Determination of Bacteriological and Physiochemical Properties of Som-Breiro River in Ahoada East Local Government Area of Rivers State Nigeria

Iloma, Unwobuesor Richard; Ezi Beauty; Ene David Ukela, Wiri Thankgod Bariyaa

Department of Environmental Health Technology, Rivers State College of Health science and Management Technology port Port Harcourt, Nigeria

Abstract: - The study seeks to examine the Bacteriological and physiochemical properties of Sambrero River in Ahoada East Local Government Area of Rivers State. Three (3) points were sampled from different locations designated as location (L1) location (L2) and location (L3) respectively, samples were collected in 0.1m of Sterile containers and were transported to the laboratory for immediate analysis. Ten (10) physiochemical, three (3) heavy metal sand three microbiological parameters were observed. Data was analyzed using standard methods (ALPHA, 1998) 20th edition and Ms-Excel version 2013 software. The result showed little variation in physiochemical parameters which are in line with World Health Organization (WHO) standard of potable water but shows much variation in microbiological parameters which are not in line with WHO standard, thereby making the water not wholesome and not potable for consumption except after proper treatment of the water. The work therefore recommends that members of Ekpena Community should ensure basic water treatment such as boiling and chlorination before consumption.

Keywords: Bacteriological, physiochemical, Sewage disposal, quality of stream water.

I. INTRODUCTION

Access to quality and safe drinking water is vital to health and sustainable quality of life of every population (Adekunle, Sridhar, Ajayi & Oluwada, 2004). One of the greatest challenges of coastal communities especially in developing countries is the safe disposal of sewage. This is so because; nearly all the activities of coastal dwellers such as bathing, washing, defecating and disposal of all kinds of pollutant are done directly in the river. This has in turn, adversely affected the quality of water from surface water bodies and consequently decreased its usefulness thereby, posing great danger to the health of man and the aquatic environment (Krantz, 2011).

Sewage refers to waste water containing feces and urine. It is a combination of one or more of domestic effluent consisting of excreta, urine, fecal sludge, kitchen and bathroom water, waste water from establishments and institutions including hospitals, industrial effluent, agricultural effluent, storm water and other storm run-offs (Sally and Jayakody, 2008). This definition is quite broad and implies that there are several sources through which sewage gains entrance into surface water such as rivers and streams. According to Sapa (2009),

one of the main factors that contributes to the sewage contamination of surface water in coastal communities is the nature of toilet system typical in such areas commonly referred to as the overhung toilet system.

Sandi and Darrin (2012) described overhung toilet system as a sewage disposal method in which, lightweight materials such as bamboos, woods and tin sheets are used to construct a platform in the river above the water level, with or without a super structure and drop-holes at the base. According to them, when pressed, residents squat at the platform to release raw excreta directly into the river through the drop-holes. This condition may over time, increase the nutrient status of such waters and also favors the release and growth of pathogenic organisms which do not only compromise the quality of water from such sources but also poses great danger to the health of man and the aquatic environment (Sandi & Darrin, 2012).

II. MATERIALS AND METHODS

Samples were collected in accordance with standard as posited by Federal Ministry of Environment and National Environmental Standard Regulation Agency (N.E.S.R.A).

Water samples for laboratory services were collected in IMC sterile sample containers from three (3) locations and were designates as Sample 1(S1), Sample 2(S2), and Sample 3(S3). Samples were immediately transported to the laboratory for analysis.

Preparation of Media

A pipette tip is fixed into the automated pipette the 0.1m from the sample and placed into the media.

28g of nutrient agar into 1 liter of distilled, autoclaved at 121^0c for 15minutes then pour plate using disposable petri dishes. The medium were oven dried to remove moisture before inoculation.

Heavy Metals in water

Water samples collected for heavy metals were analyzed using atomic absorption spectroscopy methods on the GBC Avanta PM Ver 2.02.

Inoculation of Media

The methods of spread plates were adopted for inoculation of media, the samples were serially diluted. The materials used for these microbial counts are: ethanol for sterilizing, steering rod for spreading, 2 petri dish for disposal, micro liter pipette automatic pipette for measuring, and dusting burner for heating and autoclave hot plate for dying the dishes.

Through this method organisms can grow indiscrete colonies; o.1mm of each water sample was transferred into a disposable petri dish for the raw microbial analysis and 0.1mm of the water sample into a sterilized water and mix thoroughly before putting it on a second petri dish.

Cultivation process

Total heterotrophic bacteria (spread plate technique): Aliquots of 0.1ml of diluted sample were inoculated separately on nutrient eager (NA) plates in duplicates. The inoculated samples were incubated at 370^c for 24 hours after incubation.

Statistical Analysis

The statistical analysis as provided by MsExcell version 2007, were used in the analysis of data.

III. RESULT

Table 4.1 Descriptive Statistics of Physicochemical and Bacteriological parameters

Parameters	Maximum	Minimum	Range	Mean	SD	WHO
Ph	6.22	5.87	0.35	5.99	0.199249	6.5 – 8.5
Temperature (OC)	32.2	31.4	0.3	32.1	0.208167	Ambient
Turbidity (NTU)	2.95	1.61	1.34	2.08	0.754255	5
Conductivity (µs/cm)	81	60	21	68	11.35782	1000
Salinity (0/00)	0.04	0.03	0.01	0.033333	0.005774	0
Total dissolved solids, TDS (mg/l)	57	44	13	49	7	5.00
Alkalinity	10	6	4	8	2	500
Chloride as CL^- (mg/l)	1.0	<1.0		0.833333	0.288675	250
Nitrate as No^-_3 (mg/l)	<0.05	<0.05	0	0.03	0	45.0
Sulphate as SO^{-2}_4 (mg/l)	1.0	<1.0	0	0.666667	0.288675	100
Iron as Fe (mg/l)	1.0	<1.0	0	0.0005	0	0.3
Manganese as Mn (mg/l)	0.116	<0.001	0.116	0.039		0.2
Lead as pb (mg/l)	<0.001	<0.001	0	0.005	0.0666840	0.1
Faecal coliform bacteria (FCB) MPN/100ml	9.8×10	Nil		98	32.66667	56.58033
Total coliform Bacteira (TCB) MPN/100ml	1.85×10^2	0.1×10	6.26	63	105.6598	10mg
Total heterotrophic bacteria (THB) cfu/ml	4.4×10^4	7.9×10	147.9	1476.33	25291.38	25291.38095
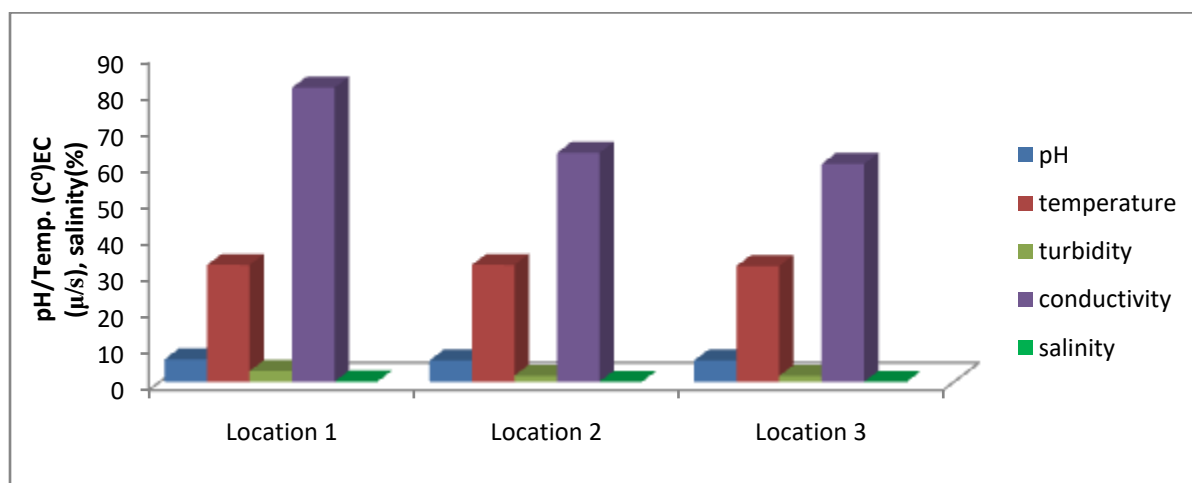
Fig.4.1. Physiochemical properties of water sample

	pH	temperature	turbidity	conductivity	Salinity
Location 1	6.22	32.2	2.95	81	0.04
Location 2	5.88	32.2	1.68	63	0.03
Location 3	5.87	31.9	1.61	60	0.03
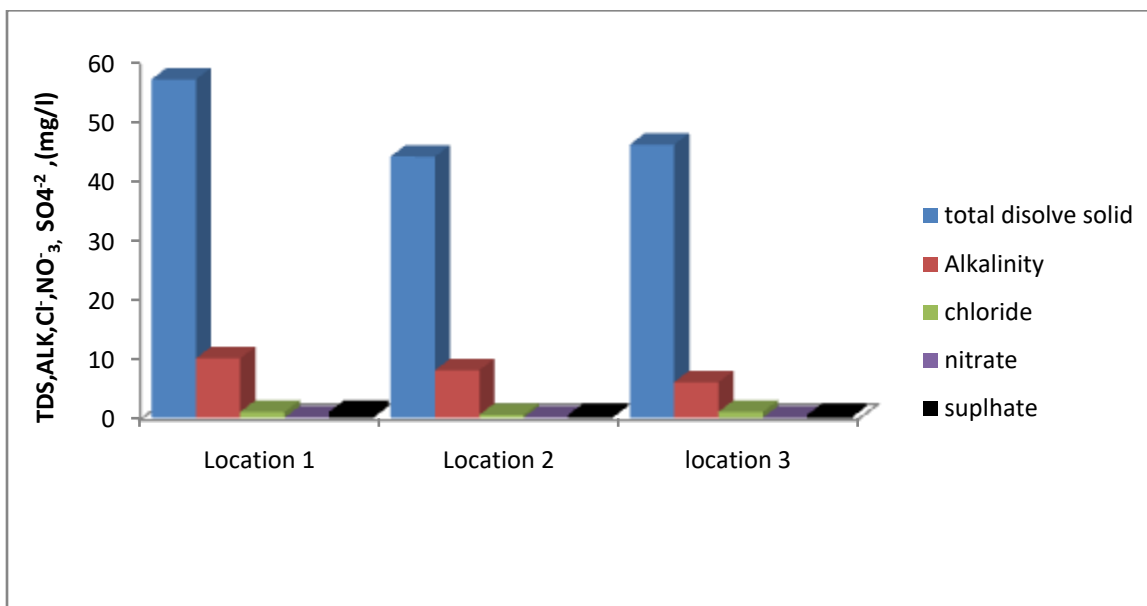
Fig.4.2. Physiochemical properties of water sample

	total dissolve solid	Alkalinity	chloride	nitrate	Sulfate
Location 1	57	10	1	0.03	1
Location 2	44	8	0.5	0.03	0.5
Location 3	46	6	1	0.03	0.5
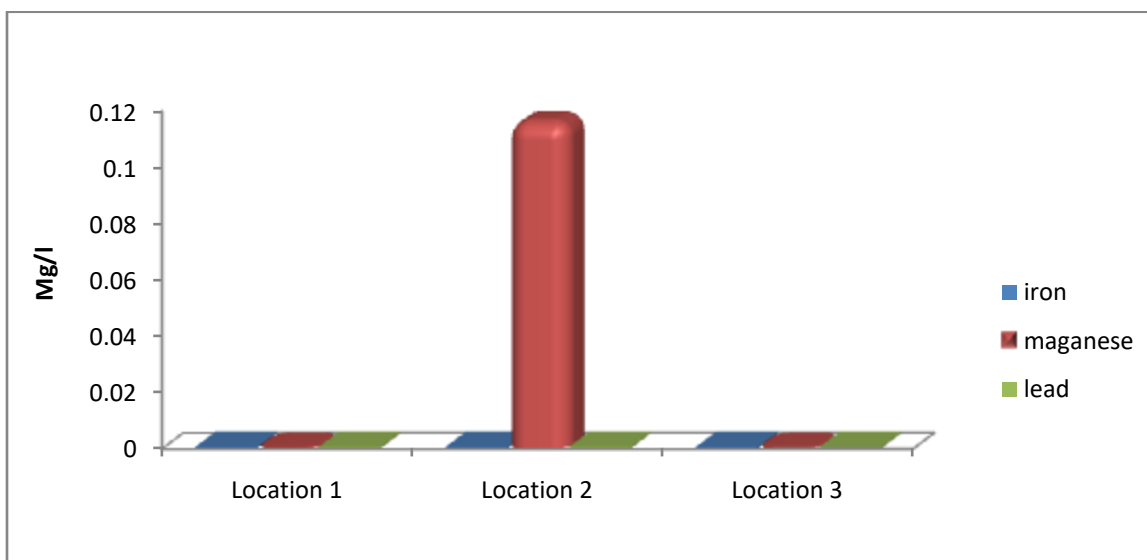
Fig.4.3. Heavy metals of water sample

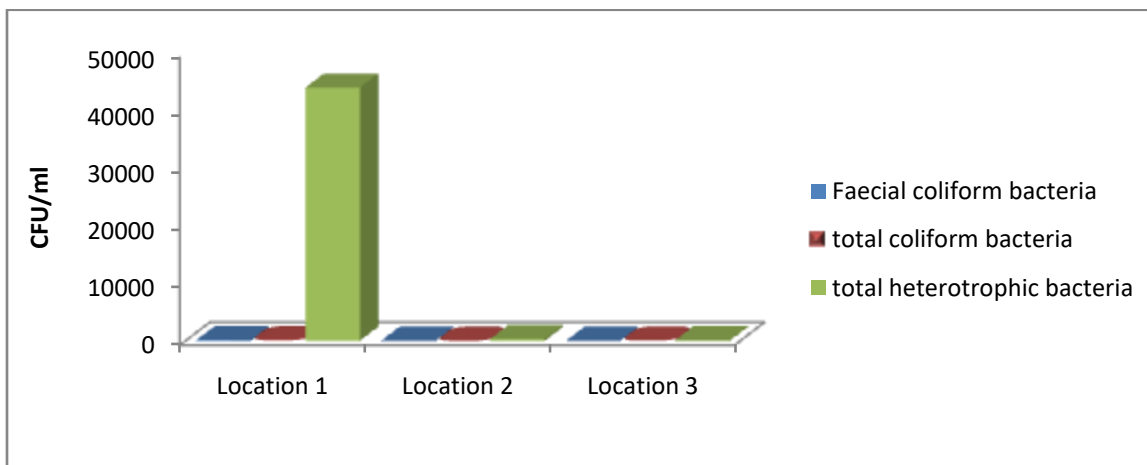|	Iron	manganese	lead
Location 1	0.0005	0.0005	0.0005
Location 2	0.0005	0.116	0.0005
Location 3	0.0005	0.0005	0.0005

Fig.4.4. Microbial Properties of the water samples

	Faecal coliform bacteria	total coliform bacteria	total heterotrophic bacteria
Location 1	98	185	44000
Location 2	0	1	310
Location 3	0	79	79

IV. DISCUSSION OF FINDINGS

The physico-chemical and microbial parameters such as temperature, pH, electric conductivity, turbidity, alkalinity, salinity, total dissolved solid, calcium, manganese, sulphate chloride, nitrate, iron, lead, fecal coliform bacteria, total coliform bacteria, and total heterotrophic bacteria of water were analyzed in the water samples taken from Location 1 (L1), Location 2 (L2) and Location 3 (L3) in Ekpena community. These parameters were taken at the three points of the river. All parameters were reported in mean value of the data with standard deviation .The concentration of THB in (L1) was $(4.4x10^4$ CFU/ml), (L2) was $3.1x10^2$ CFU/ml and (L3) was $7.9x10^1$CFU/ml as shown in Fig. 4.3, Signify the present of biological contaminant or pollutants, this may be as a result of poor sanitation and dumping site that close to the River mostly in (L1). The above parameter is higher when compared with SIN, 2007. Standard $(1.0x10^1$CFU/ml), indicating that consumption of water from these Rivers may result to health challenges in accordance with Public Health Law Cap 106 as amended in 1999, in Rivers State.

V. RECOMMENDATION

Result from findings shows that the water is not safe for human consumption. It is advised that the people of Ahoada east local government area of Rivers state should avoid bathing and drinking the water unless treated.

REFERENCES

[1] Adekunle S. A. and Oluwada (2004), African journal of microbiology research. 7(8) 5-86.
[2] Jamie B. and Richard (1996) bacteriological Analysis of borehole water.
[3] World Health Organisation (2000) Global water supply and sanitation assessment report.
[4] World Health Organization (W.H.O.) (1998) Guideline for drinking water quality. Health criteria and other supporting information   (2ndedn)   Geneva,   2:   231   -270