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A STUDY ON THE FISH FAUNA OF URIE CREEK AT IGBIDE, NIGER DELTA

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Abstract
The fish fauna of Urie Creek at Igbide in Delta State, Nigeria, was studied from January to December, 2006. Sampling was carried out both day and night during high and low tide using different fishing gears. A total of 2,050 specimens were sampled made up of 45 fish species in 32 genera and 24 families. Variation in the mesh sizes of gear used greatly influenced fish catch in the creek. Cast net recorded the highest number of fish catch (44.05%) and fish species (36 species). Two chichlid species, *Tilapia zilli* and *Hemichromis fasciatus* were the most abundant in the catch, amounting to 10.34 and 10.83% respectively. The families, Cichlidae and Clariidae were the most dominant families constituting 38.39% and 10.34% of the total catch respectively. Fish abundance showed high catches during the dry season (67.85%), low tides (63.8%) and day time (68.2%).

Key words: Fish fauna, fish abundance, Urie Creek

Introduction

Nigeria is blessed with abundant natural aquatic resources in marine, estuarine and freshwater environments. These numerous freshwater bodies in Nigeria with over 270 fish species are the richest in fish diversity in West Africa (Tobor, 1992). The Niger Delta as Africa's largest delta has been variously described as a repository of fish diversity. Among the people of this region, fish constitutes more than 70% of the protein intake (Chindah and Osuamkpe, 1994). Besides, fishing activities have become a source of employment for the teeming populace. However, fishing in this region is practiced on a very low scale, mainly for subsistence (Gabriel, 2000). Thus, over the years, the demand for fish has continuously outweighed supply as in most parts of Nigeria. Fishing activities in these water bodies are intense all year round; with fishermen using all types of fishing gears and sometimes explosives (though illegal) to increase their catches (Idodo-Umeh and Victor, 1990). In most cases, their fishing efforts are not commensurate with their catches. But if an inventory of the commercially important species including the tidal, seasonal and diurnal variations in abundance, as well as the gear selectivity of these species are studied and results made known to the fishermen then they can target their fishing efforts at particular seasons and time of the day to achieve better fish catches.

Knowledge of fish biology and species composition of different water bodies is necessary to enhance the management of water resources. Hitherto, published information on the fishes and fisheries of the Niger Delta have mainly been on the larger rivers (Idodo-Umeh, 1987, in River Ase; Ikomi and Sikoki, 1998, in Jamieson River and Odum, 1995, in Ethiope River), while the numerous creeks and rivulets which criss-cross this region have been neglected. This present study therefore is a preliminary investigation of the fish fauna of Urie Creek, with the view to appraising the prospects of harnessing the fisheries of this water body.

Materials and Methods

Study Area

This study was conducted in a stretch of Urie Creek at Igbide, Isoko-South Local Government Area, Delta State. Urie Creek lies between latitude

5°15N and 5°30[1]N and longitude 6°5[1]E within the tropical rainforest of Delta State (Figure I). The creek takes its source from the tributary of the Niger at Patani in the Delta Valley and flows northwest through Umeh to Owodokpokpo-Igbide, both in Isoko-South Local Government Area. It also channels its water to Ase River particularly during peak of the flood. The water is tidal (semi-diurnal) and flows into the creek during high tide and out at low tide but stagnates briefly at the point of tidal changes. The intertidal bank is fringed with red mangrove, *Rhizophora* and the white mangrove, *Avicennia africana* (Wilcox, 1980). Other aquatic macrophytes include *Symphonia globulifena, Aistonia congenesis, Oxystima manni, Mitragyna ciliata, Nymphea lotus, Fussiaerea ripens* and *Xylopia species*. The main channel of the creek is fairly deep with the bottom made up of loamy clay derived from the marshes. Fishing in the area is dominated by artisanal fishermen that use manually operated wooden (dug-out) canoes using mostly cast net, gillnet, drift net, traps and long line for fishing.

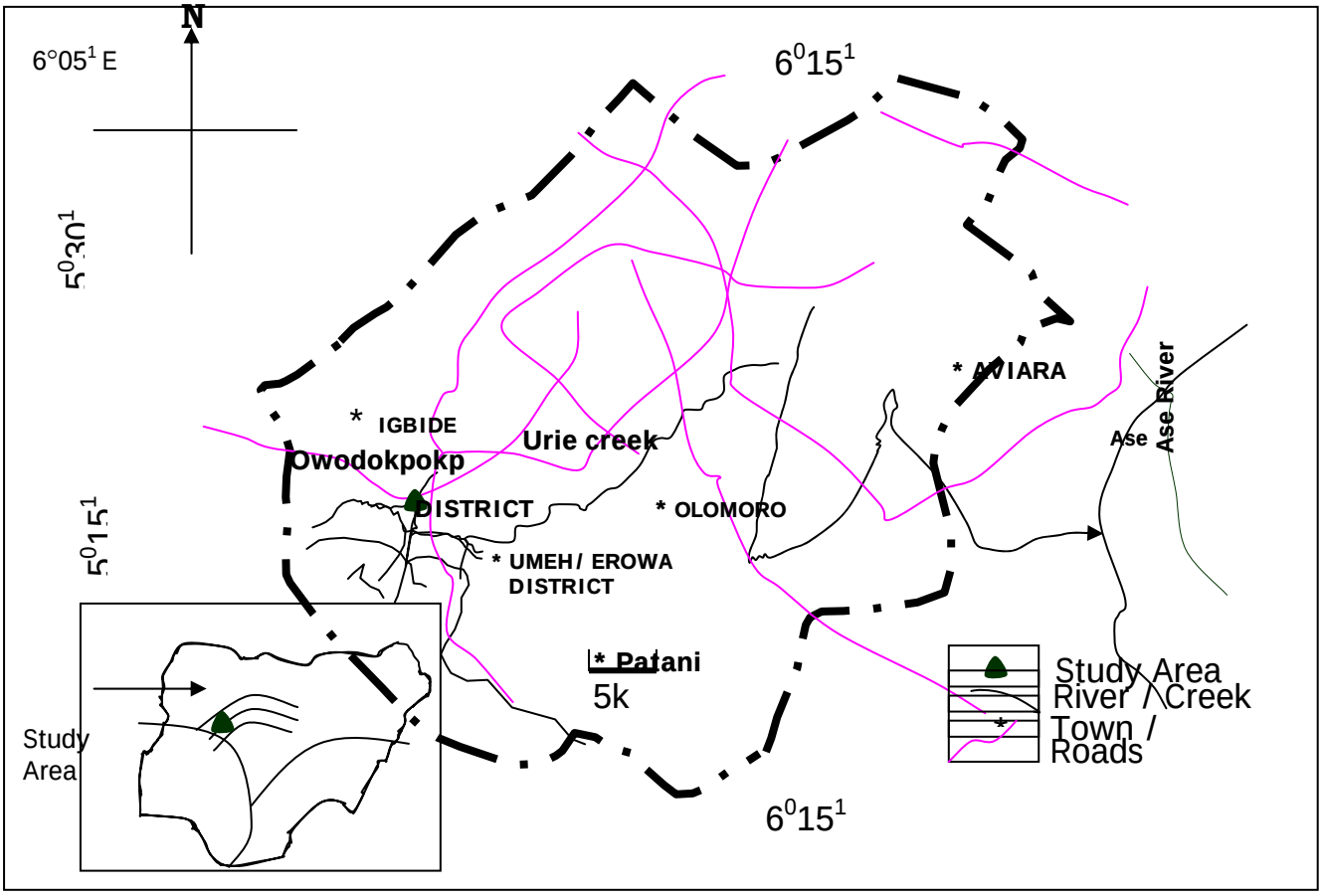

Fig. 1: Map showing the location of Urie creek in Nigeria (inset)

Fish Sampling Procedure

The gears and methods used were in accordance with the recommend-dations of Gullard (1980), that reliable sampling should involve a combination of two or more gears. In each sampling period, fishing was carried out during high tide and low tide both day and night. Sampling was done once a month for twelve months (January to December, 2006). The gears consisted of cast net (10 – 15mm mesh size), drift net (5mm mesh size), gill net (5mm mesh size), local traps and hook and line. A uniform fishing effort of 5 fishermen for six hours duration per day was maintained

throughout the study period. Fish were collected into an iced cooler and transported to the laboratory where they were preserved in 10% formalin for further examination.

Fish Identification

Fish identification was done as far as possible using available keys of Olaosebikan and Raji (1998), Teugels *et al*, (1992) and Idodo-Umeh (2003).

Data Analysis

All fish species collected were counted to determine species abundance. The abundance score of the species was estimated by calculating the relative abundance (%) of each species as given by the formula below as adopted from Benech *et al*, (1983):

$$R.A = \frac{S.A}{T.A} \times 100\%$$

Where,

R.A = Relative Abundance of each species (%)
S.A = Species Abundance
T.A = Total Abundance for all species

The abundance of each species was estimated according to the following criteria:

≥ 10% = dominant
1 – 9% = subdominant
< 1% (but caught more than once) = occasional
< 1% (and caught only once) = rare

Similarly, the tidal, seasonal and diurnal variations in catches for each fish family was calculated and chi-square (X^2) was used to test for differences in abundance between high and low tide, dry and wet season and day and night.

Results

Ichthyofauna

The fish fauna encountered in Urie Creek is shown in Table I. A total of 45 species belonging to 32 genera and 24 families were recorded in this study. The highest number of species (10) was observed in the family; Cichlidae followed by Mormyridae and Clariidae with 3 species each (Table 2). On the whole, of the 2,050 fish caught in this study, the cichlids and clariids constitute 38.39% and 10.24% by number respectively, making them the dominant families.

The two cichlid species: *Tilapia zilli* and *Hemichromis fasciatus* were the dominant species with relative abundant scores of 10.34% and 10.83% respectively. Twenty-four species were subdominant in Urie Creek. They included *Auchenoglanis occidentalis* (2.34%), *A. biscutatus* (1.95%), *Parachanna africana* (3.17%), *P. africana* (3.95%), *Hepsetus odoe* (3.80%), *Marcusenius isidori* (4.15%), *M. Petricolus* (3.27%), *Chromidotilapia guentheri* (3.80%), *Oreochromis niloticus* (2.98%), *O. aureus* (2.98%), *Clarias gariepinus* (6.24%) and *C. macromystax* (3.27%).

The occasional species include *Tilapia dageti* (0.98%), *Pantodon bucholsi* (0.98%), *Gymnarchus niloticus* (0.78%), *Xenomystus nigri* (0.73%), *Malapterurus electricus* (0.93%), *Mastacembellus leonbergii* (0.83%) and *Gymnallabes typus* (0.73%).

The rare species recorded in this study were *Sphyraena afra* (0.34%), *Arius lasticulatus* (0.05%), *Barbus clarotaei* (0.24%) and *Polypterus ansorgei* (0.19%).

Table 1: A checklist of fish fauna in Urie Creek showing abundance and relative abundance (%)

Family/Species	Total Catch	Relative Abundance (%)
ANABANTIDAE		
Ctenopoma kingsleyae (Gunther, 1896)	6	0.29
NOTOPTERIDAE		
Papyrocranus afer (Gunther, 1868)	9	0.44
Xenomystus nigri (Gunther, 1868)	15	0.73
BAGRIDAE		
Auchenoglanis occidentalis (Curvier & Valencienes, 1840)	48	2.34
A. biscutatus (Jeoarey st. Hilare, 1827)	40	1.95
PANTODONTIDAE		
Pantodon bucholzi (Peters, 1877)	20	0.98
CHANNIDAE		
Parachanna obscura (Gunther, 1861)	65	3.17
P. africana (Myers & Shapovair, 1932)	81	3.95
HEPSETIDAE		
Hepsetus odoe (Block, 1739)	78	3.80
PROTOPTERIDAE		
Protopterus annectens (Owen, 1839)	9	0.44
NANDIDAE		
Polycentropsis abbreviata (Bonlenger, 1901)	35	1.71
CHARACIDAE		
Brycinus longipinnis (Gunther, 1864)	47	2.29
B. nurse (Ruppel, 1832)	12	0.59
PHRACTOLAEMIDAE		
Phractolaemus ansorgie (Boulenger, 1901)	37	1.80
MORMYRIDAE		
Marcusenius psittacus (Boulenger, 1897)	30	1.46
M. isidori (Cuvier & Valenciennes, 1864)	85	4.15
M. petricolus (Daget, 1954)	67	3.27
MOCHOKIDAE		
Synodontis nigrita (Cuvier & Valencienes, 1864)	37	1.80
S. ocellifer (Boulenger, 1900)	141	6.88
SPHYRAENIDAE		
Sphyraena afra (Peters, 1844)	7	0.34
SCHILBEIDAE		
Schilbe intermedius (Gunther, 1867)	28	1.37
S. uranoscopus (Ruppel, 1832)	11	0.54

POLYPTERIDAE		
Erpetoichthys calabaricus (Smith, 1868)	29	1.41
Polypterus ansorgei (Boulenger, 1910)	4	0.19
GYMNARCHIDAE		
Gymnarchus niloticus (Cuvier, 1869)	16	0.78
OSTEOGLOSSIDAE		
Heterotis niloticus (Cuvier, 1829)	9	0.44
MALAPTERURIDAE		
Malapterurus electricus (Gmeli, 1789)	19	0.93
ARIIDAE		
Arius latisculatus (Gunther, 1864)	1	0.05
CYPRINIDAE		
Barbus chlorotaenia (Boulenger, 1911)	5	0.24
B. callipterus (Boulenger, 1901)	30	0.15
MASTACEMBELLIDAE		
Mastacembellus leonbergii (Boulenger, 1898)	17	0.83
DISTICHODONTIDAE		
Distichodus engycephalus (Gunther, 1864)	15	0.73
CICHLIDAE		
Tilapia zilli (Gervais, 1848)	21	10.34
T. mariae (Boulenger, 1899)	25	1.22
T. guineensis (Bleeker, 1962)	23	1.12
T. dageti (Thys van de Audenaaede, 1971)	20	0.98
Hemichromis fasciatus (Peters, 1857)	222	10.83
H. bimaculatus (Gill, 1862)	50	2.44
Chromidotilapia guentheri (Sanvage, 1882)	78	3.80
Oreochromis niloticus (Linnaeus, 1758)	61	2.98
O. aureus (Steindachaner, 1864)	61	2.98
Sarotherodon galilaeus (Linnaeus, 1758)	35	1.71
CLARIIDAE		
Clarias gariepinus (Burchel, 1822)	128	6.24
C. macromystax (Gunther, 1864)	67	3.27
Gymnallabes typus (Gunther, 1867)	15	0.73

Table 2: Abundance and seasonal variation of fish families in Urie Creek January – December, 2006

S/N	Family	%	Wet Season		Dry Season		Total No. of
			A	%	A	%	Individuals
1	Anabantidae	0.29	2	0.30	4	0.29	6
2	Notopteridae	1.17	10	1.52	14	1.00	24
3	Bagridae	4.29	18	2.73	70	5.03	88
4	Pantodontidae	0.98	16	2.43	4	0.29	20
5	Channidae	7.12	26	3.95	120	8.65	146
6	Hepsetidae	3.80	50	7.59	28	2.01	78
7	Protopteridae	0.44	-	-	9	0.65	9
8	Nandidae	1.71	15	2.28	20	1.43	35
9	Characidae	2.88	19	2.88	40	2.87	59
10	Phractolaemidae	1.81	14	2.12	23	1.65	37
11	Mormyridae	8.88	40	60.7	142	10.20	182
12	Mochokidae	8.68	28	4.25	150	10.78	178
13	Sphyraenidae	0.34	7	1.06	-	-	7
14	Schilbeidae	1.09	19	2.88	20	1.43	39
15	Polypteridae	1.61	3	4.55	30	2.16	33
16	Gymnarchridae	0.78	9	1.37	7	0.50	16
17	Osteoglossidae	0.44	-	-	9	0.65	9
18	Malapteruridae	0.93	8	1.12	11	0.79	19
19	Ariidae	0.05	1	0.15	-	-	1
20	Cyprinidae	1.17	12	1.82	23	1.65	35
21	Mastacembellidae	0.83	10	1.52	7	0.50	17
22	Distichodontidae	0.73	10	1.52	5	0.36	15
23	Cichlidae	38.39	272	41.27	515	37.02	787
24	Clariidae	10.24	70	10.62	140	10.06	210
	Total		**659**		**1391**		**2050**
	Relative Abundance (%)		**32.15**		**67.85**		

Gear Selectivity

Table 3 shows the species composition of the different gears used. The cast net recorded the highest number of species (36) and also the highest number of individuals (903) and closely followed by gill net with 32 species and 356 individuals. Hook and line captured the least number of individuals (195) and species (13). The bulk of the catches (61%) of the local traps were the mormyrids and the clariids.

Seasonal Variation

The seasonal variation of the fish fauna of Urie Creek is shown in Table 2. A trend of higher catches in the dry season (67.85%) than the wet season (32.15%) was observed. Chi-square test showed significant difference ($P<0.05$) between the dry and wet season fish catches in the creek. The dominant dry season catches were Cichlidae (37.02%), Clariidae (10.06%), Mormyridae (10.20%), and Mochokidae (10.78%), while rare catches consisted

of Distichodontidae, Mastacembellidae and Pantodontidae. In the wet season, the Cichlids and Clariids were also dominant, closely followed by Hepsetidae (7.59%) and Mormyridae (6.07%). The remaining families had a fairly uniform relative abundance of less than 4% in both seasons. The families Protopteridae and Osteoglossidae were caught only during the dry season while Sphyraenidae and Ariidae were caught only during the wet season.

Diurnal Variation in Catch

Generally, higher catches were made during low tide than high tide (Table 4). Chi-square test also showed that there was significant difference ($P<0.05$) in catches due to tidal variation. A similar trend of better catches by day than night was observed (Table 4), as the day catches constituted 68.24% while the night catches made up 31.76% of the total catch. Chi-square test also confirmed a significant difference in the diurnal catches. The cichlids dominated both the day and night catches with 40.81% and 33.18% respectively. The Clariids were caught more at night (16.90%) than the day (7.15%). The remaining families had a fairly low uniform abundance.

Discussion

The primary objective of a sampling survey of this nature is to attempt to find out what fish species exist in the creek and perhaps look at the factors governing their abundance. However, according to Benech *et al*, (1983), fish communities studies are not generally equivalent to ichthyocoenoses because the description of any fish community is a biased image arising from the sampling of a group of fishes in a particular environment at a given time. Gear selectivity and sampling strategies are usual sources of these biases. Despite these shortcomings, attempts will be made here to compare data obtained in this study with that from related studies. The ichthyofauna of Urie Creek with 45 species from 24 families appear richer than 35 species from 20 families of Elechi Creek in Rivers State (Allison *et al*, 1997) and 23 species from 17 families in the mangrove habitat of the Lagos Lagoon (Nwadukwe, 1995). It compares well with 41 species in 28 families recorded by Alfred-Ochiya (1996) in Kolo Creek, Rivers State. However, the number of species encountered in the present study is lower than 70 species by Imevbore and Okpo (1975) in River Niger, 85 species by Syndeham (1977) in Ogun River, 120 species by Reid and Syndeham (1979) in the Lower Benue River, 58 species by Victor and Tetteh (1988) in Ikpoba River, Benin City, 98 species by Nwadiora (1989) in Oguta Lake, 60 species by Odum (1995) in Ethiope River and 55 species by Ikomi and Sikoki (1998) in River Jamieson.

Gear selectivity was observed in the fish catch from Urie Creek. The variation in mesh size and gear used may have greatly influenced species composition and abundance in this study. Ufodike *et al*, (1989) opined that gill net technology and catch period/techniques are essential in maximizing fish catches. Both cast and gill nets constituted more than 50% of the catch in this study and were dominated mainly by the cichlids and the mochokids. The results agree with that of Hopson (1968) in Lake Chad, Udolisa (1982) in the Lagos Lagoon and Alfred-Ochiya (1996) in Kolo Creek. The gill net's high selectivity may be connected with the morphoteric projections on the body of most species such as the mochokids (*Synodontis occelifer* and *S. nigrita*) and the presence of scales on most other species such as the cichlids (*Tilapia zilli* and *Hemichromis fasciatus*). These projections make such fishes more susceptible to be gilled in the gill net. In the case of the cast net, its very high selectivity may be connected with the heterogeneous mesh sizes of different panels used which made it possible to catch fishes of different sizes. Similarly, the low selectivity of local traps

and hook and line agrees with the earlier findings of Alfred-Ochiya (1996) in Kolo Creek and Ikomi and Sikoki (1998) in River Jamieson. These gears are mostly used by fishermen in the area particularly during the wet season when flooding makes the use of other gears somewhat difficult. The gear selectivity observed in the present study suggests that multi-gear approach may be the best way to obtain comprehensive ichthyofaunal samples for such studies.

Higher dry season than wet season catches observed in this study have also been reported by Chindah and Osuamkpe (1994) in the Lower Bonny River, Nwadukwe (1995) in Lagos Lagoon, Alfred-Ochiya (1996) in Kolo Creek, and Allison *et al*, (1997) in Elechi Creek, both in Rivers State. however, the present finding disagrees with that of Idodo-Umeh (1987) in Ase River and Ikomi and Sikoki (1998) in Jamieson River who observed more fish catches in the wet season than the dry season. The reduced water level or flood which implies easier access into the creek for the fishermen as most of the fishes are concentrated on the main channel of the creek could be responsible for the higher catches in the dry season than the wet season. On the other hand, during the wet season, the increased flooding and water depth increases the available space or micro-habitat for the fishes with some of them going into over-flooded inaccessible flood plains/swamps of the creek.

On the diurnal variation in fish abundance, Idodo-Umeh (2003/04) noted that the diel habits of different fish species are likely to influence the species composition of day and night catches. Since most fishes are more active in the day than night, they are then more susceptible to be caught in the day. Similar results have been reported by Motwani and Kanwai (1975), Arawomo (1996) and Allison et al, (1997). The significant difference between low and high tide fish catches in this study was similarly reported by Allison et al, (1997) in Elechi Creek. The high tide upsurge of water tends to hinder navigation and subsequently fishing activities in most water bodies under tidal influence.

Conclusion

The result of this present study has shown that Urie Creek, like most other water bodies in the Niger Delta has an enviable potential for fisheries exploitation considering its fairly high fish species composition and abundance. The gear selectivity noticed among the fish species showed that the use of multiple gears may probably be the best approach to such studies on fish composition in the future. Finally, since fish abundance in this study showed significant variations in tidal conditions, season and time of the day, it is therefore recommended that these factors be of prime consideration in the future exploitation of the fish resources in the study area. In addition, future research effort should be geared towards the investigation of the ecology/biology of the dominant, occasional as well as the rare species of the area with the view to enhancing their conservation.

Table 3: Gear selectivity of fish species in Urie Creek (January – December, 2006)

		Cast Net		Gill Net		Drift Net		Local Trap		Hook & Line		
S/N	Species	A	%	A	%	A	%	A	%	A	%	Total Catch
1	*Ctenopoma kingsleyae*	2	0.22	-	-	4	1.6	-	-	-	-	6
2	*Papyrocranus afer*	3	0.33	2	0.56	4	1.6	-	-	-	-	9
3	*Xenomystus nigri*	2	0.22	5	1.40	7	2.8	1	0.29	-	-	15
4	*Auchenoglanis occidentalis*	10	1.11	15	4.21	19	7.6	3	0.87	1	0.51	48
5	*A. biscutatus*	12	1.33	17	4.78	8	3.2	3	0.87	-	-	40
6	*Pantodon bucholzi*	1	0.11	10	2.81	9	3.6	-	-	-	-	20
7	*Parachanna obscura*	14	1.55	7	1.97	7	2.8	10	2.89	27	13.85	65
8	*P. africana*	43	4.76	10	2.81	2	2.8	-	-	21	10.77	81
9	*Hepsetus odoe*	65	7.20	-	-	-	-	3	0.87	10	5.13	78
10	*Protopterus annectens*	8	0.89	1	0.28	-	-	-	-	-	-	9
11	*Polycentropsis abbreviatta*	27	2.99	3	0.84	-	-	5	1.45	-	-	35
12	*Brycinus longipinnis*	23	2.55	13	3.65	11	4.4	-	-	-	-	47
13	*B. nurse*	10	1.11	2	0.56	-	-	-	-	-	-	12
14	*Phractolaemus ansorgei*	8	0.89	9	2.52	-	-	20	5.78	-	-	37
15	*Marcusenus psittacus*	-	-	-	-	-	-	60	17.34	2	3.59	30
16	*M. isidori*	9	0.99	8	2.25	-	-	45	13.00	23	11.78	85
17	*M. petricolus*	-	-	-	-	-	-	60	17.34	2	3.59	67
18	*Synodontis nigrita*	22	2.44	15	4.21	-	-	-	-	-	-	37
19	*S. ocellifer*	101	11.18	25	7.02	15	6.0	-	-	-	-	141
20	*Sphyreana afra*	7	0.78	-	-	-	-	-	-	-	-	7
21	*Schilbe intermedius*	20	2.21	6	1.69	2	0.8	-	-	-	-	28
22	*S. uranoscopus*	9	0.99	2	0.56	-	-	-	-	-	-	11
23	*Erpetoichthys calabaricus*	-	-	-	-	-	-	24	6.94	5	2.56	29
24	*Polypterus ansorgei*	-	-	-	-	-	-	4	1.16	-	-	4
25	*Gymnarchus niloticus*	4	0.44	-	-	-	-	2	0.58	10	5.13	16
26	*Heterotis niloticus*	6	0.66	3	0.84	-	-	-	-	-	-	9
27	*Malapterurus electricus*	-	-	8	2.25	-	-	11	3.18	-	-	19
28	*Arius latisticulatus*	1	0.11	-	-	-	-	-	-	-	-	1
29	*Barbus chlorotaenia*	-	-	5	1.40	-	-	-	-	-	-	5

30	*B. callipterus*	25	2.77	5	1.40	-	-	-	-	-	-	30
31	*Mastacembellus leonbergii*	-	-	-	-	-	-	17	4.78	-	-	17
32	*Distichodus engycephalus*	8	0.89	5	1.40	2	0.8	-	-	-	-	15
33	*Tilapia zilli*	140	15.50	12	3.37	60	24	-	-0	-	-	212
34	*T. mariae*	7	0.78	18	5.06	-	-	-	-	-	-	25
35	*T. guineensis*	15	1.66	8	2.25	-	-	-	-	-	-	23
36	*T. dageti*	8	0.89	12	3.37	-	-	-	-	-	-	20
37	*Hemichromis fasciatus*	130	14.40	-	-	72	28.8	-	-	20	10.26	222
38	*H. bimaculatus*	38	4.21	12	3.37	-	-	-	-	-	-	50
39	*Chromidotilapia guentheri*	22	2.44	56	15.7	-	-	-	-	-	-	78
40	*Oreochromis niloticus*	38	4.21	3	0.84	20	0.8	-	-	-	-	61
41	*Sarotherodon galilaeus*	25	2.77	10	2.81	-	-	-	-	-	-	35
42	*Oreochromis aureus*	18	1.99	40	11.2	3	1.2	-	-	-	-	61
43	*Clarias gariepinus*	22	2.44	-	-	-	-	71	19.98	35	17.95	128
44	*C. macromystax*	-	-	9	2.53	-	-	38	10.98	20	10.26	67
45	*Gymnallabes typus*	-	-	-	-	-	-	13	3.76	2	1.03	15
	Total Abundance	**903**		**356**		**250**		**346**		**195**		**2050**
	Relative Abundance (%)	**44.05**		**17.37**		**12.20**		**16.88**		**9.51**		
	No. of Species Caught	**36**		**32**		**16**		**18**		**13**		

(≤2.0%) in both day and night, except for the families Bagridae (5.58% by day and 1.54% by night), Channidae (6.08% day and 9.37% night), Mormyridae (10.0% day and 6.45% night), and Mochokidae (7.15% day and 11.98% night).

Table 4: Diurnal variations in fish catch from Urie Creek January – December, 2006

		Low Tide		High Tide		Day		Night	
S/N	Family	N	%	N	%	N	%	N	%
1	Anabantidae	6	0.46	-	-	6	0.43	-	-
2	Notopteridae	20	1.53	4	0.54	18	1.27	6	0.92
3	Bagridae	68	5.20	20	2.70	78	5.58	10	1.54
4	Patodontidae	18	1.38	2	0.27	15	1.07	5	0.77
5	Channidae	120	9.17	26	3.50	55	6.08	61	9.37
6	Hepsetidae	18	1.38	60	8.09	69	4.93	9	1.38
7	Protopteridae	-	-	9	1.21	-	-	9	1.38
8	Nandidae	25	1.91	10	1.35	28	2.00	7	1.08
9	Characidae	39	2.83	22	2.96	45	3.22	5	0.77
10	Phractolaemidae	25	1.91	12	1.62	20	1.43	17	2.61
11	Mormyridae	130	9.94	52	7.00	140	10.00	42	6.45
12	Mochokidae	100	7.65	78	10.51	100	7.15	78	1.9
13	Spygraenidae	7	5.35	-	-	-	-	7	1.08
14	Schilbeidae	28	2.14	11	1.48	30	2.14	9	1.38
15	Polypteridae	25	1.91	8	1.08	13	0.93	20	3.7
16	Gymnarchidae	10	0.76	6	0.81	16	1.14	-	-
17	Osteoglossidae	6	0.46	3	0.40	9	0.64	-	-
18	Malapteruridae	12	.92	7	0.94	9	0.64	10	1.54
19	Ariidae	1	0.08	-	-	1	0.07	-	-
20	Cyprinidae	15	1.15	20	2.70	30	2.14	5	0.77
21	Mastacembellidae	10	0.76	7	0.94	13	0.93	4	0.61
22	Distichodontidae	5	0.38	10	1.35	5	0.36	10	1.54
23	Cichlidae	502	38.38	285	38.41	571	40.81	216	33.18
24	Clariidae	120	9.17	90	12.31	100	7.15	110	16.90
	Total	**1308**		**742**		**1399**		**651**	
	Relative Abundance (%)	**63.8**		**36.2**		**68.2**		**31.8**	

References

Alfred-Ochiya, J.F. (1996). Studies on the ichthyofauna of Kolo Creek, Rivers State, Nigiera. *Niger Delta Biologia* 1(9): 24 – 28.

Allison, M.E., Gabriel, U.U., Imko-Tariah, M.B., Davies, O.A. and Udeme-NAA, B. (1997). The fish assemblage of Elechi Creek, Rivers State, Nigeria. *Niger Delta Biologia* 2(1):90-96.

Arawomo, G.O. (1996). The ecology of fish genera, *Citharinus* and *Distichodus* in Lake Kainji, Nigeria. M. Phil. Thesis University of Ife, Nigeria, 129pp.

Benech, V., Duran, J.R. and Quensiere, J. (1983). Fish communities of Lake Chad and associated rivers and flood plains. In Lake Chad, ecology and productivity of a shallow tropical system (Garmuze J.P.; J.R. Durand; C. Leveque (eds). Dr. W. Junk, The Hague: 293 – 356.

Chindah, A.C. and Osuamkpe, A. (1994). The fish assemblage of the lower Bonny River, Niger Delta. *Africa Journal of Ecology*. Vol. 35: 58 – 65.

Gabriel, A.O.I. (2000). Women in the Niger Delta: Environmental issues and challenges in the third millennium.

Gullard, J.A. (1980). General concept of sampling fish. Fisheries Department, F.A.O. Rome, 7 – 12pp.

Hopson, A.J. (1968). The gill net fisheries of Lake Chad. Federal Department of Fisheries, Occasional Paper No. 11, 32pp.

Idodo-Umeh, G. (1988). Studies on the fish community of River Ase, Bendel State, with special emphasis on the food and feeding habits of Citharinidae, Bagridae, Schilbeidae and Mocholcidae. Ph.D. thesis, University of Benin City.

Idodo-Umeh, G. (2003). *Freshwater fishes of Nigeria. (Taxonomy, Ecological notes, diet and utilization)*. Idodo-Umeh Pub. Ltd, Benin-City, Nigeria, pp 232.

Idodo-Umeh, G. (2003/2004). Diel variations in the fish species of River Ase, Niger Delta, Nigeria. *Tropical Freshwater Biology,* 12/13: 65 – 75.

Idodo-Umeh, G. and Victor, R. (1990). Some aspects of the ecology of *Citharinus citharus* in River Ase, Southern Nigeria. *Arch. Hydrobiol*. 120(2): 241-256.

Ikoni, R.B. and Sikoki, F.D. (1998). Fish communities of the River Jamieson, Niger Delta, Nigeria. *Tropical Freshwater Biology*, 7: 37-51.

Imevbore, A.M.A. and Okpo, W.S. (1975). Aspects of the biology of Kainji Lake fishes and ecology of Lake Kainji. In Kainji, the transition from river to lake. Pp 165-176.

Lagler, K.F.; Bardach, J.E.; Miller, R.R. (1977). *Ichthyology. The study of fishes*. John Wiley and sons. Inc. New York and London. 545pp.

Lowe-Mccnonnel, R.H. (1975). Fish communities in tropical freshwater. Longman, London. 337pp.

Motwani, M.P. and Kanwai, Y. (1970). Fish and fisheries of the coffer-dammed right channel of River Niger of Kainji. Pp27 – 48 in Visser, S.A. (ed). Kainji Lake studies. *J. Ecology*. Ibadan University Press, Ibadan. 126pp.

Nwadiora, C.S. (1989). Ichtyofauna of Lake Oguta, a shallow lake in Southern Nigeria. *Arch Hydrobiol*., 115(3): 463-475.

Nwadukwe, F.O. (1995). Species abundance and seasonal variation in catch from the mangrove habitats in the Lagos Lagoon. *Environment and Ecology*. 13(1): 121-128.

Odum, O. (1995). Fish distribution in Ethiope River, Southern Nigeria. *Tropical Freshwater Biology*. 53-64.

Olaosebikan, B.D. and Raji, A. (1998). *Field Guide to Nigerian Freshwater Fishes*. Federal College of Freshwater Fisheries Technology. New Bussa. 106pp.

Reid, G.M. and Sydenham, H. (1979). A checklist of lower Benue River fishes and on Ichthyogeographical review of the Benue River (West Africa). *Journal of Natural History*. 13: 41-67.

Sydenham, D.H.J. (1977). The qualitative composition and longitudinal zonation of the fish fauna of the River Ogun, Western Nigeria. *Rev. Zool. Afr*., 91: 974-996.

Teugels, G.G.; Reid, G.M; and Kings, R.D. (1982). Fishes of the Cross River Basin Cameroun-Nigeria. Taxonomy, Zoogeography, Ecology and Conservation. Mus. Royal. Del'Afrigu Centrale Tervaren, Belgique, *Annals Sciences Zoologiques*. Vol 266.

Tobor, J.G. (1992). Fin and shellfish of conservation interest in Nigeria. *Nig. Inst. Oceangr. and mar. Research. Tech. Pap. Mo*. 79:30pp.

Udolisa, R.E.K. (1982). Gill net fisheries of Nigerian coastal waters, ann. Report NIMOR. Lagos. Pp 55-58.

Ufodike, E.B.C.; Anthony, A. and ABB, G.S. (1989). Studies on the inheritance of Gill net technology and diurnal variations on fish catch in Ouree Reservoir Miango, Plateau State. *Journal of Aquatic Sciences*. 4: 17-19.

Victor, R. and Tetteh, J.O. (1988). Fish community of a perturbed stream in Southern Nigeria. Journal of Tropical Ecology. 4: 49-59.

Wilcox, B.H.R. (1980). Angiosperm flora of a Niger Delta Mangal. A taxonomic review. In: Abstract of workshop on the Niger Delta Mangrove Ecosystem. University of Port Harcourt. 19th May, 1980: 1-350.