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Frame and Catch Assessment Surveys of the Fisheries of Egbe Reservoir, Ekiti State, Nigeria

Kabiru Haruna[1]* and Ibrahim Adamu[2]

[1]National Institute for Freshwater Fisheries Research. P.M.B. 6006, New Bussa, Niger State, Nigeria.
[2]Department of Animal and Environmental Biology, Faculty of Life Science, Kebbi State University of Science and Technology Aleiro P. M. B. 1144, Kebbi State, Nigeria.

*Corresponding author:
Kabiru Haruna,
National Institute for Freshwater Fisheries Research.
P.M.B. 6006, New Bussa,
Niger State,
Nigeria.
Email: kabiruharuna48@yahoo.com

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ABSTRACT

Frame and Catch Assessments of surveys of the fisheries of the Egbe reservoir were conducted to provide data needed for its management and development. Descriptive statistics was used to analyze the data. A total of 2748 fish species were assessed. 57 fishermen were recorded. Sixty wooden canoes were counted and recorded. Fishing gears recorded included (380) gill nets, (19) cast nets, (77) long lines, (1008) Malian fish traps, (3879) wire fish traps, and (13) spares. About 7 fish species from 5 families were identified. *Cichlidae* was the most relatively abundant family, contributing 75.9% to the number and 71.7% to the weight of the total fish caught on the reservoir, while *Mormyridae* was the lowest abundant family, accounting for 0.58% and 0.15% in terms of number and weight respectively of the total fish caught. The current fish yield of the reservoir is 17.5 metric tonnes per annum. This corresponds to 64.2 kg/ha and is considered low. Recommendations were made for the management and development of the reservoir fisheries.

INTRODUCTION

Frame and Catch Assessment Surveys of the fisheries of the Egbe reservoir were conducted to provide data needed for its management and development. There are fishers whose livelihood is fishing and living in the settlement around the reservoir, thus revealing the fisheries potential of the reservoir. This potential can be explored through the generation and analysis of frame and catch data from the reservoir to meet the national goal of increasing inland fish production and food security for improved livelihoods of the communities around the reservoir. The Egbe Reservoir is situated in Gbonyin Local Government Area of Ekiti State. It is located between latitudes 7° 36' and 7° 39' N and longitudes 5° 32' and 5° 35' E. The reservoir, with an average depth of 5.2 metres, has a surface area of 272.5 hectares [1]. It was created to serve as a source of drinking water and used for irrigation to boost agriculture following the construction of the Egbe dam. The reservoir, nevertheless, created secondary opportunities, in particular fisheries. [2] studied the fisheries of the reservoir. [1] studied the fisheries' potential in the reservoir, which revealed, among others, the annual fish yield of 19.8 metric tonnes, representing 72.7 kg/ha.

The objectives of this study are to determine the size and distribution of fishing localities, fishers, fishing crafts, and fishing gears, as well as assess the fish composition, abundance, species diversity, and the current annual fish yield of Egbe reservoir.

MATERIALS AND METHOD

Data were collected from a fishing village using structural questionnaires and interviews with some randomly selected fishers for the frame survey. Total count and recording of all the fishing villages, fishers, and fishing equipment operating on the reservoir were made. During the catch assessment, fishers' catches at Egbe and Ode landing sites were assessed (plates 1 and 2). Whenever a fisherman landed with a canoe, the fish caught were identified using an identification manual [3] and sorted according to species and the gear type used. They were counted, and their weights were taken using a weighing balance, which was recorded on the datasheet. The landing prices of all the fish species identified were also recorded.

Plate 1: Fisher landing with fish

Plate 2: Fisher's catch

RESULTS AND DISCUSSION

Frame Survey - Two fishing villages are located around the reservoir, as indicated in **Table 1**. The fishing landing sites visited included the Ode Ekiti and Egbe landing sites. **Table 1** shows the distribution of the landing sites, fishers, their fishing crafts and gears. A total of 57 fishers were counted and recorded. A total of 37 fishers were recorded in Ode Ekiti and 20 in Egbe. [4] recommended a density of two (2) fishers per square kilometer. With a surface area of 2.7 square kilometers, only five fishers should have been registered to fish on the reservoir; however, 57 were recorded during the survey.

Sixty (60) wooden canoes were counted and recorded. Fishing gears recorded include (380) gill nets, (19) cast nets, (77) long lines, (1008) Malian fish traps, (3879) wire fish traps, and (13) spares.

Table 1. Frame data shows the village name, distribution of fishers, fishing crafts, and gears at the Egbe reservoir.

Village Name	No of landing sites	Fishermen	Canoe	GN	CN	LL	MT	WT	S
Ode Ekiti	1	37	45	280	12	57	708	2879	9
Egbe	1	20	15	100	7	20	300	1000	4
Total	2	57	60	380	19	77	1008	3879	13

GN= Gill nets, CN=Cast nets, LL=Longlines, MT=Malian fish traps, WT=wire fish traps, S=spare

Catch Assessment

Table 2 shows seven species from 5 families in the Egbe reservoir. *Cichlidae* was the most relatively abundant family, contributing 75.9% to the number and 71.7% to the weight of the total fish caught on the reservoir, while *Mormyridae* was the lowest abundant family, accounting for 0.58% and 0.15% in terms of number and weight respectively of the total fish caught. Based on fish species diversity, the family Cichlidae - *Oreochromis niloticus, Coptodon zilli,* and *Sarotherodon galilaeues* had the highest with three species while Channida - *Parachana obscura;* Clariidae - *Clarias pantagon;* Hepsetidae - *Hepsetus odoe* and Mormyridae - *Mormyrops anguilloides* had the lowest with one species each. The fish species diversity of this study is nearly in line with the findings of [1] that revealed eight different fish species and five families from the same reservoir, but low compared with the result of [5] having 31 fish species belonging to 13 families from a similar water body. The mean sizes of fish caught by the fishers during the assessment revealed that they were using mostly small mesh-size nets. This is evident in the fishers' catches.

Table 2. Fish composition, abundance, and weight on Egbe reservoir.

Family/Species	No	% No.	Wt(kg)	%Wt	Mean Weight
Cichlidae					
Oreochromis niloticus	540	19.65	23.12	14.78	0.043
Coptodon zilli	1072	39.01	57.91	37.01	0.054
Sarotherodon galilaeus	474	17.25	31.1	19.87	0.066
Channidae					
Parachana obscura	56	2.04	6.71	4.29	0.120
Clariidae					
Clarias pantagon	379	13.79	14.5	9.27	0.038
Hepsetidae					
Hepsetus odoe	211	7.68	22.91	14.64	0.109
Mormyridae					
Mormyrops anguilloides	16	0.58	0.23	0.15	0.014
Total	2748	100.00	156.48	100.00	

Approximate estimate of current fish yields

Catches by gillnets, cast nets, longlines, Malian fish traps, wire fish traps, and spares from the reservoir were examined during the sampling periods. The catch per unit effort (CPUE) was 5.4 kg per fishing day, and an average of 10 boats were operated daily. In an interview with fishers, fishing activities take place about 27 days a month. An approximate yield was therefore calculated [6].

The total catch = Total fishing effort * Catch per unit effort (Eqn. 1)

But

Fishing effort = Fcap * BAC * A (Eqn. 2)

Where Fcap = Fishing capacity (the total number of fishing boats that are potentially operating at all fishing sites)

BAC = Boat Activity Coefficient (the probability that any boat will be active on any day during the month)

A = raising time factor expressing the total number of days fishing activities occur during the month.

From Eqn. 2 above,

Fishing effort = 60 *10/60 *27 = 270 boat days

Hence, the total catch = 270*5.4kg = 1,458kg/month

Current Annual fish yield of Egbe reservoir = 1458 *12 =17496 kg

The current annual fish yield estimate of the reservoir is 17.5 metric tonnes. This represents 64.2 kg/ha and is considered low in comparison to previous work on the same water body with 139.7 kg/ha [2] and 72.7 kg/ha [1]. To provide a broader context, the table below presents the reported fish yields from various studies on different reservoirs (Table 3).

Table 3. Reported fish yields from various studies on different reservoirs.

Reservoir	Location	Fish Yield (kg/ha)	Ref
Egbe Reservoir	Ekiti State, Nigeria	64.2	[1]
Egbe Reservoir (Previous)	Ekiti State, Nigeria	139.7	[1]
Egbe Reservoir (Previous)	Ekiti State, Nigeria	72.7	[1]
Kontagora Reservoir	Niger State, Nigeria	4.4 (kg/canoe/day)	[7]
Bontanga Reservoir	Northern Ghana	2.7 (kg/canoe/day)	[8]
Imo River	Abia State, Nigeria	43 (fish/canoe)	[9]
Zobe Reservoir	Katsina State, Nigeria	Varies seasonally	[10]

The fish production from Egbe Reservoir is comparatively deficient compared to other research findings and past yields from the same reservoir. The decline in fish yield can be ascribed to various factors, such as overfishing, insufficient management practices, and environmental alterations. Fish productivity in Nigeria and Ghana's other reservoirs varies due to factors such as fishing pressure, gear types used, and water quality conditions. The study from Kontagora Reservoir indicated a mean catch of 4.4 kg per canoe per day, suggesting that artisanal fishing practices in similar reservoirs yield lower CPUEs compared to the Egbe Reservoir. Similarly, the Bontanga Reservoir in Ghana recorded a Catch Per Unit Effort (CPUE) of 2.7 kg per canoe per day, which is noticeably lower than the CPUE of the Egbe Reservoir (**Table 3**).

Overall, these comparisons indicate that there is a possibility of enhancing the fish yield in Egbe Reservoir by implementing improved management practices, such as regulating fishing activities, enforcing fishing regulations, and enhancing fish habitats. Sustainable fisheries management practices are crucial for maintaining the reservoir's aquatic resources' long-term productivity and ecological balance.

CONCLUSION

The study's findings revealed that the current fish yield estimate from the reservoir based on the catch assessment data collected from the fishers' landings is 17.5 metric tonnes per annum. This corresponds to 64.2 kg/ha and is considered low. The reservoir should be restocked with indigenous fish species to enhance its productivity. The mean weights of fish caught by the fishers during the assessment showed that they were using mostly small mesh-size nets. Fishers on inland water bodies should use a minimum mesh size of 3" in line with the Federal Fisheries Act 2014. The act's enforcement would allow effective fish species growth before exploitation. With a surface area of 2.7 km^2, only about five fishermen should have been registered to fish on the reservoir. The estimated 57 fishers operating on the reservoir could lead to overfishing of the stock. A licensing system is recommended to control the number of boats and fishers. The fish species diversity of the reservoir needs to be improved by restocking it with the following fish species, *Mormyrus rume, Bagrus docmak, Clarias gariepinus, Polypterus senegalus, Citharinus citharus* to reduce the fishing pressure on the few available fish species in the reservoir.

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