A Study On Rural Livelihood And Beach-Seine Catches In Atlantic Shoreline, Nigeria

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Abstract: Several scientists working on this sensitive environmental issue relate it impacts on fishing industry and hence prompted this research. Beside the outstanding mortality of juvenile species, were problems like increasing fishing efforts, unsustainable and irresponsible fishery. Thereby justify the aim to the study of rural livelihood of fisher-folks and their operations in beach-seinecatches along the shores of Atlantic. The gear were made of three stretched mesh size panels of polyamide, namely; A (multifilament = 35mm), B (multifilament = 45mm) and C (monofilament = 65mm) with thickness of 4mm, 2mm and 1mm respectively. Sinking force (Fs = 154,567.1kg/f) and buoyancy force (F =7071.4g/f) were computed, hanging co-efficient (E) for the panels A, B, and C were 0.3, 0.5, and 0.8 respectively. Names of bycatches and families were observed, identified, recorded and compared in compositions. Relative paired T-test were adopted to test the hypothesis that there was no significant different between the total number of mature target and juvenile bycatch species. The entire bycatch and target landings revealed ($P < 0.05$, $n = 20$, $df = 19$) statistically significant results. The temperature ranges between $27^0 – 31^0$c in both seasons. The overall bycatch composition results, lead to rejecting the H_0 and accepting H_1 meaning the hypothesis were statistically significant. The socioeconomic studies reveals 50% respondent of sampled from the primary study area. These sub-samples were obtained through the process of random sampling of fisher folks to checkmate bias in the results. Beach seine operations impact on marine environment and its effect were ranked, and reveal the adverse effects remarked accordingly. The economic indices of the beach seining operation were investigated in terms of recurrent expenditure (₦1, 325.93±483.2) and capital expenses (₦318, 960.00± 64082.86).

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Keywords: Design characteristics, Bycatchmortality, Rural livelihood of fisher-folks, Beach-seine operations, Entrepreneurial index, Environmental impact and Atlantic shoreline.

Introduction:

Bycatch is simply a (Bykill); where marine animals are unintentionally killed (Mortality) while desirable organisms are collected (Captured). Therefore, the intended organisms are not the victim. Bycatch mortality (Bykilled) exceeds the target catch. Ambrose *et. al.,* (2005) defined bycatch as non-target catch of multi-species landed, which are marketed and consumed to an extent. Beach seines, also called haul seines, are typically small mesh nets in the range of 100m in length that are set in shallow water parallel to the beach or back reef and are then hauled onto the beach or reef (Kailola, *et al.,* 1993). Nédélec (1990), noted beach seines have poor selectivity properties, catching variety of species and sizes of fish and other organisms. There may be some bycatch mortality associated with beach seining, while the energy efficiency and the catch quantity of this gear are generally high. In many cases, beach seining involves the participation of groups of men, women and even children and has a big impact on fisher-folks food security especially among poor fishing households. While scientific studies have been conducted in some places to determine the catch composition of the gear, there is no comprehensive analysis that addresses the social, economic and environmental impacts of beach seining. A socioeconomic survey helps to define the parameters in which the fishery is working (Tzanatos *et al.,* 2006). The socioeconomic information mostly gathered are commonly termed to be different kinds of community characteristic (Kronen *et al.,* 2007). Associated with poverty in rural/riverine communities the tendency to have large families (thereby leading to rapidly increasing population) to waste natural resources, to contravene regulations meant to ensure the sustainable utilization of these resources and to generally exert a degradatory effect on the environment. (Dasguta, 1992., Myers, 1992., Perringset, *et al.,* Moses, 1999). This research is aimed at studying the rural livelihood of fisher-folks and their operations in beach-seine catches along the shores of Atlantic.

Methodology:

The research work was carried out in a fishing settlement, in Akwa Ibom State, Atlantic shoreline located in the Delta fringe of Imo and Qua Iboe River. It is bounded in the North by Mkpat Enin Local Government Area, North East by Onna, and West by

Ikot Abasi, South East by Ibeno Local Government Areas and in the South by the Atlantic Ocean. (Fig. 1)

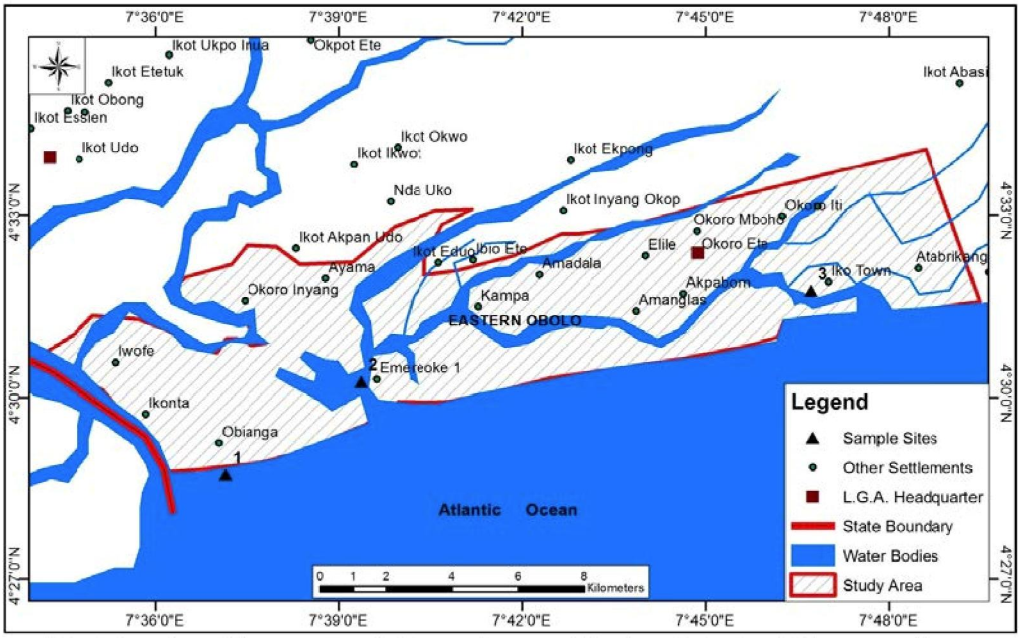


Fig. 1: Location of the sampling stations on the map of Eastern Obolo Local Government Area

Beach-Seine Design; Beach seine was identified based on the design outline documented in the FAO catalogue of small scale fishery gear in Nigeria. (Udolisa *et al.,* 1994).

Fishery Studies; Accomplished in two phases namely; reconnaissance and observer-based study phase. The observer based survey incorporated both fishery dependent and independent survey.

Data collection; landing catches were sorted, into matured (target species) and juvenile fishes (bycatches). Juvenile categories were identified, sorted according to species in 20 replicate landings. T- test analysis of catch data was used to pooled the landings from both 10 fishery dependent and 10 fishery independent landings. CPUE was calculated according to the method of stamatopoulous (2002).

Socioeconomic Studies; Questionnaires were administered to rural settlers; cooperatives were interview to collect data. Discussion and photographed were used. Personal interviews and fisher folks were selected at random. Questionnaires were administered, collected and recorded for analysis**.** The information gathered were accumulated, grouped and interpreted for statistical studies. Since it came from a particular stock, relative T-test statistic technique was used to compare the relationship between the two set of responses.

Results: Design of conventional beach seine; the beach seine net used consisted of three panels of nettings. The bunt panel is made with polyamide multifilament netting with stretched mesh size 35mm and a thickness of 4mm (R270tex), the center panel has a stretched mesh size of 45mm and thickness of 2mm (R155tex), while the terminal panel is made of monofilaments netting with stretched mesh size of 65mm and a thickness of 1mm (R130tex). These mesh sizes decreases from the two terminal wing panels towards the bunt. The bunt meshes retained the captured fishes; while other two meshes act as fish leaders toward bunt, hence has larger mesh sizes. The thickness of twine used in mesh design varied, just like mesh size in each of three panels; twine thickness increases towards bunt to impart strength and abrasive resistance against wearing and tearing to the net during hauling along the sandy bottom. The net was 0.8km in length and 4m in depth.

Buoyancy and sinking forces from the computations, was buoyed negatively with a sinking force of 154,567.05kg/f and a positively buoyancy force of 7071.4g/f. The rigging pattern is therefore appropriate because beach seine catch bottom dwelling fishes more than pelagic, hence height sinking power net is required. The sinkers at the bunt panel were closely spaced (2-5m) than that of the remaining two panels (5-10m). The bunt meshes were hang at E-values of 0.3, while the middle and terminal panels have E-value of 0.5 and 0.8 respectively to allow for height or mesh lift reduction and increase in speed or horizontal extension of the mesh size.

Beach seine catches and operations; The bycatch compositions of species as revealed by the study were identified and named accordingly as shore in the below table. The statistical method in use was relative T-test, because they organisms were from one population. The tables also revealed that for every matured target fishes caught by the beach seine gear, three juveniles' bycatch species are vulnerably exploited. Except for the less valued shell fish that mortality of matured species are more than the juveniles.

Socioeconomics of fisher-folks with beach-seine bycatch operations; revealed that marital status and religion of the respondent was 26.7% (single) and 6.7% (Islam) indicating that beach seining was dominantly carried out by married and Christian fisher folk with 73.3% and 93.3% respectively (Table5). Figure 11 showed that the level of illiteracy was significantly higher, with a mean value of 13.1 ±2.76, pointing to 50% secondary level. As revealed also in the result were active male (73.3%) in beach-seining than female (26.7%) that were involved in other aspects of beach seining fisheries and shore-based activities (Figure 8). In terms of family type 80% were nucleated family (figure 12) and the best fishing season was dry season (100%) respondent as indicated by the analysis (Figure 5). There was a high rate of jelly fishes which contributed to the increasing weight of the haul. There were two dominate average monthly income classes in the study, namely ₦26,000 – ₦31,000 and ₦32,000 – ₦37,000 with a frequency size of 33.3% each. The mean income of the entire study sample was ₦33,333 while only 3.3% of the fisher folk households earned as high as ₦98,000 – ₦103,000 as income (Figure 17). Also the least mean value of fishing experience X = 7.33 ± 3.72 meaning most fisher folk experienced at least close to 4 years (Figure 13). Figure 16 reveals that 36.7% each were members of cooperative and also those who were about to join, while the fishing operation per day 27 ± 1.96 was 90%, meaning that fisher folks mostly goes out for beach seine fishing twice a day (Figure 15). The study proved that occupational diversity of beach-seining fishers to trading and farming with 33.3% and 23.3% respectively (Figure 14). The study also revealed composition/size of fishers household with age 15 – 24 (male = 111) and (female = 96) being the highest and age 45 and above (male = 30) and (female = 32) as the least. Notably, women between 20 – 30 years also go to fishing mostly with hooks and lines.

Impact of beach seine on marine environments, aquatic resources and habitats; The assessment carried out suggested that discards are not a problem in beach-seining. Changes and depletion in fish population, out-migration of the fisher folks and reduction in other socioeconomic activities showed the highest in ranking while reduction of sustainable fishery, marine species extinction and ecosystem simplification were the lowest in its effects on the environment (Table 7). The study also reveals the adverse effect remarked to be of greater degree from 2.31 (max) and 2.29 (min) are of lesser degree on the marine environment impacted upon (Table 7).

Financial and economic performance of beach-seine bycatches; Economic indices of the beach seining operation were investigated in terms of recurrent expenditure (cost/trip), capital expenditure (fixed cost) and revenue (viability). The total recurrent and capital expenditure incurred was between (₦4000 – ₦34,000), and (₦500,000 – ₦1,250,000) respectively. Gross margin implies that the Return on investment (ROI) was about 53% showing the percentage of investment cost subtracted from total revenue (Table 8).

Table I: Names, length and weight of fish species caught by nearshore beach seine.

S/N	Family/Names	Scientific Names	Common Names	Local Names	Min-Max Total Length (cm)	Min-max Total Weight
1.	Mugilidae	*Mugil cephalus*	Mullets	Okurukuru	1.4 – 88.0	0.5 – 10.0
2.	Mugilidae	*Mugil falcipinus*	Sickle fin	Aseke	1.3 – 19.5	0.19- 31.45
3.	Scieanidae	*Pseudotolithius typus*	Long neck croaker	Okpo	1.0 – 16.2	0.34- 9.82
4.	Scieanidae	*Pseudotolithius elongatus*	Bobo croaker	Broke marry	1.7 – 44.2	0.34-2.2
5.	Scieanidae	*Pseudotolithius senegalensis*	Short neck croaker	Onna	3.2 – 10.0	0.11 – 4.80
6.	Polynemidae	*Pentanemus quinquarius*	Royal threadfin	Ora	1.7 – 18.2	0.28 – 1.80
7.	Polynemidae	*Galeoides decadactylus*	Shiny nose	Ora	1.3 – 17.5	1.50 – 31.34
8.	Polynemidae	*Polydactylus quadrilifilis*	African threadfin	Ora	1.9 – 31.4	2.05 – 3.50
9.	Clupeidae	*Illisha africana*	African shad	Ebat	1.6 – 57.0	3.50 - 56.07
10.	Clupeidae	*Ethmalosa fimbriata*	Bonga shad	Ebat	1.0 – 172.5	3.55 – 30.50
11.	Ariidae	*Arius latisculatu Is*	Catfish		1.5 – 46.1	0.21 – 43.11
12.	Carangidae	*Caranx carangus*	Color jack fish	Nnkukang	1.3 – 20.5	11.0 – 25.33
13.	Carrangidae	*Caranx hippos*	Crevalle jack fish	Nkikang	2.1 – 13.5	3.05 – 7.90
14.	Lutjanidae	*Lutjanus dentatus*	Red snapper		2.5 – 18.5	10.50 – 17.50
15.	Lutjanidae	*Lutjanus goreensis*	Gorean Snapper		2.0 – 8.8	5.20 – 8.16
16.	Pomadasyidae	*Pomadasys jubelini*	Grunters		1.9 – 13.9	2.0 – 5.50
17.	Pomadasyidae	*Pomadasy speroteti*	Pigsnout grunt		1.5 – 13.5	0.70 – 10.05

S/N	Family/Names	Scientific Names	Common Names	Local Names	Min-Max Total Length (cm)	Min-max Total Weight
18.	Sphyraenidae	*Sphyraena sphyraena*	Barracuda		1.1 – 28.6	4.50 – 56.50
19.	Sphyraenidae	*Sphyraena guachancho*	Senects		2.0 – 25.8	0.35 – 15.8
20.	Tetraodontidae	*Lagocephalus laevigatus*	Smooth puffer		1.5 – 12.7	18 – 2.70
21.	Tetraodontidae	*Sphoeroides senegalensis*	Blunthead puffer		1. – 10.52	1.5 – 15.5
22.	Serranidae	*Epinephelus aneus*	Grouper (white)		1.6 – 17.0	4.50 – 7.50
23.	Dasyatidae	*Dasyastis margarita*	Sting Ray	Cover pot	1.5 – 15.8	3.20 – 3.50
24.	Cynoglossidae	*Cynoglossus senegaslensis*	Tongue sole		1.5 – 15.8	1.50 – 7.20
25.	Portunidae	*Callinectus amnicola*	Blue crab	Isob	2cl – 10cl	1.20 – 1.70
26.	Penaeidae	*Parapenaeopsis atlantica*	Guinea shrimp	Obu	0.5mm – 125mm	0.5 – 100g

Source: ***Field survey, 2017.***

Table II: Number of mature and juvenile (bycatch) species caught per landings that was used in T-test analysis (N=20; SS=Statistically Significant; NS=Not Statistically Significant; ES= Extremely Statistically).

S/N	Month	Monthly Species	Juvenile A	Matured B	Total A + B	Difference A - B	P-value	T-value	Degree of Freedom Df.	Error	Remark
1.	8/4/16	7	25	9	34	16	0.0428	2.5621	6	0.892	SS
2.	22/4/16	6	29	5	34	24	0.0288	3.0382	5	1.317	SS
3.	12/5/16	10	58	12	70	46	0.0025	4.1533	9	1.108	SS
4.	20/5/16	8	51	7	58	44	0.0004	6.2048	7	0.886	SS
5.	10/6/16	7	29	20	49	9	0.4354	0.8356	6	1.539	NS
6.	24/6/16	6	24	11	35	13	0.1946	1.4971	5	1.447	NS
7.	8/7/16	10	52	15	67	37	0.0726	2.0330	9	1.820	NS
8.	22/7/16	8	55	11	66	44	0.0089	3.5824	7	1.535	SS
9.	12/8/16	9	78	30	108	48	0.1114	1.7889	8	2.981	NS
10.	26/8/16	9	62	9	71	53	0.0074	3.5611	8	1.654	SS
11.	9/9/16	8	86	14	100	72	0.0048	4.0540	7	2.220	SS
12.	23/9/16	8	58	7	65	51	0.0355	4.6364	7	1.375	SS
13.	4/10/16	9	87	37	124	50	0.0279	2.5262	8	2.199	SS
14.	28/10/16	9	98	41	139	57	0.0281	2.6803	8	2.363	SS
15.	11/11/16	12	165	74	239	91	0.0153	2.5268	11	3.001	SS
16.	25/11/16	12	181	79	260	102	0.0001	2.8686	11	2.963	SS
17.	9/12/16	16	272	99	372	174	0.0001	5.3606	15	2.029	ES
18.	23/12/16	16	293	110	403	183	0.0001	5.7611	15	1.985	ES
19.	6/1/17	23	404	160	564	244	0.0001	6.7743	22	1.502	ES
20.	20/1/17	23	405	154	559	251	0.0001	7.6125	22	1.405	ES
Total		**216**	**2513**	**904**	**3417**	**1609**	**0.0001**	**15.1856**	**215**	**0.494**	**ES**

Source: ***Field survey, 2017.***

Table III: Number of target (matured) catch and juvenile (bycatches) of twenty-six (26) species caught by nearshore beach seine that was used in percentage and ratio comparison. (Matured versus Juveniles) (N=20).

S/N	Species	Total No. of Juvenile (A)	Total No. of Mature (B)	Total No. of individual sp. (A + B) = C	Percentage %	Ratio (A:B)
1.	*Mugil cephalus*	144	40	184	5.38	3:1
2.	*Mugil falcipinus*	59	14	73	2.14	4:1
3.	*Pseudotolithius typus*	117	58	175	5.12	2:1
4.	*Pseudotolithius elongatus*	253	91	344	10.07	2:1
5.	*Pseudotolithius senegalensis*	36	18	54	1.58	2:1
6.	*Pentanemus quinquarius*	37	12	49	1.43	3:1
7.	*Galeoides decadactylus*	198	61	259	7.58	3:1
8.	*Polydactylus quadrilfilis*	65	16	81	2.37	4:1
9.	*Illisha africana*	99	25	124	3.63	3:1
10.	*Ethmalosa fimbriata*	268	56	324	9.48	4:1
11.	*Arius latiscutatus*	155	50	205	5.99	3:1
12.	*Caranx carangus*	247	53	300	8.78	4:1
13.	*Caranx hippos*	134	28	162	4.74	4:1
14.	*Lutjanus dentatus*	111	23	134	3.92	4:1
15.	*Lutjanus goreensis*	18	5	23	0.67	3:1
16.	*Pomadasys jubelini*	68	21	89	2.61	3:1
17.	*Pomadasys peroteti*	40	14	54	1.58	2:1
18.	*Sphyraena sphyraena*	100	25	125	3.66	4:1
19.	*Sphyraena guachancho*	55	12	67	1.96	3:1
20.	*Lagocephalus laevigatus*	47	18	65	1.90	2:1
21.	*Sphoeroides senegalensis*	33	9	42	1.23	3:1
22.	*Epinephelus aneus*	105	25	130	3.80	4:1
23.	*Dasyatis margarita*	24	29	53	1.55	1:1
24.	*Cynoglossus senegalensis*	7	34	41	1.19	1:4
25.	*Callinectus amnicola*	63	162	225	6.58	1:2
26.	*Parapenaeopsisatlantica*	30	5	35	1.02	6:1
	Total	**2513**	**904**	**3417**	**100.00**	**-**
	Means	96.65	34.76	131.42	-	-

Source: ***Field survey, 2017.***

Table IV: Different between target matured catch and juvenile bycatches of each species caught by nearshore beach seine that was used in T-test paired composition (N=20).

S/N	Species	Total of No. of Juvenile (A)	Total No. of Mature (B)	Difference A-B = D	$(A-B)^2$	Calculated T-test values	Level of significant (0.05)	Inference
1.	*Mugil cephalus*	144	40	104	10816	4.36	2.060	SS
2.	*Mugil falcipinus*	59	14	45	2025	4.19		SS
3.	*Pseudotolithius typus*	117	58	59	3481	4.35		SS
4.	*Pseudololithius elongatus*	253	91	162	26244	4.35		SS
5.	*Pseudotolithius senegalensis*	36	18	18	324	4.35		SS
6.	*Pentanemus quinquarius*	37	12	25	625	3.14		SS
7.	*Galeoides decadactylus*	198	61	137	18769	4.36		SS
8.	*Polydactylus quadrilifilis*	65	16	49	2401	4.36		SS
9.	*Illisha africana*	99	25	74	5476	4.36		SS
10.	*Ethmalosa fimbriata*	268	56	212	44944	4.36		SS
11.	*Arius latiscutatus*	155	50	105	11025	4.36		SS
12.	*Caranx carangus*	247	53	194	37636	4.36		SS
13.	*Caranx hippos*	134	28	106	11236	4.36		SS
14.	*Lutjanus dentatus*	111	23	88	7744	4.25		SS
15.	*Lutjanus goreensis*	18	5	13	169	4.36		SS
16.	*Pomodasys jubelini*	68	21	47	2209	4.36		SS
17.	*Pomadasy speroteti*	40	14	26	676	4.36		SS
18.	*Sphyraena sphyraena*	100	25	75	5625	4.36		SS
19.	*Sphyraena guachancho*	55	12	39	1521	4.36		SS
20.	*Lagocephalus laevigatus*	47	18	29	841	4.36		SS
21.	*Sphoeroides senegalensis*	33	9	24	576	4.36		SS
22.	*Epinephelusaneus*	105	25	80	6400	4.35		SS
23.	*Dasyatis margarita*	24	29	-5	25	-4.35		NS
24.	*Cynoglossu ssenegalensis*	7	34	-27	729	-4.36		NS
25.	*Callinectus amnicola*	63	162	-99	9801	-4.36		NS
26.	*Parapenaeopsis atlantica*	30	5	25	625	4.36		SS
Total		**2513**	**904**	**1609**	**2588881**	**5.0**	**2.060**	**ES**

Source: ***Field survey, 2017.***

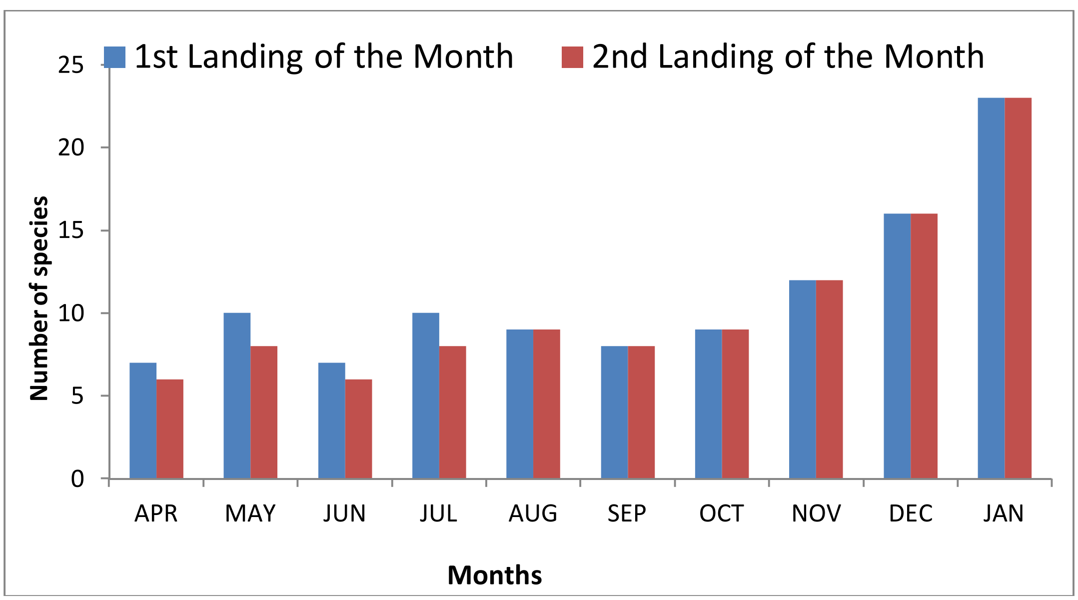


Figure V: Number of species landed per month.

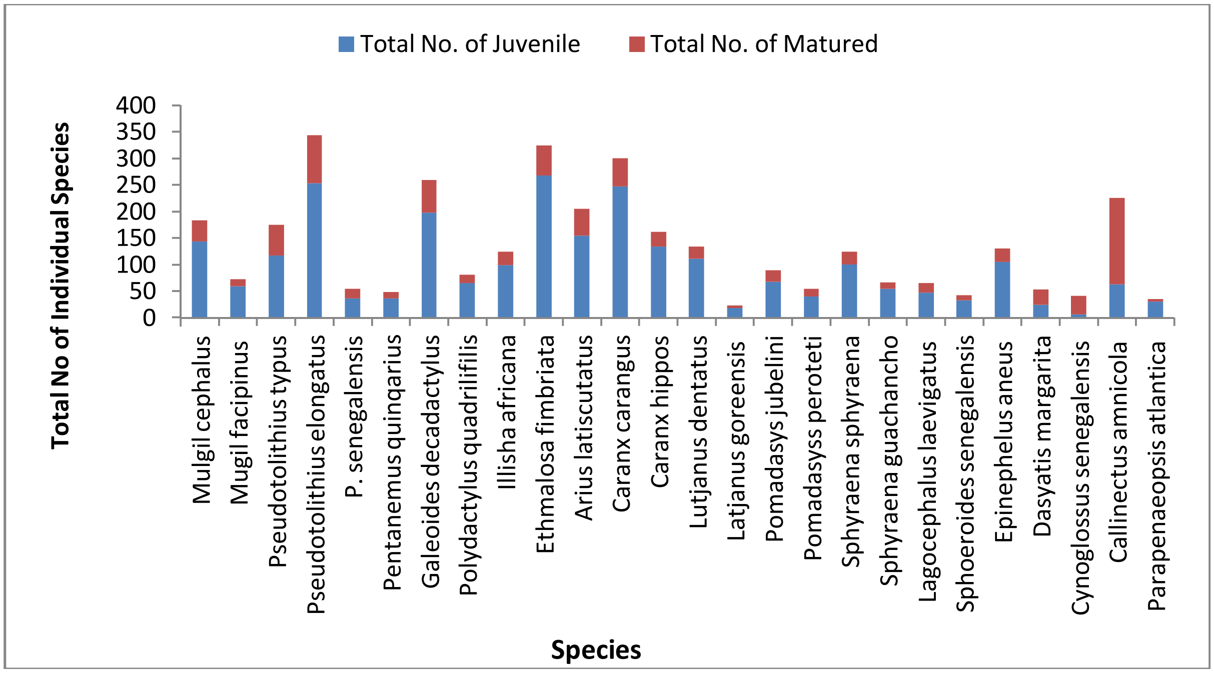


Figure VI: Total number of individual species landing for 26 species in 20 replicate

Table V: Distribution of Fisher-Folk Respondents

S/N	AGE AGE RANGE (YEAR)	FREQUENCY	PERCENTAGE (%)	MEAN (X)	SD
1.	15-25	10	33		
2.	26-36	18	60		
3.	37-47	2	7		
	TOTAL	30	100.0	28.73	
	SEX				
1.	Male	22	73.3		
2.	Female	8	26.7		
	TOTAL	30	100.0		
	MARITAL STATUS				
1.	Single	8	26.7		
2.	Married	22	73.3		
	TOTAL	30	100.0		
	RELIGION				
1.	Christian	28	93.3		
2.	Islam	2	6.7		
	TOTAL	30	100.0		
	LEVEL OF EDUCATION				
1.	Primary	2	6.7		
2.	Secondary	15	50.0		
3.	OND/NCE	5	16.7		
4.	B.sc/HND	6	20.0		
5.	Msc	2	6.7		
	TOTAL	30	100.0	13.1	2.76
	FAMILY TYPE				
1.	Nuclear	24	80.0		
2.	Extended	6	20.0		
	TOTAL	30	100.0		
	EXPERIENCE IN FISHING				

S/N	AGE AGE RANGE (YEAR)	FREQUENCY	PERCENTAGE (%)	MEAN (X)	SD
1.	1-5	13	43.3		
2.	6-10	14	46.67		
3.	11-15	1	3.33		
4.	16-20	2	6.67		
	TOTAL	30	100.0	7.33	3.72
	SECONDARY OCCUPATION				
1.	Trading	10	33.3		
2.	Faming	7	23.3		
3.	Boat building	2	6.7		
4.	Crafts	6	20.0		
5.	Others	5	16.7		
	TOTAL	30	100.0		
	BEST FISHING SEASON				
1.	Wet Season	0	0		
2.	Dry season	30	100.0		
	FISHING OPERATION PER DAY				
1.	1	2	6.7		
2.	2	27	90.0		
3.	3	1	3.3		
	TOTAL	30	100.0	1.96	
	MEMBERSHIP OF COOPERATIVE				
1.	Yes	11	36.7		
2.	No	8	26.7		
3.	About to join	11	36.7		
	TOTAL	30	100.0		
	INCOME RANGE (₦: k)				
1.	20,000-25,000	10	33.3		
2.	26,000-31,000	10	33.3		
3.	32,000-37,000	4	13.3		
4.	44,000-49,000	4	13.3		
5.	68,000-73,000	1	3.3		
6.	98,000-103,000	1	3.3		
	TOTAL	30	100.0	33,333	15,799

Source: Field survey, 2017

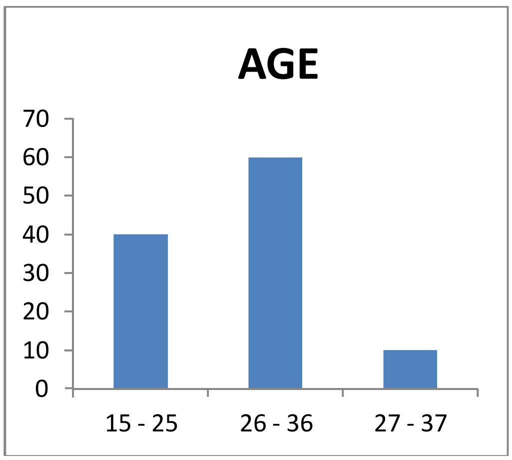
Table VII: Beach-Seine Operation Impact on Marine Environment, Aquatic Resources and Habitat

S/N	EFFECTS	MEAN (X)	RANK	REMARK
1.	Changes and depletion in fish population (increase CPUE)	3.00	1	Maximum
2.	Distortion in ecosystem food chain (trophic level)	2.80	4	Maximum
3.	Out migration of the fisher folks	2.87	3	Maximum
4.	Disruption of other fisheries activities	2.47	6	Maximum
5.	Reduction of sustainable fishery (irresponsible fishery)	2.27	10	Minimum
6.	Migration of fish species to other location	2.60	5	Minimum
7.	Marine species extinction strip mining (overfishing)	2.20	11	Minimum
8.	Ecosystem simplification (evolutionary success/future recruit failure)	1.83	12	Minimum
9.	Biodiversity loss/mortality of vulnerable marine non-fish species	2.43	7	Minimum
10.	Description in downstream fishery activities (resource utilization, processing/marketing)	2.37	8	Minimum
11.	Reduction in other socio-economic activities (urbanization & industrialization)	2.87	3	Maximum
12	Beach/shores strewn with discards (Environmental Health Impact Assessment (HIA).	2.33	9	Minimum

Source: Field survey, 2017.

Table VIII: Cost Structure of Beach-Seine bycatch operations in Marine Environment

	Minimum ₦: K	Maximum ₦: K	Mean (X) ₦: K	S.D
Fuel	2500	6000	3860:00	1407.5
Feeding	1000	25000	2685:17	4240.9
Miscellaneous	500	3000	1325:93	483.2
Total	**4000**	**34,000**	**7871:10**	**5073.45**
Boat (5 years)	250,000	450,000	310,000.00	50854.76
Gear (2 years)	150,000	350,000	227,083.30	41479.46
Engine (10 years)	100,000	450,000	318,960.00	64082.86
Total	**500,000**	**1,250,000**	**856,043.30**	**109644.9**
Fish	30	150	-	-
Quantity	15	50	26.03	11.14012
Price	5000	50,000	-	-
Total	**5045**	**50,200**	**-**	**-**



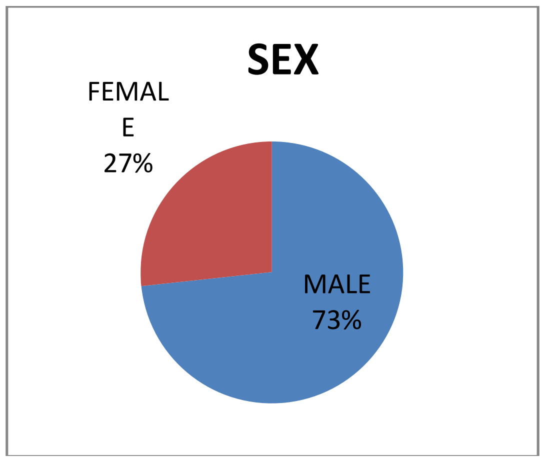
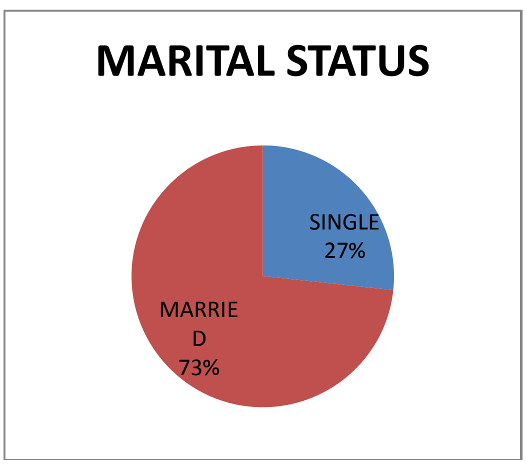


Figure VII: Distribution of fisher folks respondents by age
Figure VIII: Distribution of fisher folks respondents by sex



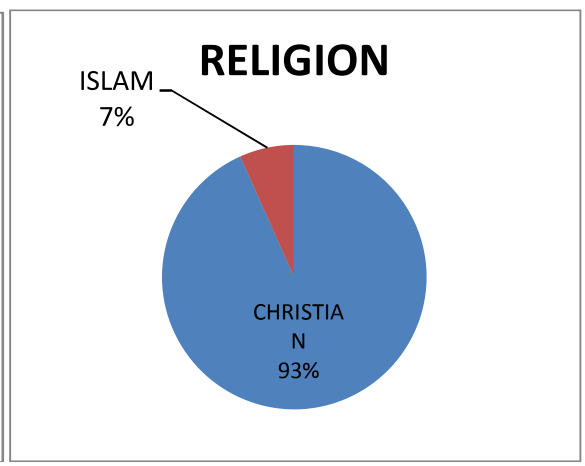
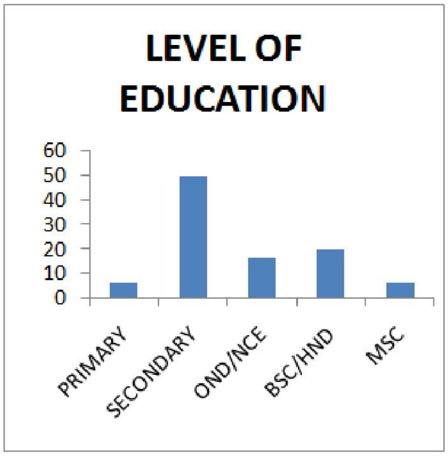


Figure IX: Distribution of fisher folks respondents by marital Status
Figure X: Distribution of fisher folks respondents by religion



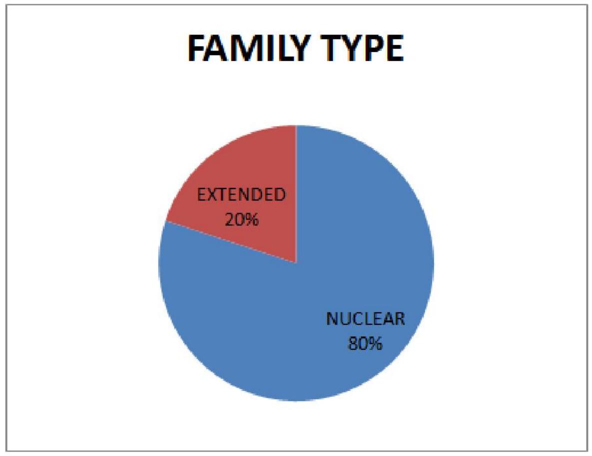


Figure XI: Distribution of fisher folks respondents by education
Figure XII: Distribution of fisher folks respondents by family type

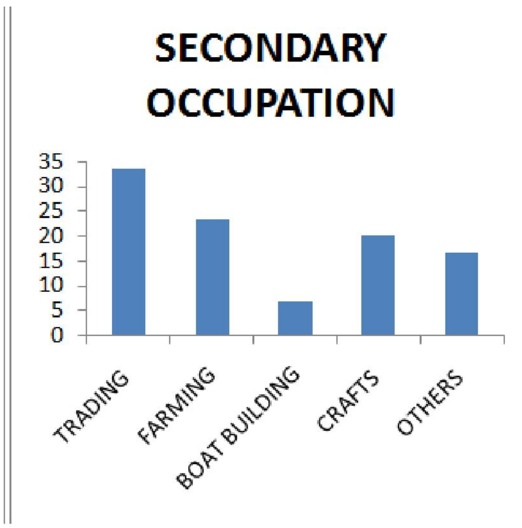
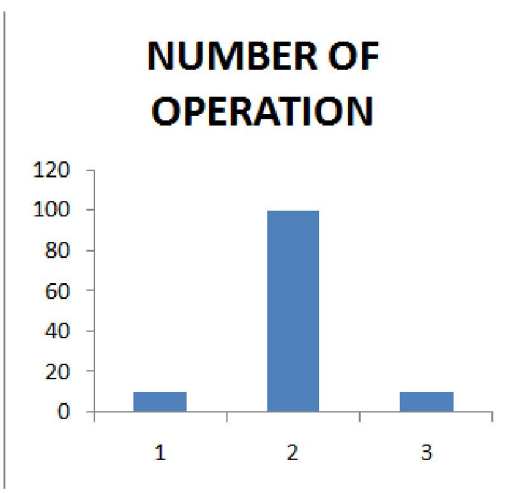


Figure XIII: Distribution of fisher folks respondents by experience in fishing
Figure XIV: Distribution of fisher folks respondents by secondary occupation



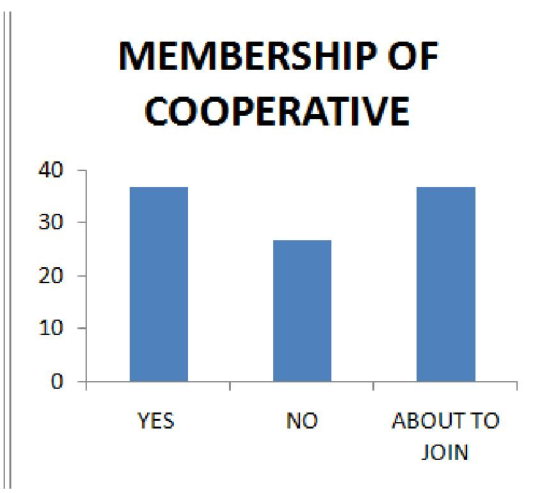


Figure XV: Distribution of fisher folks respondents by number of operation
Figure XVI: Distribution of fisher folks respondents by membership of cooperative

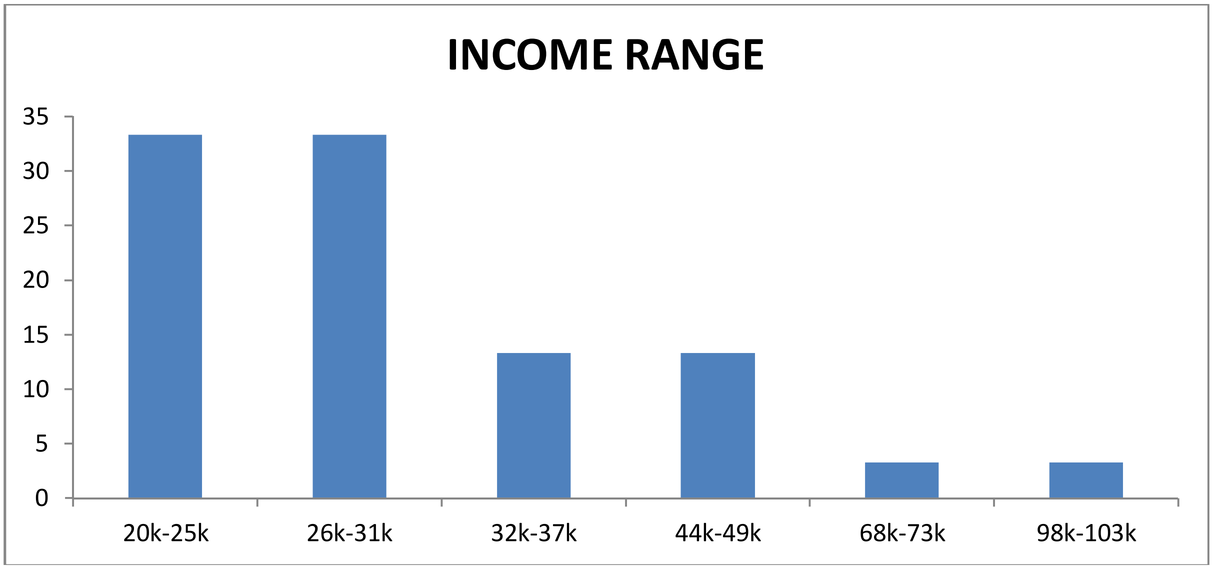


Figure XVII: Distribution of fisher folks respondents by income range

Discussion:

Shahjahan (2000) studied on the economic condition of fishermen of the Jamune River in terms of religion, family size and composition, education status and income, which this study showed consistency of such parameters. As an economic indicator that reflects how well an enterprise operate, in terms of gross revenue to produce a certain profit or net surplus; the Return on investment (ROI) of fifty-three percent (53%) for beach-seining operation needed to be improved upon. The result of the present study, have proven that as far as the impact of beach seining bycatch on marine environment is concerned, all studies observe a high percentage of juvenile in the catches of beach seine. Hicks *et al.,* (2012) reported that beach-seine lands high volumes of fish under 5cm whilst of the same time damaging habitat it is pulled through; the damage to corals with repeated usage limits resettlement. Portt*et al.,* (2006) saw the size of the fish caught in the beach seine depends on the mesh size, avoidance and encircling efficiency. (Bentes*et al.,* 2006, Rooker*et al.,* 1991) observed that seasonal migration and juvenile recruitment of species can affect fish communities over long term time frames. The massive captured of juveniles Bobo Croaker (Scieanda) and Bonga (clupeidae) is invariant with the report of Moses (2000), the use small mesh net to harvest massively juveniles bonga (*Ethmalosafimbiriata)* and other clupeids from the brackish water nursery grounds of south eastern Nigerian. Tsai and Ali (1997) reported same that supply of fish depends upon the season, number of fishermen engaged in fishing and their fishing method.

Conclusion/Recommendations

While suggesting a further comprehensive research on this sensitive environmental issue, I strongly point out the below recommendations.

-The use of fisher's ecological knowledge in resource management and opportunities for value addition and post-harvest improvements.

-Occupational diversification to other income-generating activities and livelihoods, while restoring the aquatic habitat.

-Diversification to move selective and environmentally friendly fishing methods, technical improvements of beach seine gear and methods to reduce catches of juvenile fish.

-Government and NGOs involvement in micro financing support and micro enterprising development.

-The use of socio-economic indicators for the monitoring of the impact of management measures on the livelihoods of the fishing community.

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