# An Evaluation of the Fish of Gurara Reservoir, Kaduna State, Nigeria

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**Abstract–** This study examined the artisanal fish production of Gurara Reservoir, Kaduna State, Nigeria in the year June 2014 – May 2015. A fishers' catch assessment survey was undertaken. This included capturing data on fish sales by fishers as soon as they landed with their catch, identification of fish by family and species, counting and weighing the various fish families. A fisheries frame survey of the reservoir was also undertaken for the time span. A total of 14 fish species under 7 families was revealed. The total fish produced was estimated at 56.2 metric tons making a contribution of 0.02% to the total fish produced by the artisanal fisheries sector of Nigeria in the year 2015. The total fish produced for the Reservoir in that year had a total price value of over seventeen million Nigerian naira (NGN) which is equivalent to ninety-two thousand United States Dollars.

**Keywords**: fish produced, fish value, Gurara Reservoir, monetary worth, Naira value, United States Dollars

## 1 Introduction

It is estimated that the inland fisheries of Africa produce 2.1 million tons of fish, which represents 24% of the total global production from inland waters (FAO, 2004). According to Food and Agricultural Organization (FAO, 2009), developing countries accounted for 49 percent of world exports by value and 59 percent by volume in 2006. In West Africa, freshwater fish production is highly important to the food security of human populations (Pauly, 2017) with reservoirs, lakes and rivers throughout the region being important sources of protein and micronutrients.

With an estimated annual per capita fish consumption of 13.3 kg in 2013, fish represents an important dietary element and one of the few sources of animal protein available to many Nigerians. According to the 2017 report on Nigeria's fish production by the National Bureau of Statistics (NBS), 5.09 million metric tons (mmt) of fish was produced between 2011 and 2015 in Nigeria. In 2015, the total fisheries production was estimated at 1 027 058 metric tons(mt), to which industrial (commercial trawlers production of fish and shrimp) catches contributed up to 15,464 mt (1.5%); aquaculture, 316,727 mt (30.8%); and 694,867mt (67.7%) for artisanal (inland and coastal/brackish water) fish production. Inland waters catches contributed 311,903 mt (30.4%) of Nigeria's total fish production in 2015 (NBS, 2017). The fishery sector contributed 0.5 percent of national Gross Domestic Production in 2015. More than 80 percent of Nigeria's total domestic production is generated by artisanal/small-scale fishers from coastal, inshore creeks of the Niger Delta, lagoons, inland rivers and lakes. This depicts fishing as a major source of livelihood. In the year 2014, 713,036 people were reported as engaged in inland fisheries with 21% of this total being women. With a total fish imports amounting to about 1.2 billion United States Dollar (USD) and exports valued at USD 284,390 million in 2013, Nigeria is a net importer of fishery products (FAO, 2007).

In an attempt to increase the inland fish production in the country, the Federal Government of Nigeria endeavored to include a plan for fisheries in the development of the Gurara Multi-Purpose Dam Project. The primary aim of the dam is to augment the raw water at Lower Usuma Dam for portable water supply to the Federal Capital Territory (FCT). The dam project mainly comprises of a large dam of 880 million cubic meter storage capacity and a 75-kilometre long pipeline of 3metre diameter for conveying water to Lower Usuma Dam. The dam is built on the upper reaches of Gurara River in parts of Kachia and Kagarko Local Government Areas of Kaduna State. Other components of the dam include a 30-megawatt (MW) hydropower plant, and the development of 6000 hectares of irrigated land for ancillary activities, such as agro-allied industry, fisheries and tourism.

The creation of Gurara reservoir in 2007 has attracted a number of artisan fishers from different parts of the country to the area. Even the natives around the created reservoir who are alien to fishing have now begun to take to it either as a full-time or part-time occupation.

The objective of this study was to determine the composition and quantity of fish species from Gurara Reservoir; estimate their monetary worth and their contribution to Nigeria's total fish production.

## 2 Materials and Methods

The study was conducted at Gurara Reservoir (latitudes 9° 38' and 9°46'N and longitudes 7°42' and 7°48'E), Kaduna State, Nigeria (Figure 1).
Primary data were collected through a boat-based, fishers'

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catch assessment survey. Three fish landing sites were randomly selected following the methods of Ikenweiwe *et al.* (2007) and Abiodun *et al.* (2013). At each of the landing sites, fish from the first five boats to arrive the shoreline were sampled daily for five days of the month and for one year (June 2014 – May 2015). The number and weight of fish were recorded according to species per boat per landing site. Each species was counted and weighed using a top-loading weighing balance to determine species, and then family, abundance. The first-sale prices (i.e. price of fish at landing or value), and size (in weight kilogram) were recorded.

In the course of this study, a frame survey was also conducted following the methods of du Feu and Abiodun (1999) and Abiodun and Ayanda (2007). The objective of the frame survey was to determine the distribution and number of existing fishing localities, landing sites, fisher folk, fishing canoes and fishing gears.

Figure 1: Map of Gurara Reservoir showing Sampling areas/stations SS1, SS2, and SS3
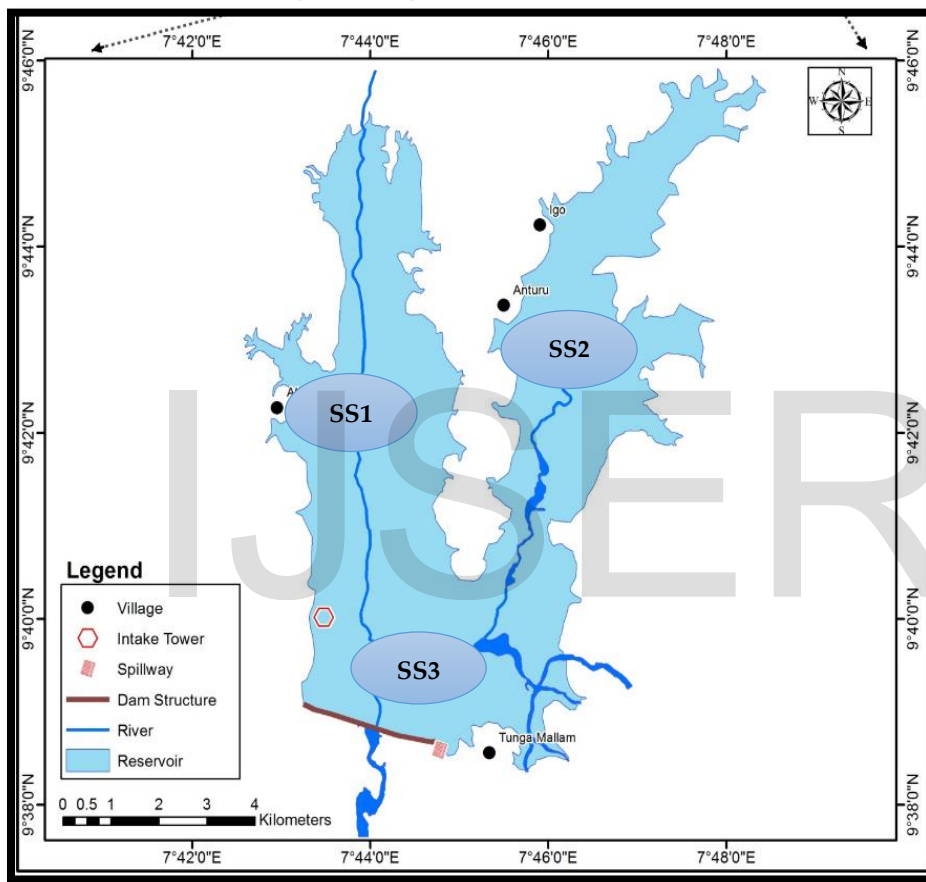


## 3 Results

Table 1 shows that a total of 14 fish species from 7 families were recorded during the study. The number and weight in grams (g) and kilogram (kg) of each species and their selling price in Naira as observed during the fishers' catch assessment survey are also indicated in the Table. Table 1 also shows computed naira-value of fish for the study period. The Table reveals that the estimated value of fish sampled had a total Naira value of ₦369,200.00 only.

Table 1: Gurara Reservoir Fish sample and Value at first-sale (June 2014 – May 2015)

| Family | Species | Number | Weight [g] | Total weight by Family in kilogram (kg) | Percentage weight by Family | Naira (₦) value by family per kilogram | Total Naira value by family (₦) |
|---|---|---|---|---|---|---|---|
| **Alestidae** | *M. elongatus* | 45,391 | 12,860 | 12.86 | 1.07% | 100.00 | 1,290 |
| **Cichlidae** | *C. zillii* | 19,381 | 390,840 | | | | |
| | *H. bimaculatus* | 88 | 510 | | | | |
| | *O. niloticus* | 10,993 | 232,330 | 623.68 | 51.80% | 250.00 | 155,925 |
| **Clariidae** | *C. anguillaris* | 1,293 | 52,840 | | | | |
| | *C. buthupogan* | 10 | 180 | 53.02 | 4.40% | 500.00 | 26,500 |
| **Cyprinidae** | *B. occidentalis* | 1,647 | 48,040 | | | | |
| | *G. waterloti* | 63 | 655 | | | | |
| | *R. senegalensis* | 3,830 | 62,780 | 111.48 | 9.26% | 350.00 | 39,025 |
| **Hepsetidae** | *H. akawo* | 4,970 | 155,260 | 155.26 | 12.89% | 350.00 | 54,355 |
| **Mormyridae** | *B. niger* | 1 | 10 | | | | |
| | *M. hasselquistii* | 6,483 | 140,180 | | | | |
| | *P. bovei* | 17 | 70 | 140.26 | 11.65% | 350.00 | 49,105 |
| **Schilbeidae** | *S. uranoscopus* | 5,212 | 107,500 | 107.50 | 8.93% | 400.00 | 43,000 |
| | | | | | | | |
| Total | | **99,379** | **1,204,055** | **1,204.06** | **100.00%** | | **369,200** |

**Note:** USD1.00 = ₦187 as at May 31, 2015

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The following information were also gathered from the frame survey:

i) An average of 40 out of a total of 98 canoes recorded in the frame survey are active on a normal fishing day.

ii) Normal fishing days in a calendar year range between 170 and 250, i.e. an average of 210 days. This is because the fishers don't go fishing on Sundays and on religious public holidays such as Christmas and *Sallah*, and other days say, of bad weather, ill health, etc. Fish production was therefore calculated as follows:

Mean daily catch/canoe/day

$$= \frac{Total\ annual\ fish\ sampled}{No.\ of\ canoes\ sampled\ per\ month}$$

$$= \frac{1,204.06\ kg}{15\ x\ 12}$$

$$=\quad 6.69\ kg$$

Total Fish production (yield) for the year = [40 fishing units] x [210 active fishing days] x [6.69 kg] =  56,196 kg

$\approx$  56.2 metric tons

From Table 1, a total of 1,204.06 kg of fish cost ₦369,200.

56.2 mt of fish will cost  $\frac{56,196\ kg\ x\ ₦369,200.00}{1,204.06\ kg}$

$= ₦17,231,336.64$

## 4 Discussion

The fisheries of Gurara Reservoir can justifiably be described as emerging because not much research has been done to expose it since the creation of the reservoir in 2007. With an annual fish production of 56.2mt and fourteen fish species belonging to 7 families, this is considered to be low/poor in fish production and diversity when compared with similar inland water bodies such as Lower Usuma dam where Abiodun *et al.* (2013) and Dan-kishiya *et al.* (2013) recorded 16 species from 7 families and 11 species from 5 families respectively. They both classified the reservoir as low in species abundance and production. Balogun (2006) attributed low fish yield and production in man-made reservoirs to include but not exclusive to the following vis-

à-vis fishing rate, nature of shoreline, available nutrients, rate of eutrophication, basin morphometry, species composition, stocking rate etc. Some of these factors could directly or indirectly have an effect on the fish production of Gurara reservoir which is considered to be at its infant stage. First fish-selling price at the reservoir usually depended on the species and their size in terms of weight, girth and/or total length. Among the fish species of Gurara Reservoir, *Clarias* attracted more value because of their nature and usually big size; and probably because the price is bargained usually while they are still alive. Most other fish species are smaller and are dead on arrival at the shore. Species like *Micralestes* and smaller cichlids especially the *Coptidon* are so small that they are sold in measures called *mudu*, hence, they are lesser in value.

Eventually, an annual naira-value of seventeen million, two hundred and thirty-one thousand, three hundred and thirty-six Naira, sixty-four kobo (₦17,231,336.64) for the fishery was authenticated. This value is passable in view of the age of the reservoir and the very minimal fisheries management practices applied on the reservoir. This figure can be up-surged if proper measures are taken to enhance the reservoir. Ago (2019) projected an annual value of over thirty-two million Naira (₦32,231,529.84) for the fishery.

## 5 Conclusion

A total of 14 fish species which comprised of 7 families were recorded during this study. The estimated fish produced during the one-year study period was 56.2 metric tons with a monetary worth of seventeen million, two hundred and thirty-one thousand, three hundred and thirty-six Naira, sixty-four kobo (₦17,231,336.64). This imply that the fish species harvested from Gurara Reservoir contributed 0.02% of total fish produced by the artisanal fisheries sector of Nigeria in the year 2015.

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