



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

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DEPARTMENT OF MINING AND WATER RESOURCES

ENGINEERING

WATER RESOURCES ENGINEERING PROGRAMME

FINAL YEAR PROJECT

ASSESSING THE IMPACTS OF LANDUSE CHANGES ON RIVER ENYAU WATER
QUALITY

CASE STUDY: RIVER ENYAU ARUA

BY

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*A final year project proposal submitted to the Department of Mining and Water Resources Engineering
as a partial fulfilment of the requirements for the award of a Bachelor of Science degree in Water
Resources Engineering*

DECLARATION

I LUBAGA MUZAMIRU declare that this final year project report is my work and has not been submitted in any other Institution either in full or part for a Bachelor's degree award.

SIGNATURE: DATE.....

DEDICATION

I dedicate this piece of work to my mother, Maama Tereza Numumbya and all my uncles, the good Lord is the only one who can reward you for the love, care and good example you have shown us.
Thank you, mum and uncles!

ACKNOWLEDGEMENT

This work has been carried out at the Department of Water Resources and Mining Engineering of the Faculty of Engineering, Busitema University. My great thanks go to Allah, the Almighty for helping me complete this Final Year Research Project. It was only by His grace and blessing that I could finish my report.

I sincerely extend my heartfelt thanks to my supervisors Mr. Oketcho Yoronimo and Mr. Kajubi Enock for the guidance and support provided to enable me accomplish this study. I further thank my family members especially Mr. Naaku Charles Lwanga, Mr. Ochieng David, Mr. Olowo Johnson, Mr. Ofwono James, Madam Nalubanga Zaina, and the entire Mumbya family of Jamugowa, for the support and encouragement provided during the period I did this work. May the almighty God reward you for the sacrifice you made.

I would also like to extend my special thanks to my siblings for their endless love, support and tolerance for all my years of education. Still on this note, I would also want to credit my Headteacher at Mama Kevina Comp. s.s Sr. Clare and Mr. okolimong Stephen – my mathematics teachers at St. peters college Tororo that inspired me to pursue a course in the field of Engineering.

APPROVAL

This is to confirm that this Final Year Project report on ‘Assessing the impacts of land use changes on river Enyau water Quality in Arua City’ has been written and presented by LUBANGA MUZAMIRU, a B.SC (Water Resources Engineering) student under my supervision.

Signature and Date.

A handwritten signature in blue ink, appearing to read 'Oketcho Yoronimo', is shown within a light gray rectangular box.

MR. OKETCHO YORONIMO

SUPERVISOR

ABSTRACT

This study aimed at assessing the impact of land use changes on River Enyau sub catchment area and using land-uses of 2000 and 2016, computing the land use change analysis using Microsoft excel and comparing the relative impact of this land-use change on water quality into the River Enyau. Arc GIS 15.2 was used to identify and characterize the land-use. It should be noted water resources in Uganda are under immense pressure due to various human activities such as agriculture, sand mining and other activities which are disastrous and with adverse environmental impacts. this study, generally was looking at pollution of river Enyau in Arua city, found in the north west part of Uganda. Potential pollutants were characterized, Water Quality Index (WQI) for each sample point was calculated and engineering measures were developed to help in pollution reduction or elimination on the river.

The water quality of the river was sampled in different areas and samples were collected from the spots where people fetch water for agriculture and domestic purposes. Grab samples were collected from River Enyau, during the period of October 2021 and January 2022. A total of 8 samples were collected and analyzed in terms of 10 physio-chemical water quality indicators, namely turbidity (T), Electrical conductivity (EC), dissolved oxygen (DO), pH, total dissolved solids, water hardness (WH), Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Total phosphorous and Temperature according to Standard methods.

Turbidity ranged from 53.92- 62.43 NTU, COD ranged from 14.75 -15mg/l, PH ranged from 8.055 - 8.1225, EC ranged from 103.75 - 120.25 $\mu\text{s}/\text{cm}$, Total phosphorus ranged from 1.5 -1.6 mg/l, Water Hardness ranged from 63.25 - 68.5 mg/l, Temperature ranged from 26.5 – 26.7 $^{\circ}\text{C}$, DO ranged from 4.7 4.67- 4.64 mg/l, BOD ranged from 8-9mg/l, TDS ranged from 54.75 - 62.25 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 four (4) sampling points of River Enyau, it was concluded that the river is highly polluted due to the high concentrations of the various pollutants and discharge from the different human activities such as fertilizer application, hospital discharge and other kind of pollutants from the surrounding areas of the river

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List Of Acronyms

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