The Effect of Tinapa Business Resort Development on Surface Water Quality in Cross River State, Nigeria

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ABSTRACT

The development of Tinapa Business Resort in Adiabo has significantly influenced the emergence of tourism support services and at the same time has enhanced community livelihood. However, in spite of the tremendous impact of the resort to the community, it activities were not devoid of socio-economic problems especially as it relate to surface water quality. Three catchment communities were used for this study of which two hundred copies of questionnaire were randomly distributed to each community in order to assess the socio-economic impact of the resort on community livelihood. Furthermore, water samples were collected in order to evaluate the physico-chemical properties and the result from the analyses shows that the pH, temperature, turbidity and other parameters were high in concentration in the water samples collected compared to WHO standard. Besides, the data obtained indicate that there were water related disease which perhaps may be as result of the high concentration of pH level in the various properties observed in the surface water samples collected in the area. Therefore, adequate measures must be put in the place to avert the menace associated with water quality in the area.

Keywords: Development, effect, resort, surface water

INTRODUCTION

Tourism development has become an effective tool for economic development of most nations in the world with tourism potentials (Sharpley, 2009). Jenkins (1980) observed a number of reasons why most less developed countries want to use tourism as a vehicle for economy development. The (UNWTO,2008) regards tourism as the fastest growing industry in the world owing to it positive and it contribution to the growth of most economy in the world . In Nigeria, tourism has become one of the governmental project owing to the numerous tourism potentials in the country (Eja and Otu). Nigeria is one of the famous tourism destination in West Africa, it overwhelming influence in tourism is attributed to the availability and development of the great tourism potentials such as Marina resort, Aqua vista resort, museum, Kwa falls and the Obudu Ranch resort which todayharbour great number of visitors all over the world. The development of the Tinapa Business Resort has made Nigeria and indeed Cross River State a tourism destination. The numerous facilities such as shopping most entertainment studio, hotel and other recreational facilities have welcome various visitors and fun-seekers into the destination. The development of the Tinapa Business Resorts has also offer great opportunities to other tourism support services, such as communication Industry, transport industry and other auxiliary tourism industry in Cross River State and Calabar in particular. Today, in spite the significance contribution of the Tinapa Business Resort on the livelihood of the people in Cross River State and indeed the host local government communities, the development quality of the resortis not devoid of problems especially as it relates to surface water for domestic uses.

These problems ranges from atmospheric pollution, social disruption, climate change, loss of natural habitat and loss of cultural resources which the people depend upon for survival. Apart from these, the development of tourism infrastructure and tourism support services in the Tinapa Business Resort has caused most of the sewage and other wastes to be discharge directly into the surrounding surface water hence affecting it uses. Besides, most of waste and other effluence discharge into the surrounding surface water such as river, streams and spring constitute health problems such that diseases such as cholera, dysentery, diarrhea, typhoid and others recorded as a result of the development of Tinapa Business Resort in the area. However, despite the fact that research have been conducted in the area on socio-economic impact of the development of Tinapa Business Resort on the host community (Eja and Violet, 2014) , the private sector involvement in the development of Tinapa Business Resort (Eja and Aniah, 2007)none has focus on the impact of the development of the Tinapa Business Resort on surfacewater quality in Odukpani Local government Area which is the gap that this research wish to bridge in the existing literature.

METHODOLOGY

This research is conducted in Cross River State, Nigeria taking into consideration three catchment communities within the Tinapa Business Resort environment. The three catchment communities include Adiabo, Esu-utan and Ikot-Ansa. Six hundred copies of questionnaire were used for this study of which Two hundred were randomly distributed in each community. Information such as socio-demographic characteristics of the people and problems of impure water conditions such as coloration, salinity among others were captured in the questionnaire. Water related diseases and the most vulnerable group associated with the development of Tinapa Business Resort in the are were equally captured in the questionnaire. One hypothesis was stated which try to evaluate or not there is variation in water related diseases within the three communities. This hypothesis was tested using the analysis of variance (ANOVA).However, in order to affirm the socio-economic parameter and the physicochemical properties in relation to the impact of the Tinapa Business Resort development on water quality. Water samples were obtained in $100cm^3$ polyethylene bottles from the river located much closed to the study area and this was done at ten different points along the river course. The samples were immediately taken to the laboratory in an ice-packed cooler kit for analysis within 24hours. Cation samples were audified to a pH <2 to keep the ion in solution, but parameters like temperature, pH and turbidity were measured Institu. Chemical analysis of water samples were carried out using appropriate certified and acceptable procedures outlined in the standard methods of the examination of water described by APHA, (1998) as shown below in table 1.

Table 1: Methods and equipments for physic-chemical analysis

s/n	Analytical equipment	Parameters
1.	Cyberscan pH20 meter	pH
2.	Thermometer	Temperature
3.	Messlerization method (APHA, 1998)	Turbidity
4.	Cyber scan low 2 conductivity meter	Total dissolved solid (TDS)
5.	Micro processor oximeter 196	Dissolved oxygen (DO)
6.	Difference between initial oxygen concentration after 5days incubation in DO bottles at 20^0C	Biochemical oxygen demand (BOD)

(ALPHA, 1998)

7. As nitrite after reduction in calcium reduction system (CONTROVO, 1988) NO_3^-(nitrite)

8. Molybdenum Blue Method (Pipper, 1994) $PO4^{2-}$ phosphate

9. Spectrophotometer in which a measurement of n-Hexame extract at wavelength of 430m   Total hydrocarbon content (THC)

10. Coliform counts meter   FC feacelcoliform

11. Coliform counts meter   TC total coliform

Source: APHA (1998)

FINDINGS

Socio-Demographic Characteristics

The socio-economic characteristics of the sampled population presented in Table 2 shows that male population constitute the major respondents in this study with a value of 55.16% while the female were 44.93%. Table 2 also indicate that two hundred and sixty three sampledpopulation were those who have attended secondary school followed by those who have also attended their tertiary education with value of 43.83% and 41.83% while those with primary school certificate were on the least side with values of 15.66%. The occupational profile of the sampled population presented in table 2 revealed that over 43.16% and 23.16% of the sampled population were unemployed and civil servants. Although, 17.5% and 16.16% of the sampled population were also traders and students. Accordingly, it was discovered that majority of the sampled population fall between the age bracket of 25 to 35years as indicated in table2 with values 41.160% and 23.3% respectively while only 10.3% and 19.16% of the sampled population were within the ages of 15 and 35years and above.

Table 2: Socio-demographic characteristics of the sampled population

s/n	Sex	Adiabo	Esuk – Utan	IkotAnsa	Total	%
A	Male	125	101	105	531	55.16
B	Female	75	99	95	269	44.83
	Total	**200**	**600**	**200**	**600**	
s/n	Education					
A	Primary school	41	22	28	91	15.66
B	Secondary school	97	67	79	263	43.83
C	Tertiary	62	91	93	246	41.00
	Total	**200**	**600**	**200**	**600**	
s/n	Occupation					
A	Traders	45	41	19	105	17.50
B	Unemployed	101	107	51	259	43.16
C	Civil servants	30	29	80	139	23.16
D	Students	24	25	50	97	16.16
	Total	**200**	**600**	**200**	**600**	

s/n	Age (years)	Adiabo	Esuk – Utan	IkotAnsa	Total	%
A	1-15yrs	22	19	21	62	10.3
B	15-25yrs	42	20	78	140	23.3
C	25-35yrs	95	86	66	247	41.16
D	35 and above	41	39	35	115	19.16
	Total	**200**	**600**	**200**	**600**	

Source: Field survey, 2014

Problems of impure water in the area

The problems associated with impure water in the area presented in figure 1 indicate that over 29.55% and 29.22% of the sampled population are of the opinion that the development of the Tinapa Business Resort has causedcolouration and odour in the surface water to havecolourin the area which at the same time makes it not useful for domestic purposes. Besides, it was also noticed that the surface water in the area have numerous sediment and salinity as observed in figure 1 with values 22.44% and 18.77% respectively.
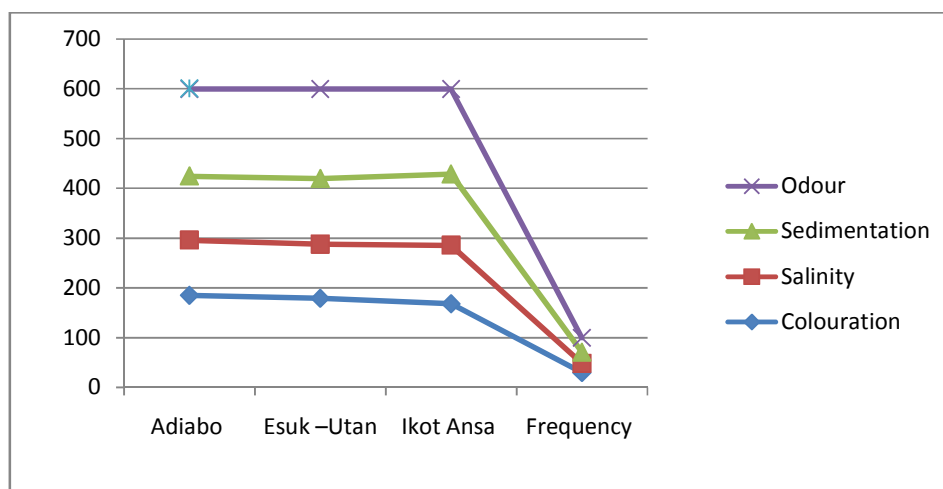

Figure 1: Problems of impure water in Calabar municipality

Source: Field survey, 2014

Water Diseases Affecting Residents In The Area

The water related diseases as a result of the development of Tinapa Business Resort presented in table 3 revealed that over 92% of the consuming residents have suffered from diseases as a result of the quality of surfacewater in the area. This result was evidenced in the data collected which shows that over 31.55% and 26.83% of the sampled population atleast to the fact that the residents in the Tinapa Business Resort environment suffered from typhoid and guinea worm while others were affected by body rashes and diarrhoea with values of 18% and 17.88% while cholera and dysentery were on the least side with values of 2.77 and 1.61% respectively.

Table 3: **Water diseases affecting residents in the area**

Diseases	Adiabo	Esuk –Utan	IkotAnsa	Total	Frequency
Cholera	25	15	10	50	2.77
Dysentery	10	9	10	29	1.61
Guinea worm	151	161	171	483	26.83
Diarrhoea	162	106	113	321	17.88
Graw-graw	07	08	10	25	1.38
Body rash	100	103	121	324	18.00
Typhoid	205	198	165	568	31.55
Total	600	600	600	1800	100

Source: Field survey, 2014

Summary Showing Variation in Water Related Diseases in The Area

The tested hypothesis which try to investigate within or no exist significant variation in disease provident in the area as a result of the development of Tinapa Business Resort on surface waterquality. However, table 4revealed a calculated F-value of 3.64 and with a table value of 0.13 at 0.05 level of significant. This result indicates that these is no significant variation in the disease that affect the three communities as a result of Tinapa Business development in the area. Besides, the tested hypothesis revealed that the above water related diseases stated in table 4 were as a result of the Tinapa Business Resort development in the area.

Table 4: Analysis showing variation in water related diseases in the area

Source variance		Of sum square	Of cal value	Df	Mean of square	Sum F
Between mean	sample	0		2	0	
Within mean	sample	127.61	0.13	37	447	3.64
Total		127.61		39		

Source: Data Analysis, 2014

Table 5 below shows the physico-chemical parameters that were analyzed in the laboratory. pH ranged from 4.9-8.5, temperature 25.4-30.2, Turbidity 3.4-8.4, Electrical conductivity 160-240, Hardness 150-301, Do 2.6-6.3, TDs 1.01-2.50, BOD 1.10-3.45, Na^+ 0.05-2.30, NO_3^- 0.01-0.75, $PO4^{2-}$ 1.50-2.60, CL^-0.01 -0.40, Fe^{2+} 0.01-1.50, Mn^{2+} 0.60-4.50, Mg^{2+} 0.30-3.30, Feacal coliform 1.00-5.50 and total coliform 2.50-6.50. The values for each of the physico-chemical parameters measured varied from one sampled location to another depending the different human activities going on within the study area. Mostly the anthropogenic activities going on in Tinapa is mostly construction of tourism structures and sites which has gone a long way to restructure the landscape. The urbanization trend has a implication on the surface water use and water management technique utilized. Most of the waste discharge directly unto the river body constitutes health problems such as diarrhea, cholera and dysentery. The high concentration of faecal and total coliform in the surface water indicates the presence of pathogens as result of direct defecation into the water body.

Table 5: Water quality result for samples obtained from Kwa River in Tinapa Business Resort

s/n	pH	(°C) Temp	(Ntu) Turbidity	(µs/cm) Elec. Cond.	Physical parameters				Chemical parameter				Heavy metals			Bacteria	
					Hardness	DO	TDS	BOD	Na^+	NO_3^-	PO_4^{2-}	CL^-	Fe^{2+}	Mn^{2+}	Mg^{2+}	Faecal coliform	(Cfu/100 m) Total coliform
1.	6.5	27.5	3.4	180	300	4.2	1.60	3.45	1.01	0.02	1.50	0.20	1.05	3.05	0.50	1.50	3.00
2.	7.4	30.1	5.6	150	240	3.4	2.00	2.10	0.05	0.01	1.80	0.01	0.04	2.45	0.30	2.40	2.50
3.	8.5	28.4	7.3	210	270	5.4	1.01	3.00	1.30	0.10	2.10	0.15	0.50	0.65	2.10	3.50	4.00
4.	5.4	27.5	45	240	290	6.3	2.20	2.50	0.70	0.50	2.40	0.30	0.10	4.00	2.50	1.00	3.50
5.	4.9	26.5	3.9	160	150	2.5	2.50	3.40	0.20	0.30	1.60	0.40	0.01	3.50	3.00	3.70	2.50
6.	5.7	30.2	8.4	200	250	3.3	1.35	2.60	0.10	0.20	1.90	0.10	0.50	3.00	1.50	5.50	3.00
7.	6.0	25.4	5.6	190	260	8.4	1.40	1.07	1.50	0.15	2.50	0.06	0.45	4.50	2.00	4.00	5.50
8.	5.2	26.9	7.8	170	290	2.6	1.00	2.50	1.20	0.75	2.30	0.25	1.50	2.40	0.80	3.50	6.50
9.	5.5	30.1	6.6	205	301	45	1.20	1.40	2.30	0.20	1.70	0.10	0.55	1.50	2.00	4.50	8.50
10	7.6	28.5	5.9	195	270	3.8	1.70	1.10	1.40	0.60	2.60	0.30	0.90	2.50	3.30	2.00	2.50
Mean	6.7	28.1	5.9	190	262.1	4.44	1.60	2.21	0.98	0.27	2.04	0.19	0.52	2.76	1.80	3.16	4.15
Standard Deviation	2.50	14.63	1.50	50.4	80.5	1.05	0.40	0.10	0.02	0.02	1.01	0.01	0.01	0.50	0.20	1.50	2.40

Table 6 revealed that the mean of some parameters such as Turbidity, Temperature, BOD, Mg^{2+}, Feacal and Total coliform was above the recommended WHO standard stipulated for drinking water . This means that the water body posses some health challenges if no properly treated before consumption. The presence of Coliforms encourages the growth of algae and according to Eni (2011) High Coliform population in surface water is an indication of poor sanitary condition in the area. This was attributed to unhygienic handling of feaces and solid waste due to developmental projects going on in the area. Disease causing bacteria in sewage include salmonella vibrio, shigella and mycobacterium and they cause diseases such as typhoid, tuberculosis and cholera. Turbidity in surface water was a result of clay and silt particles, discharge from sewage, industrial waste and the presence of large numbers of microorganisms. The high Turbidity indicated a poor water quality. High temperature showed the environment is very aggressive and consequently the corrosion rate of metallic materials was very high. The concentration of BOD indicated the absence of organic pollution from defunct sewage and solid waste dumps. High BOD affects coagulation of particles and treatment of water body. Manganese (Mg^{2+}) is one of the most active transition metals in an aquatic environment and often it occurs with iron (Eni, 2014). Manganese gives water a colour, stains and laundry and sanitary waves. It is his therefore important for the surface water in the area to be treated properly before consumption.

Table 6: Comparing mean of physic-chemical parameters with WHO standard for drinking water

s/n	Physico-chemical parameters	WHO standard	Mean of parameters
1.	pH	6.5-8.5	6.7
2.	Turbidity (Ntu)	≥ 5.00	5.9
3.	Electrical conductivity ($\mu s/cm$)	5.0	190
4.	Temperature (^0C)	25^0C	28.1^0C
5.	Hardness	≥ 300	262.1
6.	DO(Mg/L)	5.0	4.4
7.	TDS(Mg/L)	1000	1.60
8.	BOD(Mg/L)	0	2.31
9.	Na^+(Mg/L)	5.0	0.98
10.	NO_3^-(Mg/L)	5.0	0.27
11.	PO_4^{2-}(Mg/L)	5.0	2.04
12.	CL^-(Mg/L)	2.50	0.19
13.	Fe^{2+}(Mg/L)	1.00	0.52
14.	Mn^{2+}(Mg/L)	≥ 0.3	2.7
15.	Mg^{2+}(Mg/L)	0.05	1.80
16.	Faecal coliform (Cfu/100m)	0	3.16
17.	Total coliform(Cfu/100m)	0	4.15

Source: Field survey, 2014

CONCLUSION

Over the years, the development of Tinapa BusinessResort has become a catalyst for socio–economic development in Cross River State and the host community (Adiabo) in particular. Although, much have been done with respect to socio-economic and environmental impact of the development of the resort on the host community but none has x-rayed it impactwith respect to surface water quality which is the focus of this research. The findings from the data collected indicate that there is a significant variation in the physico-chemicalparameters compared to the WHO standard. Accordingly, the development of the report has also caused a change in the water quality which has also resulted in the emergence of surface water related diseases in the area.

RECOMMENDATIONS

It is quite clear that the development of the Tinapa Business resort has not only encourage the development of Adiabo community but has also led to the degradation of the surface water quality in the area. However, in order to avert the menace that has endangered the surface water quality in the area, the following recommendations are hereby put forward:-

1. The government should provide taskforce that would monitor the activities of various tourism support services in the area, so as to reduce further depletion of thenatural ecosystem.

2. The stakeholders in the resort must provide effective waste management techniques. This would help to minimize the rate of effluence discharge into the water bodiesor surrounding surface wasters in the area

3. Tourism activities such as infrastructural development should be undertaken in an environmental friendly manner so that the surface water is free from pollution

4. Awareness and sensitization campaigns be carried out our improved urban sanitation in the tourism vicinity

5. Proper planning should be done to ensure that tourism activities are executed at areas that are not capable of contaminating surface water body.

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