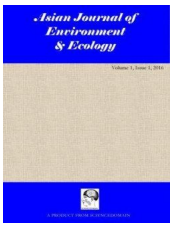

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Inventory and Impact of Dominant Fishing Gear and Method in Eleyele Lake, Oyo State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author AMA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AOA and OBA managed the analyses of the study. Author TAK managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Gill nets fishery are potentially selective and therefore use as a sampling gear if mesh sizes are rightly chosen in order to conserve the young and developing fishes. Precautionary approach towards Conserving and sustaining renewable aquatic resources is the best for exploitation of the cheapest sources of animal protein in sub-Sahara region. This paper gives inventory of the existing fishing gears and methods commonly in use and impacts of gill net fishery in terms of mesh sizes selectivity, catch per unit effort and fishing profitability index in Eleyele Lake Ibadan. A total of 539 fishing gears were encountered in six sampled areas of two strata; gill nets, traps, cast nets, dragnets and long - line (baited and un-baited). Gillnets accounted for 36% in the strata. Apparently, stratum 1 had 159 and stratum 2 had 33 units of gill net; descriptive statistics showed Wide variation in the total fishing gears and methods observed in the strata and X^2 (Chi square) showed significant (P> 0.01) in the numerical strength of gill nets and less significant (P> 0.01) of

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legal mesh sizes usage. The most caught species was tilapia, 57.7% by number and 33.8% by weight of the total catch and were not sizable with mean weight of 203 g of the total catch. Gill net fishery of Eleyele Lake comprises of legal and illegal mesh sizes of which the later accounted for 48% of 192 and its use accounted for over 58.7% by number and 20% by weight of the entire fish caught. The effects of catching process of gill net fishery in Eleyele Lake resulted into yields with wider variation across genera and species of fish caught (mean=341.5, S.D=229.2) and fetches its production cost about 12.23 times in a life span.

Keywords: Sustainability; by catch; gear selectivity; fishing efficiency; gill nets; mesh size; Eleyele Lake.

1. INTRODUCTION

Nigeria, like most tropical regions of the world is endowed with abundant water bodies which form excellent environment for numerous fish species with other aquatic flora and fauna. These water bodies are subjected to multipurpose use and therefore prone to various degrees of environmental pollution and degradation that are hazardous to fisheries resources [1]. Ecological information is useful as a basis for planning and formulation of management policies towards the rational utilization of the resources among different end users [2]. Rivers and lakes (natural and man-made) are very important for human settlement from origin of mankind. The history of river impoundment to create artificial lake can be traced to the Roman culture and later, that of Western Europe [3]. Initial aim of such impoundments was to conserve water of seasonal river for dry season, primarily for domestic use. However, with modernization and technological advancement, other uses for impounded river such as irrigation, hydroelectricity generation emerged (Kainji Lake) [4]. There are 12 major reservoirs with an estimated surface area of 303,600 ha, in addition to numerous smaller reservoirs with an estimated area of 98,900 ha; Kainji Lake with a surface area of 1280 km^2 is both the largest and most intensively studied in Nigeria [5]. However, Oyo State is land locked with no access to territorial water and as a result has 28 man-made lakes built by different government agencies and Research Institutes. They include Water Corporation of Oyo State (WCOS), Oyo State Agricultural Development Programme, (OYSADEP), Railway Corporation, Federal Department of Fisheries (FDF), International Institute of Tropical Agriculture (IITA) and Ogun-Osun River Basin Development Authority (OORBDA). There is also a natural lake at Ibusogbooro in Oyo West Local Government. The prominent Nigeria natural and artificial lakes are Lake Chad and Kainji respectively. These major lakes in Oyo state cover a total water surface area of 10, 250.2 hectares with 1, 152 fisher folks, 962 canoes as at 1999 [6]. In 2000, 2,433.02 tons of fish were landed in various landing sites [7]. The inland water bodies of the state are already overfished as a result of increasing rate of fishing efforts being employed for exploitation of aquatic resources [8]. Fisher folks density of 10 Canoes/km^2 is far in excess of the recommended density of approximately 2 Canoes/km^2 for African lakes [9].

Hydrological data on the Eleyele Lake has been provided by [10]. It has a surface area of 156.27 ha and storage capacity of 1550 million gallons; a maximum depth of 12 m, and of a mean depth of 6.5 m. Its basin is long and narrow and conspicuously divided into two; main stretches, with the widest 250 m and the narrowest part 20 m. The principal source of water to the dam is from River Ona and other associated tributaries including water from run – offs. The development, exploitation, management and protection of the fisheries resources resided in the Oyo State Ministry of Agriculture, Natural Resources and Rural Development (M.A.N.R&RD) acting through its Department of Fisheries. In 2000, the catch estimates of the Eleyele lake was as high as 159.87 tonnes as against 143.88 tonnes in 1998 [10]. The commonest fishing nets adopted in Elayele Lake include among others: gill net (Fixed type), cast nets, Drag nets, long lining (baited and unbaited) etc; and majorly made of multifilament. There were reported research works carried out on Eleyele lake including [10,11] on the plankton and hydrology; on stock assessment of the post impoundment fisheries amongst others [12]. Though there are a variety of methods used in Eleyele Lake to catch fish, the majority methods have an adverse effect on the aquatic environment, in terms of by-catch, destruction of bottom habitat and ecosystem effects. Eleyele Lake was mainly constructed for specific purposes; fish production, all year round water

source and for flood control. The ongoing gill net fishery in Eleyele Lake is beyond its carrying capacity as evidenced in smaller fishes caught as a result of predominant use of illegal mesh sizes during catching process of the study gear and method (Gill net). This study was conducted to provide baseline information on inventory of fishing gear and methods encountered and gill net fishery in Eleyele Lake for sustainable fish production.

2. MATERIALS AND METHODS

2.1 Study Area

Eleyele Lake was constructed by damming the Ona River which is part of the dense network of inland water course that flows towards lagoon. The water source of the lake, river Ona covers a distance of 62 kilometers across thickly forested zones. The lake lies northwest of the city of Ibadan at an altitude of 125 m above the sea level. It has an area of 5.4659 km that is capable of storing 77.5 x 10^3 m^3 of water at full capacity. The surface temperature and pH are within the range of 20°C - 28°C and 6.5- 8.5 respectively. The total dissolved solid is 174.7 mg/l. The basin is long and narrow, at its widest it covers 250 m and at its narrowest just 20 m. The bottom of the lake is not uniform, with gravel in some parts as well as soft (mud and decaying organic matter) in character.

2.2 Sampled Areas

Eleyele is a man-made lake with 15 fishing localities (villages and sites) that scattered all over the shore line and islands of the lake. The sampled areas were randomly selected out of these fishing localities using [13] method. The entire lake was divided into two strata each representing a distinct ecological zone with 6 fishing localities for a period of 12 months (January- December).

Stratum 1 (Widest part 250 m) has the bottom profile that is rather regular and uniform in character. The basin is characterized by steep banks (East and West banks). The deepest part of the lake has a maximum depth of 12 m near the dam wall and an average depth of 6.5 m with maximum width of 0.25 km. The settler in stratum 1 comprises of Ibadan, Ilajes and Ijaws designated as 01, 02, and 03 respectively.

Stratum 2 (Narrowest part 20 m) is the upper most portions of the lake, where the river Ona enters the lake through Apete characterized by a narrow channel, irregular and non-uniform bottom profile. It has average depth of 3 m with Gaddda, Apete, and Corner designated as 04, 05 and 06 respectively.

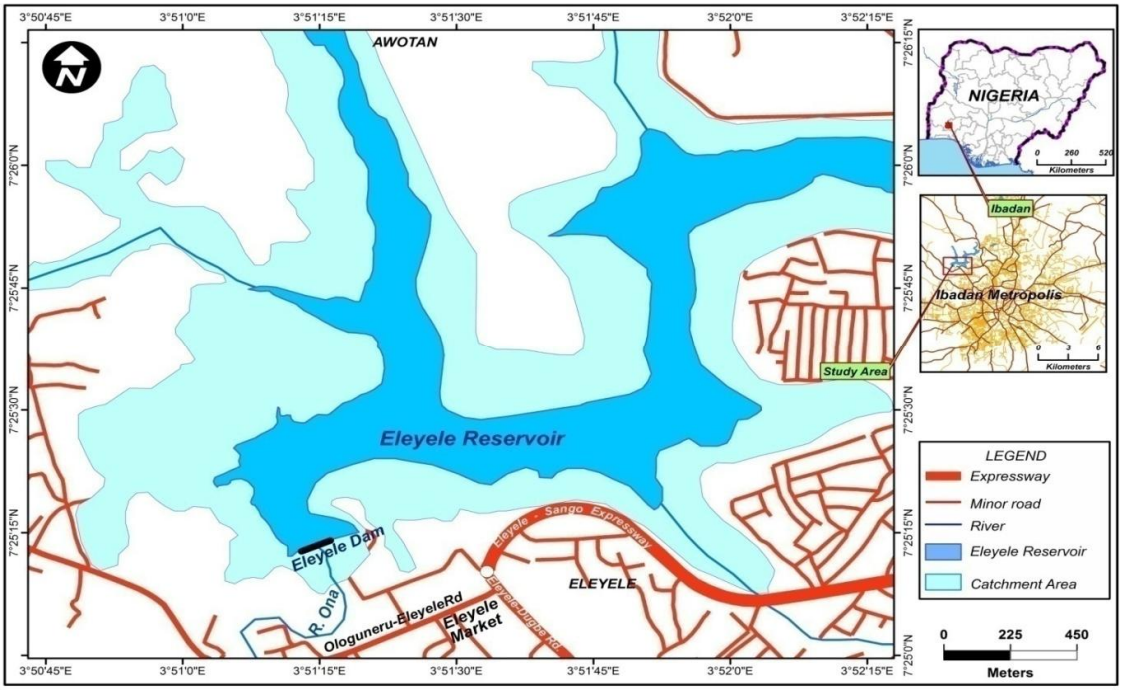

Fig. 1. Map of Eleyele Lake

Encountered fishing gears in the sampled areas of each stratum were enumerated and their percentages of occurrence and distributions were calculated. The classifications of observed fishing gears and methods in each stratum of the lake followed International Statistical Standard Classification of Fishing Gear of [14] classifications.

The mesh sizes of encountered gillnets were measured as a distance between the middle of two opposite knots of stretched mesh in mm.

2.3 Determination of Catch Per Unit Effort (CPUE)

[15] stated that estimation of gear catch and the effort exerted toward such varied from one worker to another due to the difference in the definition of efforts. In artisanal fisheries like the case of Eleyele Lake, CPUE was computed by taking effort to mean the size of the fishing gear (gill net). This implies that, the fishing efforts for gill net is the size of the net based on the total head length and depth (m) of the mounted net used for the fishing operation.

Catch per Unit Effort is equal to Total fish weight (kg) divided by Total efforts (areas) m^2

$$\text{CPUE} = \frac{\text{Total fish weight (kg)}}{\text{Total efforts (areas) } m^2}$$

One bundle is equal to 30 m long multiply by 3 m deep

1bundle = 30 m by 3 m

2.4 Determination of Fishing Profitability Index (FPI)

The FPI of gill net is obtained by considering construction cost and total catch values in a life span using [15,16] formula.

$$\text{FPI} = \frac{C^1 - C^0}{C^1}$$

where, C^1 = predicted catch in a life span
C^0 = construction cost + 10% repair cost

3. RESULTS

3.1 Fishing Gears & Methods Encountered in Eleyele Lake

A total number of five hundred and thirty nine (539) fishing gears including netting and non-netting gears were encountered within the six sampled areas of the two strata (Table 1). There exist six different groups that can easily be classified into five ISSCFG numbers. Gillnets and traps in classes ISSCFG 0.7.1.0 and 0.8.1.0 had the highest percentages of occurrence respectively, followed by cast nets 22.6% (ISSCFG 0.6.1.0), drag net 0.6% (ISSCFG 0.2.1.0) and long- line (ISSCFG 0.9.0.0), baited 1.6% (ISSCFG 0.9.3.1) and un-baited 0.4% (ISSCFG 0.9.3.2) . Some characteristics of these gears were highlighted in Table 2. It was recorded that gill nets and traps were used widely with clear different in use during the seasons of the year in both strata. Each stratum accounted for 410 and 99 of fishing gears encountered during the period of study. Gill nets dominated and used widely amongst fishing gears in both strata, Stratum 1 with three sampled areas had 159 and Stratum 2 had 33; followed by traps in that order with 135 and 55 respectively. Cast nets were used only in stratum 1, while drag nets and long- line (baited and un-baited) were limitedly used in stratum 1 and 2 respectively. The larger value of SD implies wide variation in Cast net, M=28.5 SD=34.7; Traps, M=31.7 SD= 27.5; and gill net M=32 SD=31.5, while Drag net, M=1.5 SD=0.7 showed close range of usage (2016 field survey).

3.2 Gill Net Mesh Size Selectivity

The mesh sizes ranged from 1" (25.4 mm) to 10" (254 mm) and catch distributions for each mesh size are showed in Table 3. Fishing was observed in the lake during the wet and dry season months of January to December, 2016. The family Cichlidae was most abundant and dominated by *Oreochromis niloticus*, *Tilapia zilli* etc. Table 4 shows the catch selection of the various fishing gears used on the lake. About 10 different species were recorded which fell into five (5) commercially important genera. Tilapia was the most widely selected by all the mesh sizes of gill net both in number and weight stratum by stratum. The lager values of standard deviation imply wide variations both in numbers and weights of fishes caught by various mesh sizes. The illegal mesh sizes (1", 1.5' and 2"") had wider variations accordingly; while mesh sizes greater than 1.5' showed low variation as the mesh sizes increased except in 3.5" mesh size.

The catch number decreased as the mesh size increased from 2.5 -10 with the exception of mesh size 3.5''. The mesh size 3.5 (89 mm) caught the highest number of fishes (26.2%) this

was followed by the mesh size 2'', 1'', 2.5''.5'', 3'', 1.5'', 4'', 6'', 5'', 8'', 9'' mesh sizes 7'' and 10'' caught the least number in fish (0.02%) each. The catch in weight also increased with increased in mesh sizes. The 3.5'' mesh size had the highest catch in weight 551.8 kg (44.8%) while mesh 7'' had the least catch 9.3 g (0.76%) in weight. In the gill net fishery, the highest catch was in 3 ½'' (89 mm) where 1587 fishes caught weighed 551.8 kg (44.89%) of the total weight of fish caught (1230 kg) (Table 3). However, further analysis showed that the catch of 1" (25.4 mm) to 2" (51.8 mm) which were the banned mesh sizes in the fisheries edicts of Kebbi and Niger states total 3258 in number and weighing 246.5 kg (58.72%) by number and 20% by weight. Mean weight of total fish caught by these illegal mesh sizes being 75.7 g. Also, the catch data of $2^{1/2}$'' (64 mm) and above was 2807 by number and 983.4 kg by weight representing 46.22% and 78 percent of the total number and weight caught respectively. Mean weight of fish caught being 350.3 g.

3.3 Gill Net Catch per Unit Efforts (CPUE)

As mesh sizes increased, average weight of fish caught increased but the number of fish caught decreased. CPUE of the resident water body was 12.93, while stratum 1 and 2 had 3.81 and 22.02 CPUE respectively. Stratum 2 had the highest number of illegal mesh sizes which resulted into low weight value of 1''- 2'' mesh sizes (Table 5).

3.4 Gill Net Fishing Profitability Index (FPI)

The Fishing Profitability index adopted here was based on the cost of producing a unit gear, fishable days in a month, estimated life span of gear and projected revenue expected in a life time. The production cost included total materials cost plus 10% repair cost in a life span. Since the study area is basically artisanal in nature, other ancillary costs such as Vessels, Motorization, and fueling etc were excluded. Gill nets in all sampled areas had FPI ranged from 12.03-12.28, while the highest mean FPI of 12.27 was observed in stratum 2 and mean FPI of 12.23 for the entire gill net fishery in Eleyele Lake (Table 6).

4. DISCUSSION

The trend of fishing gear occurrence and dominance stratum by stratum follows; gill net, cast net, Traps and drag net in stratum 1. In stratum 2, it was Traps, followed by gill net and cast net. The result showed that fishing gear in class ISSCFG 0.7.1.0 comprising of gill net was the commonest gear used. It must be emphasized that the fisher folks of Eleyele Lake are not restricted to the use of just one particular fishing gear alone. They rather tend to combine the use of two or more different types of gear at different fishing periods of the day.

Gill net fishery dominated Eleyele Lake, possibly the choice of gill net by fishermen may be attributed for its low-energy fishing unlike trawl fishing. This observation agreed with report made by [17]. This study had vividly shown that small mesh size in gill net fishery is not only detrimental to the rejuvenation of fish stocked of the resident water body, but it also yield low mean weight of fish caught when mesh sizes are wrongly chosen. Economically, low revenue is fetched in the market since large fish command better/higher price than the smaller ones. However, apart from the resource management consideration for sustainable livelihood, the fisher folks tend to gain immediate advantage for using large mesh size netting by selling their product at a higher price.

The mesh size, which caught the highest catch in weight, was the 3.5'' with fish quantity 551.8 kg (44.8%), while mesh 7'' had the least catch 9.3 kg (0.76%). The catch weight increased with increased in mesh sizes; an indication of overfishing. The fish catch decreased in number as the mesh size increased from 2.5'' – 10'' with the exception of illegal mesh sizes 1'', 1.5'' and 2''. In this study, the observed inverse relationship between mesh size and fish catch (in number) was in agreement with the earlier works by [18] on Lake Oyan, [19] on Al-Kalakla and JabelAwlia Dams and [20] in Khartoum State Fisheries. There was uneven distribution of fish on the lake evidenced from the catches strata and micro habitat. This is linked directly with water productivity in terms of biological elements interaction that account for fish abundance and composition. This finding agreed with research work of [21]. Catch Per Unit Effort (weight) increased in value and percentage in 3.5'' but showed a fluctuation between 1'' – 2'', the result that agreed with the earlier works of [18,16] on Oyan and Kainji Lakes who reported increased in mesh sizes brought about decreased in average weights of fish caught.

Table 1. Distribution of fishing gears encountered in sampled areas of Eleyele Lake, Ibadan Nigeria

Gear names	Stratum 1 Sampled areas			Sub total	Mean	S.D	%Av.	Stratum 2 Sampled areas			Sub total	Mean	S.D	%Av	Grand total	Mean	Av. no	S.D	%Av. no
	1	2	3					4	5	6									
Gill nets	80	64	15	159	53.0	33.9	38.78	10	09	14	33	11	2.6	31.14	192	32	64	31.5	37.9
Cast nets	03	75	35	113	37.7	36.1	26.56	-	01	-	01	01	-	2.83	144	28.5	38.7	34.7	28.4
Traps	45	80	10	135	45.0	35.0	32.73	31	15	09	55	18.3	11.4	51.90	190	31.7	63.3	27.5	37.5
Drag nets	-	02	01	03	1.5	0.7	0.73	-	-	-	-	-	-	-	0.3	1.5	1.0	0.7	0.6
Longline																			
Baited	-	-	-	-	-	-	-	4	2	2	08	2.66	-	7.53	08		2.9	-	1.6
Unbaited	-	-	-	-	-	-	-	-	01	01	02	1.0	-	2.83	02		1.0	-	0.4

Source: Field Survey, 2016

Table 2. Characteristics of fishing gears used in Eleyele Lake fishery (2016) Ibadan Nigeria

Type of Fishing gears (nets)	Local name	Twine	Mesh size (mm)/ Hook number	Operation period	Area of practice
Gillnet	Simini	Multifilament/	64 up to 254	Day & Night	Deep water
		Monofilament	25.4 up to 51.8	Day & Night	Deep water
Cast net	Obiliki/Ahe	Multifilament	38.1 to 64	Day	Deep water and Dam's barrier
Dragnet	-	Multifilament	51.8 up to 76	Day	Near shore
Traps	Asabilli	Multifilament	51.8 up to 76	Night	Flooded area/ near shore
Longline					
Baited	Ayanfi	Multifilament	5-8	Day & Night	Deep water
Unbaited	Atada	Multifilament	10-15	Day & Night	Deep water

Table 3. Variation in mesh sizes of gill net fishery in Eleyele Lake Ibadan Nigeria

Mesh size	Number and weight of fish	Stratum 1			Stratum 2			Mean	Standard deviation	Number	%number	Weight	% weight	Mean weight (kg)
		1	2	3	4	5	6							
1'' (25 mm)	Number	631	108	-	583	85	-	351.8	295.5	1407	23.20	85.7	6.92	60.9
	Weight (kg)	51.7	8	-	21.0	5	-	21.4	21.3					
1.5'' (38.1 mm)	Number	81	-	235	-	-	45	120.3	100.9	361	5.95	20.9	1.70	57.9
	Weight (kg)	3.8	-	15	-	-	2.1	7.0	7.0					
2'' (51.8 mm)	Number	49	310	-	224	558	349	298.0	185.6	1490	29.57	139.9	11.38	93.9
	Weight (kg)	9	37.2	-	28.4	34	31.3	28.0	11.1					
2.5'' (64 mm)	Number	159	46	105	-	255	-	141.3	88.8	565	9.32	54.2	4.41	95.9
	Weight (kg)	18.1	2.0	20.3	-	13.8	-	13.6	8.2					
3'' (76 mm)	Number	150	110	-	90	35	26	82.2	52.0	411	6.78	117.3	9.54	2854
	Weight (kg)	39.8	24.5	-	35.0	10.0	8.0	23.5	14.3					
3.5'' (89 mm)	Number	-	146	-	18	89	1334	396.8	627.0	1587	26.17	551.8	44.89	347.7
	Weight (kg)	-	238	-	3.0	45.0	480	138.0	228.7					
4'' (102.1 mm)	Number	91	42	12	30	-	-	43.8	33.8	175	2.89	64.2	5.22	367
	Weight (kg)	32.8	14.1	4.3	13	-	-	16.1	12.0					
5'' (127 mm)	Number	-	5	4	-	2	-	3.7	1.5	11	0.18	44.7	3.64	4064
	Weight (kg)	-	30.6	9.9	-	4.2	-	14.9	13.9					
6''(152.4 mm)	Number	22	-	18	-	-	9	16.3	6.7	49	0.81	67.1	5.46	1369.4
	Weight (kg)	33	-	19.1	-	-	15	22.4	9.4					
7'' (178 mm)	Number	1	-	-	-	-	-	-	-	1	0.02	9.3	0.76	9300
	Weight (kg)	9.3	-	-	-	-	-							
8''(203 mm)	Number	-	-	-	4	-	-	-	-	4	0.07	17.2	1.39	4300
	Weight (kg)	-	-	-	17.2	-	-							
9'' (229.1 mm)	Number	-	-	3	-	-	-	-	-	3	0.05	27.6	2.25	9200
	Weight (kg)	-	-	27.6	-	-	-							
10'' (254 mm)	Number	1	-	-	-	-	-	-	-	1	0.02	30	2.44	30000
	Weight (kg)	30	-	-	-	-	-							
Total										**6065**	**100**	**1229.9**	**100**	**59541.2**

Source: Field Survey, 2016

Table 4. Variations in gill net fishery yields in all sampled areas of Eleyele Lake

Genera	Yields (kg)	% number	% weight	Differential weight (gm)
Tilapines	415.3	57.7	33.8	118.7
Characins	188.2	29.9	15.3	103.8
Lates spp	305.8	5.4	24.9	929.5
Catfishes	104.7	1.7	8.5	1016.5
Gymnarchus spp	2163	5.3	17.5	675.8
Total	1230	100	100	2844.3
Mean	341.5	20	20	568.9
S. Deviation	229.2	23.9	9.7	436.1

Source: Field Survey, 2016

Table 5. Catch per unit effort (CPUE) for Eleyele Lake Gillnet fishery 2016

Stratum	Sampled areas	Fish weight (kg)	Total efforts	Mean effort	CPUE	
1	01	227.5	20,000	250	2.84	
	02	140.2	11,200	175	2.19	3.81
	03	96.2	3,000	200	6.41	
2	04	117.6	1000	100	11.76	
	05	112.0	735	105	16.00	22.02
	06	536.4	1050	75	38.31	

Source: Field Survey, 2016; Gill net Mean CPUE for the two strata = 12.93

Table 6. Fishing Profitability Index (FPI) for Eleyele Lake Gill net fishery 2016

Stratum	Sampled areas	Fishable Days/ month	Catch value (#)	Total effort (m)	Mean effort (m)	Est. life span in months	Catch value/unit gear (#)	Pr. Cost/ unit gear	Proj. Earning in life span	Est. FPI	
1	01	22	36,000	20,000	250	18	450	13,430.50	178,200	12.28	
	02	22	20,160	11,200	175	18	315	9,401.35	124,740	12.27	12.19
	03	22	5,400	3000	200	18	360	10,744.40	142,560	12.03	
2	04	22	1,800	1000	100	18	180	5,375.20	71,280	12.26	
	05	22	1,323	735	105	18	189	5640.81	74,844	12.27	12.27
	06	22	1,890	1050	75	18	135	4029.15	53,460	12.27	

Source: Field Survey, 2016; Est. life span = Estimated life span; Mean FPI for the two strata = 12.23; Pr. Cost/ unit gear = Projected cost/ unit gear; Proj. Earning in life span = Projected Earning in life span; Est. FPI = Estimated fishing profitability index

CPUE and FPI are directly related, where FPI depends on CPUE. The profitability of any fishery is a reflection of low CPUE value. Economically, the lower the CPUE value the earlier the gear fetches its production life span. This result followed the same trend pattern with earlier work of [16]; who reported 9.85 CPUE and 9.39 FPI for gill net fisheries in Kainji Lake. However, value in stratum 2 was more than stratum 1, possibly, because of its ecological function as a breeding ground with agglomeration of members of food chain, low fishing intensity in terms of number of fishermen and fishing efforts and complete absence of drag net fishery; the observations that confirmed the findings of [16].

There is no gear that does not have negative impact on the water body. But the level of destruction is a function of the fishing technique and fabrication method that is adopted. [16] identified these to include:

i. Use of legal mesh size for the main panel
ii. Non- regulation of operation frequency that restricts excessive exploitation of a specific fishing ground.

Therefore, Technological changes at further increasing fishing capacity would not been seen as desirable, instead a precautionary approach to technological changes towards; improving the conservation long term sustainability of living aquatic resources, preventing irreversible damage to the environment, improving the social and economic benefits derived from fishing through usage of legal mesh sizes and improving the safety and working condition of fishery workers [22].

5. CONCLUSION

The on -going commercial gill net fishery in Eleyele Lake is at alarmed rates; considering the heaviness of fishing efforts on definite but renewable fish resources and carrying capacity of the aquatic habitat (Eleyele Lake). This is evidenced in the large numbers of smaller fish sizes caught during gill net catching process with biological effects and consequently, jeopardizes futuristic benefits of the aquatic resources of Eleyele Lake. Therefore, proactive management strategies are recommended through efficient surveillance and effective monitoring of fishing operation in Eleyele Lake by the supervising Ministry and Department towards conserving and sustaining Eleyele Lake resources for the generation unborn.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Craig JF. Aims of Nasser project and first planning workshop. ICLARM Conference Proceedings. 2002;61:11-13.
2. Olaniran TS. Ecological evaluation and sustainable management of fish production in IITA Lake, Ibadan, Nigeria; 2000.
3. Welcome RL. River fisheries. FAO Fisheries Technical Paper. 1985;262-330.
4. Olaosebikan BD, Raji A. The field guide to Nigerian freshwater fishes. FCFFFT, P.M.B. 1500, New Bussa Niger State, Nig. Decency Enterprises and Stationaries Ltd; 1998.
5. Ita EO. Inland fishery resources of Nigeria CIFA. Occas. Paper. 1993;20:120.
6. Aboderin AO. Artificial lake fisheries management in Oyo state: Pre-season training of officers handling the IFAD-assisted artisanal fisheries. Fisheries Research Laboratory Complex; Premier Hotel Road Agodi Ibadan. 2002;22-31.
7. Ojo OO. Artificial lake fisheries management in Oyo state: Pre-season training of officers handling the IFAD-assisted artisanal fisheries. Fisheries Research Laboratory Complex; Premier Hotel Road Agodi Ibadan. 2002;1-8.
8. Faturoti EO. Beneath the ripples and sustainable fish production. The 4th Inaugural Lecture, University of Ibadan. 2000;47.
9. Adedokun MA, Fawole OO. Distributions and habitations of African pike Hepsetusodoe (Bloch, 1794) in Oba Rsercoir, Ogbomoso Nigeria (*Actinopterygii*: Hepsetidae). Mun. Ent. Zool. 2012;7(2):709-713.
10. Henderson HF, Welcome RL. The relationship of yields to Morpho-Edaphic

index (MEI) and numbers of fishermen in African Inland Fishermen in African Inland Fisheries. FAO, Rome (CIFAS) Occasional Paper; 1974.
11. Imevbore AMA. A preliminary check-list of the planktonic organisms of Eleyele Reservoir, Ibadan, Nigeria. J. W. Afri. Sc Ass. 1965;10:56-60.
12. Imevbore AMA. Hydrology and plankton of Eleyele Reservoir, Ibadan, Nigeria. Hydrobiol. 1967;30:154-176.
13. Akinyemi O. Management of lake Eleyele and lakeAsejire fisheries: Application of bionomic models. Unpublished Ph.D Thesis University of Ibadan Nigeria; 1986.
14. Pang SC. Traditional fishing activities in the mangrove ecosystems of Sarawak. Department of Fisheries, M.O.A Malaysia; 1980.
15. Food and Agriculture Organization. Comparative studies of freshwater fisheries. Report of a Workshop Held at the institutoitaliano di Idrobiologia, FAO Fish Tech. Paleanza, Italy. 1978;198:46.
16. Adimula AB. Distribution and efficiency of artisanal fishing gears and methods in Lake Kainji. Unpublished PGD Thesis, Federal University of Technology Akure, Nigeria; 1998.
17. Adedokun MA, Ayanboye AO, Amusat IA. Derelict gill net in Oyo State water bodies: Threat to food security. TOPS Journal of Science and Engineering Focus (TJSEF). 2016;1(1).
18. Ikenwewe I, Otubusin SO. Limnology and plankton abundance in relation to fish production in Oyan Lake South –Western Nigeria. VDM Publishing House Ltd; Meldrum Court 17, Beau Bassin Mauritius; 2005.
Available:www.vdm-publishing.house.com
19. Mohammed MO. Effects of gill-nets and fishers on fisheries of Al-Kalakla and JabelAwlia Dam. Unpublished M. Sc. Thesis Sudan Academy of Science, Khartoum. 2006;130.
20. Mohammed MO, Ali ME. Gill net selectivity in the White Nile fisheries, Khartoum State, Sudan. Jour. of Ecol. and the Nat. Envir. 2012;4(5):135-140.
21. NIFFR. Post impoundment fisheries survey of Asa and Agba reservoirs, Ilorin, Kwara State; Nig. A Report Prepared by National Institute for Freshwater Fisheries Research, New Bussa, Nig; 1991.
22. Adedokun MA, Siyanbola MF, Eniola PO. Basic fisheries technology. ISBN: 978-240-025, Published by Real Success Consults, Suite 7/9 Ruflat Shopping Complex, Opposite Muslim Hospital, Ogbooro Road, Saki Oyo State, Nig.

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