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FACULTY OF ENGINEERING

**DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION
ENGINEERING
A FINAL YEAR THESIS**

**APPLICATION OF GIS AND REMOTE SENSED DATA IN ASSESSING THE
POTENTIAL FOR APICULTURAL SITE ZONATION TO IMPROVE HONEY
PRODUCTION.**

Case study: WEST NILE Sub-region

BY

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ABSTRACT

Food insecurity coupled with high cases of malnutrition has been a major problem all over developing countries including Uganda; this is especially in rural areas where the citizenry is solely dependent on agriculture. This situation has been worsening with a constant negative change of climatic conditions. This study aimed at analysis and mapping of suitable areas for beekeeping in West Nile sub-region to widen the socio-economic wellbeing of the population therein.

Chapter one included the background of the research, the problem statement, objectives, justification and scope of the project research.

Chapter two included the brief overview of beekeeping development in Africa, Uganda in particular, the description of GIS and MCDA for land suitability analysis, as well as the Analytical Hierarchy Process

Chapter three included the tools and the methods, and/ or activities used to generate the suitability model. A spatial model for each of the criterion factors was designed and developed to achieve the objective. This entailed data collection, data manipulation and analysis which involved the spatial overlay of several factor maps to generate the overall suitability map for beekeeping. The research aimed at identifying and delineating the land that can best support beekeeping using GIS-based multi-Criteria Evaluation technique and Remote Sensing. It is possible to increase apiculture ability in an appropriate area by identifying the important factors and ranking suitability of the land. These factors were therefore considered: forage growth, climate, topography, and socio-economic factors. The final output of this project were land suitability maps for apiculture. According to the study, 44% of West Nile sub-region was highly suitable for beekeeping, 41% was moderately suitable and the rest 14% was completely not Suitable for beekeeping.

Chapter four included the methods used to validate the generated suitability model by actual findings on the ground, and experimental analysis. The findings of this research should therefore be considered by farmers and stakeholders in order to improve honey production and bee population in West Nile sub-region of Uganda and East Africa at large.

Common words: Geographic Information System, Analytical Hierarchy Process, Apiary, Bee, Honey.

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DEDICATION

I dedicate this report to my supervisor, Eng. Dr. Daniel Otim and to the beloved Busitema University community and more specifically to my beloved mother Mrs. Basigirenda Faustine. May the almighty God bless and reward them abundantly.

DECLARATION

I **KUSEMERERWA JOSEPH** of REG No. **BU/UG/2017/34**, declare to the best of my knowledge that this project report is as result of my research and efforts.

Student's signature: -----

Date: 18th, March / 2022-----

APPROVAL

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

Eng. Dr. OTIM DANIEL

Signature.....

Date.....

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LIST OF ABBREVIATIONS/ ACRONYMS

GIS	Geographic Information System
AHP	Analytical Hierarchy Process
MCE	Multi-criteria Evaluation
ZARDI	Zonal Agricultural Research and Development Institutes.
UNBS	Uganda National Bureau of Standards
UBOS	Uganda Bureau Of Statistics
URA	Uganda Roads Authority
UWA	Uganda Wildlife Authority
FAO	Food and Agricultural Organisation
mS/cm	Millionth of a Siemens per centimeter
W.C	Water Content
E.C	Electrical Conductivity
LULC	Land Use and Land Cover
NSE	Nash-Sutcliffe model Efficiency coefficient
NDVI	Normalized Difference Vegetation Index