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**WATER RESOURCES ENGINEERING PROGRAMME**

**FINAL YEAR PROJECT REPORT**

**EXAMINING THE POLLUTION RISK OF INDUSTRIAL WASTEWATER ON  
STREAMS**

**(Case study: Kinawataka Stream in Nakawa-Ntinda Industrial area)**

**BY**

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fulfillment of the requirements for the award of a Bachelor of Science degree in  
Water Resources Engineering**

## ABSTRACT

Water pollution from industrial effluents being on the rise in Uganda's water systems. Water is a basic resource for human life yet has been a route for epidemic diseases in the country, this study presents an in depth examination of pollution risk in Kinawataka stream. The examination is based on laboratory tests made on 10 week samples collected from two technically chosen sampling stations along the stream. Various parameters of industrial origin known to be prime causers and or indicators of pollution are presented together with various monitoring methods applied on streams and their catchments. Statistical correlations among parameters and graphical comparisons of variation between parameters and against standard maximum permissible limits for effluents as set by NEMA were conducted. The study found out that most of these parameters are at very high concentrations of up to 10 times the maximum permissible limits set by the country's regulatory body; parameters of great effect to the streams health and human health like lead were found in great concentrations at points near their industrial sources. However, 6 kilo meters downstream it was observed that most of the parameters except for total pH and Nitrogen had lessened in concentration owing to various processes discussed in the third chapter. This reduction in concentration was well below the maximum permissible limits for effluent discharge but still presented a possible high risk event as per the decision support tool presented in the fourth chapter. A multi criteria decision support tool for response to any pollution event by relevant authorities is presented for turbidity units at  $\geq 300$  NTU and  $< 300$  NTU. This report gives a proof of significant variation of parameters between sampling stations and provides what could be used as a timely decision support tool to respond to pollution events in the country.

**DECLARATION**

I **MUTSAKA IVAN** hereby declare that, this report is a true work of my hands and has never been presented by any person or institution for an academic award.

Signature: ..... 

Date: ..... 25<sup>TH</sup> - MAY - 2016



**APPROVAL**

This project report is submitted for examination with approval of the following supervisors:

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## **DEDICATION.**

This report is dedicated to my family members. My father Mr. Wantsusi Michael, my mother Mrs. Wekosasa Juliet, my siblings; Tonny, Eddy, Derrick, Frida, Joshua and Anita.

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## ACRONYMS.

BOD	Biochemical Oxygen Demand
CCME	Canadian Council of Ministers of the Environment
NaFIRRI	National Agricultural Fisheries Resources Research Institute
NARO	National Agricultural Research Organization
NEMA	National Environmental Management Authority
NEMA-MPL	NEMA-Maximum Permissible Limit
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Units
NWQH	National Water Quality Handbook
pH	Hydrogen Potential
USDA	U.S. Department of Agriculture

## LIST OF FIGURES

Figure 4-1: pH levels at station 1 and 2 .....	18
Figure 4-2: TN levels at station 1 and 2 .....	19
Figure 4-3: TP levels at station 1 and 2 .....	20
Figure 4-4: Turbidity levels at station 1 and 2 .....	21
Figure 4-5: BOD levels at station 1 and 2 .....	22
Figure 4-6: Pb levels at station 1 and 2 .....	23
Figure 4-7: Station 1 overall .....	24
Figure 4-8: Station 2 overall .....	25
Figure 4-9: Decision support tool .....	26
Figure 5-10: Sketch map of Kinawataka stream watershed.....	37
Figure 5-12: Taking a 500ml water sample at station 2.....	39
Figure 5-13: Performing BOD <sub>5</sub> test. ....	40



## LIST OF TABLES

Table 4-1: Correlation analysis station 1 (ST-1).....	16
Table 4-2: Correlation analysis station 2 (ST-2).....	17
Table 5-1: Results for station 1 .....	35
Table 5-2: Results for station 2.....	36
Table 5-3: NEMA standards of discharge of effluents or wastewater .....	38

## TABLE OF CONTENTS

DECLARATION.....	ii
APPROVAL.....	iii
DEDICATION.....	iv
ACKNOWLEDGEMENT.....	v
ACRÓNOMS.....	vi
LIST OF FIGURES.....	vii
LIST OF TABLES.....	viii
CHAPTER ONE.....	1
1.0 INTRODUCTION.....	1
1.1 BACKGROUND.....	1
1.2 PROBLEM STATEMENT.....	2
1.3 JUSTIFICATION.....	2
1.4 PURPOSE OF THE STUDY.....	3
1.5 OBJECTIVES OF THE STUDY.....	3
1.5.1 Main objective.....	3
1.5.2 Specific Objectives.....	3
1.6 SCOPE OF STUDY.....	3
CHAPTER TWO:.....	4
2.1 LITERATURE REVIEW.....	4
2.2 WATER POLLUTION DUE TO INDUSTRIAL ACTIVITIES.....	4
2.3 EFFLUENT CHARACTERISTICS AND WATER QUALITY.....	4
2.4 MAJOR PARAMETERS DISCUSSED.....	5
2.4.1 PH.....	5
2.4.2 Plant Nutrients. (Nitrogen and Phosphorus).....	5
2.4.3 Turbidity.....	6
2.4.4 Biochemical Oxygen Demand, (BOD).....	6
2.4.5 Heavy metals (Lead, Copper and Cadmium).....	7
2.5. Effects of industrial effluents:.....	7
2.5.1 Pathogens.....	7

2.5.2 Oxygen depletion:.....	7
2.5.3 Eutrophication:.....	7
2.5.4 Toxicity of effluents:.....	8
2.6.1 Stream ordering or hierarchical approach.....	8
2.6.2 Plot designs.....	8
2.6.3 Single watershed. (Before and after) .....	9
2.6.4 Above and below watersheds.....	9
2.6.6 Two watersheds.....	9
2.6.7 Paired watersheds.....	9
2.6.8 Multiple watersheds.....	10
2.6.9 Trend stations.....	10
2.7 Study area.....	10
2.8 Study design and sampling .....	10
2.9 Decision-support system tools.....	11
CHAPTER THREE: METHODOLOGY .....	12
3.1 Determining characteristics of water at sampling stations along the stream.....	12
3.1.1 Measuring pH.....	12
3.1.2 Measuring Total Nitrogen (TN).....	12
3.1.3 Measuring Total Phosphorus (TP).....	13
3.1.4 Determining Turbidity .....	13
3.1.5 Biochemical Oxygen Demand (BOD).....	13
3.1.6 Testing for Lead (Pb).....	14
3.2 Correlation analysis between parameters and comparison with national standards.....	14
3.3 Developing a decision support tool.....	14
CHAPTER FOUR:.....	16
4.0 RESULTS AND DISCUSSION.....	16
4.1 Characteristics of water at the two sampling stations.....	16
4.2.1 Station 1.....	16
4.2.2 Station 2.....	17
4.3 A decision support tool for the use of stream water. (Turbidity event).....	26



## CHAPTER ONE.

### 1.0 INTRODUCTION

This chapter entails relevant information about the project, problem statement, and justification, objectives of the study, purpose of the study and the scope of the study.

### 1.1 BACKGROUND

Streams are a primary source of water that provides an ecological, social and economic status contributing to the GNP (Gross National Product) of the nation. They serve as source of water for domestic use, fishing, agriculture, recreation etc (Muwanga, 2006). The area through which Kinawataka stream passes is highly industrialized and also having a high population living in slums at the downstream (UBOS, 2014). Industries in the stream's catchment area include: Fish filleting, foods and beverage, pharmaceuticals, plastics, mattresses and metal fabricating industries. Careless disposal of industrial effluents and other wastes may contribute greatly to water pollution. Industrial pollution in the Uganda is on the increase and is creating a high environmental risk. Pollution emitted from industries is one of the major factors contributing to the deterioration of water quality in Uganda (Walakira, 2011).

The availability and quality of water determines the quality of life. Water quality is closely linked to water use and to the state of economic development (Environment Canada, 2001). Ground and surface waters can be contaminated by several sources. In urban areas, the careless disposal of industrial effluents and other wastes may contribute greatly to the poor quality of water (Walakira, 2011). Most of the water bodies in the areas of the developing world are the end points of effluents discharged from industries (NWQH, 2003). Kinawataka stream and its tributaries receive untreated effluents from industries in this area, the water quality of these streams has been tremendously affected as result of the industrial activities. These streams drain parts of Naguru Hill, Ntinda, Kyambogo, Banda, Kireka and feed into Kinawataka wetland and then finally into Lake Victoria. Effluents from the above industries are disposed into the streams almost without adequate treatment, which is likely to affect the water quality, human health and

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