UNIVERSITI TEKNOLOGI MARA

ESTABLISHMENT OF RAINFALL EROSIVITY CALENDAR AT MAIN CITIES OF PENINSULAR MALAYSIA

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Candidates's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

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ABSTRACT

Malaysia in its rapid growing of development is undergoing tremendous landuse changes especially in the development of infrastructure. Although this activity forms an important role to the intergral part of the socio-economic advancement in the country, the unpleasant effects of land development, particularly soil erosion will certainly jeopardize its success. Soil erosion has become a very serious problem in Malaysia recently and it is one of the natural processes that occur on earth. With the accelerated land development both in public and commercial sectors, this problem will certainly persevere and deteriorate unless proper planning and management of land utilization is adopted at the early stage of any future land development. The fact that soil erosion continue to be an environmental problem and of significant impact in the country suggest that more definitive guidelines and stern monitoring of land development are required. Therefore, this research will focus on recognizing the rainfall induced erosion risk occurrence since rainfall is one of the significant factors is causing soil erosion that can leads to landslide to major cities in Peninsular Malaysia. Thus, evaluation of rainfall erosivity profile at the main cities of Peninsular Malaysia namely Alor Setar, Georgetown, Kuala Lumpur, Johor Bahru, Kuantan and Kuala Terengganu would be tangible contribution to the various states government in tackling problems to soil erosion issues.

Research outcomes indicate that different cities reveals different results namely the monthly rainfall amount, erosion risk frequency, percentage of rainfall erosivity potential as well as the degree of values of rainfall erosivity. As in the case of the most risky months, months of October, November and December recorded the highest number of occurrence based on the accumulated degree of 7 days rainfall amount. Further results reveal that the most risky city with regards to rainfall erosivity corresponding to high, very high and critical degree of "ROSE" Index is Kuala Lumpur while the less risky city is Kuala Terengganu. The results indirectly confirm the severity of erosion induced erosion at Kuala Lumpur city based on historical records as well as the present scenario. This research is also useable in other areas in Malaysia in order to determine the risky and safest areas with regards to rainfall induced erosion which can leads to landslide.

By using the degree of rainfall induced erosion risk, the Malaysia states government can take immediate action and make the necessary planning particularly on the preventive measures besides providing early warning to the public at large. With the final outcome of producing a rainfall erosivity calendar for the respective cities, it would be beneficial to the respective authorities in moving a step closer towards understanding the phenomena of erosion induced landslide particularly in ensuring a safer and sustainable development for the country in the future. The rainfall erosivity calendar can be further established not only to all other automatic rainfall stations throughout the country but also can be developed globally.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE PROBLEM

In Malaysia, rapid economic development over the past decades have necessitated the cutting of many hill slope in order to maximize land utilization especially in the main cities of Peninsular Malaysia. Coupled with frequent heavy rainfalls in tropical climate, this has resulted in frequent occurrences of soil erosion process. Since soil degradation and erosion happen so slowly, it seldom give rise to immediate action and is hardly noticed. It is nearly impossible to imagine that this unnoticeable rate of loss is many times that of natural formation. From the engineering perspective, soil erosion is defined as a general destruction of soil structure by the action of water and wind. It is essentially the smoothing process with soil particles being carried away, rolled and washed down by the force of gravity (Morgan, 1993).

The major agent of soil erosion occurrence is without a doubt is rainfall. Soil erosion by water is the result of rain detaching and transporting vulnerable soil, either directly by means of rain splash or indirectly by rill and gully erosion. In the case of a slope, an altered bare surface of the slope with the formation of sheet, rill and gully erosion features, will cause instability of the slope. This situation will gradually cause slope failure or rainfall induced erosion. The soil erosion phenomenon is basically the function of the erosivity of rainfall and erodibilty of the soil. In other words, when the rainfall acts upon the earth surface, the amount of the soil erosion loss will basically depend upon the combination of the strength and the magnitude of the rainfall to cause the erosion process, and the ability of the soil to withstand the rain itself (Wischmeier and Smih, 1958).