Influence of Human Activities on Fish Distribution, Composition and Abundance in Otamiri River, Imo State

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Abstract— *Otamiri River was carried out between July to October, 2018. The objective of the study was to identify those human activities that had been hindering the growth and survival of fish species in the river as well as ascertaining the species composition present in the river. The fish population were assessed using hooks and lines, gillnets, cast nets, traps etc as gears while one man dugout canoe as well as planked canoes were used as crafts. A total of 757 fish species which consist of 9 families, 10 genera and 15 species were described and identified. The family ranked highest as the most abundant fish species with 363 fishes, while Distichodontidae ranked the lowest with 5 fishes. The result of this study was further compared with other studies that had been carried out previously on the river where it was discovered that there had been a steady decline in number of fish species caught which were caused by most human activities such as sand and gravel mining, pollution, agricultural activities, deforestation etc.*

Keywords— Human, Fish distribution, Otamiri River.

I. INTRODUCTION

The fish farm fauna of the Ecozone has changed dramatically since the Europeans first arrived in the 16000's changes in the aquatic community structure have resulted from a variety of human activity including exploitation, habitat alteration, pollution, drains, canals, and introduction of non-native species. Often these factors act together to decimate native species and reduce the overall biodiversity of native aquatic ecosystems.

Unrelated or inadequately regulated commercial fishing quickly reduced populations of the lake sturgeon, and many species of native trout and whitefishes.

Species diversity is affected by habitat destruction which includes removal of ground water, land clearing and consequent sedimentation and water turbidity, more drastic variability of water levels, channelization, and removal of gravel and sand nutrient enrichment and addition of toxic contaminants. Populations of species which migrate up streams to spawn have been reduced or extirpated because dams have blocked access to spawning areas. In the 1800's dams were built usually to provide a head water to operate a mill. A secondary effect was the pollution caused by the organic waste material dumped into the water by the function of these mills. Species have been unintentionally introduced through man-made canals (e.g Wenand Canal, the Eric Barge Canal and the Trent Canal) or transported and introduced with blast water. Human interest in only a limited number of recreational species. Unauthorized introductions have come from bait buckets, aquariums, and fish markets that import live fishes for human food.

Recent examples of unintentional introductions include two members of the Goby family native to the black and Caspian seas in Europe which have been transported and inadvertently introduced – with discharged ballast water of international vessels. The tuberose goby, *proterorlinus marmoratus*, was the first to be discovered in April 1990 in ST. Clair River followed shortly by the round goby, *Neogobius melanostomus* discovered in June 1990. (Grossman and Holm, 1998). The effects of this population explosion on the total biodiversity is not fully understood yet, but it is becoming apparent that the round goby will cause a significant decline of the native mottled sculpin and possible log perch and other darters through competition for food, space, spawning areas, or by direct predation on these species. These two species are excellent examples of the unpredictable consequences of introductions.

One might have predicted from the rare occurrences of the introduced tuberose goby that the round goby would respond similarly and exert a negligible impact on native species.

II. MATERIALS AND METHODS

2.1 Study Area

The area chosen for this project was Otamiri River which lies on the eastern border of Imo state Polytechnic Umuagwo. It covers a length of about 4KM and width of 40cm, it has an estimated mean depth of 2.3M and sechi disc transparency of 2m (Akabuchi, 1986). In this part of the river are aquatic plants such as Lemna Polvrrhiza and Nymphae *spp.* Also on the water surface are floating Riiamentions plants. In the littoral zone are rooted aquatic plants easily identified amongst these are the Valiisheria *spp,* Scispus *spp* and Saggitharus *spp.*

Otamiri River lies between latitude 50^0: 01' and 5^0: 34' N and longitude 6^0: 55 and 7^0 : 07E. It has its sources at Egbu near Emekuku in Owerri North Local Government Area of Imo state in the south-East part of Nigeria.

This areas lies within the Equatorial rain forest zone of Nigeria cited in Nwadiora and Okereke (1993). The source of Otamiri River (Egbu) is at low relief region in the range of 61-122m above sea level. It starts as a first order stream flows West-ward for about 7km to receive another first order stream Nworie River in Owerri Local Government Area of Imo State. From that point if flows southward as a second order river for 28km and receives a major tributary river Oramiriukwa. From Oramiriukwa input, it continues southward for another 21km before it receives Ogochia River, its third tributary in Etche Local Government Area in River State. It finally continues for another 26km downstream to its south at near Owaza in Ikwere Local Government Area of River State, where it discharges into Elele River in Rivers State.

The source length of Otamiri River is approximately 82 kilometers. The width has a dry season maximum of 126-189 meters and a flood season equivalent of 145-208 meters, especially within the stretch studied within the stream of the Ogochia River confluence. Due to the shallowness of the river, it is not navigable (mean depth 2.5). Numerous obstructions occur along the main River channel. These include trees, logs, stumps, disused canoes and aquatic macrophytes like pistia, Azola, salvinia lemna and *typha* Nymphaea. Valisneria and ultlcularia. While the mareinal plants are sagitteria, and ipoma (Nwadiaro and Okereke, 1993). Otamiri River is an acidic water which has the temperature of 26.7^oC and pH range from 4.5 to 5.5 (Courant *et al* 1985). It indicates forested rivers within the lower Niger Delta (Nwadiaro *et al.*,1982). The total suspend solid was 2.5-mgl-l while the mean dissolve oxygen concentrationwas 4.8mgl-l. Otamiri River is under the influence of some mental disturbance due to human activities imputes into Otamiri from the main feeder stream, Nworie river through diverse sources such as sewage discharge from Owerri General Hospital, Alvan Ikoku College of Education. The river has greatly be affected by the human activities of the local communities (Mgbirichi and Umuagwo) aho are emerge in dredging the river for commercial sand and gravel (Nwadiaro and Okereke 1993).

2.2 Sampling:

Samplings was done using local fishermen; these samplings were done in the study area around Imo State Polytechnic Umuagwo (Otamiri River) and two other replicates. Replicates II was done at Otamiri River behind Mgbirichi while replicate III was done behind Umuagwo. The fish gears used for the sampling were hooks and line of size 18(grade), gillnets, cast net, and traps (Conical net). The mesh sizes of net used were 4.5cm, 3.5cm and 6cm.

2.3 Data Collection and Analysis:

Data (species composition and diversity) were collected from three sampling stations, designated as station 1, 11 and 111 change the course of Otamiri River, between Umuagwo and Mgbirichi.

Fishes collected were identified using keys, description and illustrations from freshwater fishes of Nigeria by Nigeria freshwater fishes by Olaosebikan and Raji (2013) and fish and fisheries of Nothern Nigeria by Reed *et al.,* (1967)

The passive gears were placed in the evening at about 4:30pm and checked in the morning by 6:00am. The duration of this sampling was from 12th July to 15th October 2018. The duration of this was sixteen weeks, this period falls into the raining season in the area of study, which is Southern-Eastern part of Nigeria; it was carried out twice a week.

III. RESULTS AND DISCUSSION

A total of 757 fishes were caught and identified during this investigation. This was made up of 15 species from 9 families as summarized in table 1.

TABLE 1
SPECIES COMPOSITION ON OTAMIRI RIVER FROM THREE SAMPLING STATION IN THE FIRST MONTH

Family	Species	RI	RII	RIII	Total	%
Cichilidae	*Tilapia Zilli*	21	22	23	66	65.9%
	T. Mariae	15	9	15	39	38.9%
	T. Guineensis	6	7	1	14	13.7%
	T. Melanopleura	0	1	4	5	4.2%
	T. Dageti	3	0	3	3	2.3%
	Hemichromis faciatus	1	2	1	4	3.1%
Channidea	*Parachanna obscura*	9	5	14	28	27.6%
Malaeruridae	*Malapterus electricus*	1	1	1	3	2.3%
Hepsetidae	*Hepsetus odoe*	-	1	2	3	2.3%
Notopteridae	*Papyrochranus a for*	14	5	3	22	21.0%
Mormyridae	*Mormyrops engystoma*	-	1	1	2	1.82%
Characidae	*Brycinus nurse*	1	-	1	2	1.82%
Mochokidae	*Synodontis omias*	3	1	7	11	10.6%
	Synodontis robbianus	-	-	1	1	0.98%
Distchodontidae	*Phago loricatus*	1	1	-	2	1.82%
Total					207	100%

Table 1 Summarizes the results, composition and diversity of fish in Otamiri River during the first month of sampling. The result in (table 1) showed that *Tilapia Zilli* comprised of 66% on the River as the most abundant species, while *Mormyrops engystoma*, *Phagoloricatus* and *Brycinus* which were least with 2 respectively.

TABLE 2
SPECIES COMPOSITION ON OTAMIRI RIVER FROM THREE SAMPLING STATIONS IN THE SECOND MONTH

Family	Species	RI	RII	RIII	Total	%
Cichilidae	*Tilapia Zilli*	14	7	6	27	26.4%
	T. Mariae	7	9		16	15.0%
	T. Guineensis	-	-	-		
	T. Melanopleura	1	1	5	7	6.5%
	T. Dageti	-	-	-	-	
	Hemichromis faciatus	2	3	-	5	4.2%
Channidea	*Parachanna obscura*	20	10	15	45	27.6%
Malaeruridae	*Malapterus electricus*	2	3	-	2	2.3%
Hepsetidae	*Hepsetus odoe*	-	1		1	2.3%
Notopteridae	*Papyrochranus a for*	12	11	4	27	26.4%
Mormyridae	*Mormyrops engystoma*	1			1	0.98%
Characidae	*Brycinus nurse*	-			-	1.82%
Mochokidae	*Synodontis omias*	10	4	7	21	20.6%
	Synodontis robbianus		1	1	2	1.82%
Distchodontidae	*Phago loricatus*	-				
Total					158	100%

TABLE 3
SPECIES COMPOSITION ON OTAMIRI RIVER FROM THREE SAMPLING STATIONS IN THE THIRD MONTH.

Family	Species	RI	RII	RIII	Total	%
Cichilidae	*Tilapia Zilli*	22	20	12	56	55.8%
	T. Mariae	12	10	4	26	25.3%
	T. Guineensis	1	3	1	5	4.2%
	T. Melanopleura	-	-	-	-	
	T. Dageti	-	-	-	-	
	Hemichromis faciatus	5	1	4	10	9.7%
Channidea	*Parachanna obscura*	10	7	11	28	27.6%
Malaeruridae	*Malapterus electricus*			1	1	0.98%
Hepsetidae	*Hepsetus odoe*	2	1	2	5	4.2%
Notopteridae	*Papyrochranus a for*	8	5	14	27	26.4%
Mormyridae	*Mormyrops engystoma*	1	1	3	5	4.72%
Characidae	*Brycinus nurse*	-			-	
Mochokidae	*Synodontis omias*	1	-	6	13	12.6%
	Synodontis robbianus			6	13	12.6%
Distchodontidae	*Phago loricatus*			1	1	0.98%
Total					183	100%

TABLE 4
SPECIES COMPOSITION ON OTAMIRI RIVER FROM THREE SAMPLING STATIONS IN THE FOURTH MONTH.

Family	Species	RI	RII	RIII	Total	%
Cichilidae	*Tilapia Zilli*	22	17	21	50	49.9%
	T. Mariae	12	8	16	36	35.6%
	T. Guineensis	4	4	2	10	9.7%
	T. Melanopleura			1	1	0.98%
	T. Dageti			1	1	0.98%
	Hemichromis faciatus					
Channidea	*Parachanna obscura*	10	9	9	28	27.6%
Malaeruridae	*Malapterus electricus*			1	1	0.98%
Hepsetidae	*Hepsetus odoe*					
Notopteridae	*Papyrochranus a for*	9	4	8	21	20.6%
Mormyridae	*Mormyrops engystoma*			1	1	0.98%
Characidae	*Brycinus nurse*		2	1	3	2.3%
Mochokidae	*Synodontis omias*	9	6	10	25	24.1%
	Synodontis robbianus		2	1	3	2.3%
Distchodontidae	*Phago loricatus*		1	1	2	1.82%
Total					209	100%
Notopteridae	*Papyrochranus after*	9	4	8	21	20.6%
Mormyridae	*Mormyrops enavstoma*			1	1	0.98%
Characidae	*Brycinus nurse*		2	1	3	2.3%
Mochokidae	*Synodontis omias*	9	6	10	25	24.1%
	Synodontis robbianus		2	1	3	2.3%
Distchodontidae	*Phago loricatus*		1	1	2	1.82%
					209	100%

Table I to VIII shows fish composition in the three sampling stations, it shows that Cichlidae was the family of fish with the greatest number of species (363 species abundance in the sample stations, Ri has the highest fish spread with 276 and followed by Riii (251), Rii(225).

IV. DISCUSSION

Comparing results obtained from this investation to previously done investigation by Nwadiaro and Okereke (1993). It showed that Otamiri River had a total of 46 species and 20 families. While Kasr and Schosser (1978) had 24 species from 14 families in their investigation, the composition of fishes in the river was 8 species from 7 families. The report show that there has been a steady decline in species ans fami;y composition of fish in Otamiri Rivers fishery. This may be attributed to some factors related to land water interaction.(Roth et al., 1996).

V. CONCLUSION

Degradation of lands adjacent to freshwater ecosystem can adversely affect biological communities through many mechanisms, for instance land use activities that eliminate vegetative covers, decrease infiltration rates or reduce moisture hold capacity of soil can adversely impact surface water quality. At Otamiri river dredging for sand and gravel have been going on for some years and this dredging helps in removing of some vegetative covering. Habitat destruction and degradation occurs when poorly managed agricultural lands, mineral extraction and construction of projects, in Otamiri, effluent from Fuason Alluminum Company, sewage from the college of Education, and soaking of cassava in the Otamiri River influence this factor.

During the dredging process, the spawning ground for some of the species must have been disrupted (causing them to migrate). Dredging also increase the depth while the width reduces some of fish families in earlier investigation. Another factor may be the season. Nwadiaro and Okereke (1993) did their investigation also during the rainy season and dry season periods, while this investigation was done during the dry season period. Some fish species might have migrate at this particular period may be in search of favorable weather condition or for breeding and or ecological reasons and this might be reasonable for the reduced catch in this study. Toxic substance in the cassava soaked in the river to be turbid which some fishes cannot tolerate. (Reeds et al., 1992) in Wiram Gulf discovered that there was evidence to suggest that over fishing with fine mesh net is partly to blame for the disappearance of haplochromis.

In conclusion, the declining rate of fish catch in Otamiri River need to be controlled in order to avoid losing most of the valuable fish species that are of great importance to fisheries. There might be need for legislation to check some of these obnoxious acts. Also some extension work should be done to educate people living along the river on the effect of what they do on the fish population and their long term to the aquatic ecosystem.

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