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# Assessment of fishing practices in a tropical low brackish lagoon ecosystem in southwestern Nigeria.

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**Abstract**

*This paper present an assessment of fishing practices in Lekki lagoon between March, 2006 and February, 2008. Lagoon fishery plays an important role in the economy of the country and the livelihoods of the people living around the lagoons. Eight different types of fishing gears were identified. Gillnets were the most operated gears in the lagoon followed by long lines. The least operated were the boat seines. Higher number of gears (N=1027) was operated in 2006/2007 than (N=995) operated in 2007/2008. The catch per unit effort (CPUE) ranged between 3.2kg/ha/day with basket and bamboo traps to 47.1kg/ha/day with boat seine net. Total fish production in Lekki Lagoon by small scale capture fisheries in 2007 was estimated at 1041.01 metric tons or 4.21 metric tonnes per square kilometer per year or 42.1 kg per hectare per year. A total of 16,960 specimens made up of juveniles and adults caught with different fishing gears types in the Lekki lagoon, were identified and classified. They comprised of eighty - one species belonging to 14 orders, 40 families and 56 genera. Community based resource management and enhancement techniques are recommended in order to improve and protract the small scale fisheries in the lagoon.*

**Key words**: *Lagoon fisheries, species composition, fishing gears, over- exploitation.*

## INTRODUCTION

Nigeria has a large area of natural aquatic habitats that provides important spawning and feeding grounds for a large number of freshwater and brackish water fishes (Kusemiju *et al*. 1993; Meye and Ikomi 2008; Emmanuel 2009). These aquatic habitats with over 270 fish species diversity are the richest in West Africa (Tobor 1992; Meye and Ikomi 2008). Lekki lagoon is one of the largest lagoons in West Africa and an important source of freshwater fish

production in Lagos State of Nigeria. The lagoon supports a local fishery based on boat seines, castnets, longlines, basket and bamboo traps, among others. However, relatively little is known about the fishes and fisheries of the waters and estuaries of this lagoon. Fagade and Olaniyan (1974) reviewed the ecological groups of fishes in the Lagos lagoon; Kusemiju (1981) studied the hydrobiology and fishes of the Lekki lagoon, while Solarin (1998) studied the hydrobiology and fishes of Lagos lagoon all in the south – western part of Nigeria.

The lagoons in the south – western part of Nigeria make a substantial contribution to the fishery of the country and the livelihoods of fisherfolks who have free access to them. Within the last decade, the lagoon and estuarine fisheries production in the country has declined (Emmanuel *et al.* 2008a & b). A number of studies indicated that the major causes of declining fish catch from lagoons are the increased fishing pressure and habitat destruction (Solarin 1998; Emmanuel and Kusemiju 2005; Emmanuel and Onyema 2007). Species diversity also declined in the lagoon due to non – selective gears, overfishing, destruction of spawning grounds and capture of juvenile fishes (Ali 1997; de Graaf *et al*. 2001; Emmanuel 2004).

No study has yet been undertaken on the status of resources as well as on the causes of declining resources in this unique lagoon. The intensity at which fishing gears are used, mesh – sizes of nets and catch per unit effort (CPUE) are good indicators of the status of exploitation level of lagoon. There are various methods to assess aquatic resources and their level of exploitation. A simple survey method allows

for gathering information that can be analyzed statistically with repeatable results (Ahmed, 2008). Therefore, a formal survey was prepared to identify the fishing gears, catch per unit effort, catch composition, species diversity and production of Lekki lagoon with the purpose of formulating better management practices to conserve the resources.

**Materials and Methods**

Lekki lagoon is located between Lagos and Ogun States of Nigeria and lies between longitude $4^0$ 00' and $4^0$ 15' E and between latitude $6^0$ 25' and $6^0$ 37'N (Figure 1). The lagoon has a surface area of about 247 square kilometers and it is mostly shallow (less than 3.0 m deep) the maximum depth being 6.4 m (Kusemiju, 1973). Lekki lagoon is a freshwater environment fed by the river Oni in the North eastern part and by rivers Oshun and Saga in the north western parts of the lagoon. It opens into the sea via the Lagos lagoon and Lagos harbour. The lagoon is transitional in that it connects three south western states (Ondo, Ogun and Lagos). The lagoon is part of an intricate system of waterways made of other lagoons and creeks that are found along the coast of South-western Nigeria from the Dahomey border to the Niger Delta. This study was conducted in 24 months, from March 2006 to February 2008.

A census of all gears operating in the study area was undertaken on second week of the month using a Lagoon Gears survey form in 25 villages landing docks around the lagoon. Total catch by species was recorded for all gillnets, cast nets, longlines, boat seines, liftnets, basket and bamboo traps operating during the census. Furthermore, the mesh size, owner status and number of gear units used by the fisherfolks was recorded. A catch assessment monitoring questionnaire developed by Emmanuel, 2009) was used in this study. Catch monitoring data were collected monthly from the fisherfolks during fishing. Total monthly catches by gear type were estimated from their average catch rates and average number of gears recorded monthly using a model equation developed by de Graaf and Chinh (1992),

$Y_d = \Sigma CPUE_g \, . \, f_g$

where, $Y_d$= total daily catch for gear (g)

$CPUE_g$= daily mean catch per unit effort for gear

$f_g$= mean effort (gears,day$^{-1}$).

The monthly catch per unit of area (CPUA) was calculated as the total daily catch ($Y_g$) divided by the sampled lagoon area.

Total fish production was estimated according to Suwarso and Wasilum (1991) and Solarin (1998) with the formula: T = h* x n x c.p.u.e

Where T = total fish production

h* = average number of fishing days per month

n = estimated number of active or functional canoe units c. p. u. e. = catch per unit effort (kilogram per canoe per day per trip) h* was influenced by the weather condition, lunar cycle, season, time required to mend nets or repair canoe/engine and period of religious and traditional festival.

**Fish species analysis**

All sample were transported to the laboratory and put in a deep freezer ($<4^0$C) immediately after appropriate labelling and identification were made with the aid of relevant literatures (Schneider, 1990; Olaosebikan and Raji, 1998) while numerical abundance of the fish species were recorded. The measurement (in centimetre) of the fishes (standard and total length) and the crabs (carapace length and width) species were taken using methods described by Emmanuel (2004) and Chindah *et al.* (2000). The specimens were also weighed on a Sartorious weighing balance to the nearest gram. All edible target species are considered economically important.

**Results**

**Fishing gears in Lekki lagoon**

Small-scale fisheries in Lekki Lagoon supported fishing gears like gillnets, boat-seines, liftnets, castnets, traps (Basket and bamboo), floating aggregating devices( i.e. floating island fishing) fishery and longlines. The gears were classified according to the International Standard Statistical classification of fishing gear (Nedelec, 1982 and Solarin 1998). The percentage composition of the inventoried fishing gear types based on canoe unit that were encountered between 2006 and 2008 is shown in Table 1. Gillnet was the most abundant fishing gear used in the lagoon.

**Catch per Unit Effort of fishing gearsin Lekki lagoon**

The average weight of fish caught per canoe per day ranged between 3.2kg with Basket and bamboo traps to 47.1kg with boat seine net. The harvest from the floating island was 29.3kg of fish per each installation. The gill nets caught fish that ranged between 6.0 to 13.0kg per canoe per day with mean weight of 8.60±2.91kg. The castnet caught fish with weights ranging from 1.0 to 7.0kg with a mean weight of 4.3±2.49kg. Lift net canoes yielded an average of 3.4 kg per canoe per day. The average weight of fish caught per canoe per day was recorded monthly from March 2006 to February, 2008 as shown in Table 2 (Figure 2).

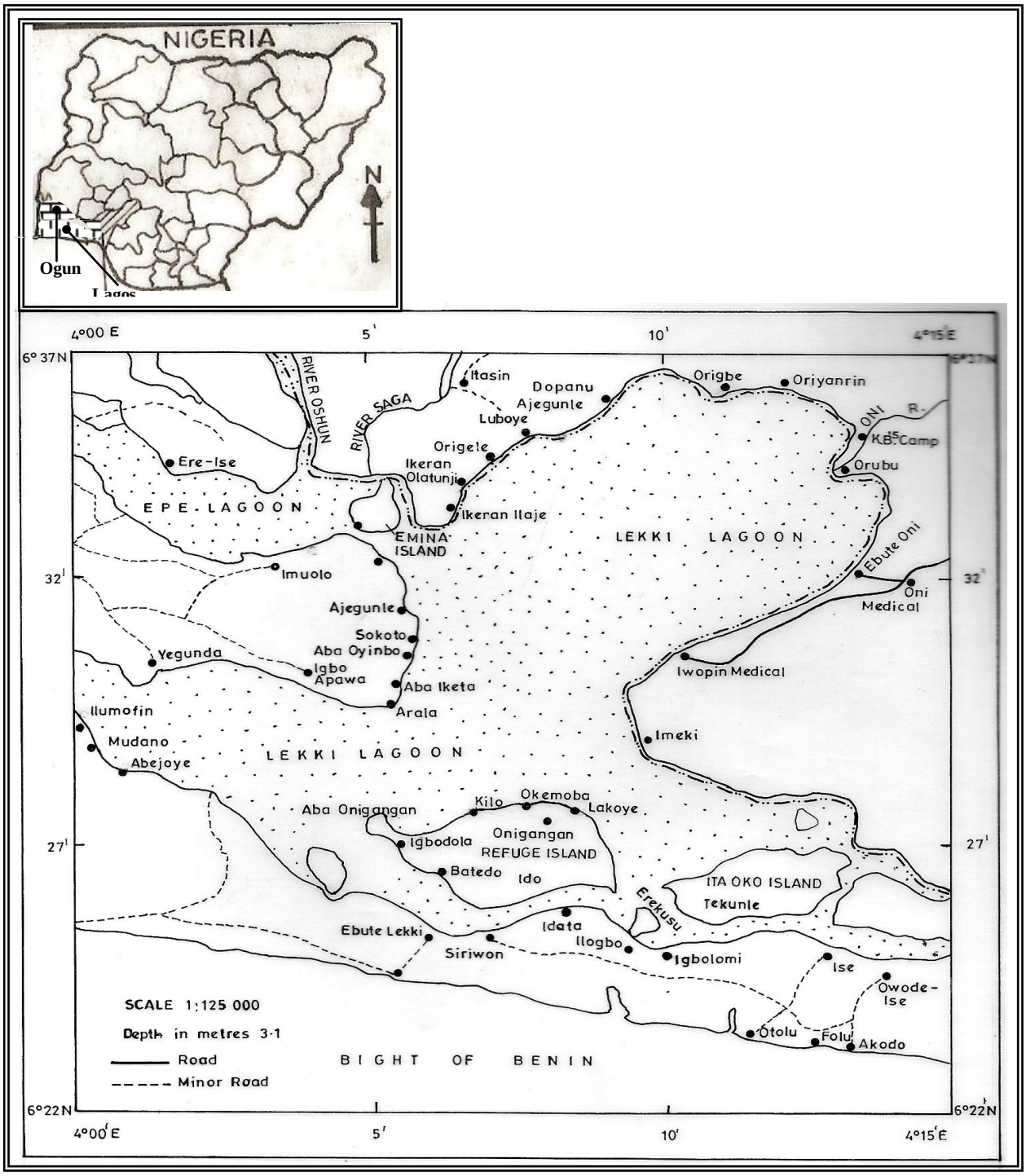


**Fig 1: Map of Lekki Lagos showing the fishing villages**

Table 3 shows the fishing methods, number of fishermen required, period of fishing and amount of fish caught in Lekki Lagoon (Figure 3). Boat seine fishery recorded the highest number of fisher folks (25-30) followed by floating island fishery (10-15). Castnet, basket trap, bamboo trap, gillnet and liftnet all recorded between 3 and 4 hours of fishing effort per day while cast net and boat seine operation lasted between 2 and 6 hours per day. Boat seine operation period depend on the visibility of the lagoon water. During clear water periods, fishing effort may not go beyond 3 hours per day but during the spirogyra bloom it may last for up to 6 hours per day. Fishing villages/settlements, the fishing gear and method around Lekki lagoon was presented in Table 4. The fishing gear indices (the frequency of gears) in Lekki lagoon revealed gillnets ( N=514) to be the most used fishing gear while boat seine (N=8) was the least used (Figure 4).

**TABLE 1: COMPOSITION (NUMBER AND PERCENTAGE) OF FISHING GEAR TYPES BASED ON CANOE UNIT IN LEKKI LAGOON, NIGERIA.**

| Fishing gear | March, 2006 – February, 2007 | | March, 2007 – February, 2008 | |
|---|---|---|---|---|
| | **Number** | **Percentage** | **Number** | **Percentage** |
| Gill net | 514 | 50.04 | 485 | 48.74 |
| Long line | 147 | 14.31 | 147 | 14.77 |
| Cast net | 120 | 11.68 | 120 | 12.06 |
| Basket trap | 109 | 10.61 | 106 | 10.65 |
| Floating island fishery (trap) | 84 | 8.18 | 84 | 8.44 |
| Bamboo trap | 35 | 3.41 | 35 | 3.52 |
| Lift net | 10 | 0.97 | 10 | 1.00 |
| Boat seine | 8 | 0.78 | 8 | 0.80 |
| **Total** | **1027** | **100** | **995** | **100** |

**TABLE 2: CATCH (KG) PER UNIT EFFORT OF FISHING GEARS IN LEKKI LAGOON, NIGERIA,**

| Fishing Gear Type | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Total | Mean ± SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gill net | 18.0 | 20.2 | 21.1 | 23.0 | 22.8 | 20.6 | 18.8 | 17.5 | 17.1 | 16.2 | 17.2 | 14.2 | 226.7 | 18.9±2.91 |
| Long line | 5.6 | 9.6 | 8.2 | 8.5 | 7.6 | 10.2 | 9.2 | 8.0 | 9.8 | 6.0 | 5.6 | 4.2 | 92.5 | 7.7±1.94 |
| Cast net | 6.0 | 5.0 | 4.5 | 1.2 | 1.0 | 1.2 | 6.6 | 7.2 | 6.9 | 7.0 | 3.0 | 2.0 | 51.6 | 4.3±2.49 |
| Traps (floating Island) | 20.6 | 31.1 | 26.0 | 21.0 | 30.0 | 21.7 | 30.0 | 50.0 | 60.0 | 25.0 | 20.0 | 16.5 | 351.9 | 29.3±12.99 |
| Bamboo trap | 2.2 | 3.9 | 4.1 | 3.7 | 4.0 | 1.2 | 1.0 | 4.2 | 5.1 | 3.2 | 4.0 | 2.1 | 38.7 | 3.2±1.30 |
| Boat Seine | 70.1 | 68.9 | 78.0 | 98.0 | 100.0 | 150.0 | 105.1 | 100.0 | 25.0 | 2.0 | 36.0 | 56.0 | 889.1 | 74.1±40.54 |
| Lift net | 5.0 | 3.0 | 2.0 | 2.2 | 3.2 | 1.2 | 2.3 | 3.3 | 4.2 | 4.4 | 5.0 | 4.5 | 40.3 | 3.4±1.27 |
| Basket trap | 2.2 | 3.9 | 4.1 | 3.7 | 4.0 | 1.2 | 1.0 | 4.2 | 5.1 | 3.2 | 4.0 | 2.1 | 38.7 | 3.2±1.30 |

**FROM MARCH, 2006 –FEBRUARY, 2008.**

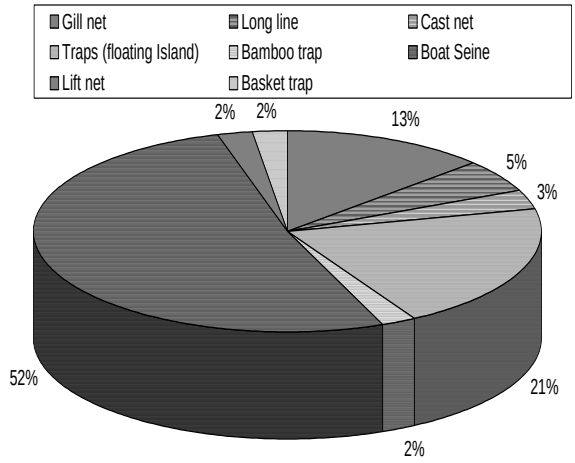


Fig. 2: Fishing Gear Types and mean weight (kg) of fish caught per kg per canoe per month in Lekki lagoon, Nigeria, from March 2006 – February, 2008.

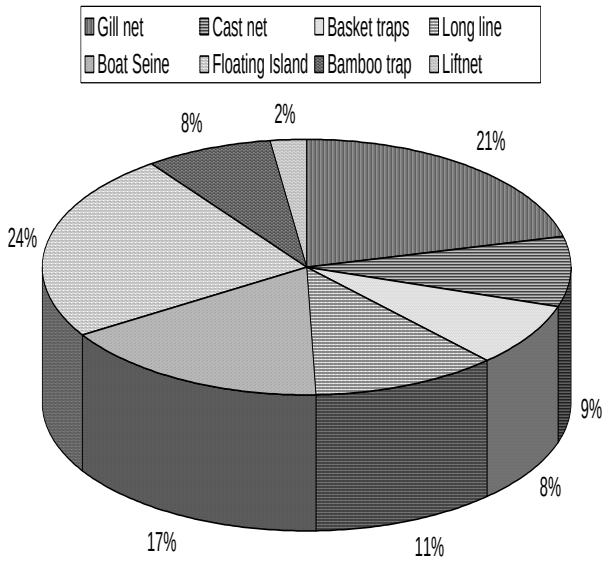


Fig. 3: Fishing method and amount of catch(mt)per year in Lekki lagoon, Nigeria, from March 2006 –Feb 2008.

TABLE 3: FISHING GEARS, NUMBER OF FISHERMEN, PERIOD OF FISHING AND AMOUNT OF CATCH IN LEKKI LAGOON

| **Fishing Methods** | **No. of Fisherfolks Required to operate gear** | **Period of Fishing per day** | **Amount of catch (mt)per year** |
|---|---|---|---|
| Gill net | 2 | Overnight | **218.73** |
| Cast net | 2 | 2-6 hours | **94.0** |
| Basket traps | 1 or 2 | Overnight | **83.23** |
| Long line | 1or 2 | Overnight | **117.71** |
| Boat Seine | 25-30 | 2-6 hours | **174.04** |
| Floating Island | 10-15 | 5 – 6 hours | **248.09** |
| Bamboo trap | 1 or 2 | Overnight | **83.20** |
| Liftnet | 1 – 3 | 3 – 4 hours | **22.01** |

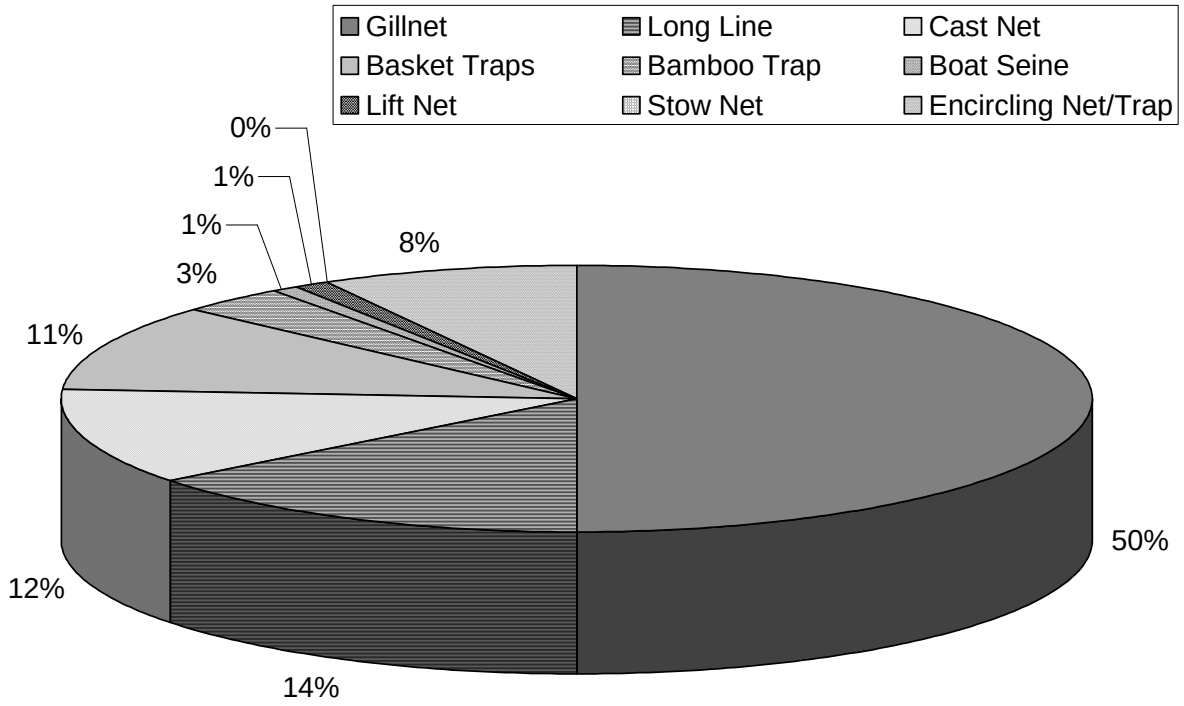


**Fig. 4: Fishing gear frequency in Lekki lagoon**

**Table 4: Fishing villages and gear frequency in Lekki lagoon between March 2006 and February 2008.**

| VILLAGE | GILLNET | LONG LINE | CAST NET | BASKET TRAPS | BAMBOO TRAP | BOAT SEINE | LIFT NET | STOW NET | ENCIRCLING NET/TRAP |
|---|---|---|---|---|---|---|---|---|---|
| ARALA | 13 | 5 | 3 | - | 1 | - | - | - | - |
| ABA-OYINBO | 15 | 5 | 4 | - | - | - | - | - | - |
| IGBODOLA | 10 | - | 7 | 6 | - | 2 | - | - | - |
| ABOMUTI SOKOTO | 11 | 4 | 2 | - | 3 | - | - | - | - |
| ABOMUTI NLA | 12 | 6 | 5 | 9 | 2 | - | - | - | - |
| AJEGUNLE | 6 | 3 | 4 | 4 | - | - | - | - | - |
| TAKE | 12 | 4 | 3 | - | - | - | - | - | - |
| EMINA | 28 | 11 | 4 | - | - | - | - | - | - |
| IKERAN (ABA-ILAJE) | 30 | 9 | 4 | 9 | - | - | - | - | - |
| IKERAN OLATUNJI | - | 1 | 3 | 6 | - | - | - | - | 36 |
| LUBOYE | 6 | 2 | 4 | 5 | 2 | - | - | - | - |
| ABATITUN | 4 | 11 | 5 | 7 | 2 | - | - | - | - |
| DOPANU AJEGUNLE | 36 | 9 | 2 | 6 | - | - | - | - | 20 |
| DOPANU | 20 | 2 | 4 | 6 | - | - | - | - | - |
| ORIGBE | 10 | 5 | 6 | 5 | 4 | - | - | - | 18 |
| IMEKI | 20 | 6 | 6 | 7 | 2 | 2 | 2 | - | - |
| IWOPIN | 86 | 15 | 8 | - | - | 4 | - | - | 10 |
| LAKOYE | 4 | 0 | 4 | 5 | 4 | - | - | - | - |
| EBUTE LEKKI | 26 | 6 | 8 | 6 | 4 | - | - | - | - |
| SIRIWON | 22 | 0 | 3 | 10 | 4 | - | - | - | - |
| ISE | 75 | 10 | 6 | - | - | - | 8 | - | - |
| IGBOLOMI | 19 | 7 | 3 | 8 | 5 | - | - | - | - |
| IDATA | 10 | 5 | 2 | 4 | - | - | - | - | - |
| ABA ONIGANGAN | 19 | 8 | 4 | - | - | - | - | - | - |
| ORIYANRIN | 21 | 13 | 4 | 6 | 2 | - | | - | - |
| **TOTAL** | 514 | 147 | **120** | 109 | 35 | 8 | 10 | 0 | 84 |

**Fish production in Lekki lagoon**

Total fish production in Lekki Lagoon by Small Scale capture fisheries in 2007 was estimated at 1041.01 metric tons or 4.21 metric tonnes per square kilometer per year or 42.1 kg per hectare per year according to Suwarso and Wasilum (1991) and Solarin (1998) (Table 5)The 514 (50.05% of the total fishing gear) gillnet canoes with an average catch of 6.10kg fish per day for approximately 14 days per month and eleven months in the year gave a production estimate of 218.73 metric tons per year.

The 120 (11.68%) cast net canoes produced an average of 4.0 kg, fish daily and for approximately 14 days per month and 9 months in the year gave a production estimate of 94.0 metric tonnes. Long line (147) produced an average of 5.10kg per day and 17.71 metric tonnes in a year. A total of 83.23 metric tonnes of fishes and prawns were produced by 109 basket trap canoes in the year. The 35 bamboo trap canoes produced 83.20 metric tonnes in the year. The eight boat seine produced 174.04 metric tonnes from average 8 days per month for 8 months. A total of 248.09 metric tonnes of fish was produced by 84 floating island fishery in the year.

**TABLE 5: FISH PRODUCTION ESTIMATES FOR 2007 IN LEKKI LAGOON, NIGERIA**

| Fishing gear | Number of canoes | Average catch (kg)/day/hr | Average number of days per month | Fishing month per year | Production estimate (metric tonnes) |
|---|---|---|---|---|---|
| Gill net | 514 | 6.10 | 14 | 12 | 218.73 |
| Cast net | 120 | 4.00 | 14 | 9 | 94.0 |
| Basket traps | 109 | 3.23 | 14 | 9 | 83.23 |
| Long line | 147 | 5.10 | 14 | 9 | 117.71 |
| Boat Seine | 8 | 74.09 | 8 | 8 | 174.04 |
| Floating Island | 84 | 31.83 | NA* | 3 | 248.09 |
| Bamboo trap | 35 | 3.20 | 14 | 9 | 83.20 |
| Liftnet | 10 | 3.36 | 14 | 9 | 22.01 |
| | | | | | **1041.01** |

## Fish species composition in Lekki lagoon

A total of 16,960 specimens made up of juveniles and adults caught with different fishing gear types in the Lekki lagoon, were identified and classified. The specimens were classified into a total of 81 species belonging to 56 genera, 40 families and 14 orders. Decapod crustaceans comprised the freshwater prawns (*Macrobrachium vollenhovenii* (Herklots) and *Macrobrachium macrobrachion* (Herklots) and the swimming crab *Callinectes amnicola* (De Rocheburne). Table 6 shows a list of fish orders, families and species, as well as the size and weight ranges of the fish specimens. Anabantidae was represented by one species (*Ctenopoma petherici*) which was caught mainly with double funnel traps in and around the river mouth between Emina and Ikeran Olatunji (Fig 1). Dasyatidae was represented by only one species *Dasyatis garouaensis* (Stanch & Blanc) and was listed in the Lekki Lagoon for the first time. The species was caught using a boat seine in the sandy area of the lagoon. The caught individual had a length of 65.0 cm and a weight of 400 g. The family Mormyridae was represented by twelve species. This family had the highest species in the lagoon. The clariidae is represented by 5 species out which only two specimens of *Heterobranchus longifilis* were recorded throughout this study.

**TABLE 6: FISH SPECIES COMPOSITION IN LEKKI LAGOON**

| Order/Family/Species | Total Length Range (cm) | Standard Length (cm) | Weight (g) | Economic Importance |
|---|---|---|---|---|
| **Perciformes** | | | | |
| Anabantidae | | | | |
| *Ctenopoma petherici* (Gunther, 1864) | 6.0 – 13.5 | 4.5 – 11.0 | 20.0 – 95 | x |
| Centropomidae | | | | |
| *Lates niloticus* (Linne, 1762) | 10.5 – 60.0 | 8.2 – 55.0 | 40.0 – 4000 | X |
| Carangidae | | | | |
| *Caranx hippos* (Linnaeus, 1766) | 5.5 – 59.5 | 4.0 – 53.5 | 9.0 – 3900 | X |
| *Trachinotus teraia* (Cuvier, 1832) | 9.5 – 45.0 | 7.0 – 40.5 | 20.0 – 3600 | X |
| Cichlidae | | | | |
| *Tilapia guineensis* (Bleeker, 1862) | 4.0 – 21.0 | 3.0 – 19.5 | 2.81 – 700 | X |
| *Tilapia zilli* (Gervais, 1848) | 5.5 – 24.0 | 3.5 – 18.40 | 5.94 – 530 | x |
| *Tilapia mariae* (Boulenger, 1899) | 5.7 – 16.0 | 3.5 – 14.5 | 3.0 – 410 | x |
| *Chromidotilapia guntherigguntheri* (Sauvage, 1882) | 5.0 – 12.0 | 3.0 – 9.5 | 4.0 – 200 | x |
| *Sarotherodon melanotheron* (Rupell, 1852) | 4.4 – 16.0 | 3.0 – 14.0 | 3.70 – 375 | X |
| *Oreochromis niloticus* (Linne, 1758) | 6.8 – 26.0 | 4.5 – 23.0 | 13.0 – 857 | X |
| *Hemichromis fasciatus* (Peters, 1852) | 4.4 – 12.0 | 3.2 – 10.0 | 4.16 – 120 | x |
| *Hemichromis bimaculatus* (Gill, 1862) | 3.9 – 10.0 | 2.5 – 8.5 | 3.39 – 30.0 | x |
| Eleotridae | | | | |
| *Eleotris vittata* (Dumeril, 1858) | 7.8 – 14.5 | 5.5 – 10.5 | 7.95 – 150.0 | x |
| *Kribia nana* (Boulenger, 1961) | 3.4 – 4.5 | 2.5 – 3.5 | 3.40 – 10.0 | x |
| Channidae | | | | |
| *Parachanna obscura* (Gunther, 1861) | 14.1 – 30.8 | 11.5 – 28.5 | 89.5 – 400 | X |
| *Parachanna africana* (Steindachner, 1879) | 13.0 – 29.5 | 10.2 – 27.0 | 79.8 – 390 | X |
| Pomadasysidae | | | | |
| *Pomadasys jubelini* (Cuvier, 1830) | 9.3 – 22.0 | 7.0 – 19.5 | 19.75 – 309 | X |
| Lutjanidae | | | | |
| *Lutjanus dentatus* (Dumeril, 1860) | 9.3 – 22.0 | 7.0 – 18.0 | 20.20 – 311 | x |
| Polynemidae | | | | |
| *Polydactylus quadrifilis* (Cuvier, 1829) | 18.0 – 105.0 | 16.0 – 85.0 | 20.70 – 60.00 | X |
| Gobiidae | | | | |
| *Bathygobius soporator* (Valenciennes, 1873) | 12.90 – 14.60 | 10.90 – 12.5 | 24.8 – 40.0 | X |
| *Goboides ansorgii* (Boulenger, 1909) | 15.40 – 32.50 | 13.00 –30.10 | 25.0 – 65.0 | x |
| Spyraenidae | | | | |
| *Sphyraena barracuda* (Walbaum, 1792) | 30.9 – 103.0 | 27.5 – 87.0 | 98.5 – 4000 | X |
| Monodactylidae | | | | |
| *Psettias sebae* (Cuvier, 1931) | 5.5 – 10.5 | 3.5 – 8.2 | 10.5 – 65.0 | x |
| Distichodontidae | | | | |
| *Ichthyborus monodi* (Pellegrin, 1929) | 6.0 – 16.5 | 4.0 – 14.0 | 16.9 – 66.5 | x |
| **Rajiformes** | | | | |
| Dasyatidae | 35.0 | | 600 | |

| Order/Family/Species | Total Length Range (cm) | Standard Length (cm) | Weight (g) | Economic Importance |
|---|---|---|---|---|
| *Dasyatis garouaensis* (Stauch & Blanc, 1962) | | | | x |
| **Polypteriformes**<br>Polypteridae<br>*Polypterus senegalus senegalus* (Cuvier, 1829) | 9.0 – 30.0 | 7.0 – 28.0 | 20.5 – 150.0 | x |
| *Erpetoichthys calabaricus* (Smith, 1866) | 20.2 – 35.5 | 18.0 – 33.5 | 19.5 – 50.2 | x |
| **Elopiformes**<br>Elopidae<br>*Elops lacerta* (Valenciennes, 1846) | 11.0 – 27.0 | 9.2 – 25.0 | 9.5 – 241 | X |
| **Osteoglossiformes**<br>Pantodontidae<br>*Pantodon buchholzi* (Peters, 1876) | 5.6 – 10.0 | 3.0 – 7.0 | 10.0 – 20.0 | X |
| Notopteridae<br>*Papyrocranus afer* (Gunther, 1868) | 12.2 – 55.5 | 10.5 – 52.0 | 12.5 – 1069 | X |
| *Xenomystus nigri* (Gunther, 1868)<br>Osteoglossidae<br>*Heterotis niloticus* (Cuvier, 1829) | 12.0 – 45.0<br><br>14.5 – 54.5 | 10.0 – 42.0<br><br>12.0 – 50.5 | 13.0 – 1050<br><br>20.0 - 2000 | x<br><br>X |
| **Mormyriformes**<br>Mormyridae<br>*Mormyrus rume* (Valenncciennes, 1846) | 12.5 – 48.0 | 9.5 – 46.5 | 15.6 – 868 | X |
| *Mormyrus macrophthalmus* (Gunther, 1866) | 12.2 – 30.1 | 9.2 – 46.5 | 20.0 – 600 | X |
| *Hippopotamyrus pictus* (Marcusen, 1864) | 5.5 – 15.5 | 4.0 – 12.5 | 15.0 – 50.5 | X |
| *Hippopotamyrus psittasus* | 6.5 – 25.0 | 5.0 – 23.0 | 18.0 – 75.9 | X |
| *Hyperopisus bebe* (Lacepede, 1803) | 15.6 – 50.0 | 12.5 – 48.0 | 20.5 – 850 | X |
| *Mormyrops anguilloides* (Linnaeus, 1758) | 9.1 – 63.3 | 7.0 – 60.0 | 5.8 – 2453 | X |
| *Marcusenius senegalensis* (Steindachner, 1870) | 9.6 – 27.3 | 7.0 – 25.3 | 10.0 – 248 | X |
| *Pollimyrus adspersus* (Gunther, 1866) | 5.2 – 9.6 | 3.5 – 7.2 | 17.0 – 50.0 | X |
| *Marcusenius brucii* (Boulenger, 1910) | 6.3 – 30.8 | 5.0 – 28.5 | 12.1 – 515 | X |
| *Brienomyrus longianalis* (Boulenger, 1901) | 16.0 – 30.8 | 14.0 – 28.5 | 50 – 610 | X |
| *Gnathonemus petersii* (Gunther, 1862) | 15.0 – 35.0 | 13.5 – 33.0 | 48.5 – 590 | X |
| *Mormyrops caballus* (Pelledrin, 1927) | 9.1 – 46.0 | 7.1 – 44.2 | 15.8 – 850 | X |
| Gymnarchidae<br>*Gymmarchus niloticus* (Cuvier, 1829) | 35.0 – 120.0 | 32.5 – 117 | 89.0 – 3000 | X |
| **Clupeiformes**<br>Clupeidae<br>*Pellonula afzeliusi* (Johnels, 1954) | 4.0 – 10.1 | 3.0 – 8.0 | 5.0 – 26.0 | |
| *Ethmalosa fimbriata* (Bowdich, 1825) | 8.70-14.70 | 6.80-11.40 | 5.35-32.26 | X |
| **Characiformes**<br>Citharinidae<br>*Citharinus latus* (Muller & Troschal, 1845) | 7.0 – 46.0 | 5.0 – 43.5 | 25.5 – 1065 | X |
| *Cithranus citharus* (Goeffrey Saint Hilane, 1809) | 10.0 – 50.0 | 8.0 – 47.5 | 45.0 – 2010 | X |
| Hepsetidae<br>*Hepsetus odoe* (Bloch, 1794) | 7.5 – 30.5 | 5.6 – 28.8 | 9.26 – 856 | X |
| Characidae<br>*Alestes macropthalmus* (Gunther, 1867) | 20.5 – 30.6 | 18.2 – 29.0 | 45.0 – 150.0 | X |
| *Alestes baremose* (de Joannis, 1835) | 10.5 – 40.5 | 8.5 – 38.2 | 20.2 – 300 | X |

| Order/Family/Species | Total Length Range (cm) | Standard Length (cm) | Weight (g) | Economic Importance |
|---|---|---|---|---|
| *Brycinus nurse* (Ruppell, 1832) | 5.3 – 20.5 | 3.8 – 18.2 | 5.2 – 212 | X |
| *Brycinus longipinnus* (Gunther, 1864) | 4.8 – 10.7 | 3.0 – 8.8 | 3.6 – 41.6 | X |
| **Siluriformes** | | | | |
| Bagridae | | | | |
| *Chrysichthys Walkeri* | 5.5 – 36.5 | 3.5 – 33.6 | 4.36 – 724 | X |
| *Chrysichthys nigrodigitatus* (Lacepede, 1803) | 5.8 – 42.5 | 4.0 – 40.5 | 5.0 – 1500 | X |
| *Chrysichthys filamentosus* (Boulenger, 1912) | 5.6 – 38.5 | 3.8 – 36.8 | 4.0 – 798 | X |
| *Parauchenoglanis akiri* (Risch, 1987) | 10.0 – 12.5 | 8.0 – 10.0 | 15.9 – 45.6 | X |
| *Auchenoglanis occidentalis* (Valenciennes, 1840) | 15.0 – 20.0 | 13.0 - 18.0 | 24.0 – 50.1 | X |
| Schilbeidae | | | | |
| *Schilbe mystus* (Linne, 1758) | 7.0 – 21.0 | 5.8 – 19.0 | 4.15 – 119.5 | X |
| *Schilbe uranoscopus* (Ruppell, 1832) | 6.2 – 28.5 | 5.0 – 26.5 | 7.61 – 360 | X |
| Clariidae | | | 78.00 – | |
| *Clarias gariepinus* (Burchell, 1822) | 20.0 – 50.5 | 17.0 – 46.8 | 1920 | X |
| *Clarias jaensis* (Boulenger, 1909) | 10.2 – 20.0 | 7.5 – 17.9 | 22.8 – 64.25 | X |
| *Clarias agboyiensis* (Sydenham, 1980) | 11.2 – 21.0 | 8.5 – 18.7 | 21.9 – 72.96 | X |
| *Clarias anguillaries* (Line, 1758) | 9.0 – 34.5 | 7.2 – 31.5 | 17.0 – 65.0 | X |
| *Heterobranchus longifilis* (Valenciennes, 1840) | 40.5 – 50.0 | 37.8 – 48.5 | 1002 – 2100 | X |
| Malapteruridae | | | | |
| *Malapterurus electricus* (Gmelin, 1789) | 13.0 – 16.5 | 11.5 – 14.0 | 60.6 – 89.8 | X |
| *Malapterurus minjiraya* (Sagua, 1987) | 14.0 – 17.5 | 12.2 – 15.0 | 64.7 – 92.0 | X |
| Mochokidae | | | | |
| *Synodontis eupterus* | 4.5 – 22.0 | 3.0 – 20.0 | 9.2 – 218 | X |
| *Synodontis clarias* (Linne, 1758) | 5.5 – 22.5 | 3.8 – 21.0 | 10.2 – 316 | X |
| *Synodontis couterti* (Pellergrin, 1906) | 6.5 – 20.6 | 4.2 – 18.0 | 10.5 – 212 | X |
| *Synodontis filamentosus* (Boulenger, 1901) | 5.5 – 18.6 | 3.0 – 16.2 | 8.9 – 200 | X |
| **Mugiliformes** | | | | |
| Mugilidae | | | | |
| *Liza falcipinnis* (Valenciennes, 1836) | 13.0 – 26.5 | 10.5 – 19.2 | 41.6 – 200 | X |
| *Mugil cephalus* (Linnaeus, 1758) | 12.5 – 20.5 | 10.0 – 18.0 | 41.2 – 360 | X |
| **Synbranchiformes** | | | | |
| Mastacembelidae | | | | |
| *Caecomastacembelus decorsei* (Pellegrin, 1919) | 14.2 – 36.5 | 12.5 – 35.0 | 20.0 – 96.0 | |
| **Pleuronectiformes** | | | | |
| Citharidae | | | | |
| *Citharus linguatula* (Linnaeus, 1758) | 10.30 – 15.0 | 8.0 – 13.2 | 9.0 – 15.9 | X |
| Cynoglossidae | | | | |
| *Cynoglossus senegalensis* (Kaup, 1858) | 15.6 – 54.0 | 13.8 – 49.2 | 20.0 – 460.0 | X |
| **Gonorychiformes** | | | | |
| Phractolaemidae | | | | |
| *Phractolaemus ansorgii* (Boulenger, 1901) | 10.5 – 19.0 | 8.0 – 17.0 | 17.0 – 56.0 | X |
| **Decapoda** | | | | |
| Palaemonidae | | | | |
| *Macrobrachium vollenhovenii* | 6.4 – 13.0 | 3.00 – 600* | 6.06 – 32.4 | X |
| *Macrobrachium macrobrachion* | 6.4 – 12.00 | 3.00 – 5.50* | 6.04 – 28.29 | X |
| Portunidae | | | *19.5 – | |
| *Callinectes amnicola* | 3.4 – 15.5** | | 115.5 | X |

*** Carapace length, ** Carapace width, x Economic Importance**



**Discussion**

In Nigeria, fishers use over 50 different types of fishing gears of five categories (Udolisa *et al.*, 1994). Several nets are designed to catch many species while others are used to catch a particular species. Description of the Lekki lagoon gears and mode of operation are detailed by Emmanuel (2009). In the present investigation, gill nets were the main gears used by local fishers, followed by longlines and castnets. Solarin (1998) and Emmanuel et al. (2008b) also found
gill nets and cast nets as dominant gears in Lagos lagoon and its adjacent creeks in Nigeria.

The wide array of fishing gear used in the Lekki lagoon revealed various degrees of efficiency and

selectivity in catching the fish resources. This study was conducted to provide information on the fishing gear in use in the lagoon, their effectiveness and their possible effect on the fish fauna.

The use of these gears, however, may promote resource overexploitation as they are non selective. So far, it has not been demonstrated that the fish stocks in the lagoon are being under exploited. This agrees with Solarin (1998) who stated that finest materials gave the best of catching result in Lagos lagoon. A minimum of 0.23mm twine thickness (instead of 0.16mm) is advised to reduce net wear and tear during fishing operation. The wide use of gillnets in the lagoon is explained on its versatility, low cost and ease of operation. The efficiency of these net types is influenced by mesh size, exposed net area, flotation, mesh shape and hanging ratio, visibility and type of netting material in relation with stiffness and breaking strength. The knowledge of the efficiency of gillnets is important for the reconstruction of the population in fish stock. This agreed with the report of Machiels *et. al*. (1994) in the use of bottom gillnets for pike perch (*Stizostedion lucioperca*) and bream (*Abramis brama*).

The fish production of 1041.01 metric tons (42.1 kg per hectare per year) in this study is low for lagoon compared to previous report in other tropical lagoon. Kapetsky (1984) investigated 106 lagoons and recorded a maximum yield of 700 kg per hectare per year and production as much as 16 tons per fisherman per year. Kapetsky (1984) and Solarin (1998) jointly observed that in the sense of regulation of entry, gear, fishermen numbers and fishing season, few coastal lagoon fisheries could be listed as well managed particularly in developing countries.

Responsible fishing practices demand that management of fisheries resources should maximize the sustainable yield of fish stocks that can be exploited economically from the coastal waters, improve the efficiency of exploitation, processing and marketing (Solarin and Kusemiju, 2003). Community based management system will improve the economic importance and potential of Lekki lagoon in supporting sustainable small- scale capture fisheries as indicated by Solarin and Kusemiju (2003).

More studies, on hydrobiology and population dynamics of commercially exploited species are also needed to formulate a sustainable management strategy for this lagoon.

**REFERENCES**

Ahmed, M.S. (2008). Assessment of fishing practices on the exploitation of the Titas floodplain in Brahmanbaria, Bangladesh. Turkish Journal of Fisheries and Aquatic Sciences.8: 329 – 334

Ali, M.A. (1997) Fish, water and people, Reflections on inland openwater fisheries resources in Bangladesh. The University Press Limited, Dhaka, 154 pp.

de Graaf, G.J. & Chinh, N.D. (1992). Floodplain fisheries in the southern province of Vietnam. Annual Report, Ministry of Fisheries, 9 pp.

de Graaf, G.J., Born, A.F., Uddin, A.K.M. & Martin, F. (2001). Floods, fish and fishermen. Eight years' experience with floodplain fisheries in Bangladesh. University Press Ltd., Dhaka, 174 pp.

Emmanuel, B.E. (2009). The artisanal fishing gears, crafts technology and their efficiency in Lekki lagoon, Nigeria. Ph.D Thesis. University of Lagos. 256pp

Emmanuel, B.E (2004). Day and night variations in cast net catches in a brackish water pond. M.Sc. Fisheries. University of Lagos, Nigeria. 61pp.

Emmanuel, B.E. & Kusemiju, K. (2005). Variations in castnet catch in a tropical brackishwater pond. *Journal of Science Technology and Environmental.*5 (1&2) 6-14

Emmanuel, B. E., Chukwu, L.O. & Azeez, L.O. (2008a). Cast net design characteristics, catch composition and selectivity in tropical open lagoon.

*African Journal of Biotechnology*.7 (12): 2081 – 2089.

Emmanuel, B. E., Chukwu, L.O. & Azeez, L.O. (2008b) Gill net selectivity and catch rates of pelagic fish in tropical coastal lagoonal ecosystem. *African Journal of Biotechnology* . 7 (21): 3962-3971

Emmanuel, B. E. & Onyema, I.C. (2007). The plankton and fishes of a tropical creek in south-western, Nigeria. *Turkish Journal of Fisheries and Aquatic Science*.7: 105-114

Fagade, S.O. & Olaniyan, C.I.O. (1974). Seasonal distribution of the fish fauna of the Lagos lagoon. *Bull de I'IFAN* A 36(11) 244 – 252.

Kusemiju, K. (1973). A study of the catfishes of Lekki lagoon with particular reference to the species *Chrysichthys walkeri* Bagridae. Ph.D Thesis. University of Lagos. 188pp.

Kusemiju, K. (1981). The hydrobiology and fishes of the Lekki lagoon, Nigeria. *Nig. J. Nat. Sc.* 3 (1&2): 135 – 146.

Kusemiju, K., Nwankwo, D.I. & Bamisaye, R.B.(1993). The hydrobiology and fishes of Opobo channel River state, Nigeria. *Journ. Sci. Res. Dev*. 1: 74 - 79

Machiels, M. A. M., Klinge, M., Lanters, R. & VanDensen, W.L.T. (1994). Effect of snood length and hanging ratio efficiency and selectivity of bottom – set gillnets for pike perch, *Stzostedion lucioperca* L. and bream, Abamis brama. *Fisheries Research*, 9, 231 – 239.

Meye, J.A.& Ikomi, R.B. (2008). A study on the fish fauna of Urie creek at Igbide, Niger Delta. *The Zoologist.* 6: 69 - 80

Nedelec, C. (1982). Definition and classification of fishing gear categories. FAO Fish. Tech. Pap. No. 222, 57pp

Olaosebikan, B.D & Raji, A. (1998). Field guide to Nigerian freshwater fishes. Federal College of Freshwater Fisheries Technology, New Bussa, Niger State, Nigeria. 106pp.

Solarin, B.B. (1998). The hydrobiology, fishes and fisheries of the Lagos lagoon, Nigeria. Ph.D Thesis. University of Lagos. 235pp.

Solarin, B.B. & Kusemiju, K. (2003). Small scale fisheries and the need for community – based resource management in Lagos lagoon, Nigeria. *Journal of Science, Technology and Environment.* 3(1&2), 1 -7

Suwarso, A. & Wasilun, O. (1999). The crab fishery around the mangrove area of Sagara Anakan – Cilacap, Java, Indonesia, *in* Chou, L.M., Chua, T.E., Khoo, H.W., Lim, P.E., Paw, J.N., Silvestre, G.T., Valenau, M.J., White, A.T. and Wong, P.M. editors, Towards an integrated management of tropical coastal resources, ICLARM Conf. Proceedings No.22, 455pp.

Tobor, J.G. (1992). Fin and shellfish of conservation interest in Nigeria. Nigerian Institute f or Oceanography and Marine Research. Tech. Pap. No. 79:30pp

Udolisa, R.E.K., Solarin, B.B., Lebo, P. & Ambrose, E.E. (1994). A catalogue of small scale fishing gear in Nigeria. RAFR Publication RAFR/041/F1/94/02: 142pp.