BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT.

A SSESSMENT OF THE EFFECTIVENESS OF THE STRUCTURAL AND NON-STRUCTURAL MITIGATION MEASURES OF FLOODS ALONG THE FLOOD PLAINS OF RIVER MANAFWA.

A case study of the Butaleja district

BY:

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A final year project submitted to the Department of Water Resources Engineering as partial fulfillment of the requirements for the award of a Bachelor of Science degree in Water Resources Engineering

ABSTRACT

River Manafwa is a natural river found in Eastern Uganda. The river originates from Mount Elgon in eastern Uganda and traverses the districts of Bududa, Manafwa, Mbale, and Butaleja. It joins the Mpologoma River, which empties into Lake Kyoga. The river basin is prone to flooding, which disrupts transportation of goods and services between the Bududa and Manafwa districts and damages buildings with several deaths recorded.

This study will focus on conducting assessing the effectiveness of the structural and non-structural mitigation measures through the utilization of software and these will be ArcGIS 10.8, HEC-HMS, and HEC-RAS. I will use ArcGIS 10.8 to delineate the catchment and Hydrological and Hydraulic models for the river catchment will be developed in HEC-HMS and HEC-RAS respectively. The curve number method was used as the loss method with the Muskingum method adopted as the routing method to simulate runoff from the catchment.

I will simulate river flows for the different return periods of 10, 25, 50 and 100 years after which the basin model was calibrated and validated in HEC-HMS by using observed River flow data of River Manafwa from the DWRM, Ministry of Water and Environment.

HECRAS 6.1.0 was used to carry out Hydraulic modeling for the river using simulated stream flow results from HEC-HMS 4.8. Effective mitigation measures and approaches were recommended to reduce the impact of floods on the communities living around the flood plains.

ACKNOWLEDGEMENT

First, 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 to **Mr. Oketcho Yoronimo** my supervisor for his continuous guidance during this research. Their advice and tireless effort in following up the progress of this project will quite instrumental for its success.

Last but not least, i thank my classmates for their advice and i admire their support. There are no better teammates for this undertaking.

DECLARATION

I, NAMUSOLE JULIUS, hereby certify that this report is my original work and has not been previously submitted to any university or other higher education institution for consideration of any academic award. I take full responsibility for the data in this report.

NAME: **NAMUSOLE JULIUS.**

SIGN: ……………………………….

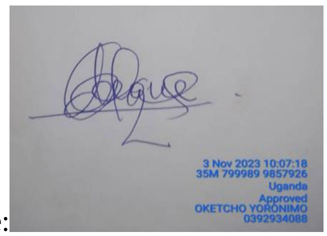
DATE: ……………………………….

APPROVAL

This is to certify that this final year project report was written under the guidance of my supervisor on the topic **"Assessment of the effectiveness of the structural and non-structural mitigation measures of floods along the flood plains of River Manafwa''**

Name: **Mr. Oketcho Yoronimo**

Signature:

Date:

LIST OF ACRONYMS

DWRM………………. DIRECTORATE OF WATER RESOURCES MANAGEMENT

MWE…………… MINISTRY OF WATER AND ENVIRONMENT

UNMA…………………. UGANDA NATIONAL METEOROLOGICAL AUTHORITY

UBOS………………..UGANDA BUREAU OF STATISTICS

HEC-HMS……………… HYDROLOGICAL ENGINEERING CENTRE-HYDROLOGIC MODELING SYSTEM

HEC-RAS………… HYDROLOGICAL ENGINEERING CENTRE-RIVER ANALYSIS SYSTEM

GIS…………………… GEOGRAPHICAL INFORMATION SYSTEM

UNDP…………. UNITED NATIONS DEVELOPMENT PROGRAM

WTP ………………..WILLINGNESS-TO-PAY

CVM…………….. CONTINGENT VALUATION METHOD

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1 CHAPTER ONE.

1.1 Introduction.

This chapter addresses the back ground of the project, problem statement, objectives, justification and scope of the study.

1.2 Background.

Butaleja District is located in the eastern region of Uganda and is traversed by River Manafwa. The river's floodplain covers a significant portion of the district, making it prone to floods, especially during the rainy seasons(District et al., 2015).

Over the years, Butaleja District has experienced devastating floods that have caused massive damage to property and loss of lives. The floods are often triggered by heavy rainfall that leads to overflowing of the river's banks and submerging of the surrounding low-lying areas(Cecinati, 2013).

In 2007, the district experienced one of the worst floods in its history, which affected over 20,000 people and caused extensive damage to infrastructure, including roads, bridges, and schools. The floods also destroyed crops, leading to food insecurity and loss of livelihoods(Government of Uganda (GOU), Ministry of Water and Environment, 2015).

In 2016, the district was hit by another wave of floods that affected over 10,000 people, leaving many homeless and causing damage to property worth millions of shillings. The floods also disrupted economic activities, with many businesses forced to close down(*Floods Cut off Butaleja Main Road, Destroy Crops – NECJOGHA_GObiUJ*, n.d.).

The floods in Butaleja District have been attributed to a combination of factors, including poor land use practices, deforestation, and inadequate drainage systems(*EAP2021UG01_Uganda Floods(0).Pdf*, n.d.). Additionally, climate change has worsened the situation, with increased rainfall leading to more frequent and severe flooding(Leitch et al., 1977).

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