Ain Shams University
Faculty of Engineering
Irrigation & Hydraulics Department

A GIS-Based Model for Estimating Runoff Sedimentation in Semi-Arid Wadies

Submitted By

MOSTAFA MOHAMED MOSTAFA MASHAL
B.Sc. in Civil Engineering (2012)

A thesis submitted in partial fulfillment of the requirements for the award of the degree of

MASTER of SCIENCE

In

Irrigation and Hydraulics

Supervised by

Dr. Mohamed Abdel Hamid Gad

Associate Professor
Irrigation & Hydraulics Department
Ain Shams University

Prof. Dr. Karima Mahmoud Attia

Former Director of Water Resources Research Institute; National Water Research Center

CAIRO-EGYPT
2019

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By

MOSTAFA MOHAMED MOSTAFA MASHAL

Examiners' Committee

Name and Affiliation	Signature
Prof. Dr. Anas Mohamed El-Molla Professor of Civil Engineering Dept., Al-Azhar University	……..
Prof. Dr. Mahmoud Samy Abd El-Salam Professor of Irrig. & Hydraulics Dept., Ain Shams University	……..….
Dr. Mohamed Abd El-Hamid Gad Associate Professor of Irrig. & Hydraulics Dept., Ain Shams University	……..….
Prof. Dr. Karmia Mahmoud Attia Former Director of Water Resources Research Institute; National Water Research Center	……..….

29th June, 2019

DECLARATION

I declare that this thesis entitled "A GIS-Based Model for Estimating Runoff Sedimentation in Semi-Arid Wadies" is the result of my own research except as cited in the references. It is being submitted to Master of Science degree in the Faculty of Engineering at Ain Shams University. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree in any other university.

Signature……...

Name: Mostafa Mohamed Mashal

Date: 29th June, 2019

Acknowledgements

First of all, thanks to god for guiding me through this work, for all what I have learnt and for all those people who supported me.

I would like to thank all members of my supervision committee during my study. My sincere thanks are to my supervisor Associate Prof. Dr. Mohamed Abdel Hamid Gad, Irrigation & Hydraulics Department; Faculty of Engineering; Ain Shams University; Cairo; Egypt; for his great help, encouragement throughout this work, valuable comments, advices and final revision of the thesis, his Professional suggestions and valuable help in reviewing this thesis added to the value of this research.

I would like also to express my deep appreciation and gratitude to Prof. Dr. Karima Attia, the former Director of Water Resources Research Institute; National Water Research Center; for her helpful directions and honest assistance, encouragement, advices and help especially for revising and modifying the thesis document that I would never do without her help. In addition, I would like to express my sincere thankful and gratitude to the staff at the Water Resource Research Institute who gave me helpful hand.

Many thanks for everyone who contributed to this research by any means.

Finally, special thanks to my family, for taking care of me during my studies. I would also like to mention my fiancée and all of my friends.

I Would like to dedicate this work to my father, my mother, my sisters, and my fiancée.

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Abstract

A spatially variable model using the USLE (the Universal soil loss equation) in a GIS (Geographic Information System) environment was developed for the estimation of sediment loads in arid and semi-arid regions. The model theory is based on a modification of the Universal soil loss equation (USLE) for predicting soil loss magnitude. The spatial capabilities of GIS (Geographic Information System) are used to represent the RUSLE predictors into spatially variable grids where the USLE is applied on a cell-by-cell basis. Accordingly, a nominated name for the model is SVUSLE (Spatially Variable Universal Soil Loss Estimator). Each grid pixel in the model is treated as an in-depended hydrologic unit (mini-sub-catchment) where the soil loss is estimated as a function of the USLE predictors. The consideration of spatially variable predictors enables the accurate estimation of soil loss since the USLE predictors (slope-length, soil type, and rainfall) are highly variable in space. The model is tested on a case study from Wadi Watier in South Sinai. The results showed reasonable agreement between the sediment loads estimated by the model and those measured in the field. The assessment of the model indicates that the model has high potential for the engineering applications since it is accurate, practical, and fast.

KEYWORDS: Arid; Semi-Arid; Sedimentation; Floods; GIS; Model; Watier; Field measurements.

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