Daily Suspended Sediment Modelling Using ANN, ANFIS, FL, MLR and SRC Models: Vamsadhara River Basin, India

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Abstract—*One of the nature`s greatest gifts to man is land. It takes hundreds to thousands of years to develop a 5 cm layer of fertile soil where as it can be washed away in a single rainstorm event. Present study deals with the sediment estimation for the Vamsadhara river catchment situated between Mahanadi and Godavari river basins in south India. Considering active monsoon period, 70% data were used for model development and remaining 30% data were used for validation. Three daily input data groups were employed using Artificial Neural Networks (ANNs), Adaptive Neuro-Fuzzy Inference System (ANFIS), Fuzzy Logic (FL), Multiple Linear Regression (MLR) and Sediment Rating Curve (SRC) to find the effect of different inputs on sediment concentration in MATLAB (R2009a) for identification of most efficient model type. Three different types of performance indicators viz. root mean square error (RMSE), correlation coefficient (r) and coefficient of efficiency (CE) were used to evaluate the accuracy of various models. Based on the performance analysis a SRC model, three MLR models, three FL models, three ANN models out of eighteen (six for each case) and three ANFIS models out of thirty-six (twelve for each case) were selected for comparison. Comparison results indicated that Neuro-Fuzzy model (RMSE-44.02 kg/sec, r-0.995 and CE value 99.06%) is superior to ANN, FL, SRC and MLR models for simulating daily sediment concentration in Vamsadhara river basin India. Results also, revealed that Neuro-Fuzzy models are in good agreement with the observed values and present better performance in comparison to the statistical models.*