



Mahanadi river basin model calibration and parameter sensitivity analysis for flood forecasting

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Proper calibration of a hydrological model is essential for understanding the catchment characteristics and adequate prediction of flow in flooding situations. In this study, the Variable Infiltration Capacity (VIC) model is developed for the Mahanadi river basin, located in the eastern part of India which is known to be severely affected by floods. A broader set of eight soil parameters used in the Variable Infiltration Capacity model are subjected to calibration. In this study, the most important parameters chosen for a systematic manual calibration approach are the variable infiltration curve parameter (B), the baseflow parameters (D_m, D_s, W_s) and the depth of the second soil layer (d_2) depending upon the catchment characteristics. The model has been set up and run for the time period of (1990-2013) for the entire basin upto Tikarapara which is located at the downstream of the Hirakud dam. As VIC only considers the naturalized flow without the effect of any water management interventions, the middle region of the Mahanadi river basin, up to the Kantamal gauge station (not having any major reservoirs/dams) is subjected to calibration for the time period of 1990-2000. A sensitivity analysis on the five soil parameters are performed by varying each parameter value around its best estimate by $\pm 10\%$ and $\pm 25\%$. The closeness between the simulated and the observed discharge for change in different parameters are assessed based on R^2 , NSE, P-Bias and the flow duration curves. The sensitivity analysis on the calibrated parameters shows that the variable infiltration curve parameter (B) and the velocity of the baseflow (D_s) are the most sensitive among the model parameters for calibration.