CALIBRATION OF STANFORD WATERSHED MODEL FOR LOCAL CATCHMENT CONDITIONS

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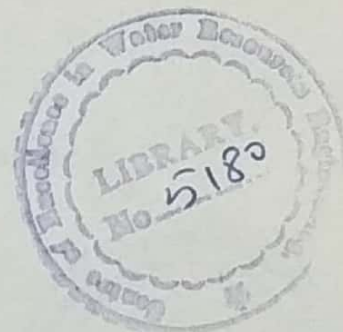
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ABSTRACT

The study deals with the application, calibration and validation of the conceptual rainfall-runoff model for local catchment conditions.

In the tributaries of Jhelum River, flows have high seasonal and year to year variation i.e their flow pattern is very uncertain. Due to uncertainty of flows, damage caused by flood is also considerable. The situation can be improved by suitable operation of the system of reservoirs and canals in the River basin. One of the pre-requisites of the proper operation is the forecasting of the flows. A conceptual, mathematical model, which simulates the daily streamflows, was chosen for the study.

In this study, a conceptual physically-based rainfall-runoff model was applied, tested and calibrated for forecasting the flows. The selected model was calibrated using nine years (1971-1979) data of streamflow for Kanshi River basin and then used to simulate the daily flows. In this model, thirty six parameters are required for calibration. The parameters of the conceptual model were calibrated using observed data of the watershed.

Precipitation, observed discharge and pan (U.S. class A) evaporation were the primary data inputs required along with some information about catchment geomorphology. Mean areal rainfall (1971- 1979) was evaluated by using Thiessen polygon technique using the data of two meteorological stations viz. Gujar Khan and Kallar. Then these mean areal rainfall values were used in the further computation. The model was applied without snowmelt subroutine because snowmelt contribution was negligible in the Kanshi River basin. Lumped parametric approach was used.

Adequacy of the well calibrated model was verified by using data (1980-1983) of the watershed other than that used to calibrate the model. Validity of the model was tested by comparing the daily observed and forecasted flows for (1980-1983).

Results (R^2 for calibration period 0.92 and for testing period 0.87) achieved are quite satisfactory and indicate that the model can be used for flow simulation in Kanshi River basin. The simulated flows by the model show a close agreement with the actual

observed flows. The model is best suitable for high flows simulation. The flows simulated by the model almost adopt the observed pattern. The model can be used effectively for medium and high flows simulation.

Finally, it was concluded that daily streamflow simulation by Stanford Watershed model of Kanshi River basin is good.