BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

Final year project report

Water Quality Monitoring of river Nile using Remote Sensing and GIS

Case study: Jinja District

BY

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This final year project report is submitted to the department of Mining and Water resources engineering at Busitema University as a partial fulfillment for the degree of Bachelors of Science in Water Resources Engineering.

ABSTRACT

Water is an important natural resource of earth and plays a vital role in our life. Surface water and groundwater are the major sources of water. The surface water qualities of major river basins are contaminated by the municipal and industrial discharges. Mapping of spatial variability of surface water quality is of vital importance and it is particularly significant where it is primary source of potable water. In order to assess the water quality the present study has been undertaken to map the spatial variability of water quality using Geographical Information System (GIS) approach. The water quality of River Nile, an important domestic and potable water source of Uganda, has been assessed in the present study. The water qualities of 2 sampling stations were randomly selected in Nile River Basin, eastern Uganda for the present study. GIS is a powerful tool for representation and analysis of spatial information related to water quality analysis. The spatial variation map for the major water quality parameters are generated and integrated using Arc GIS software. The final integrated map shows three priority classes such as Good, Moderate and Poor water quality zones of the study area and provides a guideline for the suitability of water for domestic purposes.

Hence monitoring of surface water quality has become indispensable. Sur-face water quality depends on various parameters such as pH, Electrical Conductivity (EC), Total Dissolved Solids, Total hard-ness, Ammonia, Nitrate and BOD etc. The present study attempts to map the spatial variation of surface water quality parameters for the Nile River Basin of Jinja District, using GIS. GIS is an effective tool for water quality mapping and essential for monitoring the environmental change detection. The water samples were collected from 2 locations randomly distributed in the study area. The physio-chemical parameters namely pH, Electrical Conductivity (EC), Total Dissolved Solids, Total hardness, Ammonia, Nitrate and BOD of the samples were analyzed. GIS is used to assess the existing condition of surface water quality and the contaminated areas can be identified for further monitoring and management. Also the present study encourages the stake holders of the river basin for its suitability for irrigation, industrial and also for drinking purposes.

DECLARATION

I, RUBANGA KEN ALLAN, declare that the entire work contained in this report is my own, original work,

Date: 30th-05-2015

Signature: .....

APPROVAL

This project report has been submitted with the approval of the following supervisors

MAIN SUPERVISOR:

Mr. Mugisha Moses

Date……..

CO-SUPERVISOR:

Ms Nakabuye Hope Njuki

Date:……

DEDICATION

I would like to dedicate this report to my beloved family especially my mom and dad with their confidence in me to overcome the entire obstacle in my journey to success. After all, we all have dreams, but in order to make dreams come into reality, it takes an awful lot of determination, dedication, sacrifice, self-discipline and effort.

I would also like to dedicate this report to my brother and friend Okello Derrick for the words of wisdom that he gave to me as regards my success in the academic journey. May the almighty bless you so much.

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I would like to express the gratitude towards my parents for their kind co-operation and encouragement which helped me in completion of this project.

Great thanks and appreciations also go to my colleagues in developing the project and people who have willingly helped me out with their abilities.

LIST OF FIGURES

LIST OF TABLES

Table of Contents

LIST OF ACRONYOMS AND ABBREVIATIONS

GIS	Geographical Information systems.
WASP	Water Quality Analysis and Simulation Programme Model
WHO	World Health Organisation
DWRM	Directorate Of Water Resources Management
NWSC	National Water And Sewerage Corporation
Ph	Protenze Hydrogen
E C	Electrical Conductivity
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CBOD	Carbonaceous Biological Oxygen Demand
EUTRO	Eutrophication
TOXI	Toxicant
WRDB	Water Resources Data Base
NTU	Nephelometric Turbidity Unit
WHO	World Health Organisation
NWSC	National Water and Sewerage Coporation
m	Meters
ms/cm	milliseconds per centimetre
m/s	meters per second
mg/l	milligrams per litre
ml	Millilitre
mm	Millimetres
gdp/ft	gallons per day per feet

CHAPTER ONE: INTRODUCTION

This chapter includes the following; title of the proposed study, case study, back ground to the study, statement of the problem, purpose, justification, and objectives of the study, and scope of the study.

1.1 Title of the proposed study

Water Quality Monitoring of river Nile using Remote Sensing and GIS

1.2 Case study

Jinja town is located in Jinja district in the eastern part of Uganda. The Nile has its source in Jinja which is Lake Victoria. Jinja district is boarded by Iganga in the east.Mukono, in the west, Buikwe in the north and Kamuli in the South.

1.3 Background of the study

Water is a vital natural resource which forms the basis of all life. We depend on water for consumption, recreation irrigation, and industry. Water covers a big portion of the earth and is the source of life but only 3% of the world's water is fit for human consumption due to its being fresh (USGS, 2010). As it flows through rivers and streams of the earth, unfortunately over time this finite resource which is very essential for life is being polluted as it flows in the cycle.

Water which was considered to be in plenty has now come to be realized as a limited resource. The escalating levels of pollution in water bodies most especially in rivers shows that there is inefficiency in controlling both point source and non-point polluting sources and this is mainly because of the difficulty found in identifying the most polluting points in the catchment. In turn many problems are caused to the ecosystem and high costs of raw water treatment. This calls for control measures to aid the decision makers and stakeholders to avert the problem at hand. Protecting the water resources requires an in-depth knowledge of the dynamic behavior of the watershed. Because of increased pressure on these vital resources it has become essential for resources planners to adopt ways and means for analyzing problems associated with space and time **(Jasrotia et al., 2006)**.

To improve the management of water resources, with an improvement of Environmental quality, greater knowledge about their quantity and quality is required. There is also a need for regular and systematic of geographical, hydrological and hydro- geological data, together with a system for

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