



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

**DEPARTMENT OF MINING & WATER RESOURCES
ENGINEERING**

FINAL YEAR PROJECT REPORT

ASSESSING SOIL EROSION USING RUSLE and SDR MODEL

A CASE STUDY OF MANAFWA SUB CATCHMENT

BY

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A project report submitted to the department of mining and water resources engineering in partial fulfillment of the requirements for the award of a bachelor of science in water resources engineering of Busitema University

ABSTRACT

Soil erosion and subsequent sediment yield are the major sub catchment problems in most developing countries. Removal of top soil is one of the problems faced in Uganda watersheds. This research aimed at assessing soil erosion of manafwa sub catchment n GIS and remote sensing using the RUSLE and SDR models. RUSLE mounted in GIS and Remote sensing technique was deployed to assess the amount of soil loss in the sub catchment by evaluating the factors of soil erosion that is rain fall erosivity (R), soil erodibility (K), cover management, (C) and topography (LS).

The obtained annual soil loss of the study area was found to be 2371,9 t ha⁻¹yr⁻¹. Main stream channel slop based SDR analysis was estimated from an ASTM DEM to estimate the sediment yield, the SDR ranged from 0.14 to 0. The sediment yield was 0- 10.8796. The erosion hot spot map obtained from the reclass of the sediment yield map indicated that the hot spots are along the main stream path. RUSLE and SDR mounted with GIS have a strong capability of estimating soil loss and sediment yield.

This research applied geographic information system and Spatial Multi-Criteria Evaluation tools for decision making in the siting of the suitable areas for putting up the recommended conservation practices based on the following criteria; the slope, rainfall, soil type and land use. Each of the criterion was assigned weights that were calculated using Analytical Hierarchy Process. Under each practice, the different parameters under each criterion were ranked according to it suitability for the use of a particular practice that is highly suitable, moderately suitable, less suitable and not suitable and then followed by a weighted overlay analysis to ascertain the suitability of the area for the use of the conservation practice or their combined use. Conclusively, the consolidation of Geographic Information System and Spatial Multi Criteria Evaluation has shown to be a fruitful tool in land suitability evaluation.

Keywords

Soil Erosion, Sediment Yield, Sediment Deliver Ratio, Geographical Information Systems, Multi Criteria Evaluation, Suitability, Criteria, Weight, Analytical Hierarchy Process.

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May the almighty God bless you all!

DECLARATION

I, AKECH SHARON, hereby declare that this report is as a result of my own effort, research and has not been submitted before by any person or institution of higher learning for any academic award.

AKECH SHARON BU/UP/2016/518

Signature: Date:

APPROVAL

This is to certify that this final year research project has been conducted under my supervision and has been submitted with approval for examination and award of bachelors of Science degree in water resources engineering at Busitema University.

Main Supervisor

Name: Mr. Kajubi Enock

Signature: Date.....

DEDICATION

I dedicate this report to my supervisor Mr. Kajubi Enock, my family members and friends for their financial, academic and emotional support and assistances

ACRONYMS

CLIGE	CLImate GENerator
N	
FAO	Food and Agriculture Organization
GIS	Geographical Information System
NEMA	National Environmental Management Authority
NFA	National Forestry Authority
RUSLE	Revised Universal Soil Loss Equation
TOPAZ	Topographic Parametrization Software
UBOS	Uganda Bureau of Statistics
USGS	United States Geographical Survey
USLE	Universal Soil Loss Equation
SDR	Sediment Assessment Tool for Effective Erosion Control
AHP	Analytical Hierarchy Process

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