The study was carried out to estimate maximum runoff coefficient and develop dynamic models of rainfall-runoff-sediment yield under different land uses of a hilly watershed. Nine different land uses (Live stock based farming system -W1, timber plantation -W2, agro-forestry -W3, agriculture in bench terrace -W4, agri-horti-silvipastoral system -W5, horticulture -W6, natural vegetation -W7, fellow under shifting cultivation -W8 and pine plantation -W_{AEW}) were considered under farming system research project site at ICAR Research Complex for NEH Region, Umiam, Meghalaya.

The rational method for computing runoff coefficient under different land uses of nine hilly micro watersheds has been successfully used. Amongst the nine different micro watersheds, the highest mean monthly maximum runoff coefficient (0.432) was found in micro watershed W8 (average slope 54.87%) followed by micro watersheds W2 (average slope 38%) and W3 (average slope 33%) with mean monthly values of maximum runoff coefficient of 0.291 and 0.271 respectively. The lowest mean monthly maximum runoff coefficient (0.0705) was found in micro watershed W7 (average slope 53.18%). In the micro watersheds W1 (average slope 32%), W4 (average land slope 32.18%), W5 (average slope 32.42%) and W6 (slope 41.77%) mean monthly maximum runoff coefficient values were obtained 0.0906, 0.1348, 0.1167 and 0.1754 respectively.

For the sediment producing events, the maximum runoff coefficients for the micro watersheds W1, W2, W3, W4 and W5 were found in the range of 0.085-0.098, 0.356-0.518, 0.293-0.359, 0.105-0.191, 0.105-0.189 and 0.181-0.458 respectively. The mean values of maximum runoff coefficient for the micro watersheds W1, W2, W3, W4, W5 and W6 were found 0.091, 0.421, 0.319, 0.138, 0.147 and 0.336 respectively.

For rainfall-runoff process, linear models were found as the best fit in micro watersheds W1, W2, W4 and W5. For micro watersheds W3, W6, W_{AEW}, non-linear models were found as the best fit models. In micro watersheds W7, W8 both linear and non-linear models, were found as the best fit models. Validation statistics of all the best fit linear and non-linear models for the watersheds W1 to W_{AEW} were found to satisfy the criteria of good model.

For runoff-sediment yield process, all linear and non-linear model developed were found at par for the micro watersheds W1, W2, W3, W4, W5, W6, W8 and W_{AEW}. Linear models were declared as the best fit as they are simple to use. Validation statistics of all the best fit linear models for the micro watersheds W1, W2, W3, W4, W5, W6, W8 and W_{AEW} were found to satisfy the criteria of good model.

Conservation factor involves the effects of conservation measure, land use, human or animal interference of a watershed that governs the amount of runoff and soil loss from a slope. Generalised models of rainfall-runoff and runoff-sediment yield were developed using conservation factor as one of the independent variable. For rainfall-runoff process nonlinear generalised models were found as the best fit. Validation statistics models were found to satisfy the criteria of good model. For runoff-sediment yield process both the linear and nonlinear generalised models were found as the best fit. Validation statistics of both the models were also found to satisfy the criteria of good model. Using generalised models of rainfall-runoff and runoff-sediment yield; runoff and sediment yield of similar behaviour micro watershed of a hilly area of the region can be predicted in advance.

Key Words: Maximum Runoff Coefficient, Rainfall-Runoff Dynamic Model, Runoff-Sediment Yield Dynamic Model, Land use, Conservation factor, Hilly Watershed.