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**FACULTY OF ENGINEERING  
DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION  
ENGINEERING**

**FINAL YEAR PROJECT REPORT**

**APPLICATION OF GEO SPATIAL TECHNIQUES IN LAND DEGRADATION RISK  
ASSESSMENT IN BUSANO SUBCOUNTY, MBALE DISTRICT**

**BY**

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## **ABSTRACT**

This study aimed to assess and evaluate the risk and extent of land degradation in Busano subcounty, Mbale district using GIS techniques together with a multi-criteria approach. The data were obtained through scientific literature review and different sources like NARO, Ministry of Water and Environment among others. Different parameters/indicators of land degradation were used. Different thematic layers were derived using ArcGIS 10.2.1 software. All the layers were overlaid and integrated in GIS setting to generate a land degradation model for Busano Subcounty.

In this study, the weighted overlay method was used to identify the areas of the subcounty that are vulnerable and at high risk to land degradation, using soil acidity, salinity, population and soil erosion. The indicator of soil erosion was developed from the Revised Universal Soil Loss Equation (RUSLE) model and its comprising factors (i.e. erosivity, soil erodibility, slope, cover management and support practice factors). This land degradation risk assessment will be valuable to land managers and environmentalists, agricultural officers and farmers in land-use and soil conservation planning. The main aim of the case study was to assess the extent of land degradation and identify the areas in Busano that are vulnerable and at risk by use of GIS tools. for analysis to support location decisions with respect to the implementation of agricultural land planning.

ArcGIS was deployed for spatial modeling, analysis and data integrated with Multicriteria evaluation, Analytical Hierarchy Process (AHP) for decision making.

**KEY WORDS:** Land Degradation, RUSLE, GIS, Multicriteria Evaluation, AHP.

**DECLARATION**

I, **TENDO HOPE** hereby declare to the best of my knowledge that this is my true and original piece of work and has never been submitted to any university or institution of higher learning by anybody for any academic award.

Signature.....

Date .....

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**APPROVAL**

This final year project report has been submitted for examination with approval from:

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## **LIST OF ACRONYMS**

AHP	Analytic Hierarchy Process
ANOVA	Analysis of Variance
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
DEM	Digital Elevation Model
DWRM	Directorate of Water Resources Management
EC	Electrical Conductivity
ERDAS	Earth Resource Development Assessment System
ESRI	Environmental Systems Research Institute
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information System
GNP	Gross National Product
GPS	Global Positioning System
IPCC	Integrated Professional Competence Course
LADA	Land Degradation Assessment in Dryland project
LDA	Land Degradation Assessment
LULC	Land Use and Land Cover
MCDA	Multi Criteria Decision Analysis
MCDM	Multi Criteria Decision Making
MCE	Multi Criteria Evaluation
MS	Microsoft
NARO	National Agricultural Research Organization
NRCS	National Research Conservation Service

RUSLE	Revised Universal Soil Loss Equation
SDGs	Sustainable Development Goals
UBOS	Uganda Bureau of Statistics
UN	United Nations
USGS	United States Geographical Survey