

# BOD, COD AND DO LOAD OF ASE CREEK, SOUTH-SOUTH NIGERIA

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## ABSTRACT

Water is an inorganic solvent and covers about 70% of the earth's surface. Quality and quantity of water are affected by an increase in anthropogenic activities and any pollution either physical or chemical which causes change to the quality of the receiving water body. Water samples were collected at three locations along Ase creek and analyzed for temperature, pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) using standard methods. Results obtained ranged as follows: 26 - 28 °C for temperature; 6.48 - 6.75 for pH; 6.50 - 8.50 mg/l for DO; 0.50 - 1.50mg/l for BOD; 1.50 -2.50mg/l for COD. The pH values for the water samples were slightly acidic. The BOD/COD ratios for all the sampling points were less than 1 indicating that the water samples have a biodegradable nature. The results obtained were within WHO permissible limit for drinking water except DO. There is thus the need to examine periodically water quality parameters of water bodies prior to use in order to ensure that they are free from organic and other pollutants. This in the long run will help to promote a healthy condition needed for sustainable development.

Keywords: Water, potable, BOD, COD, DO, Samples, locations

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## I. INTRODUCTION

Water is an inorganic solvent covering about 70% of the earth's surface (Egba and Okoye, 2008). Water availability determines the location and activities of man in a given area causing a great demand on natural fresh water resources (Waziri and Ogugbuaja, 2010). Water is one of the most essential needs for the continued existence of all living organisms on earth (Oladipo et al., 2009). The day-to-day activities of all living organisms required water in whatever form. Water is one of the most important, as well as one of the most abundant substances and it is particularly vital to living organisms (Tortora et al., 2002).

Rivers are among the basic water resources that ensures a remarkable economic value (Gunasekar and Isaac, 2015). Quality and quantity of water are

affected by an increase in anthropogenic activities and any pollution either physical or chemical which causes change to the quality of the receiving water body (Aremu et al., 2011). These changes may include: increased dissolved nutrients which may result in eutrophication, changes in stream temperature and bottom characteristics which leads to habitat destruction and alteration of species diversity and the addition of toxic substances which have either acute or chronic effects on organisms (Egborge, 1991; Aremu and Inajoh, 2007). The anticipated consequence of unregulated waste discharge into water bodies has elicited several studies on aquatic ecosystems (Chindah, 1998; Atolaiye and Aremu, 2007).

Biochemical oxygen demand (BOD) is a standard test carried out to assay the concentration of oxygen-demanding microbes to degrade organic matter over a given time period, usually five days (Samudro and

Mangkoedihardjo, 2010). It is the amount of oxygen required by bacteria for the breaking down of decomposable organic matter present in any water, waste water or treated effluent to simpler substances (Ademoroti, 1996). Chemical oxygen demand (COD) is a standard test carried out for water to consume oxygen during the degradation of organic matter and inorganic chemicals like ammonia and nitrite in the form of potassium dichromate (Samudro and Mangkoedihardjo, 2010). COD is a measure of the amount of oxygen required for complete oxidation carbon (IV) oxide and water of organic matter present in a sample of water, wastewater or effluent (Ademoroti, 1996). This present study was carried out to determine the DO, BOD and COD load of Ase creek, South-South, Nigeria.

## II. METHODS AND MATERIAL

### Study Area

The study was conducted in Ase creek, South-South, Nigeria. Three locations; Ashaka, Ndokwa East Local Government Area and Osemele and Kwale both in Ndokwa West Local Government Areas of Delta State, South-South, Nigeria situated along the creek were selected for this study. The people depends on the

creek as a source of drinking water, bathing, fishing, sand for building and other domestic uses.

### Sample Collection and Preparation

Water samples were collected from Ase creek on the 16<sup>th</sup> day of July, 2017 from three sampling locations (Ashaka, Osemele and Kwale) where human activities were high. At each sampling location, composite surface water samples were collected using a 1-liter plastic container, which have been rinsed with distilled water and taken to the laboratory for analysis.

### Methods

Temperature, pH, DO, BOD and COD, were analyzed in the laboratory by following standard methods prescribed by APHA (1998). All the water samples were analyzed 3 times. Results obtained were expressed as mean  $\pm$  SD

## III. RESULTS AND DISCUSSION

The results of the physicochemical parameters determined and the WHO standards for potable water are presented in table 1 and figure 1-3. The water samples from all the sampling points were tasteless and odourless.

**Table 1:** Showing Analytical Result of Physicochemical Parameters of Ase Creek.

Parameter	Results obtained				
	Ashaka	Kwale	Osemele	Mean	WHO Standard
Temperature	27.00 $\pm$ 0.10	28.00 $\pm$ 0.17	26.00 $\pm$ 0.00	27.00 $\pm$ 1.00	30-35°C
P <sup>H</sup>	6.88 $\pm$ 0.01	6.75 $\pm$ 0.05	6.48 $\pm$ 0.02	6.70 $\pm$ 0.20	6.5 – 8.5
DO (mg/l)	8.50 $\pm$ 0.10	7.00 $\pm$ 0.00	6.50 $\pm$ 0.01	7.33 $\pm$ 1.04	5.00
BOD (mg/l)	1.50 $\pm$ 0.10	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	1.00 $\pm$ 0.50	5.00
COD (mg/l)	2.50 $\pm$ 0.05	2.00 $\pm$ 0.17	1.50 $\pm$ 0.00	2.00 $\pm$ 0.50	10.00
BOD/COD Ratio	0.60	0.50	0.33	0.48	

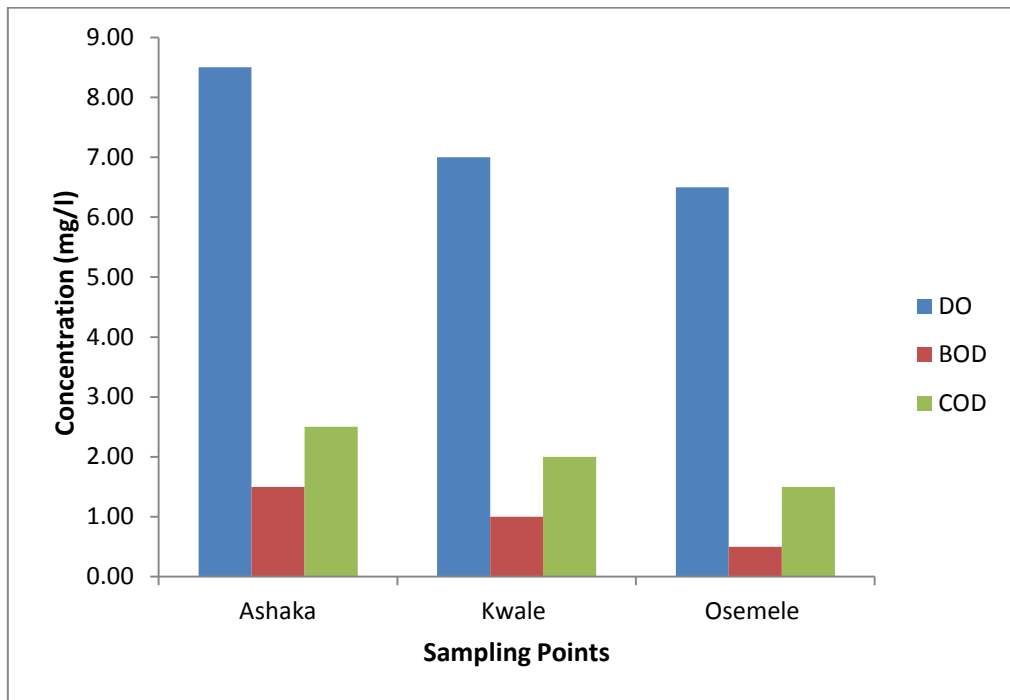


Fig 1: DO, BOD and COD profile for three locations along Ase Creek, South-South Nigeria

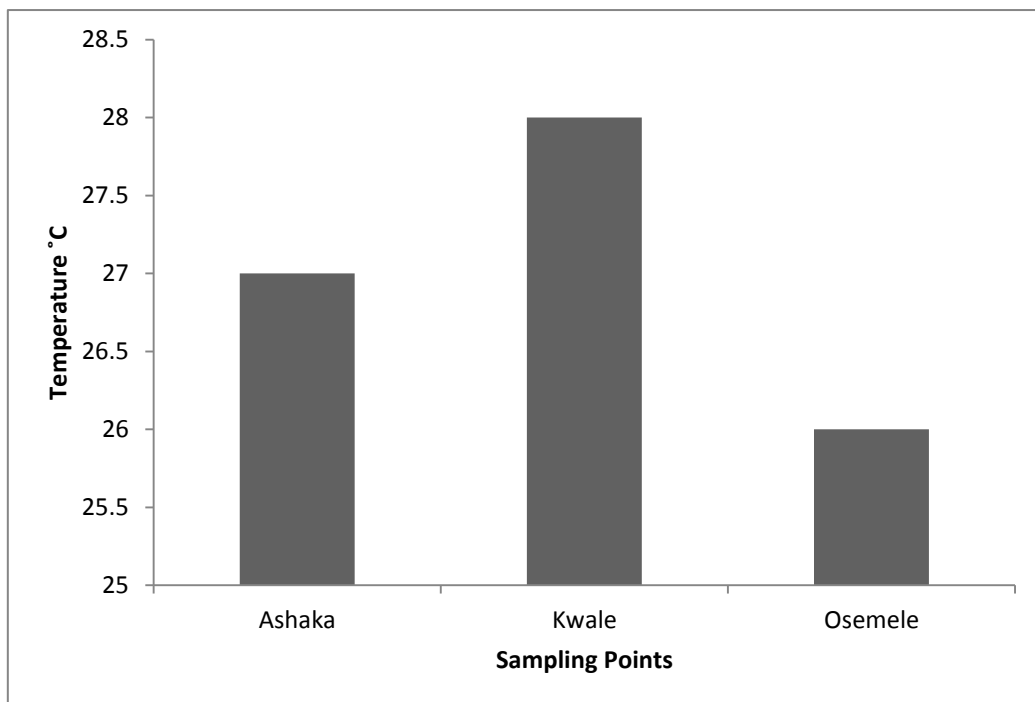


Fig 2: Temperature profile for three locations along Ase Creek, South-South Nigeria

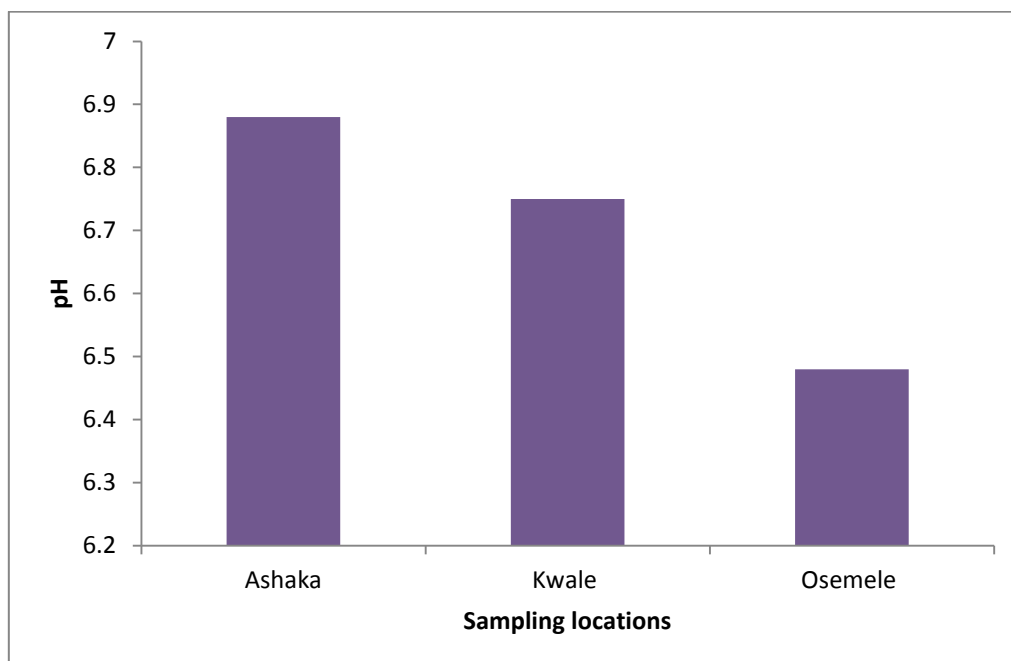


Fig 3: pH profile for three locations along Ase Creek, South-South Nigeria

## DISCUSSION

The temperature ranged from 26°C - 28°C with a mean value of 27.00±1.00°C. The temperature variation of water sample depends on the season, sampling time, and the temperature of the effluents discharged into the river (Jeyaraman *et al.*, 2003). The temperature recorded in this study was within the permissible limits of WHO (2008) for drinking water.

The pH of the Ase creek water samples ranged from 6.48 – 6.75 with an average value of 6.70±0.20. The results obtained were slightly acidic. The result was within the range of 6.2 – 8.27 reported by Gunasekar and Isaac, (2015) for River Sone, India. The pH result was also within WHO (2008) permissible range of 6.5 – 8.5 for drinking water. The pH of a water body is very important in the determination of water quality since it affects other chemical reaction such as solubility and metal toxicity.

The DO of the water samples ranged between 6.50 and 8.50 mg/l with a mean value of 7.33±1.04 mg/l (Table 1). The result was higher than the 0.76 and 4.85 mg/l range reported by Gunasekar and Isaac,

(2015) for River Sone, India. Dissolved oxygen (DO) is very important for the survival of aquatic organisms and it is also used to evaluate the degree of freshness of river water (Fakayode, 2005). The dissolved oxygen was high above the 5mg/l permissible guidelines level for drinking water stipulated by WHO (2008).

BOD result ranged from 0.50 - 1.50mg/l with an average value of 1.00±0.5mg/l (Table 1). The result was lower than the 5.00mg/l value stipulated by WHO (2008). The result varied slightly within the result range of 1.69 - 274.01mg/l reported by Gunasekar and Isaac, (2015) for Sone River. The result was also at variance with the 95 - 180 mg/l range reported by Sikder *et al.*, 2013 for Buriganga River, Bangladash. The low BOD recorded in this study is an indication of lower biological activity in the river (Mugdha *et al.*, 2012).

COD result ranged from 1.50 - 2.50mg/l with a mean value of 2.00±0.5mg/l (Table 1). The result was lower than the 10.00mg/l set by WHO (2008) for drinking water. The COD result was within the 1.48 – 198.43 range reported by Gunasekar and Isaac, (2015) for Sone River. However, COD result was very much

lower than the range of 95 - 180 mg/l reported by Sikder *et al.*, (2013) for Buriganga River, Bangladash.

The BOD/COD ratio for the three locations was 0.60, 0.50 and 0.33 with a mean value of 0.48 as shown in Table 1. The BOD/COD ratios were all less than 1 indicating that the water samples have a biodegradable nature. This agrees with the finding of other researchers (Lee and Nikraz, 2015; Magadam *et al.*, 2017), The BOD/COD ratio is an indicator for the outcome effect of organic matter containing materials (mainly water, wastewater, etc.) in environmental components of natural and man-made environment (Samudro and Mangkoedihardjo, 2010).

#### IV.CONCLUSION

The importance of water quality criteria cannot be over emphasized. The result obtained show that the water samples from the sampling locations along Ase creek, South-South, Nigeria meet up with permissible guidelines level for drinking water stipulated by WHO (2008) except DO result. There was no serious impact on the parameters analyzed for in the water samples except for the slight acidity (pH) and DO recorded. Water quality test if properly carried out would eradicate if not eliminate completely some forms of epidemics such as cholera, typhoid among others associated with water pollution.

#### V. RECOMMENDATION

A yearly analysis of water samples for detailed pollution survey on water body should be carried out to ascertain the pollution status arising from waste water effluent and exploration activities on Ase creek, South-South, Nigeria. Regulatory agents on the environment should ensure periodic monitoring of the creek and other surface water bodies in order to ensure safe acts for sustainable development.

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