CALIBRATION AND VALIDATION OF SWAT MODEL FOR THE STREAMFLOW OF KIRINDI OYA RIVER BASIN IN SRI LANKA

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Hydrological modelling is performed widely to study the dynamics of movement of water and sediment and their impact on the river basins health. Soil and Water Assessment Tool (SWAT) was set up to Kirindi Oya river basin for hydrologic modeling. SWAT-CUP (SWAT-Calibration and Uncertainty Program) was used for model sensitivity, calibration and validation, following the Sequential Uncertainty Fitting technique. The model calibration was performed for 10 years and validated for the subsequent 6 years. To assess the competence of model calibration and uncertainty, two indices; 'p-factor' and 'r-factor' were taken into account. The goodness of fit was further assessed through the use of the coefficient of determination (R^2) and the Nash–Sutcliffe efficiency (NS) between the observed and the final simulated values. The Kirindi Oya river basin was delineated and sub divided into 18 sub basins and 350 hydrological response units during setting the model. Calibration and validation of SWAT model for streamflow at two stations resulted in 'p- factor' in the range of 0.29 to 0.39 and 0.24 to 0.29 during calibration and validation respectively. The 'r-factor' varied from 0.91 to 1.61 and 1.04 to 1.68 during calibration and validation periods respectively. Further statistics during the calibration period (NS = -0.53 to 0.14, R^2 = 0.06 to 0.17) and the validation period (NS = -0.61 to - 0.68, R^2 = 0.02 to 0.04) were not so satisfactory. The reasons for poor performance may be because that this study did not consider the hydrology of tanks and paddy fields in the basin due to non-availability of data and poor quality streamflow data. Therefore, it is suggested to setup the model for the upstream area of the basin where there are no considerable number of tanks and also use quality set of streamflow data for calibration and validation.

Keywords: Soil and Water Assessment Tool, SWAT-Calibration and Uncertainty Program, Kirindi Oya river basin