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AQUA-TOURISM POTENTIALS IN SOME FISHING SITES IN BITUMEN BEARING WETLANDS OF ONDO STATE, NIGERIA

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ABSTRACT

A 24-month survey was conducted during the wet (May- August) and Dry (October – April) season of 2004 and 2006 along eight economic fishing sites in Ondo State bearing Wetland, with the aim of determining the abundance, species diversity of some ornamental species thus promoting ecotourism potential and preventing the loss of these species in the area during and after exploitation. The study was carried out in 4 study zones namely Odigbo (S1), Ode-Aye (S2), Okitipupa (S3), and Ilaje ese-odo (S4) noted for active bitumen seepage. Fishing potential of the area was assessed using catch per unit effort method as well as physico chemical analysis of water samples obtained from designated sites in the area in accordance with AOAC methodology. Fish compositions were assessed using multifilament gillnet, of different sizes hanging from 38 mm to 178 mm. The results revealed that the area is blessed with 24 economic species of fishes belonging to 13 families which could boost the tourist potential of Ondo State. The percentage composition of families identified varies as follows: Ariidae (2.04%), Anabantidae (3.27%), Bagridae (6.36%), Channidae (4.32%), Characidae (10.62%) Cichlidae (45.65%) Clupeidae (3.94%), Clariidae (11.78%), Hepsetidae (0.95%), Mormyridae (7.42 %), Malapteruridae (1.13%), Schilbiidae (1.76%), Polypteridae (0.76%). The family Cichlidae was the most abundant in the area during the study period. The diversity of fish during the study varied with locations and season .The study showed higher fish population during the dry season than raining season and lower population in study zones highly polluted by bitumen seepages. The study emphasizes the need for sustainable resource management during bitumen exploitation.

Keywords: Aqua tourism, Bitumen, Wetlands, Ondo State

INTRODUCTION

Tourism has continued to play a vital role in world economy since time immemorial. Tourism serves as a source of pleasure, holiday, and travel, provides job opportunity, small scale business for several people and also serve as a source of earning and revenue yielding to most countries and governments of the world (Ayodele, 2002).

However, despite the high demand for tourism in the world today, Nigerian tourism still remains at its infancy stage, so it becomes necessary to give attention to this aspect of our economy. Aqua tourism as popularly known is an aspect of ecotourism which currently require urgent attention in the country so as to prevent species extinction and to bridge the gap between the ever increasing pace at which the world demand for tourism outstrip our poor tourist industry.

Nigeria as a nation is blessed with a vast potential in aqua tourism which are largely distributed in the coastal and riverine areas of the country. Nigeria has a coastline covering a distance of 79 km with Ondo State having one of the richest in country (ODSEED, 2006). However, Ondo state bitumen deposit belt falls within this region.

This study was carried out with the aim of providing baseline information on the aquatic diversity, abundance and the aqua tourist potential of species in this area and how they could be managed effectively for sustainable use.

THE STUDY AREA

Falls within the riparian bitumen deposited belt in the southern fringe of Ondo state lying within latitude 04 $^{0}44^{'}$ and $05^{0}20^{'}$ and latitude $06^{0}29^{'}$ and $06^{0}45^{'}$. Covering a landed area of 800 km^2 stretching across 4 local government areas namely Odigbo, Irele, Okitipupa and Ese odo local government area. The study area contained the largest Nigerian deposit of Tarsand (bitumen oil sand) (Adegoke *et al.*, 1980).

The region is inhabited by over 200 settlements containing about 699,033 human populations according to 1991 population census figure.

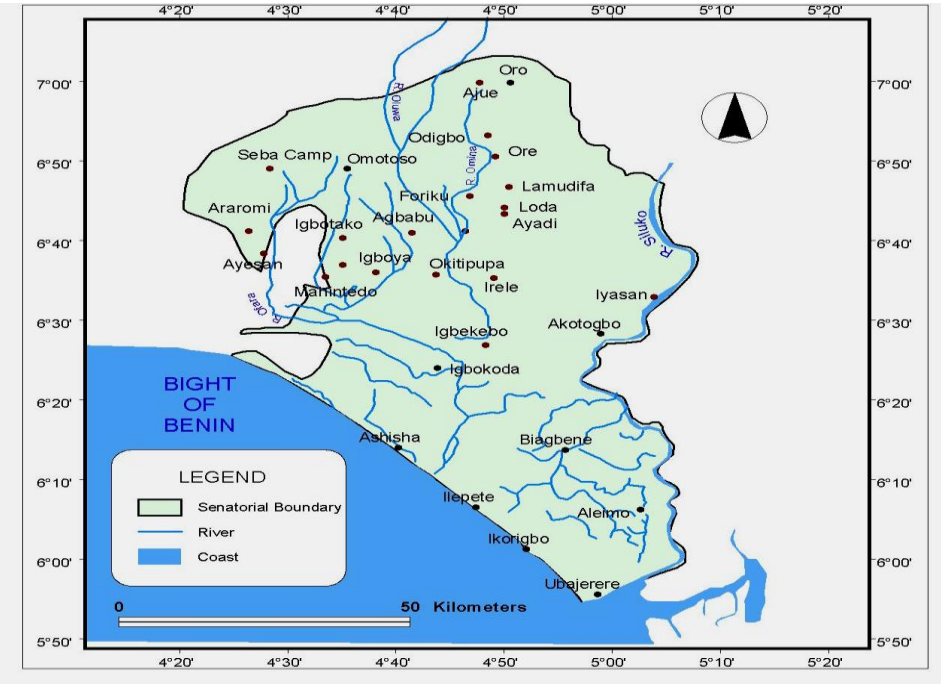

Fig 1: Map of the study area

METHODOLOGY

Data for the survey was collected bi-monthly during the wet (May-August) and Dry season (October-April) of 2004 and 2006. Fish sampling was done using monofilament gillnets of 38 mm to 178 mm mesh sizes hung up at 50% hanging ratio each with a net area of 150 m^2. Long lines with different hook grades were set across the sampling zones. Fish identification was performed based on Morphometric and meristic features of the fishes as described by Olaosebikan and Raji (1998). Physicochemical analysis was carried out in line with the method of AOAC (2003).

RESULTS

Fish composition

The result of the survey on fish composition revealed 24 species of fish belonging to 13 families in wetlands of Ondo State (Table 1). The fish species identified were found to possess economic and touristic values. The species fall into the following families: Ariidae (2.04%), Anabantidae (3.27%), Bagridae (6.36%), Channidae (4.32%), and Characidae (10.62%) Cichlidae (45.65%) Clupeidae (3.94%), Clariidae (11.78%), Hepsetidae (0.95%), Mormyridae (7.42 %), Malapteruridae (1.13%), Schilbeidae (1.76%), Polypteridae (0.76%). With family Polypteridae (0.76%) having the lowest while Cichlidae (45.65%) possessed the highest stock composition percentage. The distribution pattern of fish species in the study area during the survey is shown on table 2, 3 and 4 with a higher fish species diversity recorded in station 8, 7 (where bitumen contamination is lower offshore) and station 1,2 and 6 (where pollution is mild) .The lowest fish species diversity was recorded at station 3,4,5 (where contamination from active bitumen seepage occurs).

Water Quality Assessment

The water quality parameters for the study area are listed in Table 2 with each parameter stated in range and mean values: The mean values for some of the parameters observed in the study sites, such as Copper (0.47 mg/l), Zinc (0.13 mg/l), Nickel (0.33 mg/l), Cadmium (0.009 mg/l) and Chromium (0.003 mg/l) were not in conformity with the safety limit recommended by the standard guidelines of World Health Organization (WHO,1998; FAO,1992; FEPA,1991) for unpolluted environment and aquatic life.

DISCUSSION

The study results show that Ondo State bituminous wetlands are richly endowed with ornamental fisheries which are of a great touristic potential. Abundance of the Cichlidae family (*Oreochromis niloticus*) in this area during the period of study agreed with the finding of Ita *et al.* (1985) on Kainji lake and Olaniran (2003) on IITA lake. Balarin and Hatton (1979) and Ita *et al* (1985) attributed the abundance and dominance of this specie in tropical inland fresh water to factors such as high fecundity, prolific nature of breeding, ability to utilize wide range of food especially at all trophic level as well as high tolerance to a wide range of temperature while shortage of some families such as Polypteridae, Hepsetidae, Mormyridae, Malapteruridae and Schilbeidae could be traced to seasonality, fish morphological adaptation ,biological behavior as well as their response to tidal wave and ocean current.

WATER QUALITY CONDITION AND ITS IMPLICATIONS

The physicochemical analysis carried out in the study area shows that water samples are polluted with metallic ions such as chromium, Copper, Lead, Zinc, Nickel, and Cadmium in quantities that are not compliant with environmental standards thus may pose a great threat to Man and Biodiversity. Presence of metallic ions in the ecosystem had been traced to anthropogenic sources such as oil seep (Odiete, 1999).

CONCLUSION

The study conclude that wetlands of Ondo State bitumen belt have a great potential to become a breeding ground for economically viable fisheries which could be harnessed alongside with bitumen exploitation and also developed into an income generating eco tourism industry both by the state and Federal Government in future. Pollution of the area from bitumen seepage constitutes a potential threat to aquatic life in The study therefore recommend that environmentally friendly and Best Applicable Technologies (BAT) be adopted during bitumen exploitation projects in the area in near future in other

to maintain the sustainability of aquatic fauna of this area.

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Table 1 Relative Abundance of fish species in wetlands of Ondo State

			Wet season catch	Dry season catch	Total catch	% Species Composition	Fish composition by family
1	*Ariidae*	*Aurius giga*	8	140	148	2.04	2.04
2	*Anabantidae*	*Ctenopoma kingleye*	222	15	237	3.27	3.27
3	*Bagridae*	*Chrysichthys nigrodigitatus*	48	97	145	2	6.36
		Chrysichthys auratus	32	108	140	1.93	
		Bagrus bayad	45	131	176	2.43	
4	*Channidae*	*Parachanna obscura*	109	204	313	4.23	4.23
5	*Characidae*	*Alestes nurse*	120	284	404	5.58	10.62
		Alestes leusiscus	106	259	365	5.04	
6	*Cichlidae*	*Hemichromis faciatus*	195	377	572	7.9	45.65
		hemichromis bimaculatus	218	402	620	8.56	
		Sarotherodon melaptheron	244	420	664	9.17	
		Tilapia zillii	306	445	751	10.37	
		Tilapia guineansis	272	427	699	9.65	
7	*Clupeidae*	*Pellonula afzeliusi*	59	92	151	2.09	3.94
		Sardinella maderensis	53	81	134	1.85	
8	*Clariidae*	*Clarias angularis*	155	162	317	4.38	11.78
		Clarias gariepinus	180	354	534	7.37	
9	*Hepsetidae*	*Hepsetum odoe*	22	47	69	0.95	0.95
10	*Mormyridae*	*Mormmyrus rume*	102	187	289	3.99	7.42
		Mormmyrus tapirus	79	169	248	3.42	
11	*Malapteruridae*	*Malapterurus electricus*	37	45	82	1.13	1.13
12	*Schilbeidae*	*Schilbe mystus*	22	51	73	1.01	1.76
		Eutropius niloticus	18	36	54	0.75	
13	*Polypteridae*	*Polypterus senegalus*	18	37	55	0.76	0.76
	Total sample		2670	4570	7240		

Table 2: Water Quality of the Area in Comparison with FAO (1992), World Health Organization (WHO) and National Environmental Standard

Water parameters	Present study	Mean Value	World health Organization (WHO 1998)	FAO (1992)	FEPA (1991) (Permissible limit for Aquatic life)
Temperature (°C)	26.5-30.1	28.3	15.0-29.4	25-30	20-33
Dissolved Oxygen (mg/l)	2.51-4.75	3.63	> 4.00	NS	4.0
pH	4.30-7.64	5.97	6.5-9.5	6.5-8.5	6.0-9.0
Alkalinity (mg/l)	18.89-87.47	53.18	<20	200	NS
TSS (mg/l)	0.25-7.07	3.66	<25.0	NS	NS
S04 (mg/l)	0.09-0.96	0.53	<0.025	NS	NS
Fe (mg/l)	0.08-2.233	1.16	-	NS	1.0
Cu (mg/l)	0.09-0.84	0.47	<0.0005	0.1	0.002-0.004
Zn (mg/l)	0.03-0.24	0.13	<0.03	2.0	NS
Ni (mg/l)	0.23-0.43	0.33	<0.025	<0.02	0.025-0.15
Cd (mg/l)	0.09-0.76	0.009	<0.002	0.002	0.0002-0.0018
Cr (mg/l)	0.04-0.24	0.003	-	NS	0.002-0.02
Pb (mg/l)	0.03-0.24	0.00035	<0.03	<0.02	0.0017