Comparison of Feed forward and Recurrent Artificial Neural Networks for Predicting River Flow at Gaborone Reservoir in Botswana

Ditiro B. Moalafhi, Bhagabat P. Parida* , Piet K. Kenabatho and N. Chaturvedi

Abstract

Modeling of the rainfall-runoff relationships for prediction of watershed runoff continues to challenge the imagination of hydrologists. Non-linearity and high spatial variability that often characterise this relationship, especially for semi-arid environments like Botswana, makes the problem even more complex. An attempt has been made in this study to use Artificial Neural Networks (ANNs) to predict inflows into Gaborone dam in south eastern Botswana. The performance of the feed forward neural network (FNN) and the recurrent neural network (RNN) were compared for the predictions. Monthly rainfall from six rainfall stations and evaporation over the catchment were used. While the study showed that ANNs may offer a robust framework for improving water supply planning in semi-arid areas where river flows are limited and highly variable, inclusion of feedback through use of RNNs provides improvement on FNNs.