

# Performance Assessment of Artisanal Fisheries in the Kainji Dam Area of Yauri Emirate, Kebbi State Nigeria

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## Abstract

Performance assessment of artisanal fisheries was conducted to determine the returns per fishing effort by fisherman in Yauri Emirate Kebbi state. The data collected from 135 randomly selected fishermen in the study area revealed that the fish catch per unit effort by majority of the fishermen has declined to less than 2kg after the establishment of the dam compared to more than 8kg realized by majority of the fishermen before the establishment of the dam. The fishermen attributed the decline in fish catch to obnoxious fishing methods such as; use of beach seine (Dala), use of fish fencing (dumba), use of water shedding (rumfar ruwa) and cutting of Niger grass to catch all species of fish that inhabit the particular surrounding water. The findings of the study revealed that efforts made by governmental and non-governmental organizations to control the exploitative fishing methods were not successful. The results of the study suggest that enlightenment campaign on the effects of exploitative fishing methods, establishment of Community Based Fisheries Management (CBFM) programme, and prosecution of violators of fishing regulation will address the unlawful fishing methods currently practiced in the study area.

**Keywords:** Fishermen, fishing, assessment

## 1. 0 Introduction

Fishing is one of the major income-earning occupations of the riverine populations including the people of Yauri Emirate. Up till today, Yauri serves as an important marketing center for smoked fish in the country. The importance of trade in the region was emphasized by Roder (1989) who claimed that before the advent of colonial rule an important trade route existed between Yelwa and Lagos/Badagry through Bussa before it was disrupted by the Yoruba civil wars.

Artisanal fishery constitutes the most important sector that accounts for the major fish supply in the developing world. However, attempts to harness the full potentials of the sector have often failed due to low technology, lack of modern equipment, and inadequate funds (Arowolo and Owotunde, 2004).

The development of fishing activities was one of the cardinal objectives of construction of Kainji dam. Fishing has been the major income-earning occupation of riverine populations and the inhabitants of Niger river basin are no exception. It was expected that since indigenous and migrant artisanal fishermen abound before the Kainji impoundment, the income of these fishermen would improve after the construction of the dam. In fact, the pre-impoundment study carried out by Daget and Byagbona (1961) estimated the potential annual fish yield of the lake at about 10,000 tons, which is equivalent to 10 million kilograms of available protein each year. But as reported by Ita (1982), initial catches improved immediately after the construction of the dam but declined in subsequent years such as from 1970-1978.

However, GTZ (1999) reported that the total yield for Kainji Lake has been estimated at about 28,851 metric tons in 1998. This figure was approximately the same as that of 1979, but had reduced by 25% in 1996. The reason for the decline was attributed to the fall in yield as a result of beach seine fishing, which targets the small pelagic clupeids.

Bazigos (1991) conducted a catch assessment survey in Kainji dam and similarly reported that the catch per unit effort was declining over the years. In 1969, 17, 000 metric tons of fish were produced. The corresponding figures in 1970, 1971 and 1973 were 28, 636, 11, 036 and 10, 000 metric tons respectively. In Shiroro dam, CAPP (2000) found out that "Damming changed the patterns of fish migration and reproduction, the size and species available and transformed a culture of fishing that had evolved over several years. In the pre-damming period, there were three fishing seasons. The early rainy season saw the fish migrating to the plains where they could be easily trapped. The main rainy season saw the fishing grounds move to the river channels while the third season was associated with deep-water fishing with large-size nets using boats. This cycle has been disrupted by damming, making useless of methods and techniques of fishing evolved over several generations. Also, the rise and fall of water levels which now depend on the level of water in the artificial lakes follow no pattern, thus throwing the fisher folks into occupational confusion.

As the black flood (a period from June to September when Kainji dam is filled with excess water that is usually blackish in color) begins, the fish catch usually decreases as the volume of water increases. Undoubtedly, this has eroded the income status of the communities whose main occupation is fishing. In addition, construction

of dam has been responsible for the loss of different species of fish such as *Alestes macrolepidotus* (*Kakara*), *Hydrocynus forshkali* (*tsege*) and the introduction of new ones such as *Citharinus distichodoides* (*faliya*) and *Synodontis gobroni* (*kurungu*) that have less commercial value than the lost species. The creation of barriers to the movement of fish species caused by the dam also caused some species to be found only on one side of the reservoir (HDAEC, 2002).

A study by Ita (1977) has also shown that the following have contributed to low catches at Kainji dam:

- The shoreline available for the breeding of fish is drastically affected by the annual fluctuation in water level, thus, exposing young fish to predation during the draw-down period when the water in the dam starts receding. This phenomenon definitely limits the number of young fish surviving to replenish the stock removed by fishermen.
- Kainji Lake was cleared of forest trees (about 43, 301 hectares out of 118, 000 hectares occupied by the dam) and the stumps were not removed. This often results in extensive damage to bottom gillnets and renders bottom trawling absolutely impracticable.
- The menace of aquatic weeds such as the water hyacinth of the mid 90s which limits navigation and fish catch has made life miserable for the fishermen.

## 2.0 Methodology

Yauri Emirate comprises of three Local Government Areas: Yauri with headquarters at Yelwa, Ngaski with headquarters at Wara and Shanga with headquarters at Shanga. The area falls within about 80% of the total area of the Kainji Lake. It is located on latitude  $11^{\circ}15'1''-12^{\circ}30'1''N$  and longitude  $5^{\circ}18'1''-11^{\circ}20'1''E$ . The area is situated in the Guinea Savanna vegetation zone of Nigeria where the average annual rainfall is about 1000mm. It has a lowest temperature of  $29^{\circ}C$ , which occurs in December during harmattan. The highest daily temperature is  $39^{\circ}C$  (Yauri Meteorological Station, 2010). The Emirate has a population of 353,808 people (NPC,2006). Out of this figure 100,564 reside within Yauri local Government LGA, while 127,142 and 126,102 were found in Shanga and Ngaski LGA respectively (National Population Commission, 2012). Farming is the major occupation of the inhabitants of the Kainji Lake area, although they also engage in fishing, trading and other informal sector activities. As a result of the flooding pattern of Kainji Lake, two agricultural zones are discernible in the area, namely upland and lowland (Oyedipe 1980).

### 2.1 Sampling and Sampling Population

The total number of the resettled household heads (3,223 household) served as sampling frame for the study. Cluster sampling was used for the study. All the resettled communities under the Kainji Dam project that benefited from the compensation scheme were identified in the three LGAs in the Emirate. These served as clusters. Systematic sampling was employed to select five resettled communities from each of the clusters identified in the three LGAs in the Emirate, which gives a total of fifteen resettled communities. In each community, the lists of all the resettled households were compiled with the assistance of the village head. Nine households were then selected from each village using simple random sampling. A total of One hundred and thirty five respondents were therefore selected.

Descriptive statistical techniques such as frequency counts and percentages were used to analyze the data.

## 3.0 Results and Discussions

### 3.1 Fishing as Economic Activity in the Study Area

Nigerian inland water bodies are primarily utilized for fishing by fishermen. The greater part of inland fisheries is artisanal in nature, supplying families with food and income. Fishing is vital to the livelihoods of those who engage in it and provide high quality food and employment to others through the market system (Abiodun et al., 2004). Results from the survey show that only 29.5% of the respondents are engaged in fishing while 44.1% engage in other economic pursuits. Ita (1977) attributed the decrease in number of fishermen in Kainji dam area to the environmental changes brought about by dam construction. Discussions with the respondents revealed that some of them engaged in fishing during the dry season.

On the issue of type of fishing method practiced, 3.7% of the respondents indicated aquaculture while 96.3% of the respondents indicated artisanal. FAO (1991) has also reported that out of the 1.9 million people who engaged in full-time, part-time or seasonal fishing; about 98% belong to the artisanal sector.

#### 3.1.1 Information on Fish Catch per Unit Effort

Catch per unit effort is expressed as estimated weight of fish caught per unit of fishing effort by fisherman. The fish catch per unit effort of the fisherman is the measure of fishing success (Abiodun et al., 2004).

Table 2: Distribution of Fishermen Based on Estimated Fish Catch Per Unit Effort

Fish Catch Per Unit Effort (kg)	Before the Dam	After the Dam
Less than 2	3(7.5)*	19(47.5) *
2-4	4(10)	6(15)
4.1 – 6	6(15)	4(10)
6.1 – 8	10(25)	6(15)
More than 8	17(42.5)	5(12.5)
<b>Total</b>	<b>40(100)</b>	<b>40(100)</b>

\* Figures in parentheses are percentages

Result from table 2 shows that majority of the respondents (42.5%) indicated that their fish catch per unit effort before the establishment of Kanji Dam was more than 8 kilograms while majority (47.5%) of the respondents indicated that their fish catch per unit effort after the establishment of the dam was less than 2kg. The result of the study agreed with the findings of Ita (1982) who reported that early fish yield after the impoundment reached 28,639 metric tones in 1970, after which the yield declined to 4,500 metric tones in 1978 (Ekwemalor, 1978). Balogun (1985) attributed the decline in fish catch per unit effort to presumed increase in fishing pressure and use of undersized fishing gears. As a result, Juvenile of most fish species is indiscriminately accepted, thus preventing smaller fish to grow to adult or marketable size.

Results of the study also showed that 71.9% of the respondents who engaged in fishing attributed the declining fish catch recorded over the years to construction of Kainji dam while 28.1% attributed it to the migratory fishermen who engaged in massive fish catch using sophisticated fishing equipment such as beach seine (*Dala*). Ita (1977) has similarly observed that the shoreline available for the breeding of fish is drastically affected by the annual fluctuation in water level, thus exposing young fish to predation during the draw down period when the water in the Kainji dam starts receding. Discussions with the respondents additionally revealed the following as causes of declining fish catch:

- Use of beach seine (*Dala*) which catches eggs and juvenile fish and prevent the growth of smaller fish. Menace of storms, and water hyacinth which causes tearing of fishing nets.
- Cutting of Niger grass by fishermen in order to catch all fish species that inhabits the particular surrounding water body. High wind turbulence caused by massive cutting of Niger grass which displaces fishing nets.
- Use of fish fencing (*dumba*) which catches small-sizes of fish. This is made from rows of trap with nylon net of fine mesh with size of about 1 inch (25mm) and arranged in rows of several kilometers to form barrier to fish passages.

Furthermore, 68.8% of the respondents indicated that there are certain fish species that disappeared from the waters of Yauri after Kainji dam construction. These fish species include *Alestes macrolepidotus* (*kakara*), *Haydrocynus forshkali* (*tsege*), *Citharinus distichoides* (*Zoru*) and *Distichodus rostratus* (*achiweweri*).

The respondents who engaged in fishing attributed the disappearance of the above-mentioned fish species from the waters of Yauri to the annual fluctuation in water level during the draw-down period when the water in the dam recedes to expose the fish species and render the water body unsuitable for their survival.

Discussion with the respondents attributed the continued use of obnoxious fishing methods to frequent occurrence of floods in the recent years that lead to loss of their cultivated crops. They further revealed that since they lost their means of livelihood, they have to employ all possible means (such as unlawful fishing methods) to feed their families. HDAEC (2002) reported that the construction of Kainji dam has increased the frequency of floods as a result of closing of the spillway gate which led to overflow. Discussions with respondents further alleged the continuous occurrence of floods in the past three years to the collapse of Goronyo dam.

### 3.1.2 Strategies for controlling obnoxious fishing methods

There is serious need for banning the use of inappropriate fishing gears such as beach seine (*Dala*) and fish fencing (*Dumba*) through the establishment of community based fisheries management (CBFM) scheme as an approach aimed at enforcement of fishery laws and regulations and achievement of sustainable management of reservoirs fishery through community institutions/members such as the emirate council, district heads, village heads, and the river chief (*Sarkin ruwa*).

The following strategies for addressing flood problem suggested by the household heads. The strategies will serve as means of preventing losses of cultivated crops, which also implies reducing pressure on fishing as means of livelihood.

Table 3: *Distribution of Respondents According to Suggestions made on Floods Problems*

Suggestions	Frequency	Percentage
Construction of small dams on the tributaries of the former River Niger.	49	36.3
Introduce cooperation, coordination and consultations between reservoir operators and farmers.	43	31.9
Construction of flood protection dyke along the dam.	23	17.0
Transplanting of crop seedlings from the nursery to farmland to facilitate early harvesting.	20	14.8
Total	135	100

Table 3 shows that, majority of the household heads (36.3%) suggested construction of small dams on the tributaries of the former River Niger. This will facilitate water flow into the reservoir or across the dry valleys which also drain into the reservoir. The Niger River Basin Development Authority (NRBDA) is an example of such project (Amaugo, 1989). 31.9% of the respondents indicated that consultations between farmers and reservoir operators will serve as solutions to the flooding problems. This will enable the farmer to have information on the period when the particular contour of the dam at which he is interested to cultivate crops are expected to be exposed or flooded. It could be inferred that using the above findings in solving the respondent's problems could improve the agricultural productivity and standard of living of the fishermen. This will in turn provide solution to overexploitation of the fishery resource in the study area.

### Conclusion and Recommendations

Artisanal fishery accounts for the major fish supply in the study area. However, attempts to harness the full potentials of the sector have often failed. The fish catch per unit effort by majority of the fishermen has declined compared to that obtained before the establishment of the dam. The respondents attributed the decline in fish catch to obnoxious fishing methods currently practiced by most of the fishermen. The findings of the study revealed that efforts made by governmental and non-governmental organizations to control the exploitative fishing methods were not successful. Frequent occurrences of floods that destroy the cultivated crops of the households was also considered as another cause of the exploitative fishing methods, because the respondents lost their cultivated crops to floods and therefore exert pressure on fishery resources as an alternative means of livelihood.

The result of the study recommends the following measures for improving the artisanal fisheries in the study area:

- Enlightenment campaign on the effects of exploitative fishing methods.
- Establishment of Community Based Fisheries Management (CBFM) programme.
- Construction of small dams on the tributaries of the former River Niger.
- Introduce cooperation, coordination and consultations between reservoir operators and farmers.
- Prosecution of violators of fishing regulation will address the unlawful fishing methods currently practiced in the study area.

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