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## Development of rainfall-runoff models using Mamdani type fuzzy inference systems

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Fuzzy inference systems (FIS) are non-linear models that describe the relation between the inputs and the output of a real system using a set of fuzzy IF-THEN rules. Although FIS have been widely applied in areas as diverse as control and decisionmaking, their use in the hydrologic sciences is still rather limited. This study explores the application of Mamdani type FIS to the development of rainfall-runoff models operating on a daily basis, using a system based approach. The model proposed uses a Rainfall Index, obtained from the weighted sum of the most recently observed rainfall values, as input information. The study area is the Shiguan-3 catchment in China, which has an area of 3092 Km<sup>2</sup> and is located in a typical monsoon influenced climate region. The performance of the fuzzy model is assessed through the mean squared error and the coefficient of efficiency  $R^2$  performance indexes, both in the calibration and the verification period. The results of the fuzzy model are compared with those of two more traditional rainfall-runoff models, namely the Simple Linear Model and the Non-Linear Perturbation Model, which use the same input information. Overall, the results of this study indicate that Mamdani type FIS are a suitable alternative for modelling the rainfall-runoff relationship.