BUSITEMA UNIVERSITY
Pursuing Excellence
Department of Agricultural Mechanization and Irrigation Engineering

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING

FINAL YEAR PROJECT REPORT

APPLICATION OF GIS BASED MULTICRITERIA EVALUATION TECHNIQUES IN ASSESSING POTENTIAL FOR SURFACE IRRIGATION FOR PADDY-RICE CULTIVATION-Case study area: River Malaba Sub Catchment

BY

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REG. NUMBER: BU/UG/2016/89

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DECLARATION

I **SONKO ERNEST** of REG NO **BU/UG/2016/89**, declare to the best of my knowledge that this final year project report is as result of my research and efforts.

Student's signature: …………………………………………………….

Date: …………………………………………………………………….

ACKNOWLEDGEMENT

I thank the Almighty God and my dearest mother Mary for the far that He has brought me, the gift of life, protection and his provision to me during and throughout the writing of this final project report and entire implementation of my project.

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APPROVAL

This final year project report has been submitted to the department of Agricultural mechanization and irrigation Engineering of Busitema University with approval of the following University Supervisor.

Mr. OKIRYA MARTIN

Signature………………………………..

Date………………………………………….

LIST OF ACRONYMS

GIS Geographical Information System

MCE Multi-Criteria Evaluation

AHP Analytical Hierarchy Process

MAAIF Ministry of Agriculture, Animal Industry and Fisheries

UBOS Uganda Bureau of Standards

FAO Food and Agriculture Organization

GDP Gross Domestic Product

MCDA Multi Criteria Decision Analysis

WIOA Weighted Overlay Analysis

NaSSARI National Semi-Arid Resources Research Institute

MWE Ministry of Water and Environment

NBI Nile Basin Initiative

NELSAP Nile Equatorial Lakes Subsidiary Action Program

UNRDS Uganda National Rice Development Strategy

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ABSTRACT

Irrigation has attained increasing importance the world over because of the growing demand for food by a rapidly growing world population. Uganda depends on the rain fed agriculture with limited use of irrigation for agricultural production. It is estimated that more than 90% of the food supply in the country comes from low productivity rain fed smallholder agriculture and hence rainfall is the single most important determinant of food supply and the country's economy. This study has focused on assessing the suitability of Surface irrigation for paddy rice cultivation of river Malaba sub-catchment using Geospatial techniques (ArcGIS tools) for analysis to support location decisions with respect to the implementation of Agricultural land planning and management, the study further assesses how the major water source within the catchment can be utilized to provide water for surface irrigation.

Suitability assessment for surface irrigation development for paddy rice cultivation was identified by considering the irrigation suitability factors such as slope, soil, land use land cover and rainfall distribution under the multicriteria evaluation using the weighted overlay method. Other methods including CROPWAT were utilized to determine the crop water requirements of paddy rice crop under consideration. This surface irrigation suitability analysis for paddy rice cultivation will be valuable to land managers, agricultural officers and farmers in land-use planning and management. The main aim of the case study was to identify the suitable areas for surface irrigation development for paddy rice cultivation in River Malaba sub-catchment eastern Uganda.

The total irrigable land of the sub-catchment is 59.51% (40929.75 ha) under highly suitable, 35.9% (24690.26ha) under moderately suitable for surface irrigation and the rest 3159.29ha (4.59%) is classified as non-suitable (N). The annual average minimum flow of river Malaba is estimated for every month and assessed to determine its capability to meet the gross irrigation water requirements for paddy rice in the growing months with in the season, 36.16037 cumecs are required for the first growing season (April-august) and 55.7587 cumecs are required for the second growing season(September-January). The study was carried out for river Malaba sub-catchment and it is possible to apply the exercise to other sub-catchments in the entire Mpologoma Catchment and possibly the whole country too.

Key Words: Surface Irrigation, Paddy rice cultivation, ArcGIS, MCE, AHP, CROPWAT, water availability assessment.

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