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Survey of Fishing Gear and Methods in the Lower Taylor Creek Area, Bayelsa State, Nigeria

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Abstract: A survey of fishing gear and methods in the Lower Taylor Creek Area of Bayelsa State was carried out in 2008. Data were obtained from a sample of ninety (90) artisanal fishers drawn from three (3) randomly selected communities along the Lower Taylor Creek: Polaku, Koroama and Ogboloma. A two stage random sampling technique was employed in selecting the fishers. The instrument used to get information from fishers was structured interview schedule. Data were analysed with the use of descriptive statistics such as counting frequency, percentages and ranking. Chi-square was further used to test relationships between variables. The results showed that the commonest gear used in the area include Traps (60%), Hook and line/longline (60%) and Drift/gill nets (47.8%). Age, marital status and fishing experience did not have any significant relationship with the gear used ($P > 0.05$). More than 70% of fishers have more than three fishing gear in-use, while most of the fishers (92.2%) fabricated their gear themselves. Selection of fishing gear depended on factors such as ability to catch live fish (83.3%), season (77.8%) and choice of fish species (77.8%). The major challenges faced by fishers included water plants (85.6%), no credit facilities (81.1%) and stealing of catches/fishing gear (77.8%).

Key words: Fishing gear % Methods % Taylor Creek % Bayelsa State % Nigeria

INTRODUCTION

Fishing gear can be described as any kind of equipment used in harvesting, cropping, or capturing fish from any water body [1], while fishing method is how the gear is used. According to Moses [2], fishing gear have generally undergone a lot of modifications and improvements in consonance with advances in modern technology, although the basic principle of wounding, hooking, trapping, encircling, scooping and filtering can still be detected. The types, designs and mode of operations of the traditional and modern fishing gear employed in the inland and coastal waters of Nigeria have been fairly described [3,4]. The list include among others, gill nets, cast nets, hook and line, entangling nets, trawls, lift nets and traps. However, Solarin *et al*., [5] reported gill nets as constituting the most abundant small-scale fishing gear in Nigeria.

Fishing is the main occupation of the people of the Niger Delta. Scott [6] described gill net as the commonest gear in river fishing in the Niger Delta. He listed other gear in use then as, hand-lines, cast net, fish fences, screens and traps of various kinds. In the Bonny estuary, gill net constituted more than 50% of the gear deployed by fishers [7,8].

However, apart from EIA reports to oil prospecting companies, there is no information concerning the fishing gear/methods being used in the Lower Taylor Creek Area, despite the enormous fisheries activities carried out by local artisans and migrant Hausa fishers there. It is important to identify gear used in this area as a prelude to determining those that can be studied, redesigned if need be and improved upon. Besides, it is also important when planning a fishery and taking management decisions. This study is therefore aimed at surveying the gear used in the Lower Taylor Creek with the following objectives:

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- To identify the types of gear used by fishers in the Lower Taylor Creek Area;
- To ascertain if the socio-economic characteristics of the fishers have any significant association with the gear/methods used;
- To find the factors that determine the use of gear; and
- To identify the challenges faced in the use of these gear by fishers in the study area.

Hypothesis of Study: There is no significant relationship between the socio-economic characteristics of fishers and the types of gear/methods being used.

MATERIALS AND METHODS

Study Area: The study was carried out in the Lower Taylor Creek (called *Gbaraintoru* by indigenes), Yenagoa Local Government Area of Bayelsa State. The Taylor Creek is situated between 5° 01' N; 6°17' E and 5° 02' N; 6° 18' E.

Several creeks and floods channels interconnect freshwater swamp forests, linking the Nun River and Taylor Creek at various points and form a mass of water body during the high flood. These creeks and swamps with their associated floodplain lakes and fishing ponds constitute the main fishing systems. Okoso Creek is at present the most prominent creek connected to the Taylor Creek which subsequently empties into the Nun River at its confluence at Polaku. In the dry and low water period, the Taylor Creek in the Zarama axis reduces to a disjointed series of pools linked by sections of shallow water. The Taylor Creek is subject to mild tidal influence in the dry season. Water flows swiftly in one direction during the flood period but gentle in the low water period. At the peak of the dry season, the direction of flow is slightly reversed in the Taylor Creek during the rising tide, while at full tide, the flow almost stagnates. Presently, oil exploration and exploitation activities and other rural developmental programmes including road construction and land reclamation works are going on in the area.

Sampling Procedure: The data for the study were obtained from a sample of ninety (90) artisanal fishers drawn from three (3) randomly selected communities along the Lower Taylor Creek, Bayelsa State, Nigeria in 2008. These communities include: Polaku, Koroama and Ogboloma.

A two stage random sampling technique was employed in selecting the fishers. Three communities were randomly selected from ten communities in the Lower Taylor Creek Area and in each community, thirty (30) fishers were randomly selected. The research instrument was a pre-tested structured interview schedule. In addition, data and information was also obtained from oral interview and personal field observation. The data collected was analyzed using such statistical tools as frequency count, percentages and ranking. Chi-square(X^2) was further used to test the stated hypothesis.

RESULTS

The types of fishing gear used by fishers in the Lower Taylor Creek Area are given in Table 1. The results revealed that the commonest gear types in this area were the Traps (60%), Hook and line/longline (60%) and drifting gill nets (47.8%). The fishing traps were of various designs: these included trigger traps (e.g. *igogo, eteu, ideribo*) and the non-return valve traps (e.g. *gura, ingo, ikara*) that were used at the bank of the creek. Among the lines were the spring-loaded set line (*fungu dayi*), rod and line (*poi dayi*) and the longline (*merimeri*/*sara dayi*) all targeting the Bagrids, Schilbeids, Clariids and Mochokids. The *merimeri* and *sari dayi* were used by the Hausas and the Ijaws respectively during the receeding flood. Drifting gill nets were also used from October when the flood was receding to July of the next year. The various types available were surface drift nets (*ofoinmo dii*) which target Characids and Schilbeids, *eleli dii* and *isoun dii* that target *Parailia pellucida* and *Pellonula leonensis* respectively and bottom drift nets (*Birin kassa*) that target Bagrids, Mochokids, Citharinids and Heterotids. The stretched mesh sizes of the drifting nets ranged from 13mm to 140mm. Attached to the footrope of these nets (as sinkers) were lead, corked bottles, stones and batteries while Styrofoam/corks were used on the headrope as floats.

Other gear included the seine net (*agodou*), gill net with bag, operated by four persons in two canoes and targets Mochokids, Mormyrids and Citharinids. It was used between November and July of the next year. Cast nets (*Igbo*) are falling nets which are gradually losing importance in the creek. Presently, they are almost entirely used in Polaku. The cast nets were constructed with nets of stretched mesh size of 38mm and target mainy Cichlids, Characids and Schilbeids. The rectangular *atalla* lift net is highly selective for *Pellonula leonensis* but also

Table 1: Fishing gear used in the Lower Taylor Creek Area

Gear	+Frequency	+Percentage	Rank
Drifting gill nets (**Birin kasa,isoun-dii,eleli-dii,yenu-dii*)	43	47.8	3rd
Spear (*Oborowei*)	18	20	6th
Hook and line/Longline (*fungu-dayi, gbemo-dayi,kpokpo-dayi, meri-meri, lemo-dayi, sara dayi, poi dayi*	54	60	1st
Cast Net (*Igbo*)	23	25.6	5th
Lift Net (*Atalla*)	7	7.8	7th
Seine Net (*Dala, agodou, keli-keli*)	25	27.8	4th
Traps (*Igogo, gura, ingo, ekere, ikara, ideribo, eteu, asoro, kana, agbuyi*)	54	60	1st
Fence (*Sanga*)	7	7.8	7th
Others (e.g. bailing of swamp ponds)	2	2.2	9th

*Local names in italics+multiple responses

Table 2: Socio-economic characteristics of respondents and relationship with the use of gear in the Lower Taylor Creek, Niger Delta

Characteristics		Percent	Drifting gill net	Spear	Hook/longline	Cast net	Lift net	Seine net	Traps	Fence	Others
Sex	Male	62.2	28	***18	35	***22	*7	19	23	*7	0
	Female	37.8	15	0	19	1	0	6	***31	0	2
Age	21-30	15.6	9	1	7	1	1	3	6	0	0
	31-40	24.4	9	6	11	6	1	7	13	3	1
	41-50	11.1	3	3	8	4	2	3	5	0	1
	51 and Above	48.9	22	8	28	12	3	12	30	4	0
Marital Status	Married	78.9	35	14	42	18	4	22	44	6	1
	Single	21.1	8	4	12	5	3	3	10	1	1
Educational Level	No Education	27.8	8	2	15	4	1	4	**19	2	0
	No Certificate	6.7	4	3	4	2	2	5	1	0	0
	FSLC	18.9	8	4	13	5	1	**7	13	2	1
	Quoranic education	5.6	1	0	0	0	0	1	4	0	0
	Trade Test	3.3	2	2	2	2	0	0	3	0	0
	WASC	18.9	9	3	10	4	2	2	7	0	1
	Tertiary education	18.9	11	4	10	6	1	6	7	3	0
Fisher's Status	Fulltime	32.2	20	7	14	11	4	9	18	4	1
	Partime	67.8	**23	11	40	12	3	16	36	3	1
	?1,000-?2,000	23.3	10	0	10	1	0	3	15	0	0
	?2,000-?3,000	23.3	11	*6	14	*9	0	5	14	2	0
	?3,000-?4,000	12.2	5	5	7	5	2	3	8	2	1
	?4,000 and Above	21.1	11	2	10	5	3	6	7	3	0
Cooperative Society	Member	13.3	9	2	4	3	0	3	7	3	1
	Non-member	86.7	*34	16	*50	20	7	22	47	*4	1
Ethnic Grouping	Ijaw	86.7	**42	16	***50	*20	6	21	47	7	2
	Hausa/Fulani	8.9	1	0	0	0	0	4	4	0	0
	Others	4.4	0	2	4	3	1	0	3	0	0
Fishing Experience	1-5 Years	7.8	4	2	5	3	0	1	3	1	0
	6-10 Years	13.3	4	0	6	0	1	1	9	0	0
	11-15 Years	13.3	7	3	7	2	0	5	5	0	0
	15 Years and Above	65.6	28	13	36	18	6	18	37	6	2

? = Naira, Nigerian currency; FSLC = First School Leaving Certificate; WASC = West African School Certificate; *P<0.05; **P<0.01; ***P<0.001 (*Shows significant relationship between socio-economic characteristic and use of gear while absence shows otherwise)
Note: Current Exchange Rate is $1= ?150

catches other species such as Citharinids and Distichodids. It is operated by two persons and is attached to one side of the canoe. Fishers claimed it was formerly used when the flood was receding till May of the next year, but is now used all year round. Fish fences were predominant in the upper course of the creek. They were prepared from forest materials and were used independently or in conjunction with other gear. They were usually set across creeklets or perpendicular to the shore to serve as fish leaders.

Table 2 shows the Socio-economic characteristics of the fishers and their relationship with the fishing gear used. The results showed that female fishers comprised 37.8% of the respondents. Gender had significant relationship with spear ($P < 0.001$), cast net ($P < 0.001$), lift net ($P < 0.05$), Traps ($P < 0.001$) and fence ($P < 0.05$).

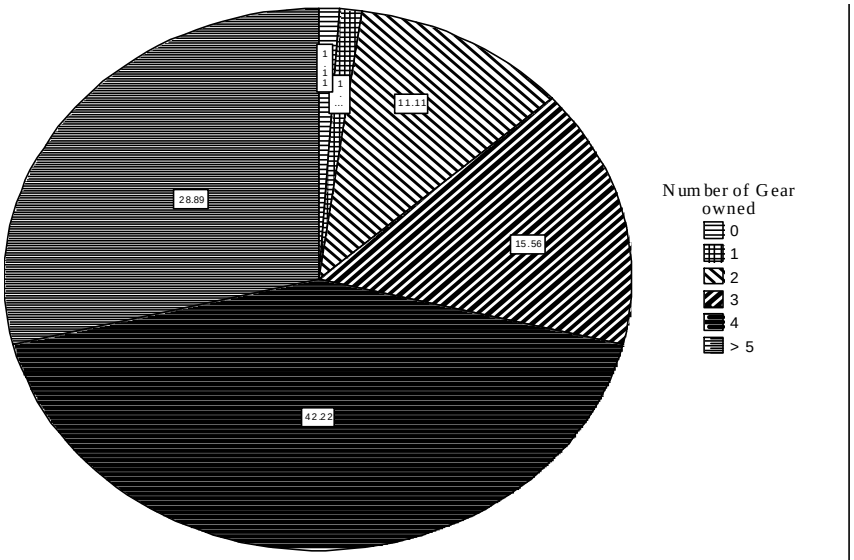

Figure 1: Number of fishing gear owned by fishers in the Lower Taylor Creek area

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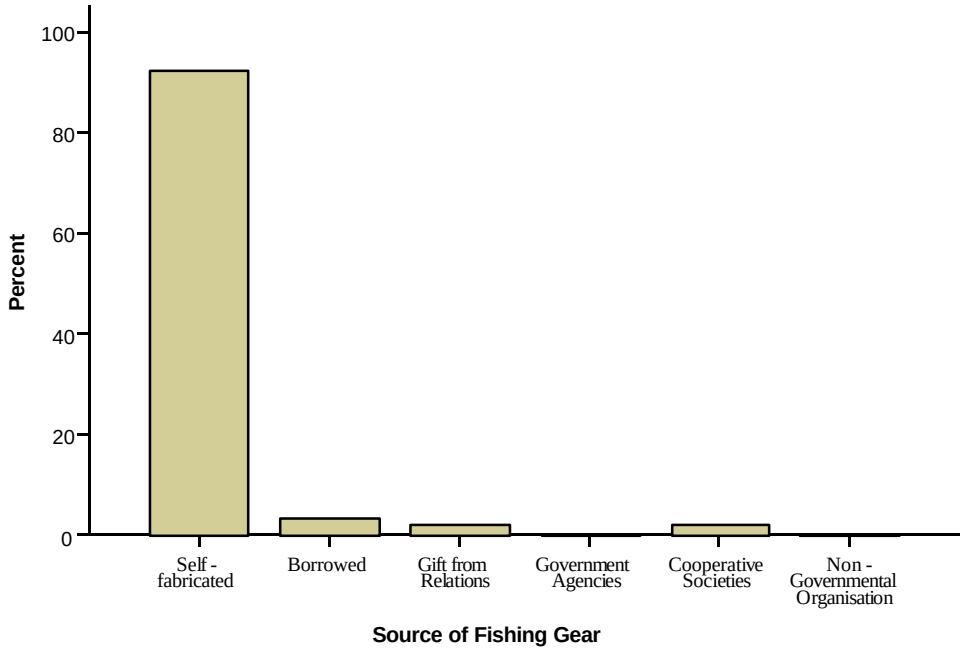

Fig. 2: Sources of fishing gear in the Lower Taylor Creek Area

The results revealed that fishing methods that involved the use of spear, cast net, lift net and fence were male dominated, while trap fishing was female dominated. The female dominated trap (*ingo*) fishery is mainly targeting shrimps (*Macrobrachium spp.)* which are abundant during the flooding season (September-October). The few men involved in trap fishery were mainly the migrant Hausa/Fulani fishers who had introduced the *gura* and *lege* to the area. The *gura* and *lege*, constructed with 25mm mesh size nets, target the Bagrids, Mochokids and Clariids depending on the type of baits used.

On the educational level of the respondents, 72.2% could read and write; 27.8% had no education at all. Educational level had significant association with seine

net (P < 0.01) and Traps (P < 0.01). Majority (67.8%) of the respondents were part-time fishers and the use of the drift net depended on the fisher's status (P < 0.01). Over 56% of respondents earned weekly income above ₦2, 000. The use of spear (P < 0.05) and cast net (P < 0.05) in fishing in Taylor Creek depended significantly on weekly income.

The results further revealed that 13.3% of respondents were members of cooperative societies while majority (86.7%) of the respondents were Ijaws, with Hausa/Fulanis coming next (8.9%) and others (4.4%) including Urhobos, Isokos and Igbos. Also, the results showed that membership of cooperative society had significant relationship with use of drift net (P < 0.05), Hook and line/longline (P < 0.05) and fence (P < 0.05), while ethnic grouping had association with the use of drift net (P < 0.01), Hook and line/longline (P < 0.001) and cast net (P < 0.05). Ijaws were more involved than any other ethnic group in the use of drift nets, hook and line/longline and cast nets.

Sixty percent of the respondents were above 40 years of age, while majority (78.9%) of the respondents were married and most of the respondents (65.6%) had been in fishing for over fifteen years. However, age, marital status and fishing experience did not have any significant association with the gear used (P > 0.05).

Table 3: Factors that determine the use of fishing gear in the Lower Taylor Creek Area

Factor	[+]Frequency	[+]Percentage	Rank
Season	70	77.8	2nd
Fish to be caught	70	77.8	2nd
Cost of gear	31	34.4	8th
Safety of gear operation	46	51.1	7th
Efficiency of gear	63	70	4th
Freshness of catch	62	69.1	5th
Catching of live fish	75	83.3	1st
Location or part of river to be fished	47	52.2	6th
Others	7	7.8	9th

[+]multiple responses

Table 4: Challenges identified by fishers in the Lower Taylor Creek Area

Challenges	[+]Frequency	[+]Percentage	Rank
High cost of gear materials	69	76.7	4th
Stealing of catches/gear	70	77.8	3rd
Fish spoilage	37	41.1	9th
Poor durability of gear material	56	62.2	5th
No boat to use for fishing	50	55.6	6th
Low fish catchability by gear	48	53.3	7th
Cannot repair net/traps	28	31.1	10th
Problems of water plant	77	85.6	1st
No access to credit facilities	73	81.1	2nd
Tearing of nets by engine boats	45	50	8th
Others	10	11.1	11th

[+]multiple responses

The number of fishing gear owned by respondents is shown in Figure 1. Over 70% of respondents had more than three fishing gear in-use. Figure 2 shows the sources of fishing gear in the Taylor Creek Area. Most of the fishers (92.2%) fabricated their gear themselves. Table 3 shows the reasons respondents adduced for using the fishing gear. Catching of live fish (83.3%) was the most important factor considered when choosing a gear. The next important factors were season (77.8%) and the fish species to be caught (77.8%). The major challenges faced by fishers in the Lower Taylor Creek are given in Table 4. It showed that water plants (85.6%) constituted the major problem of fishers in the study area. Others include-no credit facilities (81.1%) and stealing of catches/fishing gear (77.8%).

DISCUSSION

The gear types identified in this study were also observed in Bayelsa State by NIFFR [9] when she surveyed all the Inland water bodies in Nigeria for fishing gear and crafts. These were the commonest gear also in Kainji Lake [10,11], Lake Alau [12] and Lake Chad basin [13], all in Nigeria. It is good to note that the commonest gear in this creek are all passive and are known to have lower rates of by-catch and less likely to alter the substratum [14]. However, one of the issues associated with traps and gill nets is 'ghost fishing', or unintentional catch caused by continuous operation of fishing traps/nets lost as a result of bad weather, loss of floats, or fouling of seabed [14,15].

The high participation of women in actual fishing in the area had already been reported by Kingdom *et al*., [16]. The male-dominated use of spear, cast net, fish fence and lift net may be due to the amount of effort (or energy) required in using these gear. The observed involvement of Ijaws than any other ethnic group in the use of drift nets, hook and line/longline and cast nets is in agreement with the report of Bankole *et al*., [12] that fishing gear could be distributed according to tribal lines. Sikoki and Otobotekere [17] had already reported that truly full-time fishers were few in inland waters. They claimed most fishers combined fishing with other occupations or supplemented their income with odd jobs during bad fishing seasons.

More than 50% of respondents earned weekly income above ₦2, 000, which translates to ₦8,000 (or more) a month which is higher than the minimum wage (₦7,500) pegged by the Bayelsa State Government for her workers. This observation had earlier been reported in the area [16].

The poor membership of cooperative societies in this area puts the fishers at a disadvantage in attracting assistance from Government, Non-Governmental Organizations and Financial Institutions.

The observed age distribution is in agreement with the report of Bayelsa State Government [18], which observed a predominance of ageing farmers in the rural areas owing to low level of technology, low agricultural productivity and low returns and preference of rural youths to migrate to urban areas rather than go into farming.

Fishers usually have variety of fishing gear because seasonal changes both in species diversity and abundance require varying fishing gear several times a year [12]. Bene and Neiland [13] observed that number and size of fishing gear depended on the wealth level of households. Self-fabrication of gear was also observed by Ipinjolu *et al*., [19] in River Rima, in North Western Nigeria. It might be cheaper to fabricate gear than buying already fabricated ones.

The claim by fishers that catching of live fish was the major factor that determined their choice of gear was also reported by Atar *et al*., [20]. They had reported that fishers in Beymelek Lagoon, Turkey, preferred hoop nets to other nets because it allowed them to sell their catch alive, even though it was more labour intensive than others. Fishers in Lakes Kainji, Chad and Alau also consider season and fish species to be caught, as important factors in their choice of fishing gear [11,12,21].

The invasion of the river system by water hyacinth (*Eichornia crassipes*) was a major challenge to fishers in the study area. The weed impeded boat traffic and fishing activities. Similar invasions had been reported in other lakes and river systems including River Shire which connects to Lake Malawi [22]. The problem of absence of credit facilities in this area had been reported by Kingdom *et al*., [16] and this might be responsible for the poor attitude of youths and women towards fisheries in particular and agriculture as a whole. The stealing of catches was also a constraint highlighted by Ipinjolu *et al*., [19] in River Rima, North Western Nigeria. They attributed this problem to the projection of the Gura trap above water, thus attracting thieves.

CONCLUSION

The commonest gear types in the Lower Taylor Creek were the traps, Hook and line/longline and the drifting gill nets. Males dominated the use of spear, cast net, lift net and fence while women dominated the trap fishery. Also, the Ijaws were more involved than any other ethnic group in the use of drift nets, hook and line/longline and cast nets, while age, marital status and fishing experience did not influence the use of fishing gear.

Recommendations: Study of the technical details (or design), efficiency and selectivity of the common gear in the study area should be carried out. This is necessary to ascertain possible effects on the fishery and likely areas for improvement. The National Inland Waterways should be alive to her responsibility in clearing the water ways of aquatic weeds. Fishers should be organized into cooperatives, while liberal credit facilities and fishing inputs should be provided.

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