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A MODEL STUDY FOR STREAM FLOW OF CHALIYAR

The main climatic factor affecting run-off is rainfall and the morphological factors include drainage area and the stream characteristics (Gregory and Walling, 1973). A regression model was attempted for the stream flow of Chaliyar river basin at the Kelappaji College of Agricultural Engineering and Technology, Tavanur, Malappuram.

The rainfall and stream flow data were collected from the Water Resources Divisional Office, Kerala PWD, Trichur. The river basin was divided into ten sub-basins with each sub-basin containing a river gauge station. Since drainage area was related to the stream characteristics, it was considered as the morphological factor influencing stream flow and was measured from topographical maps. Rainfall contributing to the stream flow was considered as the arithmetic average of the rainfall collected at various rain gauge stations in the vicinity of each river gauge station. The weighted daily river flow was computed from which the monthly and annual flow required for the analysis were calculated. The data for the period 1976-85 were split into two viz., 1976-80 and 1981-85.

Non-monsoon rainfall contributed only a small fraction of the total rainfall and was found to have no significant correlations with the discharge. Hence, monsoon rainfall was only coasidered for final analysis. Correlation coefficients of the average monthly monsoon discharge during 1976-80 and 1981-85 with the drainage area were 0.96** and 0.97** respectively. Benson (1962) obtained high correlations with flood flow and drainage area. Discharge contributed by unit area is obviously due to rainfall (r=0.87* for both periods). Correlations of annual monsoon discharge and total discharge with the monsoon and total rainfall were more or less the same (r=0.65*). Empirical equations were developed for annual stream flow of different river basins of Kerala using annual rainfall of the same year and the previous year (Anon., 1974). The relationship between the monthly monsoon discharge and the rainfall of the same month and that of the previous two months was examined. The

Table 1. Average monthly monsoon discharge per unit area, Mm^3/km^2

Sub-basin	Monthly monsoon discharge per area	
	Observed	Calculated
1986		
1 Kuthirapuzha	0.190	0.193
2 Mukkom	0.394	0.269
3 Maruthapuzha	0.187	0.134
4 Chaliyar	0.114	0.189
5 Koodathai	0.349	0.327
6 Punnapuzha	0.180	0.185
7 Arecord	0.229	0.229
8 Karimpuzha	0.148	0.145
1987		
1 Kuthirapuzha	0.206	0.199
2 Mukkom	0.202	0.242
3 Maruthapuzha	0.170	0.158
4 Chaliyar	0.119	0.209
5 Koodathai	0.512	0.523
6 Punnapuzha	0.102	0.112
7 Arecode	0.170	0.174
8 Karimpuzha	0.152	0.155
*1988**		
1 Kuthirapuzha	0.553	0.655
2 Mukkom	0.240	0.250
3 Maruthapuzha	0.418	0.441
4 Chaliyar	0.235	0.251
5 Koodathai	0.279	0.314
6 Punnapuzha	0.365	0.365
7 Arecode	0.553	0.554
8 Karimpuzha	0.235	0.251

*Rainfall data available from one of the representative rain gauge stations were used

correlation coefficient varied from 0.80-0.91 for the rainfall of the same month. However, the extent of relationship was found to have decreasing trend for earlier months. An empirical equation for average monthly monsoon discharge per unit area was developed as: $qm_1 = 0.0014707\ P - 0.23605$ ($r = 0.90^{**}$) and $qm_2 = 0.0008409\ 5P - 0.0495737$ ($r = 0.897^{**}$) where qm_1 was average monthly monsoon discharge during 1976-80 (Mm^3/km^2), qm_2 was average monthly monsoon discharge per unit area during 1981-85 (Mm^3/km^2) and P was the average monthly monsoon

discharge (nun). The equation developed for 1981-85 was found more adaptable to study the trend of stream flow (Table 1). Rainfall data were not available for the sub-basins Chaliyar and Mukkom and hence showed some deviations. The projected discharge is an indication of the response of the river basin to rainfall.

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