FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

FINAL YEAR PROJECT REPORT

MODELLING WATER DEMANDS AND EFFICIENT WATER USE IN RIVER MALABA CATCHMENT.

BY

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A final year project Report submitted to the Department of Mining and Water Resources Engineering as a partial fulfilment of the requirements for the award of a Bachelor of Science degree in Water Resources Engineering.

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ABSTRACT

The places traversed by Malaba River Catchment in Uganda have been constrained by acute scarcity of water due to the increasing water demands, which is occasioned by the industrial growth, increasing population and changing land uses. This study applied Soil and Water Assessment Tool (SWAT) to assess water supply and and Water Evaluation and Planning (WEAP) model to evaluate past trends and simulate current demand scenarios and water management scenarios for the purposes of planning by authorities in regard to future use demand for the period 2015 to 2050 by simulation. The hydrology of the catchment was studied using Soil and Water Assessment Tool (SWAT). SWAT model was calibrated using data from 2002 to 2008 and then validated using data from 2009 to 2013. The model was successfully calibrated with NSE of 0.77 and the R^2 0.79 and for validation with NSE of 0.55 and 0.7 for the R^2.The calibrated model was then used to estimate the available water resources which was later an input for WEAP model. This study also used WEAP model to forecast demand and analyze scenarios on water use in Malaba river catchment. WEAP model schematic was set to develop current and reference scenarios. Parameters used to run WEAP model were a GIS map of the sub-catchment, Head flow obtained from SWAT modelling and water demand data from NWSC and from the field. High population growth was predicted to increase water demand while reuse though not practiced, was found by the model to be the most effective approach to manage unmet demands as compared to reduced conveyance losses and increased demand managent scenarios. The study concluded that water reuse through exploitation of wastewater could be a viable solution to Malaba river catchment water problems.

DECLARATION

I **WAISWA EMMANUEL**, declare that this report is my own, original piece of work and has never been presented by any person or institution for an academic award.

Signature: …….

Date: ……..…….

APPROVAL

This is to certify that this final year project research report has been conducted under my supervision and has been submitted with my approval for examination and award for a Bachelor of Science in Water Resources Engineering degree at Busitema University.

Main supervisor: Mr. KAJUBI ENOCK

Sign: ……..

Date: ……

ACKNOWLEDGEMENT

I appreciate my supervisor Mr. Kajubi Enock for his guidance during preparation of this report.

DEDICATION

This research is dedicated to my parents,late Katwere Patrick and Mrs.Nabirye Jesca and my lovely brother Mr.Bogere r siblings and relatives for the support they have extended to me in order to attain quality education.

ABBREVATION AND ACRONYMS

UBOS	Uganda Bureau of Statistics
DWRM	Directorate of Water Resources Management
FAO	Food and Agriculture Organization
UNMA	Uganda National Meteorological Authority
DEM	Digital Elevation Modal
HMS	Hydrological Modelling System
HEC	Hydrological Engineering Centre
GIS	Geographical Information System
WEAP	Water Evaluation and Planning Model
DSS	Decision Support System
DSM	Demand-side management
SWAT	Soil Water and Assessment Tool
HRU	Hydrological Response Units Distribution
MCM	Million Cubic Meters
CMS	Meters cubed per second

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