



**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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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 Oytino 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.

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



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:

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Date.....

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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LIST OF TABLES

Table 2.1 Table	10
Table 2.2 Laboratory Tests	11
Table 3.1 Data Sources	27
Table 3.2 Causes of Earth dam failures	35
Table 3.3 Geotechnical analysis result for oyitino earth dam.....	35
Table 3.4 Stability checks for the earth dam.....	39
Table 3.5 The bill of Quantities.	42
Table 4.1 Monthly rainfall variation	46
Table 4.2 The results for stream flow measurement.....	49
Table 4.3 The results for time of float measurement	49
Table 4.4 The population in the municipality.....	50
Table 4.5 Gulu municipality 50 years population projection	51
Table 4.6 Stability check results	56
Table 4.7 Bill of Quantities with total project cost.....	58

LIST OF FIGURES

Figure 2:1 The stream cross section.....	12
Figure 2:2 Acoustic doppler velocimeter mounted on a rod	14
Figure 2.3 The design of the silt chamber	20
Figure 3.1 HEC-HMS modeling	31
Figure 3.2 Forces acting on the dam wall.....	38
Figure 4.1 Oyitino catchment area.....	44
Figure 4.2 The slope aspect and contour	44
Figure 4.3 Oyitino Cordinates and DEM	45
Figure 4.4 The Land use in the catchment area	45
Figure 4.5 Sub basin model and the Hyetograph.....	47
Figure 4.6 The Hydrograph and Summary table	48

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

TABLE OF CONTENTS

ABSTRACT	i
DECLARATION	ii
APPROVAL	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ACRONYMS/ABBREVIATIONS	viii
TABLE OF CONTENTS	ix
1.0 CHAPTER ONE: INTRODUCTION	1
1.1 BACKGROUND INFORMATION	1
1.2 PROBLEM STATEMENT	2
1.3 JUSTIFICATION	2
1.4 OBJECTIVES	2
1.4.1 MAIN OBJECTIVE:	2
1.4.2 SPECIFIC OBJECTIVES.....	2
1.5 SCOPE	3
CHAPTER TWO: LITERATURE REVIEW	4
2.1 Definition of a dam	4
2.1.1 Classification for dams.	4
2.1.2 TYPES OF DAMS.....	6
2.1.3 SELECTION OF DAM SITE	8
2.2 Earth dams	9
2.2.1 ADVANTAGES OF EARTH DAMS OVER GRAVITY DAMS.....	9
2.2.3 Analysis of an Earth dam wall.....	10
2.3 Measurement of Stream Velocity and Discharge	11
2.3.1 Current Meter	12
2.3.2 Acoustic Doppler Current Profiler	13
2.3.3 Measuring Discharge Using a Weir	15
2.3.4 Stream Flow Using Float to Measure Velocity	15

2.5 Silt chamber	19
2.5 POPULATION PROJECTION	20
2.5.1 Linear growth	20
2.5.2 Exponential growth	21
2.5.3 Decreasing growth.....	22
2.5.4 Correlation method	23
2.5.5 Geometric Progression Method.....	23
2.6 Economic evaluation	24
2.6.1 Net Present Value [NPV]	24
2.6.2 Internal Rate of Return [IRR]	25
2.6.3 Benefit/Cost Ratio Analysis [B/C]	25
2.6.4 Payback Period Method	26
3.0 CHAPTER THREE: METHODOLOGY	27
3.1 Project Area	27
3.2 Determining the catchment area characteristics and Land Use in the Catchment area.	27
3.2.1 Materials.....	27
3.2.2 Field Surveys (GPS technology and Arc GIS were used)	28
3.3 Determining the hydrology of the catchment area and the hydraulics of the streams therein.	30
3.3.1 Data Required:.....	30
3.3.2 Tools:	30
3.3.3 Determining the Hydraulics of the Stream.....	31
3.4 The hydraulic and structural re-design of the earth dam for the reservoir of Oyitino	32
3.4.1 Water Demand	32
3.4.2 Determining the Reservoir Capacity.....	32
3.4.3 Determining the Structural Capacity of the Reservoir to enable it hold the required volume of water effectively:.....	33
3.4.4 Determination of the dam wall height.	34
3.4.5 Design of the silt chamber (To control siltation level in the reservoir).....	40
3.4 Economic Analysis of the project	42
3.4.1 The Total Cost.....	42
3.4.2 Project Benefit.....	43
4.0 CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DESIGN	44
4.1 Characterizing the Catchment Area	44

4.1.1 The Land Cover of the Catchment Area	45
4.2 To determine the hydrology of the catchment area and the hydraulics of the streams therein.	46
4.2.1 Average monthly rainfall variation for the 15 years	46
4.2.2 Hyetograph.....	47
4.2.3 Hydrograph.....	48
4.2.4 Estimated surface runoff.....	48
4.2.5 Determining the Hydraulics of the Stream.....	48
4.3 Re- designing the earth dam Capacity.....	50
4.3.1 Water Demand Analysis	50
4.3.2 The capacity of the reservoir.....	52
4.3.3 Earth dam wall design	54
4.4 Economic analysis of the project.....	58
4.4.1 The Bill of Quantities (Total Estimated Project Costs)	58
4.4.2 The Total Benefit	59
4.4.3 Benefit-Cost Ratio.....	60
5.0 CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS	61
5.1 CONCLUSION.....	61
5.2 RECOMMENDATIONS	61
REFERENCE	62
APPENDICES	63

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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