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Fish Species Diversity and Abundance of Dadin Kowa Dam, Gombe State Nigeria

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Abstract:

An assessment of fish species diversity and abundance of Dadin Kowa Dam Gombe State has been carried out over a period of eight months (July, 2011-February, 2012). A total of twenty six (26) fish species representing fourteen (14) families were identified under families Bagridae, Mormyridae, Cichlidae, Characidae, Citharinadae, Claridae, Mochokidae, Polypteridae, Cyprinidae, Dischontidae, Gymnarchidae, Malapteruridae, Osteoglossidae and Schilbedae. The families Bagridae and Mormyridae had the highest representation in terms of species number. The Dam has a rich ichthyofauna complex, the trend in the fish fauna is yet to be stabilized, in future when the Lake condition is fully established, changes may occur in the composition and relative abundance of various fish species.

Keywords: Fish species, Diversity, Abundance, Dadin Kowa Dam.

1. Introduction

Fish is a high quality food and its protein content is high; it is rich in vitamins and contains variable quantities of fats and calcium for human health (Moses, 1990). Fish contributes a significant share in the world protein, its protein is first class and inexpensive and its consumption is highly desirable (Moses, 1990). As a component of economy, fishing provides employment, income, trading opportunity and valuable supply of protein for human consumption (Neiland *et al*, 1994 and 1997).

Inland fisheries are extremely diverse and harvest a tremendous amount of biodiversity. Inland fisheries in Nigeria is said to contribute about 200,000 metric tons to the total annual National fish production that stagnates at about 500,000 metric tons. Nigeria consumes some 1.3 million metric tons of fish a year including up to 700, 000 metric tons of imported frozen fish (Miller, 2004). According to Aquaculture and inland fisheries project Newsteller, April, 2004, Nigeria has over 14 million hectares of inland waters, much of which lack proper management. Nigeria could be self-sufficient in fish production and be a major exporter of fish if the, over 14 million hectares of Nigerian inland water bodies are developed and properly managed (Abiodun, and Miller, 2005). Fresh water aquatic systems represent about 2-3% of the marine area, yet contain 40% of known fish species. Some of this biodiversity are threatened or rare, and inland fish species have been identified as the most threatened group of vertebrates used by humans (Devin and John, 2008). Aquaculture can be a component of species recovery program if integrated in to a broader management framework.

Inland fisheries provide food and employment in rural areas where few other options are available. Over 60 million people in developing countries are involved in aspects of small-scale inland fisheries. A large quantity of the marine catches is reduced to fishmeal or oil used to raise farmed fish (Lymer *et al*, 2008a). Tacon and Metian (2009) showed that 23.8 million tones or 29% total marine capture fisheries landing in 2006 were used as feed. Regarding contribution to rural nutrition, a large part of aquaculture and marine production may be sold on major markets and even exported, while inland fisheries generally produce low product that are consumed in the fishing household or are sold locally (Tacon and Metian, 2009).

Investigation on fish population structure of inland water in West Africa showed that more than 200 species of fish were found in diverse habitats. In Nigeria, fishing is associated with many areas; the main rivers are Niger, Benue, Hadeja, Kaduna, Cross River, Imo, Sokoto, Gongola, Lake Chad basin, the coastal creeks and Lagoons (Abdullahi, 2005). Methods of fish cropping such as use of nets, seines, hooks and lines, Baskets, canoes and fishing engines boats with trawlers for fishing expedition are mostly common in many Nigerian regions (Oye, 1986).

The identification of fish fauna of an aquatic ecosystem is the first and the most important step in the full exploitation of its fishery resources. The aim of the study is to determine the species diversity and abundance of Dadin Kowa Dam and the objectives of the study are to determine the most abundant species in the study area.

2. Materials And Methods

2.1. 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 18N of the equator (UBRDA, 1980). The Dam is part of River Gongola; its drainage basin is situated in North-Eastern Nigeria, with water capacity of

800million cubes and surface area of 300kilometers square. The Dam experiences two seasonal periods, the rainy season, which is characterized with heavy rainfall and sometimes results in flood action. The dry season which is characterized by cold, dusty dry winds, followed by intense heat.

2.2. Fish Sampling Protocols

Two landing centre's were used for fish sampling. One centre at deeper waters closer to the Dam site and the other at the shallower waters. Samples were obtained from the local fishermen at each of the landing sites. Fishing gears that were used by the local fishermen includes Top and Bottom set foul hookline, gill and cast nets of different mesh sizes (2, 2.5, and 3 inches). Fish species identification was done with the aid of reference materials (Babatunde and Raji, 1998), (Anthony, 1982) and (Holden and Reed, 1972). Fish sampling were carried out over a period of eight months.

3. Results

The result of fish species identified is presented in Table 1. A total of twenty six (26) fish species, representing fourteen (14) families were identified. The table also revealed that families Bagridae and Mormyridae had the highest number of species each, followed by families Chichlidae, Characidae, Citharinadae, Claridae, Mochokidae and Polypteridae with two (2) species each. The remaining families (Cyprinidae, Distichontidae, Gymnarchidae, Malapteruridae, Osteoglossidae and Schilbedae) had only one species representing each of them (Table 1).

Family – Bagridae (sub-order: Siluroidei
Auchenoglanis bicutatus
Bagrus docmac niger
Bagrus bayad macropterus
Claroates laticeps
Family - Characidae
Alestes nurse
Hydrocynus lineatus
Family- Chichlidae (Order: perciformes)
Oreochromis niloticus
Tilapia galileaus
Family- Citharinidae (Sub order: charcoidei)
Citharinus cithrus
Citharinus latus
Family- Claridae (sub order: siluroidei)
Clarias lazera
Clarias gariepinus
Family- Cyprinidae (sub order: cyprinoidei)
Labeo senegalansis
Family- Distichontidae
Distichodus brevipinnus
Family- Gymnarchidae
Gymnarchus niloticus
Family- Mochochidae (sub order:siluroidei)
Synodontis batensoda
Synodontis schall
Family- Mormyridae (order: mormyriiformes)
Mormyrus rume
Mormyrus macrophthalmus
Gnathanemus abadii
Gnathanemus senegalensis
Family- Malapteruridae
Malapterirus electricus
Family- Osteoglossidae
Heterotis nilitocus
Family- Polypteridae
Polypterus senegalus
Polypterus annectens
Family- Shilbedae (order: siluroidae)
Shilbe mytus

Table 1: Fish species identified in Dadin Kowa Dam

The percentage composition of fish species identified in Dadin Kowa Dam is presented in Table 2. The table reveals that, *Bagrus bayad macropterus*, *Oreochromis niloticus* and *Clarias lazera* had 13.7%, 10%, and 7.8% of the total fish species identified. *Schilbe mytus* and *Sarothredon galileaus* had 6% and 5.5% respectively. *Auchenoglanis biscutatus*, *Citharinus citharus*, *Citharinus latus* and *Synodontis batensoda* had 5% each. The remaining fish species had less than 5% of the total fish species identified (Table 2).

Table 3 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 February and its least relative abundance in the month of October.

Fish species	Number identified	Percentage (%)
<i>Auchenoglanis biscutatus</i>	36	5.1
<i>Alestes nurse</i>	9	1.3
<i>Bagrus docmac niger</i>	12	1.7
<i>Bagrus bayad macropterus</i>	97	13.7
<i>Cithrinus citharus</i>	36	5.1
<i>Cithrinus latus</i>	36	5.1
<i>Clarias lazera</i>	55	7.8
<i>Clarias gariepinus</i>	23	3.3
<i>Claroates laticeps</i>	9	1.3
<i>Distichodus brevipinis</i>	7	1.0
<i>Gnathonemus abadii</i>	14	2.0
<i>Gnathonemus senegalus</i>	24	3.4
<i>Gymnarchus niloticus</i>	9	1.3
<i>Heterotis niloticus</i>	6	0.8
<i>Hydrocynus lineatus</i>	33	4.7
<i>Labeo senegalensis</i>	25	3.5
<i>Malapterirus electricus</i>	8	1.1
<i>Mormyrus rume</i>	22	3.1
<i>Mormyrus macrophthalmus</i>	32	4.5
<i>Oreochromis niloticus</i>	72	10.2
<i>Shilbe mytus</i>	44	6.2
<i>Synodontis batensoda</i>	38	5.4
<i>Synodontis schall</i>	11	1.6
<i>Sarotherodon galileaus</i>	39	5.5
<i>Polypterus senegalus</i>	6	0.8
<i>Protepterus annectens</i>	4	0.6
Total	707	100%

Table 2: Percentage composition of fish species identified in Dadin Kowa Dam

Fish species	M	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	TOTAL
<i>Oreochromis niloticus</i>	12	10	2	-	2	12	14	20	72	
<i>Sarotherodon galileaus</i>	5	7	3	1	-	6	5	12	39	
<i>Bagrus docmac niger</i>	1	-	1	3	1	-	4	2	12	
<i>Bagrus bayad macropterus</i>	14	-	12	9	13	10	17	22	97	
<i>Labeo senegalensis</i>	2	4	-	3	7	4	2	3	25	
<i>Cithrinus citharus</i>	20	2	4	-	2	3	1	4	36	
<i>Cithrinus latus</i>	6	12	4	2	1	2	-	3	30	
<i>Shilbe mytus</i>	6	3	4	-	4	18	6	3	44	
<i>Auchenoglanis biscutatus</i>	12	8	4	6	-	1	3	2	36	
<i>Synodontis batensoda</i>	3	6	4	10	-	3	8	4	38	
<i>Clarias lazera</i>	3	6	7	2	4	11	13	9	55	
<i>Gymnarchus niloticus</i>	7	2	-	-	-	-	-	-	9	
<i>Gnathonemus abadii</i>	-	-	3	1	6	2	-	2	14	
<i>Mormyrus rume</i>	4	6	2	3	-	4	2	1	22	
<i>Polypterus senegalus</i>	-	-	1	-	2	1	-	2	6	
<i>Dischondus brevipinnis</i>	-	2	-	-	1	-	2	2	7	
<i>Claroates laticeps</i>	2	1	-	-	2	1	3	-	9	
<i>Protepterus annectens</i>	1	-	-	-	2	-	-	1	4	
<i>Synodontis schall</i>	2	1	-	3	2	1	2	-	11	
<i>Malapterirus electricus</i>	1	-	2	2	1	-	-	2	8	
<i>Alestes nurse</i>	3	2	-	1	-	-	2	1	9	
<i>Mormyrus macrophthalmus</i>	4	3	5	6	2	1	8	3	32	
<i>Hydrocynus lineatus</i>	2	4	1	3	7	4	3	9	33	
<i>Gnathonemus senegalensis</i>	-	10	2	4	3	2	7	5	24	
<i>Heterotis niloticus</i>	3	2	1	-	-	-	-	-	6	
<i>Clarias gariepinus</i>	-	4	1	5	-	-	9	4	23	
TOTAL	119	91	63	58	62	87	106	121	707	

Table 3: Relative abundance of fish species identified in Dadin Kowa Dam

2.3. Discussion

The result has shown that the dam has a rich ichthyofauna complex with 26 species and 14 families compared with other water bodies where similar studies have been carried out, for instance in Gubi-reservoir Bauchi state only seven species were identified (Oguzie, 1982). The result of this study agrees with that of many researchers which include (Ekeanyanwu, 1980) in river Delmi Jos where seven genera were identified. (Anthony *et al*, 1986) recorded four species in Auree reservoir near Plateau state. Eleven species were identified in Lake Botsumtrwi, Ghana (whyte, 1975). It was reported that fisherman of Gongola river (Dadin Kowa area) indicated the presence of 30 species in the river throughout the season before its impoundment (Mathew and Marshall, 1980). Abdullahi (2005) reported 26 species identified in river Benue around Boronji area. Dankishiya (1991) identified 31 species in Lake Geriyo, but Abubakar (2006) reported 36 species in the same Lake Geriyo.

From the result, in terms of representation, the families Mormyridae and Bagridae had the highest species (i.e. represented by 4 species each) and rank 15.4%. The remaining had 2 or 3 species representing them. The result agrees with that (Motwani and Kanwai, 1970) in Lake Kainji, where the family Mormyridae recorded the most abundant with 19 species.

In term of relative abundance of the 26 species identified, *Bagrus bayad macropterus* stands the most dominant species constituting 13.7% of the total catch. This was followed by *Oreochromis niloticus* with 10.2% of the total catch. 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 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). In Lake Bosumtwi Ghana, *Sarotherodon* and *Tilapia* constituted the bulk of catches (whyte, 1975). Abubakar (2006) reported *Oreochromis niloticus* as the most abundant species in Lake Geriyo. Abdullahi (2005) reported high species abundance of *Sarotherodon galileaus*. Abiodun and Miller (2005) also reported that *Oreochromis* and *Sarotherodon* as the most abundant species in lake Geriyo Adamawa state.

The Dam has a rich ichthyofauna complex, the trend in the fish fauna is yet to be stabilized, in future when the Lake condition is fully established, changes may occur in the composition and relative abundance of various fish species.

Proper management of the Dam cannot be achieved without regulating the gears used for harvesting and possibly also by assigning convenient time for fishing. Controlling the mesh sizes of the gears is also needed, gear should not be less than 2 inches in line with Federal Inland fisheries decree (ANON, 1992) in order to protect the spawning stock of commercially valued species. Creation of alternatives other than fishing to the local fishermen is highly recommended in order to attain a proper management of the Dam.

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