# Rainfall-runoff modelling using co-active neuro fuzzy interface system (CANFIS) and multiple linear regression (MLR) techniques for Karso watershed

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**ABSTRACT:** Rainfall-runoff modelling is one of the most important topics in water resources planning, development and management to reduce flood risks by providing a flood warning and mitigation system which includes complex relationship between rainfall and runoff. This study was undertaken to develop and evaluate the applicability of Co-Active Neuro Fuzzy Interface System (CANFIS) and Multiple Linear Regression (MLR) models to simulate runoff from a watershed. The performance of the developed models, on the basis of training and testing, was judged on the basis of three statistical measures such as root mean squared error (RMSE), coefficient of efficiency (CE) and correlation coefficient (r) during monsoon period (June to September) for Karso watershed of Damodar-Barakar basin in the Hazaribagh district of Jharkhand state of India. Appropriate input parameters for these models were selected on the basis of Gamma test. The Neuro Solution 5.0 software and Microsoft Excel were used in analysis and the performance evaluation of developed models, respectively. The architecture of CANFIS was designed with Gaussian membership function, Takagi-Sugeno-Kang fuzzy model, hyperbolic tangent activation function and Delta-Bar-Delta learning algorithm. The result indicated that the predicted runoff using CANFIS model was found to be in close agreement with the observed one for the Karso watersheds. Therefore, according to CANFIS model, the current day's runoff can be simulated on the basis of current and previous day's rainfall and previous two days' runoff for the Karso watershed. This study also gave clear indication of non-applicability of the MLR model to simulate runoff for the study watersheds.