BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT

ASSESSING THE EFFECT OF AGRICULTURAL PRACTICES ON THE STREAM FLOW WITH IN RIVER MANAFWA CATCHMENT

BY

KADECEMBER AGNES

BU/UG/2014/105

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A final year project submitted to the department of water and mining engineering in partial fulfillment for the award of the bachelor degree of science in Water Resources Engineering of Busitema University

ABSTRACT

Land use plays an important role in controlling hydrologic response of catchment, particularly in terms of the nature and magnitude of surface water and ground water interactions and surface water availability. The change in land use controls the water yield of surface streams and groundwater aquifers and thus the amount of water available in a watershed. In the Manafwa watershed, located in eastern Uganda, agriculture land use has been noticed to be highly practiced. The abstraction of water from River Manafwa for irrigation has altered the stream flow of the river. This study therefore focused on assessing the impact of water abstractions on the stream flow and also suggested better management measures for sustainability of River Manafwa. Soil and Water Assessment Tool (SWAT) was applied for determining agricultural water requirement and Hydrologic Engineering Centre Hydrological Modeling System (HEC-HMS) was also applied to develop a precipitation run off model for Manafwa catchment. The stream flow response to different land use changes was also simulated using HEC-HMS and the land use changes included restoration of wetlands and reforestation. Agriculture water demand for paddy rice was found to have 5.3% and 5.2% effect on the stream flow of river Manafwa for season one and two respectively. Restoration of wetlands and reforestation would be better management strategies with in Manafwa catchment as they would positively influence the hydrology of River Manafwa hence sustainability.

DECLARERATION

I **KADECEMBER AGNES** solemnly declare that this project report is a result of my own efforts and tremendous work done during the research period apart from the citations and it has never been submitted to Busitema University or any other institution of higher learning for any academic award.

NAME: KADECEMBER AGNES

REG NO: BU/UG/2014/105

SIGNATURE: ....

DATE: 30/05/2018

DEDICATION

I dedicate this final year project report to all my family members; my father Mr. BYABAKAMA INNOCENT, my mother Mrs. KYOHAIRYWE FLORANCE.

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I would love to thank my supervisors who guided me in writing this project report. I would also like to appreciate our family friends Mr. Kyooma Xavier Akampurira and Mr. Ayehamye Francis Xavier for the courage they have always given me, as well as their moral and financial support towards my academic struggle.

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Above all, I would love to thank the Almighty God for giving me wisdom, knowledge, health and patience to learn.

APPROVAL

This project report has been submitted with the approval of the following supervisors
Mr. OKETCHO YORONIMO

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Signature and date

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Miss HOPE NJUKI NAKABUYE

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Signature and date

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ET	Evapotranspiration
GIS	Geographical Information System
MWE	Ministry of Water and Environment
HEC-HMS	Hydrologic Engineering Centre Hydrological modeling system
SCS	Soil Conservation service
CN	Curve Number
SWAT	Soil and Water Assessment Tool
HRU	Hydrologic Response Unit
DEM	Digital Elevation Model
UNMA	Uganda National Meteorological Centre
DRWM	Directorate of Water Resources Management
CNGRID	Curve Number Grid
LCI	Land Cover Institute
UBoS	Uganda Bureau of Statistics
SMA	Soil Moisture Accounting
WATR	Water
URBN	Urbanization
FRST	Forestry
AGRL	Agriculture
WETL	Wetland
Etc	crop water requirement
df	degree of freedom

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Irrigation has contributed to the agricultural production increase during the past decades, becoming the largest water consumption sector throughout the world, accounting for about 70 % of the global freshwater withdrawals and 90 % of consumptive water uses (Zeng and Cai, 2014)

In Africa, agriculture forms the backbone of most of the continent's economies, providing about 60% of all employment. During the last decade, per capita agricultural production has not kept pace with population growth. Irrigation is a very old practice, dating back to the earliest civilizations of humankind. It served as one of the key drivers behind growth in agricultural productivity, increasing household income and alleviation of rural poverty, thereby highlighting the various ways that irrigation can impact poverty. To meet food requirements by 2020, the Food and Agriculture Organization for United Nations (FAO) estimated that food production from irrigated areas will need to increase from 35% in 1995 to 45% in 2020. This indicates that access to water for irrigation will become an issue of global concern and competition in the future, especially in the arid and semi-arid regions of the world.(Wollo, 2016)

Water is one of the essential components of the environment and requires proper planning and management to achieve its sustainable utilization. Global advances in the economy and standards of living have resulted in a growing dependency on water resources in addition to climate change; land use change is one of the important human interventions altering the quality and quantity of both surface and ground water.

In the 1970s the Chinese initiated the development of irrigated rice cultivation comprising of the Kibimba rice scheme for rice technology development and the Doho rice scheme for seed multiplication and popularization of production. Paddy rice growing is the largest agricultural activity practiced along river Manafwa. Other agricultural practices include fishing and livestock farming. The Doho rice scheme occupies an area of 2500 acres (1,012 ha), subdivided into 10 blocks of unequal sizes. The 10 blocks are connected by the three layers of channels that is the main, sub main, and tertiary channels. The main channel provides irrigation water from River Manafwa to the scheme and branches out into the sub-channels, which provide irrigation water to each of the ten blocks (Angella, Dick and Fred, 2014). The abstraction of

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