

Assessment of the Season of Highest fish Landings among Fishing Communities in Shiroro and Kainji Dams, Nigeria

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Abstract

This study assessed the season of highest fish landings among fishing communities in Shiroro and Kainji dams, Nigeria. A Questionnaire was used to collect data from 460 fishers. Multi-stage and proportionate sampling techniques were used in selecting the respondents. Descriptive statistics were used for data analysis. The results of the study showed rainy season accounted for (85.7%) respondents supporting that fishes were caught more during rainy/flood season, dry season constituted (27.4%) respondents in support that more catches were made during dry season. The seasonal fishing activities in Shiroro and Kainji dams is dictated by the hydrology of the dams and the environment which in turn depended on the prevailing climate of the areas. Study findings indicated that August/September is usually the peak period for fishing activities because it corresponded with high rainfall and flooding season, this increases the water surface area for fishing activities even in the flooded tributaries and low lands. Findings of the study on ways of disposal of caught fish indicated that, the majority of the fishers dispose their catch fresh (57.2%), (33.0%) of respondents sell their catch dried while (11.5%) fishers sell their catch smoked. The majority of caught fish is sold fresh. The preference for fresh fish could be due to better infrastructure or local demand for fresh products around the dams. Outcome of the study further show that the majority (63.5%) of the fishers caught fish for consumption and sales, (28.0%) of the fishers caught fish for main consumption while (8.5%) caught fish for sale only. Findings further reveal that caught fish were used for household consumption and the surplus was sold for income generation. This reflects a dual-purpose approach where households consume part of their catch and sell the surplus, which is supported by research on subsistence and small-scale fisheries. In conclusion, the study showed that artisanal fisheries activities are an important livelihood activity in the lives of the fishers as they enhance the food security and income of fishers. The study therefore recommended that more extension officers should be recruited by the government to provide more extension services to fishers that could boost artisanal fisheries practices around the two dams and in the country at large. The government should encourage the development of local fisheries technologies by financing relevant research institutes to come up with fisheries developmental strategies. Relevant agencies should network with local fishers to import environmentally compatible fishing gears and boats and other fishing equipment for sustainable fisheries development around the two dams and Nigeria at large.

Keywords: Season, Fish landings, Fishing communities, Shiroro and Kainji Dams

INTRODUCTION

The importance of the fisheries sector to individuals and the economy of many developed and developing countries cannot be overemphasized. Notably, fish provides more than (60.0%) of the world's supply of protein, especially in developing countries. Its importance could be felt directly and indirectly among rural and urban residents in Nigeria. In Nigeria, fisheries is particularly an important subsector that contributes about (3–5%) to the agricultural share of the Gross Domestic Product (GDP). Artisanal fisheries provide the largest proportion of domestic fish supply in Nigeria despite the neglect it is receiving. Artisanal fisheries contribute to the livelihoods of the poor through improved food supply, employment, and income (Ella, 2018). Fisheries production in Nigeria especially from marine is important for the socioeconomic development of Nigerians and it contributes to the nation's economic growth through the Gross Domestic Product (GDP) (Ekpo & Essien, 2013). Egesi (2016) posits that Nigeria is blessed with enough marine fishery resources that could enhance increased fish supply/production. DFID (2015) posits that 43.5 million people were directly engaged in the primary production of fish, either by artisanal fishing or in aquaculture.

The demand for fish has been rising rapidly in Nigeria as a result of an increase in population, per capita income, and prices of alternative sources of animal protein (Alhassan *et al.*, 2023). However, the domestic supply of fish does not satisfy the demand. The national production is about 1.1 million metric tonnes from all sources, including aquaculture, artisanal, and industrial fishing sectors, leading to a supply shortfall of about 2.1 million metric tonnes (Dasuki *et al.*, 2014). Artisanal fishing is characterized by various small-scale, low-technology, low-capital fishing practices undertaken by individual fishing households. Artisanal fisheries have great economic, social, and cultural value, and are characterized by local systems composed of professional small-scale coastal fishing communities (Alhassan and Sanchi, 2024). They possess high professional competence, culture, and traditions handed down from generation to generation, which have developed due to the high biodiversity that the water bodies traditionally offer.

METHODOLOGY

Description of Shiroro Dam

The study was carried out along Shiroro and Kainji Dams. The population of Shiroro is projected in 2020 to be 322,918 people using (3.2%) growth rate (NPC, 2006). The climate, edaphic features and hydrology of the state where the dam is located allows sufficient opportunities for harvesting fresh water fish such as *Tilapia spp*, *Bagrus spp*, *Clarias spp*, *Gymnarchus niloticus*, *Heterotis spp*, *Labeo spp*, *Mormysus spp*, *Latesniloticus* etc. It also permits the cultivation of most of Nigeria's staple crops such as maize, yam, rice, millet and sorghum. The Shiroro hydropower reservoir is a storage-based hydroelectric facility located in Shiroro Local Government, Niger State

at the Shiroro Gorge which lies approximately between Latitude 9° 57' 25N and Longitude 6° 49' 55E. About (70%) of inflows into the reservoir are from river Kaduna, with lateral contributions from rivers Dinya, Guni, Sarkin-Pawa, Erena and Muyi. Annual temperature around the reservoir varies between 27 and 35°C (Damilare, 2014).

Description of Kainji Dam

Kainji Lake is located between latitudes 9°5' and 10°55'N and longitudes 4°21' and 4°45'E. It cuts across Niger and Kebbi states, but is mostly located in Niger state. Kainji is the second largest lake in Africa and the largest man-made lake in Nigeria (Chilaka *et al.*, 2013). It was created in 1968 following the impoundment of the Niger River by the construction of the Kainji Dam at New Bussa, in Borgu Local Government Area of present day Niger State. The total annual rainfall for the Lake ranges between 1,100 mm and 1,250 mm, spreading from April to October (Anyanwu *et al.*, 2019). The highest (about 30°C) and lowest (about 25°C) monthly temperatures are recorded in March and August, respectively (Bolarinwa, 2011).

Method of Data Collection

Both primary and secondary data were used for the study. Primary data was obtained using a structured questionnaire designed in line with the study objectives. Secondary data were sourced from journal articles, conference papers, online data bases etc.

Sampling Procedure and Sample Size

The study employed multi-stage and proportionate sampling techniques. Firstly, two dams in North central region where artisanal fisheries activities were widely practiced were purposively selected. The dams were Shiroro and Kainji. Secondly, 30 Villages were randomly drawn along Kainji dam and 20 along Shiroro dam, thereby giving a total number of 50 villages for the study. Thirdly, proportionate sampling technique was then employed to select (10%) of the fishing population from each of the selected villages, thus making 240 fishers along Kainji dam and 220 along Shiroro dam, thereby giving a sample size of 460 fishers for the study. The study identified 550 fishing villages along Kainji dam and 296 fishing villages along Shiroro dam. The fishing villages have a fishing population of about 3,823 along Kainji dam and 3,632 along Shiroro. These figures (3,823 and 3,632) represent the sampling frame out of which the sample size of the study was drawn.

Analytical Technique

Data collected were analyzed using descriptive statistics. Descriptive statistics such as frequency distribution count and percentages were used to analyze objectives of the study

Descriptive Statistics

This method of analysis provides statistics that are used to describe the features of the data in a study. It provides simple summaries of the attributes of the sample such as measurement of dispersion and central tendency. The limitation with this analytical procedure is that descriptive statistics do not show the relationship among the variables and the influence that each variable may have on the response. Descriptive analysis does, however, often guide more advanced quantitative analyses.

RESULTS AND DISCUSSION

Results

Table 1: Distribution of the Respondents according to Season of Highest Fish Landings (n = 460)

Season	Frequency	Percentage
Rainy season	394	85.7
Dry season	126	27.4
Total	460	100

Source: Field Survey, 2023 * Multiple responses were recorded

Table 2: Distribution of the Respondents based on ways of Disposal of Fish Caught (n = 460)

S/N	Variable	Frequency	Percentage
1.	Forms in which caught fish is sold		
	Smoked	53	11.5
	Dried	152	33.0
	Fresh	263	57.2
	Total	460	100
2.	Method of disposal of caught fish		
	Consumption	129	28.0
	Consumption and sale	292	63.5
	Sale only	39	8.5
	Total	460	100
3.	Place of sale of caught fish		
	Local market	146	31,7
	Dam site	269	58.5
	At home	45	9.8
	Total	460	100
4.	Reason for choosing fishing as a major occupation		
	No land for cultivation	27	5.9
	Don't have other skills	44	9.6
	High profitability	210	45.7
	Inherited it from my parents	122	26.5
	Less capital investment	34	7.4
	Easy to do	23	5.0
	Total	460	100

Source: Field Survey, 2023 * Multiple responses were recorded

Discussion of Findings

Season of Highest Fish Landings

Table 1: reveals the distribution of the respondent's according to season of highest fish catch. Rainy season accounted for (85.7%) respondents supporting that fishes are caught more during rainy/flood season, dry season constituted (27.4%) respondents in support that more catches are made during dry season. The seasonal fishing activities in Shiroro and Kainji dams is dictated by the hydrology of the dams and the environment which in turn depended on the prevailing climate of the areas. It is observed that fishing activities is not uniform throughout the year across the two dams, however, it is a year round activity along the two dams. A good number of fishers indicated high fishing activities during flood rainy/season in August/September. The fishers reported that August/September is usually the peak period for fishing activities because it corresponded with high rainfall and flooding season, this increases the water surface area for fishing activities even in the flooded tributaries and low lands. Similar observations were reported by Anko and Eyo (2021) who suggested that few fishers fished during December/January and this indicated low fishing activities.

This period corresponded with cold harmattan and dusty wind which is associated with low temperatures. The cold water of the dams discouraged many part-time and unprofessional fishers from fishing. Similar observations were made by (Alhassan and Manga, 2024). However, Dasuki *et al.* (2014) reported low fishing activities during the rainy season and day time among the fishers of Tagwai Lake Nigeria. This could be due to geographical divide between Shiroro/Kainji dams and Tagwai Lake. The August/September period was also associated with high catches by the fishers because most of the neighboring inlets, tributaries and low lands were filled to capacity, thus providing a good source of fishing operations to the fishers. The fishers also reported catching bigger sized fishes beginning from the early rainfall (May/June) and continued into the flood season (August/September).

The fishing season can have both positive *and negative* effects on the fishing industry, depending on the specific conditions and circumstances. The wet season is most preferred probably because the conditions are ideal for fish breeding and consequently this may result in large catches particularly in rivers (Dasuki *et al.*, 2014). The best times to fish are always early in the morning from 6:am am to 9:00am, late morning to afternoon from 9:00am to 1:00pm or afternoon to dusk from 1:00pm to 5:00pm. Fish are much harder to find in hot days or too cold days (Dasuki *et al.*, 2014).

Forms in Which Caught Fish is Sold

Table 2 shows the various forms in which caught fish is been sold by the fishers in the study area. The majority of the fishers dispose of their catch fresh (57.2%), (33.0%) of respondents sell their catch dried while (11.5%) fishers sell their catch smoked. The majority of caught fish is sold fresh.

The preference for fresh fish could be due to better infrastructure or local demand for fresh products around the dams. This is consistent with findings that fresh fish often commands higher market prices and is preferred by consumers for its superior taste and quality (DFID, 2015). Fish was also sold dried by the fishers. This method of sales was prevalent in many villages around the dams preservation is necessary due to lack of refrigeration (Ekpo & Essien, 2013). It aligns with practices in places where storage and transportation are challenging. Some groups of fishers sold their catch smoked. This method of sales is less common in the study area compared to dried and fresh, this may be due to specific regional preferences or the availability of smoking facilities among the fishers (Ella, 2018).

Method of Disposal of Caught Fish

The findings of the study were also presented in Table 2. The results show that the majority (63.5%) of the fishers caught fish for consumption and sales, (28.0%) of the fishers caught fish for main consumption while (8.5%) caught fish for sale only. A significant majority of fishers reported that their caught fish was used for household consumption and the surplus was sold for income generation. This reflects a dual-purpose approach where households consume part of their catch and sell the surplus, which is supported by research on subsistence and small-scale fisheries (Allison *et al.*, 2012). This practice helps in meeting immediate dietary needs while generating income (Egesi, 2016).

Some fishers caught fish for mainly consumption. This is particularly common among the part-time fishers who only fish at particular periods of the year for household consumption. This was prevalent in many communities in the study area. Fishes were primarily used for personal consumption in the study area due to low market access or cultural preferences. A smaller proportion of fishers caught fish for sale only, this was common among mostly the single fishers who fish for commercial purposes. This was because the single fishers did not have households to cater for. This category of fishers embraces a more commercial approach to fishing or limited household consumption needs.

Place of Sale of Caught Fish

Table 2 further shows that the majority of the fishers (58.5%) sell their catch at the shore of the dam. This was evident because customers usually waited at the river bank to purchase the catch. Some even pay in advance and thereby wait for the fish landings at the shore of the lake. Selling at the dam site may be a practical choice due to the proximity to where fish are caught and a direct consumer base (Chilaka *et al.*, 2013). This method could reduce transportation costs and ensure freshness. Similarly, (31.7%) of the fishers sell their catch at local markets either fresh, smoked, or dried. The local market is a common place for fish sales, aligning with general practices of selling surplus catch in accessible local markets (Anyanwu *et al.*, 2019). Another group of fishers (9.8%) prefer to sell their catch at home. Selling fish at home is less common in the study area but can be a convenient option for small-scale or local sales. It might reflect limited market access or a preference for direct sales to neighbors.

Reason for Choosing Fishing as a Major Occupation

Table 2 reveals the reasons for choosing fishing as a major occupation by the fishers. Majority (45.7%) of the fishers choose fishing as a major occupation because of high profitability of the fishing enterprise. The respondents citing profitability as a reason aligns with research indicating that fishing is often chosen for its economic benefits, especially in areas with high market demand (Damilare, 2014). (26.5%) of fishers were into fishing because they inherited it from their parents. Many of the fishers in the study area were practicing fishing since tender ages because their parents live by fishing and thus consider it as a way of life. Fishing as an inherited occupation reflects cultural and generational practices, supporting findings that family traditions play a significant role in occupation choices (Alhassan *et al.*, 2023). (9.6%) of the fishers were into fishing because they don't have other skills. These reasons by the fishers suggested a lack of alternative employment opportunities or perceived ease of fishing compared to other occupations, which is consistent with research on occupational choice in rural areas (Alhassan and Sanchi, 2024). The least percentage of fishers (7.4%), (5.9%) and (5.0%) selected fishing as their major occupation because it was a less capital investment venture, no land for cultivation of crops and keeping animals and the enterprise is easy to do. These factors also align with studies highlighting fishing as an alternative livelihood in areas where land-based agriculture is not feasible or requires significant capital (Anko and Eyo, 2021).

Conclusion/ Recommendations

Conclusively, the study showed that artisanal fisheries activities are important livelihood activities that impacted positively on the lives of the fishers along the two dams. The seasonal fishing activities in Shiroro and Kainji dams is dictated by the hydrology of the dams and the environment which in turn depended on the prevailing climate of the areas. Fishers indicated high fishing activities takes place during flood rainy/season in August/September. August/September is usually the peak period for fishing activities because it corresponded with high rainfall and flooding season, this increases the water surface area for fishing activities even in the flooded tributaries and low lands. The following recommendations were offered:

1. More extension officers should be recruited by the government to provide more extension services to fishers that could boost artisanal fisheries practices around the two dams and in the country at large.
2. The government should encourage the development of local fisheries technologies by financing relevant research institutes to come up with fisheries developmental strategies. This will help promote fisheries operations, remove drudgery associated with fishing, save labour and time and achieve technological transformation of the fishers.
3. Relevant agencies should network with local fishers to import environmental compatible fishing gears and boats and other fishing equipment for sustainable fisheries development in Nigeria. Such gears and boats should also place premium on mending materials, efficiency, fisher's knowledge and experience as well as economic and environmental considerations.

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