ENVIRONMENTAL POLLUTION: A CASE STUDY OF WASTE WATER PARAMETERS FROM IBRAHIM ADAMU LAKE, JIGAWA, NIGERIA.

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ABSTRACT
The effects of environmental pollution in relation to waste water parameters from Ibrahim Adamu Lake were examined for a period of 12 Months from October, 2003 – September, 2004. The physico – chemical parameters of p^H, temperature, Dissolved oxygen alkalinity, nitrate, and phosphate were examined using standard methods (APHA, 1992). It was found that all the evaluated parameters were below the Federal environmental planning and protection Agency (FEPA, 1990) and World Health Organization (WHO, 1999) standards.
Keywords, Waste Water; Environment; Pollution.

INTRODUCTION

The world is faced with problems related to environmental pollution. This is due to extensive industrialization, increasing population density and high urbanized societies (EPA, 1993; M_C Casland et al., 2008). Water pollution is a broad term that includes contamination of different water bodies such as lakes, rivers and ocean. The problems created by environmental pollution are many which include releasing of gases and smokes which pollute the air, dumping of waste into water bodies, fertilizer application, overgrazing of farmlands which introduces a wide range of chemical pollutants and microbial contaminants to water sources (Eikel boom and Draaijer, 1999; Amir et al., 2004). The waste generated from domestic and industrial activities constitute the major sources of the natural water pollution load (EPA, 1993; 1996).The prevention of pollution of water sources and protection of health by safe guarding water suppliers against the spread of diseases are the two important reasons for preventing water pollution (Akpor, O.B., and Muchie, M., 2011).The common water pollutants of variables concern are dissolved oxygen, suspended solids, Nitrate, Phosphate, alkalinity and a range of other nutrients and trace metals (Decico, 1979; Brooks, 1996). The high presence of high concentrations of these pollutants above the critical values stipulated by international regulatory bodies is considered unacceptable in water bodies.
The study is aimed at physico – chemical evaluation of water from the lake with a view to suggesting ways of controlling the water pollution.

MATERIALS AND METHODS

Water samples were collected in all – glass airtight sampling bottles. The standard method of analysis for water was adopted in the analysis of these parameters using Jenway 6100 Model Spectrophotometer (APHA, 1992), P^H and temperature of the samples were determined directly on the field using mercury-in-glass thermometer and a portable Jenway 3150 Model p^H meter respectively (APHA, 1992). The chemicals used in the analysis were obtained from BDH chemicals ltd, Poole, England. Mean results were recorded and expressed in S.I units.

RESULTS AND DISCUSSION

The Physico - Chemical parameters of p^H, temperature, dissolved oxygen, alkalinity, nitrate, Phosphate and zinc were assessed and their means were presented in Table 1. The result was compared with the limits set by the federal environmental planning and protection Agency (FEPA, 1990) and World Health Organization (WHO, 1999).

Table 1: Physico – Chemical parameters of Ibrahim Adamu Lake, Jigawa State, Nigeria

Parameter	Mean	*FEPA Limit	*WHO Desirable	WHO Permissible
P^H	6.0	6.0 – 9.0	7.5 – 8.5	6.0 – 9.0
Temperature (^{0}C)	23.2	40	40	40
Dissolved Oxygen (mg/l)	5.23	5.0 – 7.0	-	-
Alkalinity (mg/l)	4.97	50 - 100	-	-
Nitrate (mg/l)	0.06	20	10	10
Phosphate (mg/l)	1.64	5	-	-
Zinc (mg/l)	1.64	5	5	15

The lake showed a mean p^H of 6.0 which is within the values set by (FEPA, 1990) and (WHO, 1999) of 6.0 – 9.0 and 7.5 – 8.5 respectively. This value recorded contributed to the acidic nature of the water in the lake (Bennett and David, 1974). The mean value of 6.0 is not a threat for domestic use as it is within the value approved by both (FEPA, 1990) and (WHO, 1999). The mean temperature of 23.2^{0}C was far below the value recommended by (FEPA, 1990) and (WHO, 1999). This implies that the temperature level of the lake might not cause any thermal pollution hazard. The mean dissolved oxygen of 5.23 mg/l was within the limit of the regulatory bodies. The low dissolved oxygen may signify little organic materials in the lake as oxygen plays a very important role in determining the biological quality of water (EPA, 1996).

Lower values of 0.06 mg/l were recorded for nitrates and phosphates respectively. These values were lower than the values by (FEPA, 1990) and (WHO, 1990). The Amount of Nitrate and phosphate in a water body are indications of surface run offs from agricultural activities or effluents from industrial operations as well as the use of detergents by residents in the area. This agrees with the findings of USEPA (1982), Bashir et al., 2002 and Sivakumar et al., (2012). Other parameters such as alkalinity and Zinc were also below the units set by FEPA, (1990) and WHO (1990).

All the physico – chemical parameters had values less than the limits set by FEFA (1990) and WHO (1990). This shows that the water in the lake is not a source of pollution.

CONCLUSION

Even though the result from the study has indicated that the water is free from pollution as most of the parameters studied were far less than the limits both for drinking and domestic uses, the following recommendations are made with a view to reducing environmental pollution to the minimum level.

There is the need for a continuous monitoring of the lake in order to ascertain long term effects of domestic wastes.

The guidelines on permissible limits set by regulatory agencies such as FEPA should be strictly enforced by industries and individuals and defaulters be prosecuted.

REFERENCES

American Public Health Association (APHA, 1992), Standard methods for the examination of waters and waste waters. 17th Edition. American Water Works Association and Water Pollution Control federation, 1992, Washington, D.C.

Amir, H.M, ALi RM., Farham, K. (2004). Nitrogen Removal from waste water in a continuous flow sequencing batch reactor. *Pak.J.B10/.Sci.7 (ii).1880 – 1883.*

Akpor, O.B., and Muchie, M. (2011). Environmental and Public Health Implications of waste water quality, *African, Journal of Biotechnology Vol.10 (I3), pp2379 – 2387.*

Bennett, D.P., and David, A.H. (1974). Introduction to field Biology, 2nd Edition, Macmillan Publishing Company Inc. Glasgow, Great Britain, 256PP.

Brooks, P.C. (1996). Investigation of Temperature effects on denitrifyingBacterial populations in biological nutrient removal (BNR) system M_S. Thesis. Virginia Polytechnic Institute and State University, Blacksburg Virginia, USA.

Bashir H. Kawo, A.H., Abdullahi B.A and Okuofu, C. (2002). The effects of Industrial effluents on the phytoplankpon and Zooplankton populations in some streams in kano, Nigeria.*African Journal of material and Natural Sciences 2 (2); 1 – 6*

Decicco, B.T. (1979). Removal of Eutrophic Nutrients from waste water and their bioconversion to bacterial single cell protein for animal feed supplements phase II water resources research centre Report 15.

EPA (1993). Constructed wetlands for waste water treatment and wild life Habitat. Available from http://www.epa.gov/owow/wetlands/construction.com

EPA (1996). U.S Environmental Protection Agency, American society of Civil Engineers and American water works Association Technology Transfer handbook: Management of water treatment plan residuals. EPA/625/R-95/1008.Washington D.C

Eikeiboom, D.H, Dranijer, A. (1999). Activated Sludge system (ASIS) Available from http://www.asissludge.com

FEPA (1990) Federal Environmental Planning and Protection Agency. Limits for effluents Discharge into surface waters. FEPA, 1990, Nigeria.

Met calf, x.,Eddy.,x, (2003). Waste water engineering Treatment and Reuse in:waste water Engineering, Treatment, Disposal and Reuse. Techobanoglous G, Burton FL, Stensel HD (eds), Tata Mcgrawhill Publishing company limited, 4th edition. New Delhi, India.

Mc casland, M., Trautmann N. Porter K., Wagenet, R. (2008). Nitrate: Health Effects in drinking water. Available from http://pmcp.cee.comell.edu/facts/shdes-self/facts/nit-heef-grw85.html.

Swakumar, K.K., Dheenadayalan, M.S., Balamurugan C., Kalaivani, R., Ramakrishnan D., and Leena Hebsi bai L. (2012). Environmental water pollution: A Review of physico – chemical and heavy metal quality of water and soil. *J. of Chemical, Biological and Physical Sciences Vol. 2, No.2, 1079 – 1090.*

USEPA (1982). Unite States Environmental Protection Agency: Methods for fresh water physical and chemical analysis.American water works Association and water pollution control federation. Revised Edition, 1982. Washington D.C.

WHO (1999). World Health Organization: Limits for effluents Discharge into surface waters. WHO, 1999, Geneva