

**ANALYSIS OF PHYSICO-CHEMICAL PARAMETERS OF RIVER IMABOLO, ANKPA
LOCAL GOVERNMENT AREA, KOGI STATE, NIGERIA**

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ABSTRACT

A baseline study was conducted to determine the physico-chemical parameter of Imabolo River in Ankpa L.G.A of Kogi State. Water samples were taken from three locations along the river in wet season between 1st August and 31st October. There was no significant different ($p > 0.05$) in the temperature of the river ranging from 26.21 °C to 26.30 °C, turbidity ranged from 25.34 to 27.79 cm. PH ranged from 6.37 to 6.43, dissolved oxygen from 3.77 to 4.06 mg/l, water hardness ranged from 55.40 to 75.50 mg/l, alkalinity ranged from 23.37 to 24.50 mg/l, ammonia varied from 0.12 to 0.18 mg/l, nitrate varied from 0.11 to 0.17 mg/l, nitrite varied from 3.03 to 4.01 mg/l, water depth varied from 49.93 to 51.70 cm. The physico-chemical parameters varied between the months of study and sampling sites. With the exception of PH, other physico-chemical parameter mean values were within the acceptable limit. This study showed that the river is not fit for direct human consumption (Drinking) but can be put to other uses.

Key words: Baseline study, Physico-chemical parameter, River Imabolo.

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INTRODUCTION

A healthy environment is necessary for any organism, since life depends on the continence of a proper exchange of essential substance and energies between the organisms and its surrounding. Water has a unique place on the planet as it supports lives on the earth. The entire fabric of life is woven around it. (Singh *et al.*, 2002). Water is a natural resource with limited and uneven distribution in time and spaces. All forms of life and human activities depends on water. Water resources according to Bronmark and Hanson (2005) are of great important to plant, animal, human for irrigation of lands and industries, fish spend their whole life in water. Water quality is the biological, physical, and chemical characteristic of water which is a measure of the water condition in relation to the requirement of one or more biotic factor and other need of man (Ramatu 2010). Bellingham (2012) stated that in order to mitigate the impacts human societies have on natural resources (water), it is important to implement comprehensive monitoring regimes which will quantify water quality, identify impairment and help policy maker make land use decision that will not only preserve natural areas but improve the quality of life. The changes in the physiochemical parameter of water such as temperature, transparency, dissolved oxygen, nitrate, ammonia, nitrite *e.t.c*, provide valuable information on the quality of the water, the sources of the variation and their impact on the function and biodiversity of the reservoir (steve *et al.*, 2014). Banyigi (2016) also stated that the physico-chemical property of the water quality assessment gives proper indication of the status, production and sustainability of a water body. Rivers are currently degraded by both natural and anthropogenic activities, which deteriorates their quality and make them unfit for both human and aquaculture use. River Imabolo in Ankpa LGA in Kogi state is one of the rivers affected by such activities around it. Many studies have been conducted on river like Okura River, Ochaja spring, Itobe River and Bassa river in Kogi East, but there is paucity of information on the physicochemical parameter of river Imabolo in Ankpa LGA Kogi East. This study was therefore conducted to investigate the water quality of the river Imabolo @yahoo.com to ascertain its productivity status.

MATERIALS AND METHODS

Study location; -

The study was conducted at river Imabolo in Ankpa LGA of Kogi state located within the latitude 7°24'16" N and longitude 7°37'50.6"E, eastern part of Kogi State. The town Ankpa in which the river Imabolo passes through has an area of approximately 1200 km² and population of 267,353 in the 2006 population census (National population commission). River Imabolo is largest river in Ankpa LGA of Kogi state which is the major source of water supply to Ankpa town, the Local government headquarters and surrounding village. Most of the town landscape slopes to the river such that the run-

off from the town finally ends in the river. Commercial and agricultural activities dominate the area. River Imabolo passes through Ankpa town in Ankpa LGA to Olamaboro LGA joining Okura River in Igala-mela LGA then flows into Anambra River that flows into river Niger. The river is perennial and use mostly for domestic purposes such as bathing, washing, cooking, and drinking. There are also some agricultural activities such as irrigation and fishing activities around the river. Three sites were chosen along the river in Ankpa town as designated as site 1, 2 and 3. Site 1 at the upper most part of the river at secretariat the local government, site 2 at bridge crossing to NTA Ankpa and site 3 at opposite COE Ankpa the distance between each site is about 1.5km.

Sample Collection

Water sample for analysis were collected at three designated sites on river Imabolo bimonthly for the period of six months (May to October), covering only wet season. Site 1: this situated near the secretariat of Ankpa LGA which is the upper most part of the river in Ankpa town. Site 2: this is located at the bridge crossing river Imabolo to Ankpa NTA. Site 3: this is situated opposite Kogi State College of Education Ankpa, the lower part of the river. Physico-chemical parameters of the water sample were analyzed using pond Lab. 200 multi-test kits water temperature was determined in the field using an analog clinical thermometer, Transparency was determined using secchi disc of 30cm diameter with alternate black and white quarters on the upper surface, centrally placed with a graduated rope(cord) at the center. Dissolved oxygen was determined using dissolved oxygen meter PEC medicap USA (ModelJJP-607), Alkalinity, water hardness, Ammonia, Nitrate, Nitrite and pH were determined by titration method. Water depth was determined by the use of secchi disc. Data obtain from physic-chemical parameter were subjected to two ways analysis of variance (ANOVA) using SPSS (version 20.0). Means were separated using Least Significance Difference (LSD).

RESULTS:

The physio-chemical analysis of Imabolo River carried from month of August to October is shown in table 1. The highest temperature 26.92% was recorded in August followed by September 26.88% the least was observed in October 25.63%. The result showed no significant difference ($p < 0.05$) in temperature among the months. Turbidity range from 28.75cm to 23.50cm with the highest in August with the least in June, there was significance difference ($p > 0.05$) among the month. The result showed the month of October to have the highest value of dissolved oxygen 3.94mg/L and August having the least 3.89mg/L. there was significant difference ($p < 0.05$) in DO among the months. The highest value of water hardness 73.43mg/L was recorded in September, followed by 62.35mg/L recorded in October while the least value 59.11mg/L was recorded in august. The average nitrate value of 3.4mg/L was recorded with highest of 3.64mg/L in august 3.48mg/L in September and 3.29mg/L in October there was significant ($p < 0.05$) difference in nitrate value among the month of study. The average value of nitrate 0.14mg/L is recorded. The highest value 0.24mg/L was recorded in august 0.11mg/L in September and the least 0.06mg/L in October. Ammonia main value of 0.15mg/L was recorded with the highest of 0.18mg/L recorded in august and the lowest value 0.12mg/L in October. There is significant difference of ammonia value among the month. The highest value of the alkalinity 24.06PPM was recorded in October closely followed by the value 24.14ppm in September and the least value 23.74ppm in august was no significant difference ($p > 0.05$) between the month of September and October but there was significant difference ($p < 0.05$) in august. The highest value of the depth 51.13cm was recorded in august, followed by 49.84cm in September and 49.25cm in October. This showed no significant difference ($p > 0.05$) in water depth in the month of September and October but there was significant difference ($p < 0.05$) in the month of august.

Table 1: Correlation Matrix showing r^2 values for physio-chemical parameters measured at different sites and months of River Imabolo, Ankpa LGA, Kogi State.

	Temp($^{\circ}$ C)	Turb(cm)	PH(PPm)	DO(mg/l)	Hard.(mg/l)	Alk.(mg/l)	NH3(mg/l)	NO3(mg/l)	NO2(mg/l)
Temp($^{\circ}$ C)									
Turb(cm)	0.319*								

PH(PPm)	-0.589**	0.026**							
DO(mg/l)	0.055NS	-0.741**	-0.611**						
Hard.(mg/l)	0.402*	0.883**	0.166*	-0.813**					
Alk.(mg/l)	0.043*	0.829**	0.442*	-0.826**	0.789**				
NH3(mg/l)	0.068*	0.491*	0.412*	-0.727**	0.740**	0.605**			
NO3(mg/l)	-0.10Ns	0.649**	0.625**	-0.952**	0.847**	0.776**	0.837**		
NO2(mg/l)	-0.610*	0.323**	0.765**	-0.726**	0.423*	0.628**	0.560**	0.734**	
0	-0.157*	0.737**	0.458*	-0.836**	0.775**	0.895**	0.787**	0.842**	0.701**

DISCUSSION

The result of physicochemical parameters obtained from the river showed most of the parameters was within the recommended range specified for most tropical fish species, reproduction and survival. The high temperature change observed within the month of study could be attributed to the effect of rainfall which made the weather warm. This agreed with the observation of Ojikutu *et al.* (2013) that the tropical climate is high all year round and fish grow best at temperature between 25oc and 32oc. The variation and low dissolved oxygen recorded could as a result of turbulences and flow rate of the river at different sites which may be beneficial for dissolved solid break down through self-pollution regulating mechanisms of fresh water system. This observation was also made by Hassan *et al.*, (2009), on Euphrates River. It then means that each sampling site was instantaneously being polluted banthropogenic activities around the river as suggested by Li and Shen (2011). Dissolved oxygen value was WHO (2000) permissible limits and range between 3.77 and 4.06 mg/l. This low dissolved oxygen value is an indication of anthropogenic pollution or natural organic materials that heighten microbial activities that deplete oxygen.

CONCLUSION

The study of the physio-chemical parameters of River Imabolo gave an insight information about the quality of water present at a particular period of the investigation indicates that the mean values of the physio-chemical parameters are within the acceptable WHO limits. It can be used for domestic and other study uses. And good for aquatic resources survival and adaptability. However, the river is not fit for direct human consumption without treatment.

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