



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

FINAL YEAR PROJECT REPORT

**ASSESSING THE IMPACT OF POLLUTION ON THE WATER
QUALITY OF RIVER MPANGA**

BY

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*A final year project report submitted to the Department of Water Resources Engineering in
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ABSTRACT

River Mpanga holds paramount importance as a primary water source for the densely populated and predominantly rural communities in western Uganda, which receives domestic, household and agricultural waste. Various community activities along the banks of River Mpanga have affected the river water quality from the upstream to downstream. Measures such as preparation of the Mpanga Catchment Management plan, details the regulating of washing bags, demarcating the buffer zone and sensitizing communities on the importance of conserving the environment have been implemented to curb the contamination of the river. However these strategies have been ineffective. This study focuses on using existing physical models to ascertain the extent the fate of the pollutants in surface water resources and develop mitigation measures to curb contamination of River Mpanga. The aim of the study was to assess the impact of pollution on the water quality of the river. To achieve this aim, a pollutant tracking model from the catchment to River Mpanga was developed using WEAP to enable the identification of sampling points along the river, potential for the increase of BOD concentration, water samples were collected from ten sampling points along River Mpanga. The water samples were analyzed for physic-chemical parameters that is Temperature, pH and BOD. The water samples showed high concentration of BOD ($>15.0\text{mg/l}$) along the selected sampling points. The WEAP model was used for hydrological modeling of the River Mpanga Catchment and the model calibration yielded R value of 0.73 and the Nash Sutcliffe Efficiency Co-efficient value of 0.50 and then surface water quality modeling was accomplished using the WASP tool. Enhancing riparian buffer zones, public awareness and education, sanitation infrastructure, pollution control regulations and construction of wastewater treatment plant were suggested to mitigate water pollution of the river by utilizing the key informant interviews (KIIs) and direct observations within the River Mpanga Catchment. The construction of a Wastewater treatment plant was selected as the most suitable mitigation measure with the performance score of 0.254 by the use of the Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) method. Further studies are recommended to be executed on sediment transportation and their impact on River Mpanga's water and innovative technologies for detecting and monitoring pollutants in the River.

Key words: Water pollution, Hydrological modeling, BOD, Water quality modeling

DECLARATION

I **LUKYAMUZI RAYMOND** solemnly declare that this final year research report is a result of my effort, and has never been submitted to Busitema University or any other institution of higher learning for any academic ward.

Signature: 

Date: 21st./10/2024

APPROVAL

I declare that, I have provided guidance for this research and, in my evaluation find that it adheres to the established standards of a scholarly report in partial fulfillment for the award of Bachelor of Science in Water Resources Engineering at Busitema University.

MAIN SUPERVISOR

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Signature..... 

Date..... 13 / 11 / 2024

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LIST OF ACRONYMS

BOD	Biochemical Oxygen Demand
DO	Dissolved oxygen
EC	Electrical Conductivity
GPS	Global Positioning System
GIS	Geographic information System
HSPF	Hydrological Simulation Program-FORTRAN
pH	Potential Hydrogen
SDG	Sustainable Development Goal
SWAT	Soil and Water Assessment Tool
TP	Total phosphorus
TDS	Total Dissolved Solids
NSE	Nash Sutcliffe Efficiency
NTU	Nephelometric Turbidity Units
NWSC	National Water and Sewerage Corporation
WASP	Water Quality Analysis Simulation Program
WEAP	Water Evaluation and planning system