FLOW DURATION CURVE MODELING AT UNGAUGED BASIN USING REGIONALIZATION APPROACHES

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ABSTRACT

Long-term hydrological information is quite essential for various application in water resources management. However, many parts of the world are challenging because of low density and inadequate spatial distribution of hydrometric networks. Specifically in Pakistan small fraction of basin are gauged and all other basin are still ungauged. Hence, this study attempted to provide a framework for better predication of hydrological information at ungauged basin in Pakistan. In current study concept of ensemble hydrological predication using simple Tyler skill Score (STSS) was introduce to ensemble the output of regionalization method i.e., Artificial Neural Network, (ANN), inverse distance weightage (IDW) and Stepwise regression (SWR). Simple Tyler skill Score (STSS) method is mainly based on performance weight derived from coefficient of determination R^2 and hydrological variables.

The overall performance evaluation based on coefficient of determination (R^2), correlation coefficient (r), root mean square error (RMSE) and Percent bias (PBIAS), it indicates that Purposed Tyler skill Score (STSS) based ensemble method provided more robust estimate (with R^2=0.972) flow duration curve as compared to other methods i.e., (ANN), (IDW) and (SWR).

Moreover, ANN performance was comparatively better than the SWR (3rd best performed approach) and IDW method. The result emphasizes that in upper Indus basin, the characteristics of the watershed matter more than the physical distance between gauged and ungauged areas. Furthermore, it was observed that combining three approaches can give a considerable weight to individual approach and help to optimize each technique's benefits while reducing its shortcomings.