View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Proceedings of The Annual International Conference, Syiah Kuala University - Life...

Proceedings of
The 3rd Annual International Conference Syiah Kuala University (AIC Unsyiah) 2013
In conjunction with
The 2nd International Conference on Multidisciplinary Research (ICMR) 2013
October 2-4, 2013, Banda Aceh, Indonesia

Soil erosion modeling or a microwatershed

[1*]Ricson L. Ines[(1*)] and [2]Romeo B. Gavino

[(1*)] Bataan Peninsula State University, Balanga City, Bataan, Philippines
[(2)] Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines
Coorresponding Author: rhenz554@yahoo.com

Abstract. The objective of this study was to develop a soil erosion model for a microwatershed. The selected watershed area was 2.64 hectares under forest area with plantation crops. Soil erosion factors identified were precipitation, stone cover, soil physical properties, height of vegetation, slope steepness and ground cover. From this mechanism, values of permanent interception, soil cohesion, erosive rainfall intensity, evapotranspiration and infiltration was established. Composition of precipitation, evapotranspiration, infiltration and surface runoff was the water balance basis for the model structure developed. Soil erosion equation (RMMF) model by Morgan was modified. Secondary equation, the kinetic energy of leaf drainage (KE(LD)) was replaced with the kinetic energy equation. Event surface runoff from the original equation of the model was enhanced; it was applied based on the water balance equation (R_s = P – ET – F). Stone cover factor was added to the equation of energy because it has an effect to the raindrop impact. The new model was calibrated and validated by comparing the observed and adjusted soil erosion values for the selected rainfall-runoff event of May to September, 2012. Analysis of data sets used in the calibration of the model yielded calibration equation of Adjusted Dt = 0.456*Dt – 0.878. Data sets during the calibration had correlation coefficient of 90.30%, root mean square error (RMSE) of 27.5 % and coefficient of determination was 81.5%. Calibration equation was included in the model to come up with the final equation that determined total soil erosion rate. In the validation of final model, adjusted detachment rate and the observed value posted 97.9% correlation with root mean square error of 56%. The model could be used as prediction measure in the design and construction of channel structures as well as soil and water conservation practices that may reduce soil erosion.

Keywords : soil erosion, microwatershed, water balance, stone cover