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Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES ENGINEERING

BACHELOR OF SCIENCE IN WATER RESOURCES ENGINEERING

(BSc WAR)

**ASSESSING THE IMPACTS OF MUNICIPAL SOLID WASTES DISPOSAL ON AYAP
STREAM WATER QUALITY.**

(CASESTUDY: AYAP STREAM IN LIRA CITY)

By BODO SAM

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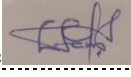
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JANUARY 2023

DECLARATION

I **BODO SAM** fully declare that the work presented in this research report is my own work except where due references are made. It has not been submitted before for any academic award to any institution of higher learning.

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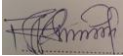
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APPROVAL

This is to confirm that this Final Year Project report on ‘Assessing the impacts of municipal solid wastes on Ayap stream water quality in Lira City has been written and presented by BODO SAM, a Bsc(Water Resources Engineering) student under the supervision of,

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ACKNOWLEDGEMENT

First and foremost, I would like to thank the Almighty God for keeping me in good health and offering me the opportunity to undertake this project.

My sincere gratitude also goes my supervisors for their continuous guidance during this research, their advice and tireless effort in following up the progress of this research.

DEDICATION

I dedicate this final year project report to my parents, uncles and brothers in appreciation of the support offered to me and the effort they put in during my study.

ABSTRACT

Uncontrolled disposal of municipal solid wastes from different sources into Ayap stream pollutes its water and can be detrimental to the urban population who use this water source. Gradual accumulations of contaminants in the water sources can result into high loads of pollutants which are potentially toxic to the users. In Lira City Ayap stream that drain through the city is the sources of water for some residents. The major aim of the study was to determine the impact of municipal solid waste disposal on Ayap stream water quality. Specific objectives were; to determine the physicochemical characteristics of water in Ayap stream at selected points; to evaluate the impacts of municipal solid wastes on the quality of water in Ayap stream using water quality index; to predict the concentrations of pollutants in the Ayap stream using WASP model and provide some mitigation measures for municipal solid wastes management.

The stream water samples were collected at three sampling points from the stream at depth of ≤ 30 cm. All samples were analyzed for physicochemical pollution indicators. The physicochemical parameters investigated included: Temperature, pH, Electrical conductivity, Nitrates, Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), Fecal Coliforms (FC), Total Dissolved Solids (TDS), Total Suspended Solids (TSS) and Turbidity which were determined using the standard analytical methods.

From the tests carried out in the lab for NWSC Manafwa area, Turbidity ranged from 53.9- 61.3 NTU, Fecal Coliforms ranged from 1650– 1700 mg/l, PH ranged from 5.87– 7.45, EC ranged from 236 - 625 μ s/cm, TSS ranged from 40 - 71 mg/l, Nitrates ranged from 9–13.2 mg/l, Temperature ranged from 21.6 – 24.8 $^{\circ}$ C, DO ranged from 1.3 –3.2 mg/l, BOD ranged from 22.3 – 28 mg/l and TDS ranged from 5402 - 6170 mg/l.

The results were compared with the WHO standards for surface water quality and almost of them were found to be high. Based on the average concentrations of both physical and chemical parameters of all the three sampling points of Ayap stream and the WASP Model predicted values, it was concluded that the stream is highly polluted due to the high concentrations of the various pollutants in municipal solid wastes discharged into the stream.

The results depict need for periodic assessment of the water quality and enactment of law on solid wastes handling from the source.

Keywords: Ayap stream; Municipal Solid Wastes; Water pollution; WQI; Lira City.

Table of Contents

DECLARATION	ii
APPROVAL	iii
ACKNOWLEDGEMENT	iv
DEDICATION	v
ABSTRACT.....	vi
Lists of tables	x
Lists of figures	x
LISTS OF ACRONYMS	xi
CHAPTER ONE	1
1 INTRODUCTION	1
1.1 Background.....	1
1.2 Problem statement.....	3
1.3 OBJECTIVES	3
1.3.1 Main objective.....	3
1.3.2 Specific objectives	3
1.4 Justification.....	3
1.5 SCOPE OF STUDY.....	4
CHAPTER TWO	5
2 LITERATURE REVIEW	5
2.1 Municipal solid wastes.....	5
2.2 Characteristics of the municipal solid wastes:	5
2.2.1 Inorganic salts	5
2.2.2 Organic matter.....	6
2.2.3 Floating Solids and liquids.....	6
2.2.4 Color	7
2.2.5 Toxic chemicals	7
2.2.6 Microorganisms	7
Foam Producing Matter	8
2.3 Effects of municipal solid waste on the Environment	8
2.4 Effects of Pollutants on Health	8
2.5 Surface water	10
2.5.1 Surface water pollution	10

2.6	Water Quality Standards and Guidelines	11
2.7	Challenges of urban solid waste management	12
2.8	Waste management in Lira city.	12
2.9	Water Quality Parameters	13
2.9.1	Physical Parameters	13
2.9.2	Chemical parameters.....	16
2.9.3	Development of Surface Water Quality Models	19
CHAPTER THREE		21
3	METHODOLOGY	21
3.1	Location of the study area.....	21
3.2	Specific objective one: To determine the physiochemical characteristics of water in Ayap stream at selected points.	22
3.2.1	Materials required	22
3.2.2	Sample collection.....	22
3.2.3	Water Quality Parameters	22
Determination of physio-chemical parameters		23
3.2.4	Temperature	23
3.2.5	The pH	23
3.2.6	Electrical conductivity	23
3.2.7	Nitrates.....	24
3.2.8	Total Dissolved Solids (TDS).	24
3.2.9	Total Suspended Solids (TSS).	25
3.2.10	Fecal coliforms.....	25
3.2.11	Turbidity	26
3.2.12	Biochemical Oxygen Demand (BOD)	26
3.3	Specific objective two: To evaluate the water quality index of Ayap stream.	26
3.3.1	Water Quality Index (WQI) calculation.....	26
3.4	Specific objective three: To predict the concentrations of pollutants in the Ayap stream using WASP model.	27
3.4.1	WASP modeling system	28
3.4.2	Uncertainty analysis.....	28
3.4.3	Model calibration	29
CHAPTER FOUR.....		30
4	RESULTS AND DISCUSSION	30

4.1	Analysis of the physiochemical characteristics of water in Ayap stream at selected points.....	30
4.1.1	Temperature	31
4.1.2	pH.....	31
4.1.3	Electrical Conductivity (EC).....	32
4.1.4	BOD	33
4.1.5	Fecal Coliforms.....	33
4.1.6	Turbidity	34
4.1.7	Dissolved oxygen.....	35
4.1.8	Nitrates.....	36
4.1.9	Total dissolved solids (TDS).....	37
4.2	Water quality index.....	37
4.2.1	Results of calculated water quality index for the three sampling points.....	38
4.3	Graphical Results of concentration predicted by the model.	40
4.3.1	Nitrates.....	40
4.3.2	TDS.....	41
4.3.3	BOD.....	42
4.3.4	Water temperature.....	43
	EC	44
	CHAPTER FIVE	45
5	CONCLUSIONS AND RECOMENDATIONS	45
5.1	Conclusions.....	45
5.2	Recommendations.....	45
	REFERENCES	47
	Appendices.....	52

Lists of tables

Table 1 showing different water color and possible contaminants.....	15
Table 2 showing different water quality parameters and analytical methods used for testing and their units	22
Table 3 showing WHO WQI ranges for drinking water.....	27
Table 4 showing tested lab results obtained from NWSC Manafwa Area laboratory.....	30
Table 5 showing WQI calculations at sample point 1	38
Table 6 showing WQI calculations at sample point 2	38
Table 7 showing WQI calculations at sample point 3	39
Table 8 showing WHO WQI ranges for drinking water.....	39

Lists of figures

Figure 1 showing solidwastes disposed in an open place near Ayap steam.....	2
Figure 2 showing the location map of the study area in Lira City.....	21
Figure 3 showing the flowchart for model simulation.....	29
Figure 4 showing a graph of variation of Water temperature at different sampling points.....	31
Figure 5 showing a graph of variation of pH at different sampling points.....	32
Figure 6 showing a graph of variation of EC at different sampling points.....	32
Figure 7 showing a graph of variation of BOD at different sampling points.....	33
Figure 8 showing a graph of variation of Faecal Coliforms at different sampling points.....	34
Figure 9 showing a graph of variation of Turbidity at different sampling points.....	35
Figure 10 showing a graph of variation of DO at different sampling points.....	36
Figure 11 showing a graph of variation of Nitrates at different sampling points.....	36
Figure 12 showing a graph of variation of TDS at different sampling points.....	37
Figure 13 showing model predicted concentrations of Nitrates	40
Figure 14 showing model predicted concentrations of TDS	41
Figure 15 showing model predicted concentrations of BOD.....	42
Figure 16 showing model predicted concentrations of Water temperature	43
Figure 17 showing model predicted concentrations of EC.....	44

LISTS OF ACRONYMS

BATS	Best Available Techniques
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
DEO	District Environmental Officer
DO	Dissolved Oxygen
FC	Faecal Coliforms
GIS	Geographic Information System
GPS	Global Positioning System
NEMA	National Environmental Management Authority
NWSC	National Water and Sewerage Corporation
SWAT	Soil, water and topography
TDS	Total dissolved solids
TSS	Total Suspended Solids
WH	Water hardness
WHO	World Health Organization

CHAPTER ONE

1 INTRODUCTION

1.1 Background

All life depends on water, which makes up between 50 and 97 percent of the weight of all plants and animals as well as roughly 70 percent of the human body. An essential resource for many other human endeavors, including manufacturing, transportation, and agriculture, is water. Water is the most mismanaged resource in the world, despite its importance.(Angiro et al., 2020)

The quality of life has always been significantly influenced by the quantity and quality of water available. Water use and economic development both have a direct impact on water quality. Several factors can contaminate ground and surface waters. The improper disposal of solid and other wastes can have a significant impact on the water quality in urban areas. (E. Studies et al., 2018)

Urban society produces garbage and other solid waste every day. In the past, men thought the environment had an infinite capacity to devour his waste without any ill effects. More recently, however, man's health and welfare are being affected by environmental pollution. These pollutants are substances present naturally in the environment but when released in significant amount by humans, become toxic. Different workers detected higher levels of organic and inorganic pollutants and heavy metals in surface and underground water and water in the vicinity of solid waste landfills. In non-arid regions, infiltrations of water through landfill have caused water table molding. This causes leachate to flow downward and outward from the land fill. Downward flow pollutes ground water while outward flow causes leachate springs at the periphery of the landfills or seepage into streams or other surface-water.(C. R. Singh & Dey, 2014)

The urban centers of the developing world are ill equipped to handle the increasing amounts of municipal solid waste. Health and environment get jeopardized when urban infrastructure is unable to cope with increasing amounts of wastes.

Waste is produced by almost all human activity in some way. The majority of individual waste products, especially those from homes and offices, do not directly endanger public health; rather,

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