DIVERSITY AND ABUNDANCE OF FISH SPECIES IN GBEDIKERE LAKE, BASSA, KOGI STATE

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ABSTRACT
Experimental gill net and artisanal fishery of Gbedikere Lake, Bassa, Kogi State, Nigeria were assessed between October 2006 and September 2008. Fish species diversity was found to be low; twelve species representing ten families were identified namely, Protopteridae, Mormyridae, Clariidae, Mochokidae, Cichlidae, Malapteruridae, Osteoglossidae, Gymnarcidae and Citharinidae. Cichlids were numerically most dominant of the catches (Oreochromis niloticus, (17.90%) and Tilapia zilli (13.01%). In terms of biomass the trend was found to be the same. Other species of numerical importance were Heterotis niloticus (15.56%), Clarias gariepinus (13.16%), Gymnarchus niloticus (8.78%), Heterobranchus bidorsalis (7.14%), Synodontis nigrita (6.69%), Mormyrus rume(5.68%), Citharinus citharus(3.91%), Labeo senegalensis(2.93%) and Protopterus annectens (2.74%). Oreochromis niloticus dominated the catches in all the months, contributing over 17.90% to catches by number and between 13.40% by weight throughout the duration of the sampling. The mean annual yield obtained through catch assessment surveys during the study was 240.2 tons. A log transformed length-weight regression analysis for four of the economically most important species revealed the following linear relationships. Log W = -1.2366 + 2.8028 Log L (r = 0.9798) for Heterotis niloticus; Log W = -1.7525 +3.047 Log L (r =0.9361) for Oreochromis niloticus; Log W = -2.3449 + 3.496 Log L (r = 0.9548), for Tilapia zilli and Log W =-1.0306 + 2.321 Log L (r =0.9351) for Clarias gariepinus.

Keywords: *Species diversity, Abundance, Length-weight, Seasonality, Gbedikere Lake.*

INTRODUCTION

Lakes are invaluable ecological resources that serve many human needs and therefore, enhance our lives by providing a lot of opportunities. This explains why a large proportion of Nigerian population live near water bodies such as lakes, reservoirs, rivers, swamps and coastal lagoons. Many depend heavily on the resources of such water bodies as their main source of animal protein and family income (Haruna *et al,* 2006). Kogi State in particular and Nigeria in general is blessed with natural and man-made water bodies among which are Gbedikere Lake which is one of the largest known natural lake in the state. Many of the most valuable fish stock in the water bodies are already fully exploited or over fished and relatively new-stocks are unveiled and exposed to exploitation (Bankole and Mbagwu, 1995).

The pioneering fishery resource survey of lake Alau in Maiduguri, Borno State carried out by Odunze, (three years after the reservoir was formed) , revealed 10 species representing 7 families. These were *Oreochromis niloticus*, *Sarotherodoen galileus* and *Tilapia zilli* (Cichlidae) *Alestes nurse* (Characidae) *Schilbe mystus* (Schilbeidae) *Synodontis nigrita* (Mochokidae) *Clarias anguillaris* (Clariidae) *Marcusenius psittacus, Gnathonemus abadii* (Mormyridae) and *Protopterus annectens* (Lepidosirenidae) (Odunze *et al* (1995). The subsequent study carried out on the lake by

Bankole *et al* (1994) was a survey of the catches obtained by fishermen. The studies revealed 16 species representing 9 families. An additional 2 species were recorded for the Mochokidae (*Synodontis batensoda* and *S. nigrita*) 1 additional species for the Characids (*Micralestes acutidens*).Two new families recorded were Polypteridae represented by *Polypterus senegalus* and Cyprinidae represented by *Labeo parvus*. The fisheries productivity of this lake could not have optimized as this depends on ecological studies which has not been undertaken. For rational and sustainable management of this exploited resource, it is important that information on sustainable management and growth be provided.

Before now, no documented study has been carried out on Gbedikere Lake. The fisheries productivity of this lake could not have been optimized as this depends on ecological studies which have not been undertaken. For rational and sustainable management of this exploited resource, information on the species composition, abundance, distribution, and growth be provided. This study is aim at this.

MATERIALS AND METHODS

Study Area

Lake Gbedikere is a natural lake located between Latitudes $7^{0}25^{N}$ and Longitudes $7^{0}30^{E}$ and is about 10km to the East of Oguma the Head quarter of Bassa Local Government Area of Kogi State. Water enters the Lake from tributaries that run from River Benue during rainy or flood season. When the season is over, the Lake separates out. The Lake is about 450m north of Gbedikere village. The water body covers area of about 400m-450m with a mean depth of 10-14m, (AIFP, 2003) depending on the season and is used majorly for domestic purposes and fishing; consequently most of the settlers around the Lake are fishermen (Upper Benue River Basin Development Authority, 1985).

The Lake is endowed with fish, other aquatic animals and some macrophytes such as wire grass (*Cyperus articulatus*) which are used for weaving mats. It experiences two seasonal periods; the rainy season that starts in the month of May and last till October and is characterized by heavy down pours which sometimes have an extensive flood action. The dry season is from late October to April and is characterized by cold, dusty -dry wind especially between December and February while this is followed by intense heat. The Lake also serves as drinking point for cattle which are a prominent part of the agricultural livestock in the region. The uncultivated and harvested farmlands serve as grazing lands for pastoralists.

Fishing was done using standard fleets of gill nets for 10 days in each month for 24 months. Fish caught were sorted into species and sex before the total, standard lengths and weight were taken. An analysis of the relationship that exists between lengths and weights of four of the economically most important species were plotted using the FiSAT Abee Length/Weight program (Gayanilo and Pauly, 1997). The analysis revealed the relationship $W = aL^{b}$. The log transformation of which gave a linear relationship Log W = a + b Log L. W = Weight L = Total Length of fish, a and b are constants. Frame and catch Assessment were carried out according to Ekwemalor, (1977) for two major seasons (dry and wet / rainy seasons**).**

RESULTS

Species Diversity

Twelve species from ten families were observed in the experimental gill-net catches (Fig.2).These are *Protopterus annectens* (Owen, 1883) from the family Protopteridae; *Mormyrus rume* (Valenciennes, 1846) from the family Mormyridae; *Clarias gariepinus* (Burchell,1822) and *Heterobranchus bidorsalis* (Geoffrey Saint Hilaire, 1809) from the family Clariidae; *Synodontis nigrita* (Valenciennes,1840) from the family Mochokidae and *Tilapia zilli* (Gervais, 1848). Other species observed were *Oreochromis niloticus* (Linnaeus, 1758) from the family Cichlidae; *Labeo senegalensis* (Valenciennes, 1842) from the family Cyprinidae ; *Malapterurus electricus* (Gmeiin, 1789) from the family Malapteruridae; *Heterotis niloticus* (Linnaeus , 1762) from the family Osteoglossidae; *Gymnarchus niloticus* (Linnaeus , 1758) from the family Gymnarchidae and *Citharinus citharus* (Geoffrey Saint Hilaire, 1809) from the family Citharinidae . This however, is not the exhaustive list of the fish family and species on Gbedikere Lake. There were other species not recorded in the experimental gill nets but which had been recorded from fishermen's catches. These include *Alestes macrolepidotus* (Bilham, 1852) from family Alestidae*; Labeo coubie* (Ruppeik, 1832) from the family Cyprinidae and *Hydrocynus forskalii* (Cuiver, 1819) from the familyCharacidae. In all 15 species from 12 families were recorded on the lake.

Numerical Abundance

Figure 1 shows the relative abundance of fish by species. The most abundant species by numbers were the Cichlids. This comprises predominantly *Oreochromis niloticus* (17.90%), *Tilapia zilli* (13.01%). They formed 30.91% of the total number of fish caught. They were followed in order of importance by *Heterotis niloticus* (15.56%). *Clarias gariepinus* (13.16%) ranked third followed by *Gymnarchus niloticus* (8.78%) fourth and *Heterobranchus bidorsalis* (7.14%) fifth respectively. All the others species together formed 44.9%. Fig.2: shows the abundance of individual species over time.

Monthly catches of the four economically most important species showed varying peaks . The highest abundance for *Oreochromis niloticus* was recorded in May 2008 (22.70%) while that for *Heterotis niloticus* was in January 2008 (20.50%). For *Tilapia zillii* the highest abundance was obtained in December 2007 (15.80%) and that for *Clarias gariepinus* was in June 2007 (20.60%).

Biomass.

The trend is similar in terms of weight**.** The most abundant species were the Cichlids, which formed 30.91% of the overall biomass. *Heterotis niloticus* ranked next with 15.56%, followed by *Clarias gariepinus* (*13.16%*), *Gmynarchus niloticus* (8 .78 %) , *Heterobranchus bidorsalis* (7 .14 %) , *Synodontis nigrita* (6.69%), *Mormyrus rume* (5.68%), *Citharinus citharus* (3.91%), *Labeo senegalensis* (2.93%) and *Protopterus annectens* (2.74%) respectively.

Yield

The mean annual yield obtained through Catch Assessment Surveys during the study was 240.2 metric tons. Standing stocks for the period was 20.3kg / Ha.

Length-weight relationships

An analysis of the relationship that exists

between lengths and weights of four of the economically most important species was carried out and the empirical formulae for predicting standard lengths from weights are presented below for four species:

Heterotis niloticus Log W = -1.2366 + 2.8028 Log L (r = 0.9798)

Tilapia zilli Log W = -2.3449 + 3.496 Log L, (r = 0.9548).

Orechromis niloticus Log W = -1.7525 + 3.047 Log L, (r = 0.9361)

Clarias gariepinus Log W = -1.0306 + 2.321 Log L, (r = 0.9351)

DISCUSSION:

The Fish Species Diversity of Gbedikere Lake revealed a low species diversity of 10 species from experimental gill-nets. However an additional two species were encountered in the artisanal fishermen's catchers bringing the total number of species to twelve. A much smaller reservoir like Asa Dam in Ilorin had a richer diversity at 21 species representing 10 families Omotosho (1998).

The most abundant specie during sampling was the Chichlids . This comprises predominantly *Oreochromis niloticus* (17.90%) and *Tilapia zilli* (13.01%). Gbedikere Lake so far gives an indication of being a Tilapia or Cichlid lake. The dominance of the cichlids could be attributed to their prolific breeding habit. The Cichlids are found to breed about three to four times in the year (Bankole *et al.,* 1994).

A closer look at three of the economically important species revealed that *O. niloticus* was the most abundant among all the species. The highest number and biomass for it was recorded in December 2006 and January 2006 for *H. niloticus*. The peak biomass for *C. gariepinus* was recorded in November 2006. This was followed by January and February 2007. The least biomass for *C. gariepinus* which was less than 5% was recorded in October 2007. This could be attributed to the flooding of the vegetated shoreline, which afforded a hiding place for the fish, therefore, making it difficult for the species to be recorded in the catches. For *O. niloticus* the lowest was in March 2008. This could be attributed to the effect of the draw-down which made the fish to go into the deeper waters, coupled with the intensive pressure of catch which had reduce the populations. The populations start to pick up again from May upwards due to the replenishment of the stock through breeding activities (Bankole *et al.,* 1994).

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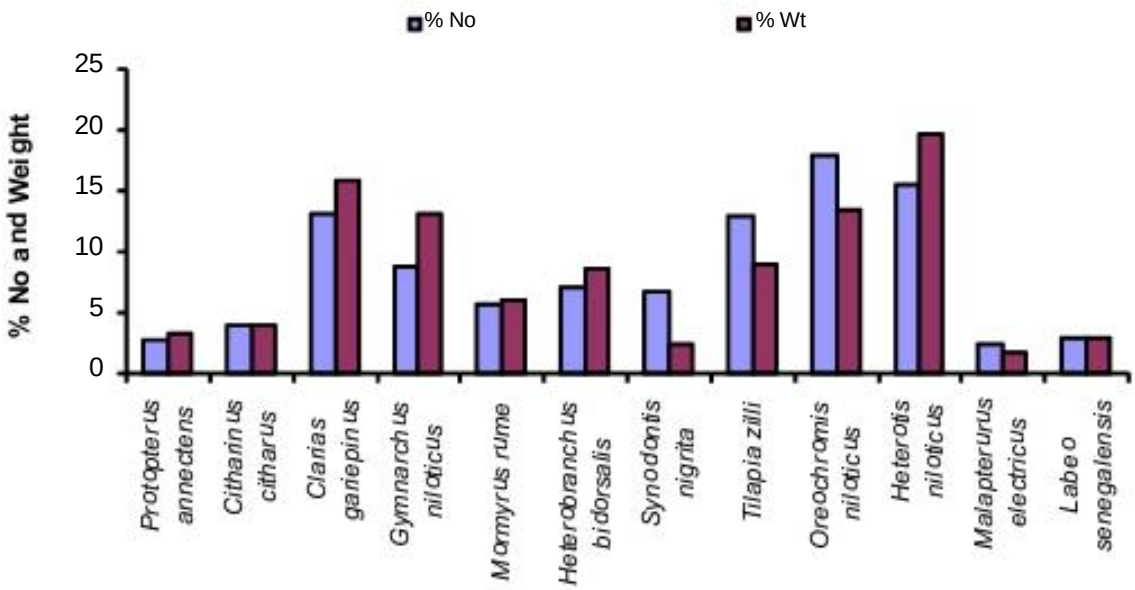

Fig 1: Fish species abundance on Gbedikere Lake, Kogi State.

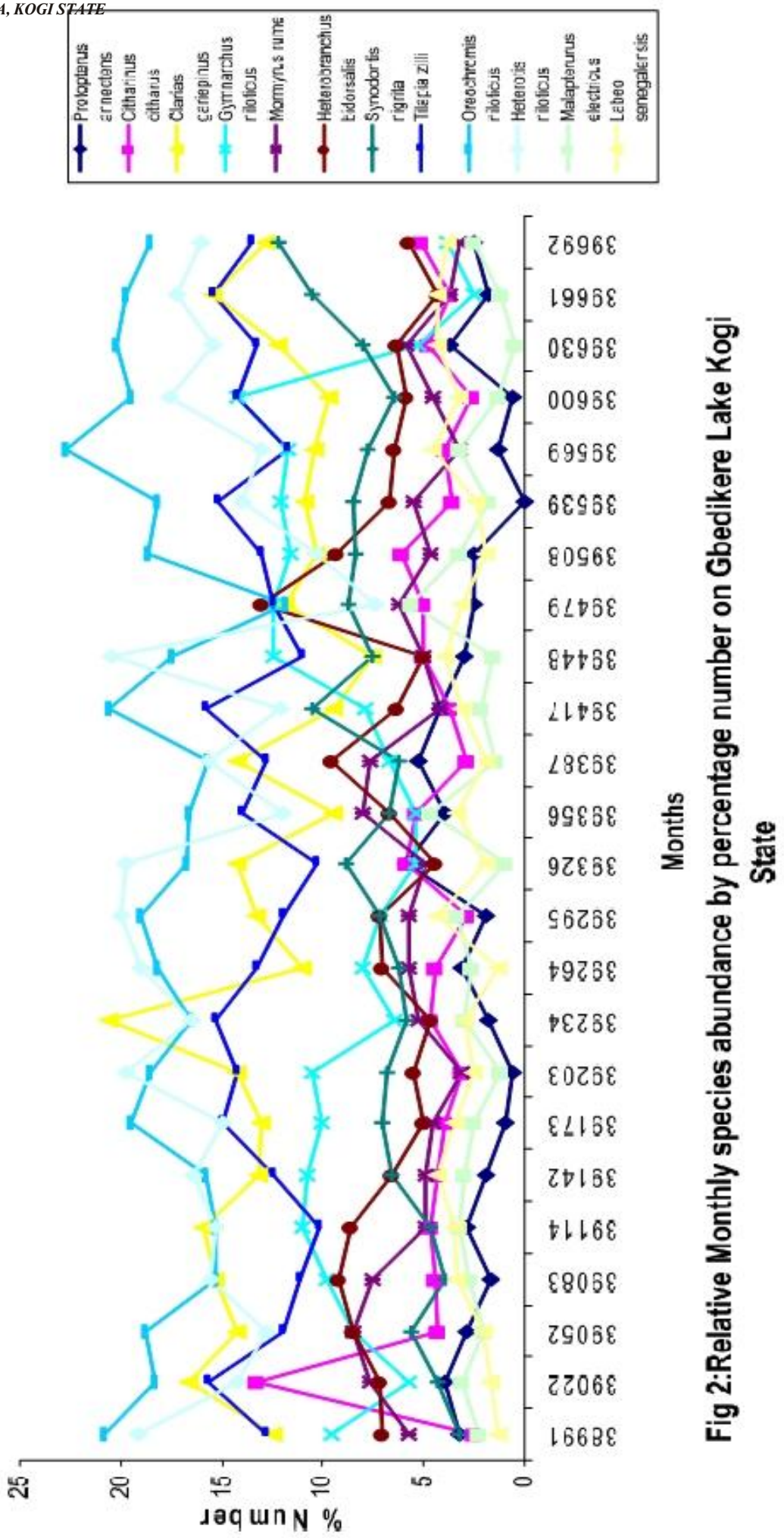

Fig 2:Relative Monthly species abundance by percentage number on Gbedikere Lake Kogi State