REFINEMENT OF TOPOGRAPHICAL FACTOR FOR ESTIMATING SOIL LOSS AND SEDIMENT YIELD IN EQUATORIAL REGIONS

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Date received: 10/07/2018, Date accepted: 25/08/2018
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Abstract – This paper aims to improve the Topographical Factor for estimation soil loss and sediment yield in Equatorial region. In the Revised Universal Soil Loss Equation (RUSLE), Topographical factor (LS) is derived as soil loss amount related to gently-inclined plane surface of 72.6ft (22.13m) slope length and 9% slope gradient in United States of America (USA). The terrains in equatorial region (especially at construction sites) comprise of more cone-shaped and pyramid-shaped characterized with steeper slopes and shorter slope lengths as compared to agricultural lands in USA. Topographical Factors (T_T, T_C & T_P) in equatorial region were found as function of sediment yield (SY), surface runoff velocity (RV), and silt and clay compositions (SC). Triangular prism-shaped slope could be used as reference or indicator due to the shape is comparable or almost similar to that of the RUSLE's gently-inclined plane surface. Cone-shaped and pyramid-shaped showed approximately 80% and 77%, respectively similar to triangular prism-shaped. Therefore, the Topographical Factors for triangular prism-shaped, cone-shaped and pyramid-shaped landscapes in equatorial region: **Error! Reference source not found.** (Triangular Prism), **Error! Reference source not found.** (Cone) and**Error! Reference source not found.** (Pyramid).

***Keywords*:** Topographical factors, slope length, slope steepness, equatorial.

1.0 INTRODUCTION

Topographical Factor (LS) in the Revised Universal Soil Loss Equation (RUSLE) can be defined as the soil loss ratio indicated by unit plot with slope length of 72.6ft (22.13m), 6ft (1.83m) width and slope gradient of 9% as shown in Figure 1 [1]. It is a combined index of the factors that could affect the soil loss amount which are slope length (L) and slope steepness (S). It is a measure of the capacity of overland flow/surface runoff to transport sediment/soil particles [2]. The LS is dimensionless, having LS values (RUSLE experimental values normalized to 72.6-ft slope length and 9% slope gradient) equal to or greater than zero [2]. The LS was developed by Wischmeier and Smith in 1958, together with other factors - rainfall erosivity (R), soil erodibility (K), cover management (C) and support practice (P) to form the Universal Soil Loss Equation (USLE) for soil loss prediction [1]. The USLE was later revised by Renard et al. in 1997 to become the Revised Universal Soil Loss Equation (RUSLE) for estimation of soil loss amount in agricultural areas [3].

The Revised Universal Soil Loss Equation (RUSLE) by Renard et al. (1997) can be considered as one of the best soil loss estimates for the agricultural sector in temperate regions as it is closely related to the amount of soil loss from agricultural lands [3,4]. The LS values in the RUSLE were evaluated from soil loss data on thirty-seven (37) agricultural/cultivated lands in the eastern USA where the terrain is composed of gently-inclined plane surfaces as illustrated in Figure 1 [1]. However, in equatorial regions, terrain (especially at construction sites) is characterized by steeper slopes and shorter slope lengths as compared to agricultural lands in the eastern USA. Since steeper and shorter hill slopes result in higher overland flows/surface runoffs as compared to RUSLE's 37 experimental sites in the eastern USA, equatorial regions could experience more soil particles being washed downslope.