

PERMANENT REFERENCE

ESTABLISHING THE RELATIONSHIPS
BETWEEN SOIL EROSION AND THE ASSOCIATED FACTORS
UNDER DIFFERENT SOIL SURFACE CONDITIONS
IN CULTIVATED LANDS OF HANGURANKETA CATCHMENT AREA

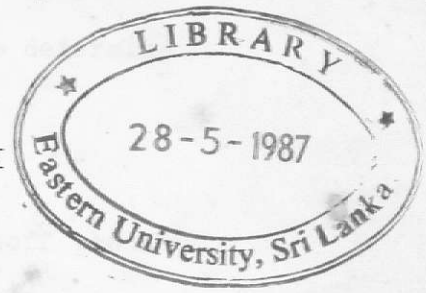
BY

SUNDARAMOORTHY URUTHERAKUMAR

A RESEARCH REPORT
SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS OF THE ADVANCED COURSE IN

AGRICULTURAL ENGINEERING

FOR THE DEGREE OF
BACHELOR OF SCIENCE IN AGRICULTURE
EASTERN UNIVERSITY, SRI LANKA
1986



APPROVED BY

P. Krishnarajah
MR. P. KRISHNARAJAH
SUPERVISOR
HEAD/SOIL CONSERVATION DIVISION
DEPARTMENT OF AGRICULTURE
PERADENIYA
SRI LANKA

S. Sivasubramaniam
DR. S. SIVASUBRAMANIAM
HEAD/DEPT. OF AGRONOMY
FACULTY OF AGRICULTURE
EASTERN UNIVERSITY
CHENKALADY
SRI LANKA

Library stamp containing the Eastern University logo, the code FAG36, a barcode, and the text "Project Report Library - EUSL".

18430

PROCESSED
Library, EUSL

A B S T R A C T

In this project, attempts were made to establish the relationship between soil loss and the factors such as the amount of rainfall, erosive rainfall, erosivity of rainfall and the percentage of daily runoff under three different soil surface conditions viz. bare, disturbed and under crop cover without any disturbance. It was also intended to determine maximum erosion hazard periods of the year.

The soil loss data on medium sized (one acre) runoff plots planted with tobacco and mixed vegetables at Hapuwella sub-catchment area located in the mid country of Sri Lanka were used for the above purposes.

The analysis of the experimental results gave different linear relationships between soil loss and the above factors under different soil surface conditions. It was also observed that the erosivity of rainfall is well correlated with the soil loss under above three conditions. Therefore, erosivity variations throughout the year can be used to study the overall pattern of the soil loss in this area.

Most of the erosion hazard occurs in November and in April due to the inadequate soil conservation measures and wrong

agricultural techniques adopted by the farmers during these periods, which experience high erosive rainfall.

The results of this study could be used as a guide to predict the erosion hazards under prevailing agricultural activities and to help farmers to adopt suitable soil conservation measures to minimise soil losses from their fields.

C O N T E N T S

	Page
Abstract	I
Acknowledgement	II
Table of Contents	III
List of Figures	IV
List of Tables	V
1. Introduction	I
2. Literature Review	5
2.1 Process of soil erosion	5
2.2 Types of water erosion	9
2.3 Factors affecting water erosion	10
2.4 Erosivity and erodibility	11
2.5 Physical characteristics of rainfall affecting soil erosion	12
2.5.1 Total amount of rainfall	12
2.5.2 Intensity of rainfall	13
2.5.3 Distribution of rainfall	14
2.5.4 Kinetic energy of rainfall	14
2.5.5 Momentum of rainfall	16
2.5.6 Rainfall erosivity index	16
2.5.7 Erosive rainfall	18

	Page
2.6 Estimation of soil losses	18
2.6.1 Universal soil loss equation	19
2.6.2 Soil loss measurements by runoff plots	19
2.6.3 Soil loss tolerance limit	20
3. Methods and Materials	21
3.1 Site selection	21
3.2 Description of the study area	21
3.2.1 Topography	23
3.2.2 Climate	23
3.2.3 Soil characteristics	25
3.2.4 Land use	25
3.3 Experimental layout	25
3.3.1 Design of experimental layout	25
3.3.2 Measurement of precipitation	29
3.4 Experimental procedure	30
3.4.1 Measurement of runoff	30
3.4.1.1 Computation of daily percentage of runoff	30
3.4.2 Measurement of daily soil loss	31
3.4.2.1 Sample collection	32
3.4.2.2 Laboratory analysis	32
3.4.2.3 Computation of daily soil losses	32

	Page
3.4.3 Determination of total quantity and intensity of rainfall	33
3.4.4 Computation of rainfall energy and $K.E > 25$	34
3.5 Analysis of data	34
4. Results and Discussions	36
4.1 Relationship between amount of rainfall and soil loss	36
4.2 Relationship between intensity of rainfall and soil loss.	38
4.3 Relationship between erosive rainfall and soil loss	43
4.4 Relationship between erosivity of rainfall and soil loss	46
4.5 Relationship between percentage of daily runoff and soil loss	50
4.6 Seasonal variations in erosivity of rainfall and soil loss	53
4.7 Maximum erosion hazard and suitable control measures	58
5. Conclusion	60
Bibiliography	62