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SOIL EROSION HAZARD ASSESSMENTS IN THE FRASER'S HILL AND THE GENTING HIGHLANDS USING "ROM" SCALE

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ABSTRACT

Rainfall-induced landslides have caused severe environmental, engineering and socio-economic repercussions in Malaysia. Highland areas in this country, which are perennially very wet such as in the Fraser's Hill and the Genting Highlands receive annual rainfall in excess of 2,000 mm. With steep natural and cut-slopes topography, it has made these areas prone to erosion or landslide to occur.

A study was initiated to classify the areas and predict potential erosion or landslide locations of occurrence in both the Fraser's Hill and the Genting Highlands. The classification was done by determining the soil susceptibility for failure in terms of its soil erodibility index value with regard to the "ROM" Scale. Soil samples were taken on the slopes at every 1 km stretch along the main road leading to both highlands. The erodibility index value obtained from the samples was used to grade and rank the slopes along both roads. Concurrently, daily rainfall data of both areas were thoroughly examined to determine the erosion risk frequency.

From the analysis of soil samples, Km 13-14 in the Genting Highlands had been identified as the most susceptible location with erodibility index value of 4.35, which is classified as High on the "ROM" Scale. While in the Fraser's Hill, Km 4-5 tops the ranking, recording an erosion index value of 5.37 which is also High in classification. The analyzed rainfall data however, had shown that the erosion frequency is at the highest risk in the month of November and September for both the Genting Highlands and the Fraser's Hill respectively. The results also highlighted and identified the erosion hazards locations and the time of possible impact risk. With implications for combining these results with the GIS and other thematic map data, the findings would greatly facilitate future assessment and estimation of erosion hazards in both areas.

CHAPTER 1

INTRODUCTION

1.1 General Introduction

Human land use in the highland areas has led to an increase in soil erosion problems in some situations although it may also decrease in others. However, factors like the infringement of the steep slope areas and accelerated rate of land development have contributed towards the escalation of the soil erosion related problems. These problems may be differently viewed by engineers, geologists or soil scientists as soil scientists would recognize the problems as part of the main form of land degradation in terms of agricultural productivity, whereas engineers perceive the situation as a form of instability especially when it occurs on hill slopes or human-created slopes. In Malaysia, erosion problems and rain-induced landslides pose substantial threats and over the years have caused severe damages. Apart from claiming people's lives, it destroys or damages residential and commercial properties, arrests development in urban areas including agricultural and forest land, and impairs water quality of rivers and streams. Soil erosion and landslide are interrelated and the problem is not unique as it occurs in many countries throughout the world.

From the engineering perspective, soil erosion includes the process of detachment of soil particles from the soil mass as a function of some driving force (erosivity) such as raindrop impact or shear stresses of flowing water or wind (Nearing, Norton and Zhang, 2001). When raindrops fall on the altered or bare surface of the slopes, it would result in these slopes to be eroded and exhibiting erosion features commonly known as sheet, rill and gully. The presence of these erosion features on the slope surface would contribute to the preparatory factors, and with increasing external stimuli such as intense rainfall, it would provide a near-immediate response in the form of landslide by rapidly increasing the stresses or by reducing the strength of the slope material (Wieczorek, 1996). In other words, this situation would gradually cause slope failure or landslide as commonly known.