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FISH FAUNA RESOURCES IN RIVER OVIA, EDO STATE, NIGERIA

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Abstract
The diversity, distribution and abundance of fish species in Ovia River, Edo state Nigeria was studied for 24 months using various fishing gears. The river was divided into three sampling stations. A total of 5,386 specimens were sampled made up of 81 fish species, 42 genera and 27 families. Mormyridae, Mochokidae and Cichlidae families were the most abundant, while the most abundant in terms of number of specimen in total catch were Mochokidae and Clariidae. Fish abundance showed higher catches during the wet season (>60%). The different stations showed marked ichthyofauna similarity but nearby stations had higher indices of similarity.

Key words: Fish fauna, diversity, distribution, abundance, Ovia River.

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Introduction

Fish resources in Nigeria are exposed to over-fishing, destruction of aquatic life and natural habitats by pollution of water bodies. Unregulated and excessive use of obnoxious fishing practice and the deliberate disposal and dumping of toxic and hazardous wastes into water bodies are significant causes of massive fish kills and loss of aquatic life and habitats in the country (Adeyemo, 2004). Like every other river in the Niger Delta, Ovia River is regarded as having high fisheries potential with little or no information on its ichthyofauna.

Tobor (1992) reported that over 270 fish species are endemic in Nigeria numerous fresh water bodies, making it the richest in fish diversity in West Africa. Fishing activities in these water bodies are intense all year round with the fisher folks using different types of fishing gears, and some even resort to the use of poisons and explosives to increase catch (Igene *et al*, 1996; Idodo-Umeh and Victor, 1999). As fishing is the primary source of employment for the peoples who due to inadequate financial well withal, still use low level technology gears and dugout canoes, thus fishing effort is not commensurate with their catch (Gabriel, 2000). Knowledge of fish species composition and distribution of Ovia River is essential to enhance the management of water resources with the prospect of harnessing the fisheries of this water body, as this study is the first intensive study on the Ovia River fish population.

Materials and Methods

This study was conducted in a stretch of Ovia River, which is the major river that forms the boundary between Ovia North-west and Ovia South-west Local Government Areas of Edo State, Nigeria. Ovia River flows in a North-Southerly direction, originating from Owan in Ovia North-East Local Government, flowing through several towns and villages before it empties into the Atlantic Bight of Benin between latitude 05°- 05 40'N and longitude 5°00'–60°30'E. The river is located within the wet tropical rainforest zone with proportionate dry and rainy seasons. The vegetation of the area is mainly evergreen forest which makes it suitable for farming. Ovia River provides high potentials for fish production in the state as it currently support a high number of fisher folks dominated by artisanal fishers that uses manually operated wooden (dugout) canoes, using multi-gears to harvest fish. Human activities in and around the river include fishing, bathing, washing, sand dredging, logging, human and goods transportation with local and motorized canoes. Three sampling stations, viz. Owan, Ikoro and Ekehuan were used as collection points during this study.

Fish samples were collected fortnightly during the period of study (Oct. 2007-Sept. 2009), and following the recommendation of Gullard (1980), that reliable sampling should involve a combination of two or more gears, a multi-gear approach was used during this study. A uniform fishing effort at each station was used, upon

landing; all fish caught were collected into iced cooler and transported to the laboratory where they are preserved in 10% formalin solution in labelled plastic containers for further examination. In the laboratory, fish identification was done using keys and descriptions of Boulenger (1909-1916), Reed *et al.* (1967) and Idodo-Umeh (2003). Specimens were counted to determine fish species abundance and adopting Benech *et al.* (1983) formula, the abundance of each fish species was estimated according to the following criteria, e"10% = dominant, 1 – 9% = Subdominant, <1% (but caught more than once) = Occasional, <1% (caught only once) = Rare. Routine morphometric measurements and weights of each fish were taken; similarly, wet and dry season catches were also determined. Fish diversity was analysed using Margalef's index (d) for species richness, Simpson's index (D), Shannon-Wiener index (H) for general diversity and Evenness index (E) which is the ratio of H and H_{max}, the maximum expected diversity, while the degree of similarity between two stations was assessed with the Sorenson's index of similarity (S) (Kreb, 1978; Zar, 1984; Odum, 1995).

Results

Altogether, 5,386 fish specimens comprising 81 species belonging to 27 families and 42 genera were collected during the study and they were all fresh water fish species. The abundance and relative distribution of the species in the different sampling stations is presented in Table 1. The most abundant fish species was *Synodontis nigrita* followed by *Clarias agboyiensis*. Of the 81 fish species caught, 26 were subdominant, 31 were occasional and 23 were rare, there were no dominant species as the individual percentage of fish species caught were less than 10%. Many of the fish species showed distinct differences in distribution in the different stations, the two most dominant families were Mochokidae followed by Clariidae, constituting about 56.09% of the total catch (Table 2), while the wet season catches were more than the dry season catches. The computed fish diversity indices in the different sampling stations on the river are presented in Table 3.

Table 1. Spatial distribution and relative abundance (%) of fish species caught in Ovia River.

FAMILY	SPECIES	STATIONS			T	P	S
		1	2	3			
ANABANTIDAE	*Ctenopoma kingsleyae*	46	114	33	193	3.58	S
	Ctenopoma petherici	0	1	2	3	0.06	O
BAGRIDAE	*Auchenoglanis monkey*	11	37	7	55	1.02	S
	Auchenoglanis occidentalis	0	2	0	2	0.04	O
	Chrysichthys auratus longifilis	2	27	65	94	1.75	S
	Chrysichthys furcatus	0	0	1	1	0.02	R
	Chrysichthys nigrodigitatus	24	51	88	163	3.03	S
CENTROPAMIDAE	*Lates niloticus*			1	1	0.02	R
CHANNIDAE	*Parachanna Africana*	43	25	22	90	1.67	S
	Parachanna obscura	46	23	21	90	1.67	S
CHARACIDAE	*Brycinus longipinnis*	0	1	3	4	0.07	O
	Brycinus nurse	1	0	2	3	0.06	O
	Hydrocynus brevis	0	0	1	1	0.02	R
CICHLIDAE	*Chromidotilapia pulcher*	0	1	0	1	0.02	R
	Hemichromis fasciatus	20	7	7	34	0.63	O
	Oreochromis aureus	0	0	4	4	0.07	R
	Oreochromis niloticus	4	7	0	11	0.20	O
	Sarotherodon galilaeus	0	2	0	2	0.04	R
	Sarotherodon macrocephala	0	13	0	13	0.24	R
	Tilapia dageti	7	21	0	28	0.52	O
	Tilapia guineensis	35	55	63	153	2.84	S
	Tilapia mariae	0	0	1	1	0.02	R
	Tilapia zillii	34	51	18	103	1.91	S
CITHARINIDAE	*Citharinus citharus*	0	0	46	46	0.85	O
	Citharinus latus	0	8	0	8	0.15	R
CLARIIDAE	*Clarias agboyiensis*	91	170	146	407	7.56	S
	Clarias anguillaris	52	24	53	129	2.40	S
	Clarias butthupogon	0	0	4	4	0.07	R
	Clarias camerunensis	0	5	3	8	0.15	O

	Clarias gariepinus	72	43	193	308	5.72	S
	Clarias pachynema	0	8	0	8	0.15	O
	Heterobranchus longifilis	6	0	0	6	0.11	O
	Heterobranchus bidorsalis	0	2	0	2	0.04	R
CYNOGLOSSIDAE	*Cynoglossus senegalensis*			3	3	0.06	O
CYPRINIDAE	*Labeo branchypoma*		0	1	1	0.02	R
	Labeo coubie		0	2	2	0.04	R
	Labeo pseudocoubie		4	0	4	0.07	R
	Labeo senegalensis		0	2	2	0.04	R
	Leptocypris niloticus		14	0	14	0.26	R
CYPRINODONTIDAE	*Aphyosemion gularis*		1		1	0.02	R
ELEOTRIDAE	*Bostrychus africanus*	14	63	9	86	1.60	S
	Eleotris senegalensis	10	18	33	61	1.13	S
GYMNARCHIDAE	*Gymnarchus niloticus*	8			8	0.15	R
HEPSETIDAE	*Hepsetus odoe*	47		5	52	0.97	O
ICTHYBORIDAE	*Phagoborus ornatus*	2		2	4	0.07	O
MALAPTERURIDAE	*Malapterurus electricus*	19	26	9	54	1.00	S
MASTACEMBELIDAE	*Mastacembelus loennbergii*		17	1	18	0.33	O
	Mastacembelus longicuada		2	0	2	0.04	O
MOCHOKIDAE	*Synodontis budgetti*	39	106	161	306	5.68	S
	Synodontis courteti	0	62	26	88	1.63	S
	Synodontis eupterus	34	153	95	282	5.24	S
	Synodontis filamentosus	9	78	79	166	3.08	S
	Synodontis gambiensis	0	0	8	8	0.15	O
	Synodontis gobroni	6	9	0	15	0.28	R
	Synodontis nigrita	90	177	159	426	7.71	S
	Synodontis ocellifer	61	105	137	303	5.63	S
	Synodontis robbianus	0	66	0	66	1.23	S
	Synodontis schall	91	95	216	402	7.46	S
	Synodontis sorex	4	45	48	97	1.80	S
MONODACTYLIDAE	*Monodactylus sebae*			1	1	0.02	R
MORMYRIDAE	*Gnathonemus cyprinoides*	4	0	0	4	0.07	R
	Gnathonemus petersii	7	11	0	18	0.33	O
	Gnathonemus senegalensis	2	3	0	5	0.09	O
	Hyperopisus bebe occidentalis	1	34	23	58	1.08	S
	Marcusenius isidori	2	0	3	5	0.09	O
	Marcusenius psittacus	1	5	0	6	0.11	O
	Mormyrops deliciosus	3	3	2	8	0.15	O
	Mormyrus hasselquisti	6	15	20	41	0.76	O
	Mormyrus macrophthalmus	3	0	0	3	0.06	R
	Mormyrus rume	13	7	23	43	0.80	O
	Petrocephalus bane ansorgei	0	0	1	1	0.02	R
	Petrocephalus simus	6	9	4	19	0.35	O
NANDIDAE	*Polycentropsis abbreviate*		1		1	0.02	R
NOTOPTERIDAE	*Papyrocranus afer*	4	1	1	6	0.11	O
	Xenomystus nigri	0	2	6	8	0.15	O
OSTEOGLOSSIDAE	*Heterotis niloticus*	1		1	2	0.04	O
PHRACTOLAEMIDAE	*Phractolaemus ansorgei*	1	5	5	11	0.20	O
POLYPTERIDAE	*Erpetoichthys calabaricus*	83	101	147	331	6.15	S
POMADASYIDAE	*Pomadasys peroteti*			3	3	0.06	O
SCHILBEIDAE	*Schilbe intermedius*	167	28	158	353	6.55	S
	Schilbe uranoscopus	4	1	7	12	0.22	O

Table 2. Percentage (%) composition by family

Family	Number	% Distribution		
		Owan	Ikoro	Ekenwan
Anabantidae	196	23.46939	58.67347	17.85714
Bagridae	315	11.74603	37.14286	51.11111
Centropamidae	1	0	0	100
Channidae	180	49.44444	26.66667	23.88889
Characidae	8	12.5	12.5	75
Cichlidae	350	28.57143	44.85714	26.57143
Citharinidae	54	0	14.81481	85.18519
Clariidae	872	25.34404	28.89908	45.75688
Cynoglossidae	3	0	0	100
Cyprinidae	23	0	78.26087	21.73913
Cyprinodontidae	1	0	100	0
Eleotridae	147	16.32653	55.10204	28.57143
Gymnarchidae	8	100	0	0
Hepsetidae	52	90.38462	0	9.615385
Icthyboridae	4	50	0	50
Malapteruridae	54	35.18519	48.14815	16.66667
Mastacembelidae	20	0	95	5
Mochokidae	2159	15.47013	41.50069	43.02918
Monodactylidae	1	0	0	100
Mormyridae	211	22.74882	41.23223	36.01896
Nandidae	1	0	100	0
Notopteridae	14	28.57143	21.42857	50
Osteoglossidae	2	50	0	50
Phractolaemidae	11	9.090909	45.45455	45.45455
Polypteridae	331	25.07553	30.5136	44.41088
Pomadasyidae	3	0	0	100
Schilbeidae	365	46.84932	7.945205	45.20548

Table 3. Fish species diversity indices of Ovia River

Diversity Indices	Station		
	1	2	3
Simple species diversity	47	57	58
Total number of different species	1236	1965	2185
Margalef's index (M)	6.461	7.385	7.413
Shannon Wiener Index (H)	1.380	1.464	1.375
Evenness Index (E)	0.825	0.834	0.780
Simpson's Dominance Index (D)	0.057	0.046	0.056

Discussion

Fish communities' studies are generally not equivalent to ichthyocoenoses according to Benech *et al.* (1983) because of the biasness that could result from sampling of a particular environment at a given time, gear selectivity and sampling strategies employed. Though, the primary objective of a sampling survey such as this is to attempt to find out the fish species existing in a particular river and if possible study the factors governing their abundance. The ichthyofauna of Ovia River with 81 fish species from 27 families appears to be richer than those of 60 fish species by Odum (1995) in Ethiope River, Southern Nigeria, 45 fish species by Meye & Ikomi (2008) at Urie creek, Niger Delta and 41 fish species by Alfred-Ochiya (1996) in Kolo creek but it is comparable to those of 70 fish species by Imevbore and Okpo (1975) in river Niger, 85 fish species by Sydenham (1977) in Ogun River and 98 fish species by Nwadiora (1989) in Oguta Lake. The use of varied mesh sizes and multi-gear approach may have resulted in the wide variation in fish species composition and abundance during this study. As Ufodike

et al. (1989) and Meye and Ikomi (2008) has opined that variation in mesh size and gear used during sampling may greatly influence fish species composition and abundance as gill net technology and catch techniques are essential in maximising fish catches, as the morpho-metric projections on the bodies of most fish species such as the family Mochokidae especially the genus *Synodontis*, presence of scales on most fish species such as the cichlids these projections according to them makes such fishes more susceptible to being gilled while heterogeneity of the mesh sizes of different panels of casts, allows for catches of varied sizes of fishes, while the low selectivity of local traps and hooks & lines especially during the wet season.

Higher wet season than dry season catches observed in this study have also been reported by Idodo-Umeh (1987) at Ase River and Ikomi and Sikoki (1998) in Jamiesson River, however, this finding disagrees with that of Alfred-Ochiya (1997) in Kolo creek, Allison *et al*, (1997) in Elechi creek, both in River state and Meye & Ikomi (2008) in Urie creek at Igbide in Delta state. During the wet season, the fishers with their canoes able to access further parts of the fishing grounds because of increased water depth and increased available space which are otherwise inaccessible during the dry season. Two groups of fish that was highly represented in the Ovia River population were the Mochokids especially the genus *Synodontis*. Several *Synodontis* spp. has been reported in many West African Rivers (Reed *et al.* 1967; Holden and Reed, 1972; Reid and Sydenham, 1979; Idodo-Umeh, 2003) and cichlids which are generally poorly represented in most African riverine fauna because according to Lowe-McConnell (1987) do better in Lacustrine conditions however formed an important part of the Ovia River ichthyofauna. African riverine fish fauna according to Lowe-McConnell (1987) vary according to the type of bottom sediment, as he illustrated this while working in the Niger system by stating that where bottom sand was fine and sandy *Alestes* (*Brycinus spp*) and *Tilapia* frequented there, while muddy bottoms were dominated by Mormyrids and catfishes. Other factors that may have affected fish fauna distribution are water volume, migratory patterns, time and method of sampling. Therefore, with a few exceptions, *Tilapia* species are well represented in the fine sandy areas, and the catfishes at the muddy bottoms.

Fish distribution in this river shows an increasing species diversity and abundance from station Owan to Ikoro and Ekehuan, longitudinal zonation of fish species has been reported by several authors and some has attributed this to differences in ichthyogeographical zones and size of river at the different zones (Merona, 1981; Sydenham, 1977; Welcome, 1979). Sorenson's index of similarity computed showed a high degree of similarity in the fish fauna of the different stations, with station Ikoro being more closely related to both stations before and after it than Ekehuan was to Owan. The larger Atlantic (Benin River System) represents a source from which many fish species disperse into the Ovia River, Ekehuan and Ikoro stations were thus more readily colonised than at station Owan, resulting in the occurrence of some fish species at these stations increases their fish species diversity and the presence of virgin rainforest swamps could also encourage increased available breeding and feeding grounds for fish.

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