BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT

IMPROVING THE MAINTENANCE AND STORAGE CAPACITY OF RUNOFF DEPENDANT EARTH DAM RESERVOIRS

(Case Study: Oyitino Earth Dam Reservoir, Gulu Municipality)

By

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A final year project report submitted in partial fulfillment of the requirement for the award of the Bachelor of Science degree in Water Resources Engineering of Busitema University

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ABSTRACT

Water is the most essential natural resource on the planet earth and it is as well one of the basic needs of human life. Thus it should be carefully monitored, accessed, assessed and purified to make it potable and fit for its various purposes.

In Uganda water is mainly abstracted from ground and surface water sources which are prone to high level of pollution and depletion. The surface water sources are majorly replenished by precipitation.

In March 2016, the reservoir of Oyitino earth dam which is 4.6m high and supplies a population of 46,400 people in the municipality dried up unexpectedly which left the municipality with a severe water crisis for a period of One month prompting a 20 litre jerry can of water to be sold as high as 1,500 Ugandan shillings. The drought was attributed to changes in the climatic condition (prolonged dry spell) in the region, the water demand exceeding the supply due to inadequate storage capacity of the reservoir resulting from its size and siltation level

This project has therefore addressed the problems by delineating and characterizing the catchment of the reservoir, carrying out hydrological analysis of the catchment to assess the availability of run off to feed the reservoir, carrying out structural re-design of the earth dam, design of a silt chamber to control the volume of silt in the reservoir and assessing the economic viability of the project.

This therefore project therefore emphasizes that increasing the dam wall height from 5.8m to 10m and designing of the silt chamber consequently increases the reservoir capacity from 4440 m3 per day of supply to 62,436m3 per day of supply which is adequate enough to supply the population of 625,913 people in the municipality by 2064 given the fact that the volume of the surface runoff from the catchment area that ends up in the reservoir is in the range of 57,121,727m3-83,713,421m3 which is adequate enough to feed the reservoir with the volume water required to meet the water demand up to 2064.

OKETTAYOT STANLEY LOBI BU/UP/2013/299

DECLARATION

I **Okettayot Stanley Lobi** declare to the best of my knowledge that the work presented in this final year project report is my own and has never been presented to any University or higher institute of learning for any academic award.

Signature...

Date............ 30|5|2017 ....

OKETTAYOT STANLEY LOBI BU/UP/2013/299

APPROVAL

This final year project report has been submitted to the Department of Mining and Water Resources Engineering for examination with approval from the following supervisors:

ENG. GEATANO OKELLO PE MASCE MUIPE RE

(MAIN SUPERVISOR)

Signature……………………………….

Date…………………………………….

MR. BAAGALA BRIAN SEMPIJJA

(CO – SUPERVISOR)

Signature……………………………….

Date…………………………………….

OKETTAYOT STANLEY LOBI BU/UP/2013/299

DEDICATION

This work is dedicated to my dear parents; Mr. Raphael Acire and Mrs. Christine Acire, my grandmother Mrs. Rose Akim, my uncles Mr. Francis Ocitti, Mr. Godfrey Akim, Mr. Patrick Oweka and my dear Aunts Mrs. Evelyn Anyango and Mrs. Christine Owila, all lovely family members and all friends for the love and support to enable me see this day and count it as success.

May the Good Lord Almighty continue to bless you abundantly.

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My sincere thanks go to the Almighty God for giving me strength, health, wisdom, grace, and protection throughout the preparation of this work. I also sincerely thank my parents uncles and siblings for being there for me in all ways whenever I needed their attention.

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Finally, I thank all my friends and the Bachelor of Science in Water Resources Engineering class 2013/2014 academic year intake for standing together in academics and social aspects up to the end of the course programme.

It's hard to pay all of you for your heartfelt assistance but May the Lord Almighty bless you all abundantly!

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LIST OF ACRONYMS/ABBREVIATIONS

ICOLD – International Commission on Large Dams

UBOS – Uganda Bureau of Statistics

MW&T – Ministry of Works and Transport

MWE – Ministry of Water and Environment

GPS – Global Positioning System

GIS – Geographical Information System

HEC-HMS – Hydrologic Engineering Center's Hydrologic Modeling System

HEC-GeoHMS – Hydrologic Engineering Center's Geospatial Hydrologic Modeling System

NWSC – National Water and Sewerage Corporation

UNMA – Uganda National Meteorological Authority

DEM – Digital Elevation Model

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1.0 CHAPTER ONE: 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 INFORMATION

Water is the most essential natural resource on the planet earth and it is as well one of the basic needs of human life. Thus it should be carefully monitored, accessed, assessed and purified to make it potable and fit for its various purposes.

The common perception some years ago has been that water is an infinite resource though at that time the world's population and standard of living were not as today hence forth the world's fresh water resources are under increasing pressure. (Gleick, 1996).

In the future, it is envisaged that even more water will be needed to produce food because the Earth's population is forecast to rise to 9.5+billion by 2050. (UN, Department of Economic & Social Affairs).

In Uganda water is mainly abstracted from ground and surface water sources which are prone to high level of pollution and depletion. The surface water sources are majorly replenished by precipitation (MWE)

In March 2016, the reservoir of Oyitino earth dam which is 4.6m high and supplies a population of 46,400 people in the municipality dried up unexpectedly which left the municipality with a severe water crisis for a period of One month prompting a 20 litre jerry can of water to be sold as high as 1,500 Ugandan shillings. (Source: National Water and Sewerage Corporation Gulu Area).

The drought was attributed to changes in the climatic condition (prolonged dry spell) in the region including the Oyitino reservoir catchment area, increasing population in the municipality which precipitated high siltation level of the reservoir.

This therefore presents a threat that such a disaster is more likely to occur more frequently if an immediate remedial action is not taken.

Hence the need to improve the storage capacity of the Oyitino reservoir so as to ensure reliability and sustainability of water supply to Gulu Municipality.

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