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Anthropogenic activities, water quality parameters and fish species diversity in Agboyi creek, Lagos State, Nigeria

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ABSTRACT
Anthropogenic activities such as overfishing, industrial, domestic pollution, sand mining, and transportation which likely pose serious ecological implications were observed during the reconnaissance survey in Agboyi Creek.
Fish sampling was carried out for four seasons (two dry seasons and two wet seasons) using seven gillnets measuring 20m long and 3m deep with mesh size ranged between 15.00mm and 120.0mm. Fish diversity was assessed using Simpson's index of diversity (I-D), Shannon-Wiener index (H) and Degree of Evenness (E). The water quality parameters like salinity, Dissolve Oxygen (DO), Ammonia (NH_3) and Phosphate (PO_4) were determined. Fifteen families with 22 species were identified, Tilapia zillii (1,764), Oreochromis aureus (200), Oreochromis niloticus (91) were most abundant in dry season while Tilapia zillii (2,856), Oreocromis niloticus (99), Leptocyprus niloticus (96) and Sardinella maderensis (96) were most abundant in wet season. There were no significant difference in season and location on fish weight and number ($P > 0.05$). Fish diversity differ significantly with seasons ($P < 0.05$) and significantly correlated with DO ($r = 0.86$). Sampling Points A, B and C have 708 (34.5kg), 1062(51.3kg) and 642 (27.7kg) of fishes respectively during the dry season while 1587 (71.8kg), 1015 (40.6kg) and 876 (38.1kg) fishes were recorded in Points A, B and C respectively during the wet season. The values ($H = 0.10 - 0.93$; $I\text{-}D = 0.9 – 0.44$; $E = 0.07 – 0.44$) on fish diversity indices obtained from the various sampling points are indication that the creek is stressed due to various human activities observed in this study.
In conclusion, Agboyi creek has phosphate values range of $0.15mgl^{-1}$–$0.38mgl^{-1}$ indicating a high level of pollution due to activities such as laundry, bathing and other domestic activities.

KEY WORDS: Agboyi creek, anthropogenic activities, water quality, fish species diversity.

INTRODUCTION

Coastal ecosystem plays a major role in the life cycle of many aquatic organisms including economically important fish species. But various human activities such as overfishing, land reclamation, drainage, coastal construction, sewage and waste water discharge and many other competing uses along the coastline, estuaries, lagoons, creeks, major rivers and tributaries are threat to marine fisheries (FAO, 2002).

Ezenwa and Ayinla (1993), reported that within the Lagos area, the reclamation of the flat swamp terrain for bridges, residential houses and industrial zones, has virtually destroyed the breeding grounds, nursery and schooling areas of mullets, tilapias, shrimps, prawns and other marine species. This has led to decreased fish landings from a peak of over 500,000 metric tons a year in the seventies, to less than 300,000 metric tons in the late eighties to preset. They estimated that approximately 6-10 metric tones of shrimps and prawns larvae and juveniles are lost annually in Lagos area since the reclamation of the foreshore of Lagoon and brackish water in 1985.

It has been reported that over 200 industrial establishments are located in the coastal regions of Nigeria (Akingbade, 1990). According to experts Lagos habours 75% of manufacturing industries in Nigeria. Ajao (1990a) recorded very high levels of organochlorine pesticides acid PCBS in sediments from Lagos Lagoon. Their detrimental effect on larvae and fry of fish species could never be in doubt.

Data on anthropogenic influence (i.e. pollutants and other forms of impacts on natural environments that can be traced to human activities) and their role in the collapse of coastal ecosystems is mounting according to modern ecological studies (Ajao 1990b, Jackson *et al*., 2001, FAO 2002). In Nigeria, overfishing, habitat destruction (through sandfilling and dredging) and discharge of sewage (industrial and domestic) are having a devastating impact on

aquatic biodiversity and thus on fish population. Therefore, there is need for constant study of human activities and their effect on fish diversity.

THE STUDY AREA

The study area is named after a community called Agboyi which is located at the Northern part of Lagos State (Figure 1). It is within Agboyi/Ketu Local Government Area between latitude N6^{0}33'52" and longitude E3^{0}24'34" of the equator with elevation of 121ft. Agboyi creek is characterized with an estuary, mangrove and salt marsh with coastal ecosystem, contributes to the biological production as well as serves as support to most of the fisheries and other living resources since there is influx of water from the lagoon and Ogun river. Over decades, this water body has been known for its enormous biological diversity which allows the immediate settlements to rely on it for livelihood. Fisheries resources such as fishes, shrimps and crabs are abundant in the creek and this gives livelihood to the community in several ways. The creek supports domestic activities and transportation. The vegetation is the swamp forest; however, the climatic condition of the area is similar to that of Lagos state.

Description of sampling points

Three sampling points A (N6^{0}34'2.4" and E3^{0}24'35.4"), B (N6^{0}35'6" and E3^{0}24'27.6") and C (N6^{0}34'42.2" and E3^{0}24'32.4") were selected on the creek. Sampling point A was located at the estuary. This was chosen based on the proximity to the lagoon and high productivity nature of an estuary, it covers 250m inward. Sampling points B and C were located at each of the tributaries for adequate sampling of the creek, they both cover 250m in distance.

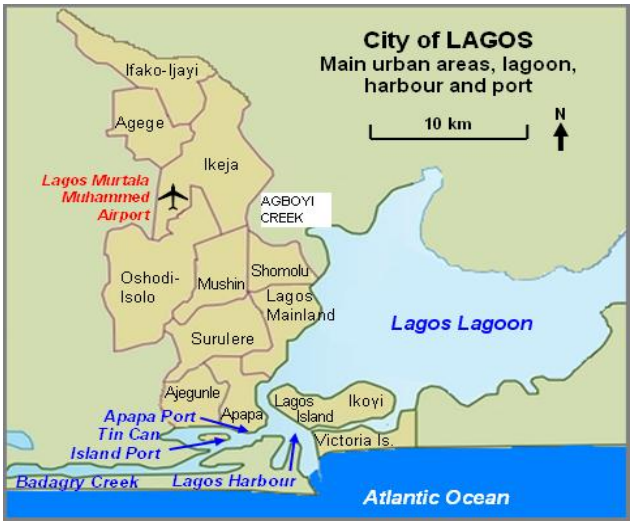

Figure 1: Map of Lagos State including the location of Agboyi Creek

MATERIALS AND METHODS

This study was carried out between December 2005 and June 2007. During these periods the fish species identification and diversity determination was carried out together with some laboratory analysis to determine the values of some chemical parameters such as oxygen, biochemical oxygen demand, pH, ammonia, phosphate and salinity. The water quality parameters like salinity, Dissolve Oxygen (DO), Ammonia (NH_3) and Phosphate (PO_4) were determined using American Public Health Association Method (APHA 1998).

Surface water was collected within a depth of one foot into sterile plastic containers which were pre-washed thoroughly with detergent, soaked with hydrochloric acid (HCl) and then rinsed with distilled water. On the site, the sample bottles were rinsed with the creek water at the point of collection. Approximately about a litre of water was collected from each sampling area. After collection, the samples were tightly covered and labeled, and immediately kept in a cooler containing ice on board for preservation.

In the laboratory, all samples were refrigerated at 4^{0}C. The water samples were analysed within 36 hours of collection to determine the chemical factors such as: pH, Total dissolved Solids, phosphate, salinity, ammonia, and Biochemical Oxygen Demand.

Water samples for the determination of dissolved oxygen were collected into narrow-mouthed glass bottles and fixed immediately at the point of collection with 1ml each of manganous solution and alkal-iodide-azide reagent. The samples collected were filled to the brim to prevent atmospheric oxygen from the surface of the water and the reagents to prevent loss of dissolved oxygen in the water. Analysis was done immediately at the laboratory. The physical factors such as water level, transparency, and temperature were determined on site.

Fish sample collection was done using gillnet of various mesh sizes. Seven gillnets each measuring 20m long and 3m deep each with mesh sizes of 38.1mm, 50.8mm, 76.2mm, 88.9mm, 101.6mm, 114mm and 139.7mm were used in sampling fish in the creek.

The gill nets were set overnight at 20.00hrs and fish caught were collected by 07.00hrs on the following day. This was identified to species level using, freshwater fishes of Nigeria (Idodo-Umeh, 2003).

Determination of fish diversity using biodiversity indices

The diversity indices used were Simpson's index of diversity, Shannon-Wiener index and Degree of evenness.

Simpson's Index

Formula

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

Where N - Total number of all individuals in the sample

n - Number of individual in each species

Then

1. Simpson's index of diversity: 1-D
2. Simpson's reciprocal index 1/D

Shannon-Wiener Index

Formula

$$H = \sum pi \ln pi$$

Where pi – The relative abundance of each species, calculated as proportion of individuals of a given species to the total number of individuals in the community.

Degree of evenness

In measuring of the Degree of evenness of the population in both season, the formula below was used.

$$E = \frac{H'}{H'_{max}}$$

Where H' – is the number derived from the Shannon diversity index

H'_{max} – is the maximum value of H', equal to the natural log of species i.e. 1n S.

RESULTS

Chemical Parameters

Salinity

Point A has the highest mean salinity value in both dry and wet season (5.22‰ and 4.95‰ respectively). The values of Point B and C during the dry season were 3.59‰ and 2.58‰ respectively while that of wet season were 3.44‰ and 2.90‰ respectively.

Dissolved oxygen (Do)

The dissolved oxygen mean value ranged between 3.45mg/l abd 3.79mg/l during the dry season and 3.10mg/l and 3.29mg/l during the wet season. The maximum value obtained both in dry and wet season were in Points C and B (3.79mg/l and 3.29mg/l respectively) while the minimum value obtained in the same seasons in Point A and C were 3.45mg/l and 3.10mg/l respectively. All the Points have higher value of dissolved oxygen during the dry season than the wet season.

Ammonia (NH_3)

The result revealed that the level of ammonia in Agboyi creek during the study period started increasing from August 2006 to June 2007 with the values ranged between 0.56mg/l and 9.30mg/l (Appendix 1 and 2). The mean values showed that Point A and B have a concentration with high difference compared to Point C in both season (Table 1).

Point A, B and C values during the dry season were 3.14mg/l, 3.31mg/l and 1.01mg/l and 1.72mg/l, 2.39mg/l and 0.47mg/l during the wet season.

Phosphate (PO_4)

The phosphate mean values ranged between 0.15mg/l and 0.33mg/l. The values obtained during the dry season were 0.20mg/l, 0.23mg/l and 0.29mg/l in Points A, B and C while the values obtained during the wet season were 0.15mg/l, 0.38mg/l and 0.26mg/l in Points A, B and C respectively.

Hydrogen ion concentration (pH)

The pH mean value obtained were 7.18, 7.18 and 6.73 for Points A, B, and C respectively in dry season and 6.73, 6.74 and 6.81 in points A, B, and C during the study.

Nitrate

At Agboyi creek the nitrate mean value ranged between 1.88mg/l and 2.19mg/l during the dry season with Point A having the highest value while the wet season has the ranged value of 2.13 mg/l and 3.62 mg/l with Point C having the highest value. The wet season has a higher concentration of nitrates in all the Points than the dry season (Table 1).

TABLE 1: CHEMICAL PARAMETERS OF AGBOYI CREEK FOR BOTH DRY AND WET SEASON

	DRY SEASON			WET SEASON			
PARAMETERS A	B	C	Std(±)	A	B	C	Std (±)
pH	7.18	7.18	6.73	0.26	6.73	6.74	6.81±0.04
Nitrate (mgl^{-1})	2.19	1.88	1.36	0.42	2.24	2.13	3.62±0.83
Salinity (‰)	5.22	3.59	2.58	1.33	4.95	3.44	2.90±1.06
Dissolved Oxygen (mgl^{-1})	3.45	3.63	3.79	0.17	3.12	3.29	3.10±0.10
Ammonia (mgl^{-1}) 3.14	3.31	1.01	1.28	1.72	2.39	3.10	0.69
Phosphate (mgl^{-1})0.20	0.23.	0.29	0.05	0.15	0.38	0.26	0.12

Fisheries resources

Fifteen families with twenty-two species were recorded throughout the study period. There is variation in the proportion of distribution of fish species (i.e. evenness) across season. During the dry season, twelve families were being represented with nineteen species while eight families with twelve species were recorded in the wet season.

The relative biomass (in percentage) of fish in the different Points sampled (A, B and C) on Agboyi creek is presented in Appendix 3a and b. The number of fishes recorded during the dry season totaled up to 2,412 fishes while the wet season has 3,478 fishes.

During the dry season, the family of Cichlidae accounted for a ranged between 54(2.2%) and 1,764 (73.1%). Also, in the wet season, the same family (Cichlidae) accounted for a range between 66 (1.8%) and 2856 (82.1%). Thus, in both season this family have the highest number of fishes. The relative abundance of fishes during the wet season is higher than the dry season (3478 in wet season and 2412 in dry season).

Sampling Points A, B and C have 708 (34.5kg), 1062(51.3kg) and 642 (27.7kg) of fishes respectively during the dry season while 1587 (71.8kg), 1015 (40.6kg) and 876 (38.1kg) fishes were recorded in Points A, B and C respectively during the wet season. In both seasons, *Tilapia zillii* (Cichlidae) was dominant with the highest number of fishes 1,764 (68.7kg) and 28567 (106.9kg) in dry and wet seasons respectively for all the sites.

TABLE 2: DISTRIBUTION OF FISH IN AGBOYI CREEK DURING THE DRY AND WET SEASON.

Species	DRY						WET					
	A		B		C		A		B		C	
	No	Kg	No	Kg	No	Kg	No	Kg	No	Kg	No	Kg
Liza falcipinis	102	4.2	12	0.9	-	-	-	-	18	0.6	-	-
Monodactylus sabae	12	0.9	6	0.3	-	-	-	-	-	-	-	-
Pomadays jubelini	3	0.3	-	-	-	-	-	-	-	-	-	-
Arius hendeloti	21	2.4	12	0.6	-	-	3	0.3	-	-	-	-
Arius latiscutatus	15	2.4	6	0.6	-	-	-	-	-	-	-	-
Hemischromis fasciatus	21	1.2	33	2.4	-	-	54	3.4	6	0.6	6	0.6
Tilapia zillii	462	18.6	780	31.2	522	18.9	1,191	45	870	31.3	795	30.6
Oreochromis aureus	33	1.8	129	8.7	3.8	2.1	174	12.9	63	3.9	63	5.1
Oreochromis niloticus	24	1.5	30	1.8	37	2.5	54	2.1	42	2.7	3	0.5
Hepsetus odoe	9	0.9	9	1.8	3	0.3	3	0.6	-	-	-	-
Caranx senegalus	6	0.3	-	-	-	-	-	-	-	-	-	-
Polynemus quadrifilis	-	-	6	0.6	3	0.3	-	-	-	-	-	-
Synodontis nigrita	-	-	3	0.3	3	0.3	-	-	-	-	-	-
Arius gigas	-	-	12	0.6	-	-	-	-	-	-	-	-
Schilbe uranoscopus	-	-	18	0.9	15	0.9	-	-	3	0.1	-	-
Heterotis niloticus	-	-	3	0.3	3	0.3	-	-	-	-	-	-
Elops lacerta	-	-	-	-	3	0.3	-	-	-	-	-	-
Hydrocynus lineatus	-	-	-	-	15	1.8	-	-	-	-	-	-
Leptoocypis niloticus	-	-	-	-	3	0.3	78	5.7	12	1.2	6	0.9
Trachinus apmatus	-	-	-	-	-	-	-	-	1	0.2	-	-

Diversity indices measurement of fish diversity using Shannon-Wiener index

Table 3a shows that during the dry season, Point A has the highest index value of H' (0.93), followed by Point B (H' = 0.67) while Point C index value was 0.36. Also, during the wet season (as shown in Table 3b), Point A has the highest value of H = 0.47, while Points B and C index values were H = 0.22 and H = 0.10 respectively.

The degree of evenness of the population have the values E = 0.44, E = 0.25 and E = 0.24 respectively during the dry season for Points A, B, and C while their values during the wet season were E = 0.24, E = 0.12 and E = 0.07 respectively (Table 4) which is an indication that Point A was more even than B and C having the least evenness.

Measurement of fish diversity using Simpson's Index of Diversity

Point A had the highest Simpson's index of Diversity (1-D) which is 0.44 during the dry season. During the wet season, the same Point A has Simpson's index of Diversity (1-D) of 0.19. Point B and C have Simpson's index of Diversity (1-D) (0.24 and 0.13) for dry season and 0.08 and 0.03 in wet season respectively as presented in Table 5a and b.

Table 3a: Measurement of fish diversity using shannon/wiener index (dry season)

				A			B		C
Species	pi	1n pi	pi 1n pi	pi	1n pi	pi 1n pi	pi	1n pi	pi 1n pi
Tilapia sp	0.7383	-0.3034	-0.2240	0.8703	-0.1389	0.1209	0.9299	0.0727	- 0.0676
Arius sp	0.0512	-2.9718	-0.1522	0.0278	-3.5825	-0.0995	-	-	-
Liza falcipinis	0.1451	-1.9303	-0.2801	0.0111	-4.4988	0.0499	-	-	-
Monodactylus sabae	0.0171	-4.0704	-0.0696	0.0056	-5.1920	0.0290	-	-	-
omodasys jubelini	0.0043	-5.4567	-0.0235	0.0028	-5.8851	0.0165	-	-	-
Hemichromis faciatus	0.0299	-3.5108	0.1049	0.0306	-3.4872	0.1067	-	-	-
Hepsetus odoe	-	-	-	0.0083	-4.7865	0.0397	0.0046	-5.3657	- 0.0246
Caranx senegalus -	0.0085	-4.7635	0.0404		-	-	-	-	-
Polynemus quadrifilis 0.0246	-	-	-	0.0055	-5.1920	-0.0286	0.0046	-5.3659	-
Auchenoglanus occidentalis 0.0246	-	-	-	0.0027	-5.8851	-0.0158	0.0046	-5.3657	
Schilbe uranoicopus 0.0875	-	-	-	0.0111	-4.4989	-0.0499	0.0233	-3.7565	
Heterotis niloticus 0.0246	-	-	-	0.0166	-4.0934	-0.0679	0.0046	-5.3659	
Elops lacerta 0.0246	-	-	-	0.0027	-5.8851	-0.0158	0.0046	-5.3659	
Hydrocynus lineatus 0.0875	-	-	-	-	-	-	0.0233	-3.7565	
Leptocyris niloticus	-	-	-	0.0027	-5.8851	-0.0158	-	-	
Trachinus apinatus	0.0043	-5.4567	-0.0235	0.0019	-6.2906	-0.0169	-	-	-
Pellenula afzelus -	0.0014	-6.5553	-0.0092	-	-	-		-	-
TOTAL		-0.9274			-0.6729		-0.3657		

TABLE 3b: MEASUREMENT OF FISH DIVERSITY USING SHANNON-WIENER INDEX (WET SEASON)

			A				B				
Species	pi	C lnpi	pilnpi	pi	lnpi	pi	lnpi	pilnpi	pi	ln
Tilapia sp		0.8947	-0.1118	-0.1000	0.9604		-0.0403	-0.0387	0.9828	-0.0172	0.0169
Arius sp	0.0018	-6.2709	0.0112	-	-		-	-	-	-	-
Liza falcipinis		-	-	-			0.0177	-4.0292	-0.0713	-	-
Hemichromis faciatus	0.0340	-3.805	-0.1149	0.0059	-5.1279		-0.0302	0.0068	-4.9835	-0.0338	
Hepsetus odoe		0.0018	-6.2709	0.0112	-		-	-	-	-	-
Schlibe uranoscopus		0.0132	-4.3250	-0.0570	-		-	-	-	-	-
Leptocyris niloticus		0.049	-3.0128	-0.1476	0.0118		-4.4347	0.0523	0.0038	-4.9835	0.0338
Labeo senegalensis		0.0056	-5.1723	-0.0289	-		-	-			
Sardinella sp		0.0034	-5.6767	-0.0193	-		0.0029	-	-5.8210	-0.0168	-
Trachinus apmatus		-	-	-			0.009	-	-6.9196	-0.0062	-
Pellenula afzelius	-	-	-		0.0009		-6.9196	-0.0062	-	-	-
TOTAL			-0.4708					-0.2155			
		-0.1038									

TABLE 3b: MEASUREMENT OF FISH DIVERSITY USING SHANNON-WIENER INDEX (WET SEASON)

			A				**B**				
Species	**pi**	**C** **1n pi**	**pi 1n pi**	**pi**	**1n pi**	**pi**	**1n pi**	**pi 1n pi**	**pi**	**1n**
Tilapia sp		0.8947	-0.1118	-0.1000	0.9604		-0.0403	-0.0387	0.9828	-0.0172	0.0169
Arius sp	0.0018	-6.2709	0.0112	-	-		-	-	-	-	-
Liza falcipinis		-	-	-			0.0177	-4.0292	-0.0713	-	-
Hemichromis faciatus	0.0340	-3.805	-0.1149	0.0059	-5.1279		-0.0302	0.0068	-4.9835	-0.0338	
Hepsetus odoe		0.0018	-6.2709	0.0112	-		-	-	-	-	-
Schlibe uranoscopus		0.0132	-4.3250	-0.0570	-		-	-	-	-	-
Leptocyris niloticus		0.049	-3.0128	-0.1476	0.0118		-4.4347	0.0523	0.0038	-4.9835	0.0338
Labeo senegalensis	5.6767	0.0056	-5.1723	-0.0289	-		-	-	-	0.0034	-
Sardinella sp		-	-	-			0.0029	-	-5.8210	-0.0168	-
Trachinus apmatus		-	-	-			0.009	-	-6.9196	-0.0062	-
Pellenula afzelius	-	-	-		0.0009		-6.9196	-0.0062	-	-	-
TOTAL			**-0.4708**					**-0.2155**			
		-0.1038									

The Shannon-Wiener index (H') during the dry season for the sampling points (A, B, and C) are;

H_A = -0.9274_{x-1} = 0.93

H_B = -0.6129_{x-1} = 0.67

H_C = -0.3657_{x-1} = 0.37

While the values during the wet season are thus:

H_A = -0.4708_{x-1} = 0.47

H_B = -0.2155_{x-1} = 0.22

H_C = -0.1038_{x-1} = 0.10

The values were multiplied with minus one (- 1) in order to remove the negative sign.

TABLE 4: MEASUREMENT OF DEGREE OF EVENNESS

	Dry Season			Wet Season		
	A	**B**	**C**	**A**	**B**	**C**
H	0.9274	0.6729	0.3657	0.47108	0.2155	0.1038
H_{max}	2.0794	2.6390	2.0794	1.9459	1.7917	1.3862
E	0.4459	0.2549	0.1758	0.2419	0.1202	0.048

TABLE 5a: MEASUREMENT OF FISH DIVERSITY USING SIMPSON'S INDEX OF DIVERSITY (1-D) (DRY SEASON)

SPECIES		A		B		C	
	n	**n(n-1)**		**n**	**n(n-1)**	**n**	**n(n-1)**
Tilapia sp	519	268842	939	880782	597	355812	
Arius sp	36	1260	30	870	-	-	
Liza falcipinis	102	10302		12	168	-	-
Monodactylus sabae	12	132		6	30	-	-
Pomodasys jubelini	3	6		3	6	-	-
Hemichromis faciatus	21	420	33	1056		-	-
Hepsetus odoe	-	-		9	72	3	6
Caranx senegalus	6	30	-	-		-	-
Polunemus quadrifilis	-	-		6	30	3	6
Auchenoglanus occidentalis	-	-		3	6	3	6
Schilbe uranoscopus	-	-		12	132	15	210
Heurotis niloticus	-		18	306		3	6
Elops lacerta	-	-		3	6	3	6
Hydrocyus lineatus	-	-		-	-	15	210
Leptocyris niloticus	-	-		3	6	-	-
Trachinus apenatus	3	6		2	2	-	-
Pellenula afzelius	1	0	-	-		-	-
TOTAL	**703**	**280998**	**1079**	**883472**	**642**	**356262**	

TABLE 5b: MEASUREMENT OF FISH DIVERSITY USING SIMPSON'S INDEX OF DIVERSITY (1-D) (WET SEASON)

SPECIES		**A**		**B**		**C**	
	n	**n(n-1)**		**n**	**n(n-1)**	**n**	**n(n-1)**
Tilapia sp	1419	201214	972	943812	861	740460	
Arius sp	3	6	-	-		-	-
Liza falcipinis	-	-		18	306	-	-
Hemichromis faciatus	54	2862	6	30		6	30
Hepsetus odoe	3	6		-	-	-	-
Schilbe uranoscopus	21	420		-	-	-	-
Leptocyris niloticus	18	6006		12	132	6	30
Labeo senegalensis	9	72		-	-	3	6
Trachinus apmatus	-	-		1	0	-	-
Pellenula afzelius	-		3	6		-	-
TOTAL (N)	**1587**	**2021514**	**1012**	**944286**	**976**	**740526**	

DISCUSSION

This study shows that the various human activities identified on the creek, has negatively affected the fish diversity in all the sampling points. The most abundant species in Agboyi creek during this study is Tilapia species (Table 2). This could be attributed to the low oxygen content (Table 1) of the creed both in dry and wet seasons. Most fishes

survive above 5mg/l except tilapia that can tolerate oxygen level as low as 3mg/l. Amadi (1991) observed the same low dissolved oxygen levels (3.5mg/l) in Lagos lagoon. However, this has contributed to the rarity of some species such as *Momodactylus sabae, Pomodasys jubelini, Arius latiscutatus, Polymemus quadrifilis, Synodontis nigrita, Arius gigas, Heterotis niloticus, Elops lacerta, Hydrocynus lineatus* in dry season. Also, seasonal changes in salinities influenced seasonal distribution of organisms (Olaniyan, 1957; Sandison and Hill, 1966; Fagade and Olaniyan, 1974 and Ajao and Fagade, 2002). The rarity and commonness of fish species indicated marked instability due to the fluctuations in salinity regime, water movement, contamination from various pollutants and a host of other interrelated factors.

The high levels of ammonia in the creek confirm the discharge of domestic waste effluent into the creek. This could be one of the contributing factors to the low oxygen level in this study. However, this agrees with Arowomole, 2000 that human activities such as discharge of municipal effluent cause serious biological oxygen demand problems especially when the effluents are untreated as is common in Lagos state. The high level of ammonia and low oxygen level in the study points could be an indication of the deteriorating water quality and probably resulted from the discharge of domestic wastes into the creek by the inhabitants of the community. Similarly, Ajao and Fagade, (1990), Akpata *et al*., (1983), Chukwu and Nwankwo, (2003) reported deteriorating water quality at organically polluted sites in Lagos lagoon.

The high level of Phosphate (> 2.0mg/l) and Nitrate (> 2.0mg/l) in most study points is suggestive of organic pollution and nutrient enrichment through various human activities such domestic pollutions (laundry and bathing) observed during this study on the creek. Ekundayo (1977) reported that the eutrophication of Lagos Lagoon was due primarily to extensive pollution by large quantities of industrial and domestic wastes.

The most striking features of the study area are the overall low fish diversity. The highest index value obtained from Shannon's index and Simpson's index is in point A (0.93 and 0.43 respectively) which is relatively low. This may be an indication of the impact of various human activities such as industrial and domestic pollutions and sand mining observed during this study. This is in agreement with Adeyanju, 1979 (as cited by FAO, 1997) that Agboyi Creek was, once very productive in fish, but it is now considered as a low productive ecosystem for fishing.

In conclusion, Agboyi creek has phosphate value range of $0.15mgl^{-1}$–$0.38mgl^{-1}$ indicating a high level of pollution due to activities such as laundry, bathing and other domestic activities.

REFERENCES

Adeyanju, B. (1979): Sewage disposal in Lagos stinks. Lagos, Daily Time, 6 October, p. 7.

Ajao, E.A. (1990a): Organochlorine Pesticides and PCBS in sediments from Lagos Lagoon, Nigeria. NIOMR week seminar April 1990. 25pp.

Ajao, E.A. (1990b): The influence of domestic and industrial effluents on population of sessile and benthic organisms in Lagos lagoon. Ph.D thesis, University of Ibadan. 413pp.

Ajao, E.A. and Fagade, S.O. (1990): A study of sediments and communities in Lagos Lagoon, Nigeria Oil and Chemical Pollution 7, 85 – 117.

Akpata, T.V.I., Oyenekan, J.A. and Nwanko, D.I. (1993): Impacts of organic pollution on the bacterial, plankton and benthic pollution of the Lagos Lagoon Nigeria. International Journal of Ecology and Environmental Sciences. 19: 73-82.

APHA (American Public Health Association) (1998): Standard methods for examination of water and waste water 13th ed. APHA, Washington, DC. 87pp.

Amadi, A.A. (1991): The coastal and marine environment of Nigeria. Aspects of ecology and management. NIOMR Tech. Paper No. 76, ISBN-978-2345-079 1 -34pp.

Arowomole, (2000): Impact of socio-economics activities on biodiversity of

coastal wetlands of Lagos state. A Ph.D thesis submitted to the Department of Wildlife and Fisheries, University of Ibadan. Pp. 16 – 60.

Chukwu, I.O. and Nwanko D.L. (2003): The impacts of land based pollution on the hydrochemistry and macro-benthic community of a tropical west African creek. Diffuse Pollution Confrence, Dublin. ECSA 4; 6-67.

Ekundayo, J.A. (1977): Environmental consequences of the pollution of the Lagos Lagoon. Bull. Sci. Asoc. Nigeria, 3(2): 290 – 9.

Ezenwa, B.I. and Ayinla, O.A. (1993): Conservation strategies for Endangered fish species Breeding and Nursery grounds within the coastal wetlands of Nigeria. A lecture in the National Conference on Conservation of Aquatic Resources.

FAO, (1997): Review of pollution in the African aquatic environment. Report No. 22 on the ninth steering committee meeting, Gaborone, Botswana, hpp//.www.fao.org.

FAO (2002): Ecosystem issues, OAR/National undersea Research programme/G.Mc Fall. www.fao.org.

Idodo-Umeh, G. (2003): Freshwater fishes of Nigeria (Taxonomy, Ecological notes, Diets and Utilization) 1st Edition, Published by Idodo-Umeh Publishers Limited. ISBN 978-8052-01-0, 1 – 219pp.

Jackson, P., Jermy, B.C., Michael, X, Wolfgang, H. (2001): Historical over-fishing and the recent collapse of coastal ecosystem.

APPENDIX

Appendix 1: The Chemical Parameters of Agboyi Creek (Dec., 2005 – Aug., 2006).

Parameters	Dec.			Feb.			April			June			Aug.		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
pH	6.8	7.07.1	7.26	7.32	7.21	7.35	6.86	6.95	7.08	6.11	6.80	6.80	7.15	7.07	
NO_3	0.19	0.04	0.07	0.80	0.40	0.75	0.80	0.38	0.79	0.24	0.29	0.12	0.37	0.30	0.40
PO_4	0.54	0.68	0.48	0.17	0.20	0.66	0.10	0.90	0.32	0.43	0.77	0.61	0.01	0.02	0.02
Salinity	7.41	4.23	2.02	2.44	2.75	1.35	3.21	3.71	2.13	3.74	2.49	3.90	1.57	1.43	0.43
DO	2.57	3.22	3.14	2.00	1.75	2.20	2.10	2.56	2.82	1.80	1.60	2.00	3.7	3.8	3.3
NH_3	0.18	0.22	0.20	0.10	0.08	0.07	0.12	0.06	0.08	0.01	0.07	0.05	0.56	0.56	0.12