluroidei)	<i>Synodontis batensoda</i> <i>Synodontis schall</i>
8. Family- Mormyridae (order: mormy riformes)	<i>Mormyrus rume</i> <i>Mormyrus macrophthalmus</i>
9. Family- Malapteruidae	<i>Malapterirus electricus</i>
10. Family- Osteoglossidae	<i>Heterotis niloticus</i>
11. Family- polypteridae	<i>Polypterus senegalus</i> <i>Polypterus annectens</i>
12. Family- Schilbeidae	<i>Schilbe mytus</i>

Table 2: Percentage Composition of various Fish Families identified in Dadin kowa Reservoir.

S/No	Family	Number of species	Percentage (%)
1.	<i>Bagridae</i>	3	15
2.	<i>Cichlidae</i>	2	10
3.	<i>Citharinidae</i>	2	10
4.	<i>Claridae</i>	2	10
5.	<i>Cyprinidae</i>	1	5
6.	<i>Gymnarchidae</i>	1	5
7.	<i>Mochochidae</i>	2	10
8.	<i>Mormyridae</i>	2	10
9.	<i>Malapterudae</i>	1	5
10.	<i>Osteoglossidae</i>	1	5
11.	<i>Polypteridae</i>	2	10
12.	<i>Schilbedae</i>	1	1
	Total	20	100%

species in the same Lake Geriyo. The decline of these fisheries has been attributed to a wide range of causes ranging from inadequate management of the fisheries resources to environmental degradation of the water bodies (Leveque et al., 1992).

The species diversity of the river agrees with a final report in the master plan of the Dam, as regards the fishery potential of the Gongola River before its impoundment. According to the report, the Gongola River being a major tributary of the Benue is from the

Table 3: Relative Abundance of Fish Biodiversity identified in Dadin Kowa Reservoir.

S/No	Fish Species	Months						Total
		Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
1.	<i>Clarias gatiepinus</i>	2	3	-	4	1	-	10
2.	<i>Synodontis schall</i>	1	-	1	2	2	-	6
3.	<i>Heterotis niloticus</i>	3	1	2	-	1	1	8
4.	<i>Propterus annectens</i>	-	1	1	-	1	2	5
5.	<i>Malapterus electricus</i>	1	-	-	2	1	-	4
6.	<i>Mormyrus rume</i>	3	2	6	5	3	-	19
7.	<i>Polypterus senegalus</i>	1	-	-	2	1	1	5
8.	<i>Clarias lazera</i>	5	2	-	4	2	3	16
9.	<i>Synodontis batensoda</i>	7	3	4	9	-	3	26
10.	<i>Gymnarchu niloticus</i>	-	2	1	2	-	-	5
11.	<i>Cithrinus latus</i>	7	5	1	4	-	6	23
12.	<i>Labeo Senegalensis</i>	3	-	2	4	2	1	12
13.	<i>Auchenoglanis biscutatus</i>	7	3	8	5	2	6	31
14.	<i>Bagrus bayad macropterus</i>	5	9	3	12	2	7	38
15.	<i>Tilapia galileus</i>	4	-	3	5	1	2	15
16.	<i>Bagrus demacniger</i>	-	-	2	3	1	-	6
17.	<i>Mormyrus macrophthalmus</i>	6	2	-	5	2	1	16
18.	<i>Schilbe mytus</i>	6	10	5	12	7	-	40
19.	<i>Citharinus Citharus</i>	5	3	4	10	2	1	25
20.	<i>Oreochromis niloticus</i>	12	5	10	8	3	7	45
	Total	78	51	53	98	34	41	355

Table 4: Percentage Composition of Fish Biodiversity in Dadin Kowa Reservoir.

S/No	Fish Species	Identified	Percentage
1.	<i>Auchenoglanis biscutatus</i>	31	8.7
2.	<i>Bagrus demacniger</i>	6	1.7
3.	<i>Bagrus bayad macropterus</i>	38	10.7
4.	<i>Citharinus citharus</i>	25	7.0
5.	<i>Cithrinus latus</i>	23	6.5
6.	<i>Clarias lazera</i>	40	11.3
7.	<i>Clarias gariepinus</i>	10	2.8
8.	<i>Gymnarchu niloticus</i>	5	1.4
9.	<i>Heterotis niloticus</i>	8	2.3
10.	<i>Labeo senegalensis</i>	12	3.4
11.	<i>Malapterus electricus</i>	4	1.1
12.	<i>Mormyrus rume</i>	19	5.4
13.	<i>Mormyrus macrophthalmus</i>	16	4.5
14.	<i>Oreochromis niloticus</i>	45	12.7
15.	<i>Shilbe mytus</i>	16	4.5
16.	<i>Synodontis batensoda</i>	26	7.3
17.	<i>Synodontis schall</i>	6	1.7
18.	<i>Tilapia galileus</i>	15	4.2
19.	<i>Polypterus senegalus</i>	5	1.4
20.	<i>Propterus annectens</i>	5	1.4
	Total	355	100

Ichthyo-geographical viewpoint a component of the Niger-Benue distribution system. That is, any fish species of river Benue have access to the Gongola River. It is known that Niger-Benue within Nigeria has well over 150 different species of fish of which 50 are regarded as being of commercial importance (Mathew and Marshall, 1980). Fish species diversity of Dadin Kowa Dam might be attributed to the wide variety of

Zooplankton and phytoplankton species present which form the bases of the food web to invertebrates' in any aquatic ecosystem. From the result, in terms of representation, the family *Bagridae* had the highest species. In terms of relative abundance of the 20 species identified, *Bagrus bayad macropterus* stands out as the most dominant species. These findings slightly deviated from the findings of other researchers

who confirm that *Tilapia* and *Oreochromis* species are the most dominant species found in most West African water bodies, *Sarotherodon* and *Tilapia* species constituted 90% by a number of the whole fish population in river Sokoto (Holden and Reed, 1972). In Auree reservoir plateau state, *Sarotherodon* and *Tilapia* species constituted 95.4% of the total by number (Anthony et al., 1986). Abubakar et al., (2005) reported *Oreochromis niloticus* as the most abundant species in Lake Geriyo, Abdullahi (2005) reported high species abundance of *Sarotherodon galileus*. Abiodun et al. (2005) also reported that *Oreochromis* and *Sarotherodon* as the most abundant species in lake Geriyo Adamawa state.

The reason why the *Bagrus bayad macropterus* was dominant during the study period might be attributed to the fact that despite the excessive breeding among *Cichlids*, the presence of many piscivorous fish species such as *Hydrocynus* species may check the population of *Cichlid* in the water body. This might have resulted in a decrease in abundance of *cichlid* during the study period. *Bagrus bayad macropterus* are reputed to feed on fish fry, fish eggs, crustaceans, snails and insect larvae, as well as plants (Zainab, 1989). Their feeding on eggs and fry of the other fishes also reduces the population of other fish species and give them the opportunity to dominate the water. Other dominant species in the river include *Clarias lazera*, *Schilbe mytus*, *Sarotherodon galileus*, *Auchenoglanis biscutatus*, *Chitharinus citharus*, *Citharinus latus* and *Synodontis batensoda*. This conforms to similar studies done in other water bodies, such as in Bakalori reservoir, *Labeo*, *Synodontis* and *Clarias* species constituted part of the most important species other than *Tilapia* species (Ita et al., 1982). In Lake Chad before the 1972/73 and 1983/84 droughts, *Bagrus* and *Labeo* species (4.2% and 3.5%) constituted part of the most important commercial species (Bukar and Gubio, 1985).

Based on the twelve families identified, the *Bagridae*, is the most abundant constituting 15%. In contrast, in the same River, Zainab, (1989), reported that *Cichlidae* was the dominant family instead of *Mormyridae* and *Bagridae* (constituting 33.3% of the total catches), followed by *Characidae* (22%) and *Schilbedae* (10.3%). In Lake Kanji *Characidae* was dominant with 36.3%, followed by *Mormyridae* (20.7%) and *Mochokidae* (18.0%) (Motwani and Kanwai, 1970).

Going by the preliminary investigations done before the impoundment of the Gongola River, *Heterobranchus*, *Lates niloticus*, *Hydrocynus*, *Gymnarchus* were particularly mentioned as being some of the commercially important species in the river. But in contrast, these species are not in the list of the dominant species in the river. In the present investigation, However species such as *Bagrus*, *Tilapia*, *Citharinus* and *Clarias*, which are among the most abundant species in the reservoir conforms to the

previous investigation done on Gongola River. *Gymnarchus* and *Heterotis* are only found at the beginning of the rainy season and was explained by the local fishermen that since the damming of Gongola River at Kirithese two species are only available during that period. This could be explained by the fact that the lake ecology is yet to stabilize, the locustrine conditions has just started; of which in the future analysis some of the species known to abound in the river may disappear or greatly reduced and the River may eventually be colonized by other species favored by the locus trine condition.

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