



CRAB FISHING AND SOCIO-ECONOMIC CONSIDERATIONS IN LAGOS LAGOON SYSTEM IN NIGERIA

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ABSTRACT

A study was carried out to elicit information on the seasonal distribution, occurrence, economics of the crab fishery, and to inform discussions around potential fisheries management changes and reforms. Data analyses revealed that most of the crab collectors and fatteners were mainly Yorubas and Beninois. In the study area, over 90% crab collectors were within the age group of 21 – 60 years working age. Average fishing experience of crab collectors was 18.9 years. Literacy level showed that over 70% of the fishers could read, write and speak in English with 19% having no access to education. Peak season ranged from March to August. Catch per unit effort during the peak period was 25 – 60 kg/day/man. Crab collections are alternative sources of income and sustainable livelihood for the disadvantaged people in the Nigeria. There is a need for adequate information about the marketing system and performance for this export fishery product to increase the volume for local consumption and international export. The fishery does face some challenges, many of which are macroeconomic in nature, due to the high exposure the fishery has to the export market. These include exposure to fluctuations in export prices due to world supply, exchange rates, and growing emphasis on eco-certification for fishery products. In addition, the fishery faces pressures on earnings from a combination of rising fuel prices and stable prices.

Keywords: crab fishing, lagoon system, socio-economic

INTRODUCTION

Callinectes amnicola (De Rocheburne, 1883), popularly known as mud crab and locally called *Akan Osa*, appears to be the most important crab species in Lagos lagoon for food and trade, but information on the crab is scarce. Mud crabs are predominantly estuarine, but depend on the marine environment for spawning and early larval life (Arriola, 1940). Some reports are available on the biology, taxonomy and consumer preference of another commercially important crab species, *Scylla serrata*. Islam (1977) studied its taxonomy, biology and ecology. Arshadullah (1976) described its industrial processing.

Crab fishing may not be of central importance to the fisheries sector in Lagos lagoon. It has continued to grow from next to nothing contributing marginally to fish production in Lagos State. Although crab fishing has had a significant

impact on the economy of Lagos State, it has had high environmental costs and including destruction of mangrove forests. It has also set in motion socioeconomic changes of the fishers (livelihood). All these changes may have serious implications for the sustainability of crab fishing.

This paper highlights trends in the size of the crab fishing and production statistics, the existing fishing system and technology and the different components of the sub-sector. To address such a complex research issue, it is critical to have detailed data on social and institutional arrangements, ecological processes that affect and determine the productivity of crab fishing, economic parameters such as input and output prices, export and domestic prices and the market structure of production. Other information provided include occurrences, seasonal distribution, abundance, trapping techniques, post-

harvest activities and transportation as well as its impacts on rural development, food security and contribution to poverty alleviation and knowledge gap in respect of the development and marketing of such commodity.

The study was conducted to assess the socio-economic conditions of mud crab (*Callinectes amnicola*) fishers and collectors in Lagos lagoon system in Nigeria with information on seasonality, abundance, occurrence and economics of the fishery. New management reforms required for the crab fishery are also discussed. With proper attention, crab could play an important role in enhancing protein production, foreign exchange earnings and internal trade development. Above all, it could help create employment opportunities for the unemployed and underemployed fishermen of the lagoon areas.

MATERIALS AND METHODS

The study used a multi-stage sampling technique involving the purposive selection of the Badagry, Ologe, Lagos, Lekki and Epe Lagoon complexes in Lagos State and the identification of communities known for producing crab in each of the lagoon system. Using snowball techniques (McCall and Simmons, 1969), a total of 150 crab fishers were interviewed using structured questionnaires and ethnographic fieldwork between March, 2009 and January, 2010. Ethnographic fieldwork entailed participant observation of crab fishing-related activities at each landing site, and informal and semi-structured interviews with fishermen, receivers, fishery support business

operators and harbour staff. The fieldwork augmented the surveys, providing in-depth information on aspects of the commercial crab fishing industry in Lagos lagoon complexes.

Descriptive statistics were used to describe crab fishers socioeconomic variables such as age, sex, year of schooling, experience acquired in fishing, marital status and accessibility to credit. Combining the depth afforded by ethnography with the breadth of a survey generates more reliable and valid information than either method alone (Yin, 1989). Both methods, however, require considerable time and effort identifying, locating and securing the participation of respondents.

RESULTS

Distribution and abundance

C. amnicola occur in almost all the lagoons and estuaries of Lagos water bodies but they are mostly abundant in the Badagry, Ologe, Lagos and Epe lagoons. Their presence in Lekki lagoon was reported by the fishermen but not exploited commercially due to the negative impact fishermen gear. The total catch, catch rates, sex ratio and size show seasonal variation (Table 1). The rainy season (April-September) is the major fishing period for almost all areas. The climatic cycle indicates that April, May, June and July are the months of peak rain, while November, December and January are the transition months between the wet and dry seasons. The data clearly shows that the peak mud crab fishing coincides with the rainy season (April to October), although crabs capture activity is generally carried on through the year.

Table 1: Seasonal distribution and abundance of mud crab fishery resources

Lagoon system	Water body	<i>Callinectes sp</i>											
		J	F	M	A	M	J	J	A	S	O	N	D
Badagry	Yeketomi	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Seke	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Ajido	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Agbalata	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
Ologe	Oto Awori	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Oworonshoki	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
Lagos	Makoko	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Badore	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Ikosi	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Ijede	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
Lekki	Bayeku	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Osiriwon	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Lekki	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
Epe	Ise	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	Epe	Red	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
	High season	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
	Low season	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange

Seasonal variation in catch/effort and size distribution

During the peak period, fishermen reported that the catch was relatively high, three to four times more by weight and quantity than the transition period (November to January). Crabs caught in the rainy season are larger in size than those caught in transition period (harmattan season). The sex ratio in the catch differs to a considerable extent between seasons. In the rainy season, the catch includes 50 – 60 per cent females. But in the harmattan period, 60 – 65 per cent of the catch is male. During the rainy season, the fishermen land and sell their catches almost every day to the nearest markets. During the dry season (November to January), they land their catches

only on one or two days in a week or even less. The catch rate varies considerably between seasons. Crab abundance appears to be poor in the harmattan when, catch/effort by lift net is 4-10 kg/day/man, whereas in the rainy season it is 25-60 kg/day/man. In the rainy season, the catch/effort by boat using net is 300 kg/day/per boat, while in harmattan it is 60 kg/day/boat on an average.

Annual production of mud crab

Lagos State production of mud crab was estimated to be between 20,000 and 22,885 metric tonnes. This excludes production from Makoko and Badore. The break-up for the production for different water bodies is given in Table 2.

Table 2: Estimated number of crab fishers and production statistics by water body

Lagoon	Village	North	East	Crab fishers	Total Qty (mt)
Badagry	Yeketomi	06° 25.14'	02° 51.689'	50	1800
Badagry	Seke			200	2835
Badagry	Ajido	06° 24.842'	03° 00.464'	25	1620
Lagos	Badore	06° 30.604'	03° 37.096'	20	0
Lagos	Ikosi	06° 36.578'	03° 42.370'	140	4410
Lagos	Ijede	06° 33.823'	03° 35.412'	35	2106
Lagos	Bayeku	06° 32.184'	03° 33.192'	200	2791
Lekki	Osiriwon	06° 25.489'	04° 07.188'	60	4500
Lekki	Lekki			50	1125
Lekki	Ise			10	675
Lagos	Oworoshoki	06° 32.947'	03° 24.418'	20	0
Lagos	Makoko	06° 29.736'	03° 23.123'	100	
Epe	Epe	06° 34.928'	03° 59.448'	60	800
Ologe	Oto Awori	06° 29.504'	03° 06.697'	10	194

Gear used in crab fishing

A large variety of simple-fishing gear designed and developed by the fishermen themselves was used in all the lagoon systems in Lagos State. Solarin and Kusemiju (2003), reported the use of crab lift nets in Lagos Lagoon. The patterns in resource utilization varied with different requirements for operation of the gear and differences in target species. Also the catch composition differed between gear and baits (Table 3). The costs and benefits for each gear differed. Some villages have specialized in one or two gears for *Callinectes* sp. At Lekki lagoon, all the fishermen specialized in gill net while in Makoko and other parts of Lagos lagoon, the lift nets were

used. In the other lagoon system, three gears are combined and this includes the lift net, stow net and ring net. The use of a mix-gear type by fishers in Lagos and Ologe lagoons can be attributed to target fisheries resources and the tribes of the fishers. The use of gillnet is predominantly Nigerian fishers affair and crab was regarded as a *by-catch* while the Beninois fishers preferred the lift net and crab was the major target species. To operate them efficiently, other supporting tools, such as canoes and scoop nets are required. With the exception of those using net, all other types of gear were used with bait. The number of gear operated by a fisherman or carried per boat or per trip was 60 to 150.

Table 3: Gear and bait used by crab fishers by water body

Lagoon system	Water body	Number of fisher	Gear	*Bait used
Badagry	Yeketomi	250	Lift net, Stow net, Trap	
	Seke	180	Lift net, Stow net, Trap	Turkey, Coconut, rat, dog
	Ajido	300	Lift net, Stow net	Turkey, dog
Ologe	Oto Awori	1200	Stow net, Lift net	Beef, Turkey
	Makoko	4000	Lift net	
Lagos	Badore	2500	Lift net, Gill net	
	Ikosi	2000	Lift net, Gill net	
	Ijede	50	Lift net, Stow net, Ring net	
	Bayeku	3000	Lift net, Stow net, Ring net	
Lekki	Osiriwon	1800	Gill net	Cow head, Fish
	Lekki	450	Gill net	Cow head, **Gari, Fish
	Ise	400	Gill net	Fish, Dog,
Epe	Epe	7500	Trap, Cast net	

*Cut pieces of bait

**Cassava product (*Manihot utilissima*)

Socio-economic considerations

Crab fishing and marketing has been practiced by the inhabitants of the lagoons for years. According to the fishermen, crab was initially being exploited by the locals for their own consumption. Gradually, the mud crab has entered local markets and gained importance, but prices are lower than for any other seafood. With the opening up of the foreign markets, extensive exploitation is carried out by Beninois fishers, mainly of the Egun tribe.

The mud crab fishermen

No statistical data on the number of crab fishermen is available either at national or local level. The present study has succeeded in collecting data on crab fishermen, and collectors in all the lagoon system of Lagos State as shown in Table 2. Mud crabs are caught by three groups of fishermen: full time crab fishers. Fishermen who carry out other types of fishing and who catch crabs as a supplementary activity as well as amateur fishermen (mainly children). There were seasonal variations in the number of fishermen

engaged in the mud crab fishery with an average of about 1000 professional crabbers excluding the children. The highest concentration crab fishers were located in Lagos (urban centre) and Badagry (border between Nigeria and Benin Republic) lagoon systems.

Socioeconomic characteristics of the crab fishers

The distribution of survey respondents by gender category is presented in Table 4. Overall, 94.0 percent of the crab fishers were male and 6.0 % were female. Crab fisher in each of the lagoon complexes is characterized with at least one female crab fishers. The age of the crab fisher ranged between 16 and 65 years (Table 4). Average age of the respondents in all the water bodies ranged from 39.9 to 44.5 years. Most respondents from Ologe, Lagos, Lekki and Epe lagoon were within the 41-60 age groups while majority of the respondents from Badagry lagoon were in the 21- 40 age bracket. Apart from Lagos lagoon which had no respondents less than 20 years of age, other lagoon had at least one respondent with less than 20 years of age. Only 4.03 % of the respondents are under the age of 20 years. Overall, 91.2 % of the respondents were of working age (21-60 years) and participate to some degree in income generating activities.

Findings revealed that 89.33 % were married compared to 10.67 which are yet to marry. Lagos and Lekki lagoon had the highest figure of married fishers (93.33 % a piece). The average family size across all respondents was 7, varying from 6 in Badagry lagoon to 7 in other water

bodies. The average family size in fishing villages is slightly higher than the Lagos State average family size of 4.7 people as recorded in the 2006 National Statistics (NPC, 2006). Fishing experience of crab fishers ranged from 3 to 55 years, with an average of 18.9 years. About 58.0 % of the fishers had been in the crab fishing activities for over 20 years while less than 3.0 % joined the trade about five years ago. Analysis of variance (18.44) shows that there was a significant difference in the experience of the fishers. Over half of the fishermen surveyed started fishing as children, and 75% learnt how to fish from family members including father, grandfather or other relatives.

Literacy level in the crab fishing communities showed that over 70 % of the fishers could read, write and speak in English. Finding revealed that 19.33% had no access to education which can be attributed to the remoteness of the villages and lack of interest on the part of the fishers. Literacy level was extremely poor among crab fishers in Badagry lagoon compared to their counterparts in Lagos and Lekki lagoon. The high literacy level in the latter two lagoons can be attributed to the nearness to urban centers while low literacy level in Badagry area could be adduced to the relatively large population of Beninose (Egun). Overall, 35.33 % of the respondents attended high school followed by 8.0 % with technical education or vocational education. Those with post-secondary education were not attracted to crab fishing and mean year of schooling was 7.5 years.

Table 4: Socioeconomic characteristics of the crab fishers

	Badagry (N=30)		Ologe (N=30)		Lagos (N=30)		Lekki (N=30)		Epe (N=30)		Total (N=150)	
	F	%	F	%	F	%	F	%	F	%	F	%
Gender												
Male	28	93.33	28	93.33	29	96.67	28	93.33	28	93.33	141	94.00
Female	2	6.67	2	6.67	1	3.33	2	6.67	2	6.67	9	6.00
Age (Years)												
≤20	1	3.30	3	9.99	-	-	1	3.30	1	3.33	6	4.02
21-40	15	49.50	7	23.31	11	36.63	10	33.30	12	39.96	55	36.85
41-60	13	42.90	18	59.94	17	56.61	17	56.61	16	53.28	81	54.27
≥61	1	3.30	2	6.66	2	6.66	2	6.66	1	3.33	8	5.36
Marital Status												
Single	3	10.00	4	13.33	2	6.67	2	6.67	5	16.67	16	10.67
Married	27	90.00	26	86.67	28	93.33	28	93.33	25	83.33	134	89.33
Divorced	-	-	-	-	-	-	-	-	-	-	-	-
Widow	-	-	-	-	-	-	-	-	-	-	-	-
Separated	-	-	-	-	-	-	-	-	-	-	-	-
Household size												
≤4	8	26.67	3	10.00	5	16.67	6	20.00	7	23.33	29	19.33
5 – 8	15	50.00	16	53.33	16	53.33	12	40.00	16	53.33	75	50.00
9 – 12	3	10.00	7	23.33	7	23.33	9	30.00	4	13.33	30	20.00
≥13	0	0	0	0	0	0	0	0	0	0	0	0.00
No response	4	13.33	4	13.33	2	6.67	3	10.00	3	10.00	16	10.67
Experience (Years)												
≤5	1	3.33	2	6.67	-	-	-	-	1	3.33	4	2.67
6 – 10	3	10.00	3	10.00	4	13.33	5	16.67	2	6.67	17	11.33
11 – 15	4	13.33	6	20.00	4	13.33	5	16.67	5	16.67	24	16.00
16 – 20	5	16.67	3	10.00	3	10.00	3	10.00	4	13.33	18	12.00
21 and above	17	56.67	16	53.33	19	63.33	17	56.67	18	60.00	87	58.00
Educational level (Years)												
No School	12	40	6	20	1	3.33	2	6.67	8	26.67	29	19.33
Elementary	11	36.67	9	30	7	23.33	18	60	11	36.67	56	37.33
High	6	20	13	43.33	16	53.33	8	26.66	10	33.33	53	35.33
College	0	0	0	0	0	0	0	0	0	0	0	0.00
Vocational	1	3.33	2	6.67	6	20	2	6.67	1	3.33	12	8.00
Labour composition												
Male	22	73.33	8	26.67	23	76.67	23	76.67	11	36.67	87	58.0
Female	0	0	0	0	0	0	0	0	0	0	0	0.00
Do not employ	8	26.67	22	73.33	7	23.33	7	23.33	19	63.33	63	42.0

Labour employment and gender composition

About 58.00 % of the crab fishers employed crew hands of between 1 and 2 for one form of activity or another while 42.0 % did not employ fishing hands. There were no women involved directly in the catching sector. Women were engaged in and participated actively in post-harvest handling. Total crew size ranged from 1 to 4 per canoe, usually made up of kinsmen.

Transport

Crabs were transported in bamboo baskets packed 40-50 kg/basket depending on the lagoon water body. Transport from the landing centres were mainly by road or water. The transport cost from Badagry lagoon up to Cotonou collecting centers ranged between N300 and N400 per basket. In the Lagos lagoon waterbody, crabs are transported by canoe to the local markets through the water ways. In Ikosi community, crabs were brought to the local markets on daily basis during the peak season (March to August) and about 3 or 5 times a week during the lean season (October to January).

Marketing and distribution of crab

Virtually all the crabs landed in the lagoons were sold live. There was no processing sector for

crab in Lagos State. There is a potential markets outside the State, Cotonou in Benin Republic, Togo and other places are the major export markets for crab. Marketing of crab was carried out through at least three channels, as shown in Figure 1. The crab marketing system is expanding with the opening up of foreign markets but domestic consumption is still poor. The price at the domestic market was much lower than the export market price because crab is regarded as inferior protein source in Lagos State compared to fish. At the domestic market, the price of crab ranged between ₦150 and ₦400 per dozen depending on the size and season. Female crabs with eggs attract higher price at the domestic markets and ranged from N 250 – N 500 per dozen. The cost price at landing site was general lower than that at the domestic markets. More than 95 % of the crabs caught at Badagry and Ologe lagoon were exported to Cotonou and Lome. Most of the crabs were marketed live at domestic and regional markets. Processed and frozen exporting was negligible. Palm frond baskets were used to transport the crabs from the lagoon to the two neighbouring countries on daily basis. The regional market rate for crab was ₦ 4000 per basket of 16.3 kg during the peak season.

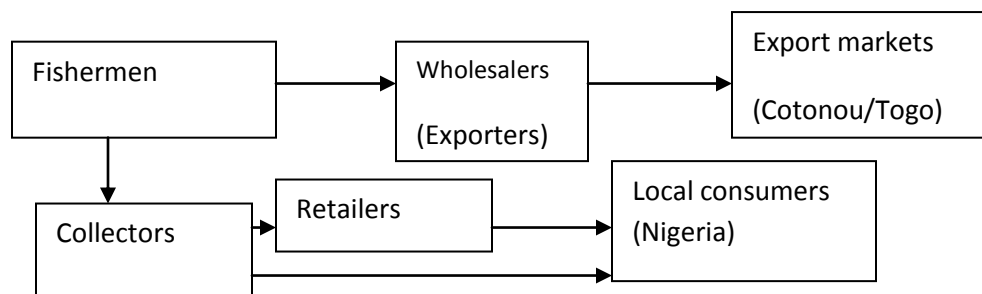


Fig. 1: Marketing channels of crab in Lagos lagoon systems

DISCUSSION

Callinectes amnicola occurs in almost all the lagoons and is exploited commercially both locally and internationally. The gear used varied to some extent in the different lagoons of the State. The most common gear widely used by fishermen was liftnet. The trap is a low cost device, designed

specifically for trapping crab. The size of the trap and mesh size of the net used in the trap vary from lagoon to lagoon but the method used is similar everywhere.

Owing to wide seasonal variations in the mud crab fishery, the majority of those involved in it, generally do not depend on this fishery alone.

They claim that income from mud crab fishing alone would not be sufficient for their sustenance. During peak seasons, however, their maximum effort is directed towards mud crab fishing. However, a few fishers particularly migrant fishers from Benin Republic appear to depend on mud crab fishing throughout the year.

An in-depth study over a considerable period of time would be necessary to assess accurately the economic and social conditions of mud crab fishermen, as this fishery is highly dispersed and often located in remote areas. To get a representative idea, a large number of mud crab fishermen would have to be interviewed. Moreover, it would be necessary to visit the mud crab landing centers during peak seasons to get a reliable estimate of the general economic and social conditions of the fishermen, for this is when the majority of the mud crab fishermen are available. Study indicated that the mud crab fishing communities in Epe were economically and socially backward, whereas those in Badagry, Lagos and Ologe lagoon enjoy satisfactory economic conditions. Mud crab fetches a very low price in the local market compared to neighbouring countries. Export quality crab are purchased and transported daily through the intermediate agents of various exporters. The export market chain at the moment seems to be well organized. Cane baskets moistened with brackish water are used for packing and transport of crab.

CONCLUSIONS

From this study, it is evident that the mud crab *Callinectes amnicola* fishery along the Lagos lagoon in Nigeria is an important fishery, making a significant contribution to both the domestic and export markets. Its importance and potential calls for due attention to be focussed on the further development of this fishery. Although culture and fattening of mud crab are not practised at present, there is a probable indication of over-fishing and suggests the need for proper management of the mud crab fishery.

Export trades in crabs have tremendously improved the living standard of professional crab fishermen in the Badagry, Ologe and Lagos lagoon areas. The wholesalers made advance payments to crab fishermen and in return, the latter sold their catch to the middlemen without much bargaining.

At the local markets, fishers' wives received the catch from their husbands and in turn sold them to the wholesalers, retailers or the consumers. The purchase and sale price was at the discretion of the wives of the crab fishermen. Catching crab was observed to be a low capital enterprise yielding a high-priced product and the fishery with high returns.

The existing fishing gears are very simple tools with small catching rates of between 5 to 10 crabs per haul. Transport infrastructure in the mangrove areas is usually very poor or non-existent and hindered product marketing. Lack of manpower was another constraint to crab fishing development. The younger generation abhors crab fishing. Presently, there is no institutional arrangement in place for the management of crab fishing. This poses a threat to crab sustainability and conservation. Experience shows that crab fisheries run the risk of collapse if not managed to prevent unsustainable fishing practices. Under the present fisheries legislation, there is no protection for crab fisheries. Research on crab culture is non-existence and should be carried out intensively and extensively for sustainable development. Capacity development of research scientists at all levels of crab culture should be intensified with the need for ecosystem approach to fisheries management involving all stakeholders.

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REFERENCES

- Arriola F.J. (1940). Cited in Jayamanne, S. C. The mud crab fishery in Sri Lanka. **In:** C. A. Angell, (Ed.). Seminar on the Mud Crab Culture and Trade, Bay of Bengal Programme for Fisheries Development, Madras, India. Seminar venue: SuratThani, Thailand. pp. 41-48.
- Arshadullah, M.D. (1976). Industrial processing of crab *Scylla serrata* (Forsk.) (Decapoda Brachyura) of the Karnaphully Estuary, Chittagong. Bangladesh. M.Sc. Thesis. Dept. of Mar. Biol. Univ. of Chittagong.

- Islam, J. (1977). Brachyura of the Karnafully Estuary and north-rust part of the Bay of Bengal with special reference to the biology of *Scylla serrata*. M.Sc. Thesis, Dept. of Mar. Biol., Univ. of Chittaponp. 160 pp.
- McCall, G. J. and Simmons, J. L. (eds.) (1969). Issues in Participant Observation, Reading, Mass.: Addison Wesley. 359 p.
- NPC (National Population Commission) (2006). Report of Nigeria's National Population Commission on the 2006 Census Population and Development Review 33 (1) (Mar., 2007), pp. 206-210.
- Solarin, B. B. and K. Kusemiju (2003). An Appraisal of gender participation in trap and liftnets fisheries in Lagos lagoon, Nigeria. *Afr. J. Appl. Zool and Environ. Biol.* 5:76-81.
- Yin, R. (1989). Case study research: Design and methods (Rev. ed.). Newbury Park, CA: Sage Publishing.