FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING.

ASSESSMENT OF THE POTENTIAL FOR WATER EROSION CONTROL

CASE STUDY AREA: NAMALU SUB WATERSHED

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Abstract

Land degradation especially soil erosion has already been treated as one of the most serious Problems all around the world that is threatening human existence and survival, with its impacts far felt environmentally, economically and socially. Establishing the impacts of soil erosion requires thorough studies to determine the erosion rates and map out erosion risk areas, and that is being aided by field studies as well as geospatial analysis. However, the best proven way of arresting the erosion effects is by adopting sustainable soil and water conservation measures. This research centered on establishing a detailed understanding of the erosion and sedimentation processes in the watershed, to evaluate a watershed scale effectiveness of the conservation and, to identify optimal BMP types and sites that may be used in the future to further reduce sedimentation of the Namalu sub watershed. In this study ArcGIS 10.4 was used to prepare thematic maps and develop RUSLE model. SWAT was used to develop the model and evaluate the pre- and post-management practices of the sub watershed. SWAT output viewer and Microsoft excel were used to analyze the results. The results show that there was an increase in annual sediment yield from 2001 to 2010 that is 10.3394/ha in 2001 and 18.7527t/ha in 2010, With a cumulative sediment yield of706.7667 t/ha. The highest sediment yield was observed in 2007 with 605.25 t/ha. Furthermore, implementation of contouring and terracing resulted in a 75.92% and 74.6% sediment yield reduction with the overall sediment yield reduction of 68.4%. Furthermore, filter strips averagely reduced sediment yield by 82.28% with the highest reduction of 96.246% achieved with a 6 m wide filter strip. Generally, implementation of these conservation measures yields some good results, however, further studies on the cost effectiveness of these conservation practices are highly recommended.

Keywords: RUSLE model, SWAT model, water erosion and sustainable conservation measures

Dedication

This piece of work is dedicated to God Almighty and those who supported me on my journey to complete this level of my education especially my brothers who have worked sacrificially and tirelessly to ensure I attain education.

Declaration

Except where otherwise stated, I hereby declare that this piece of work is my own original work and has never been submitted wholly or partially to any University or institution of higher learning for any award whatsoever.

Signature: ……..

ACHUKA JOHN

Date: ……....……

Approval
This piece of work has been approved by;

Main Supervisor

Mr. OKETCHO YORONIMO

Signature……

Date…….

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List of acronyms

C factor	Cover management factor
CN	Curve Numbers
DEM	Digital Elevation Model
DSMW	Digital Soil Map of the World
DWRM	Directorate of Water Resource Management
FAO	Food and Agricultural Organization
GIS	Geographical Information Systems
K factor	Soil erodibility factor
LS factor	Slope length and slope stiffness factors
LULC	land use and land cover
MAAIF	Ministry of Agriculture, Animal industry and Fishery
MUSLE	Modified Universal Soil Loss Equation
MWE	Ministry of Water and Environment
NEMA	National Environmental Management Authority
NFA	National Forest Authority
NRCS	National Research Conservation Service
P factor	Conservation practice
R factor	Rain fall erosivity factor
RUSLE	Revised Universal Soil Loss Equation

SWAT	Soil and Water Assessment Tool
t ha-1 y-1	ton per hectares per year.
TIN	Triangulated irregular Network
UBSO	Uganda Bureau of Statistics
UNMA	Uganda National Metrological Authority
USGS	United States Geographical Survey
USLE	Universal Soil Loss Equation
UTM	Universal Transverse Mercator
WGS	World Geographical System
WHO	World Health Organization