Pak. J. Agri. Sci., Vol. 21 (1-2), 1984

RAINFALL TRENDS AND CYCLIC VARIATIONS AT FAISALABAD

M. A. Salimi* and N. A. Parwaz

ABSTRACT

The analysis of the rainfall data (1961-1980) of Faisalabad revealed decreasing trend upto 1970, whereas increasing trend was noticed afterwards. The contribution to this increasing tendency after 1970 was mainly made by summer rainfall.

INTRODUCTION

The source of all fresh water on the earth is precipitation in the form of rain, snow, hail, frost and dew. Variations of precipitation in time and space are obvious even to those living in areas were precipitation is fairly evenly distributed throughout the year and does not vary greatly from place to place. However, this variability of precipitation from the coastal area to the interior, and from winter to summer is an obvious fact which to a large extent determines one's livelihood and social activities.

While portions of a precipitation record may suggest an increasing or decreasing trend, there is usually a tendency to return to the mean; abnormally wet periods tend to be balanced by dry periods. The regularity of these fluctuations has been repeatedly investigated. More than 100 apparent cycles, ranging in period from 1 to 744 years have been reported by Shaw (1942). However, with the exception of diurnal and seasonal variations, no persistent cycles of any appreciable magnitude have been conclusively demonstrated (Landsberg, 1945).

The rainfall data were analysed by Dyer (1977) to trace the periodicities. He indicated that if the regional temporal series were smoothed out and it was assumed that the past patterns in these series continued to repeat themselves, subjective forecasts for the general behaviour of rainfall could be made.

MATERIALS AND METHODS

The data used in the present study have been recorded at the Meteorological Observatory, Faisalabad.

*Department of Physics and Meteorology, University of Agriculture, Faisalabad;

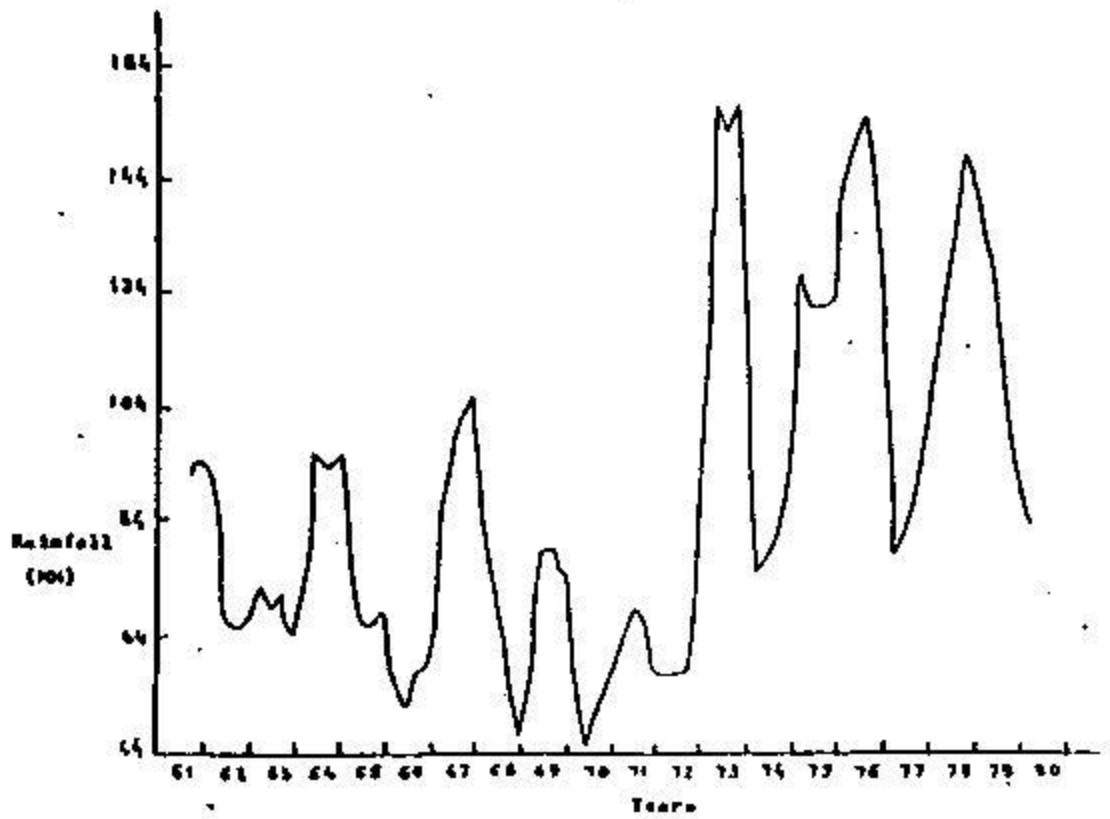

Fig.1 RAINFALL TRENDS (3-SEASONS CENTRED MOVING AVERAGE)

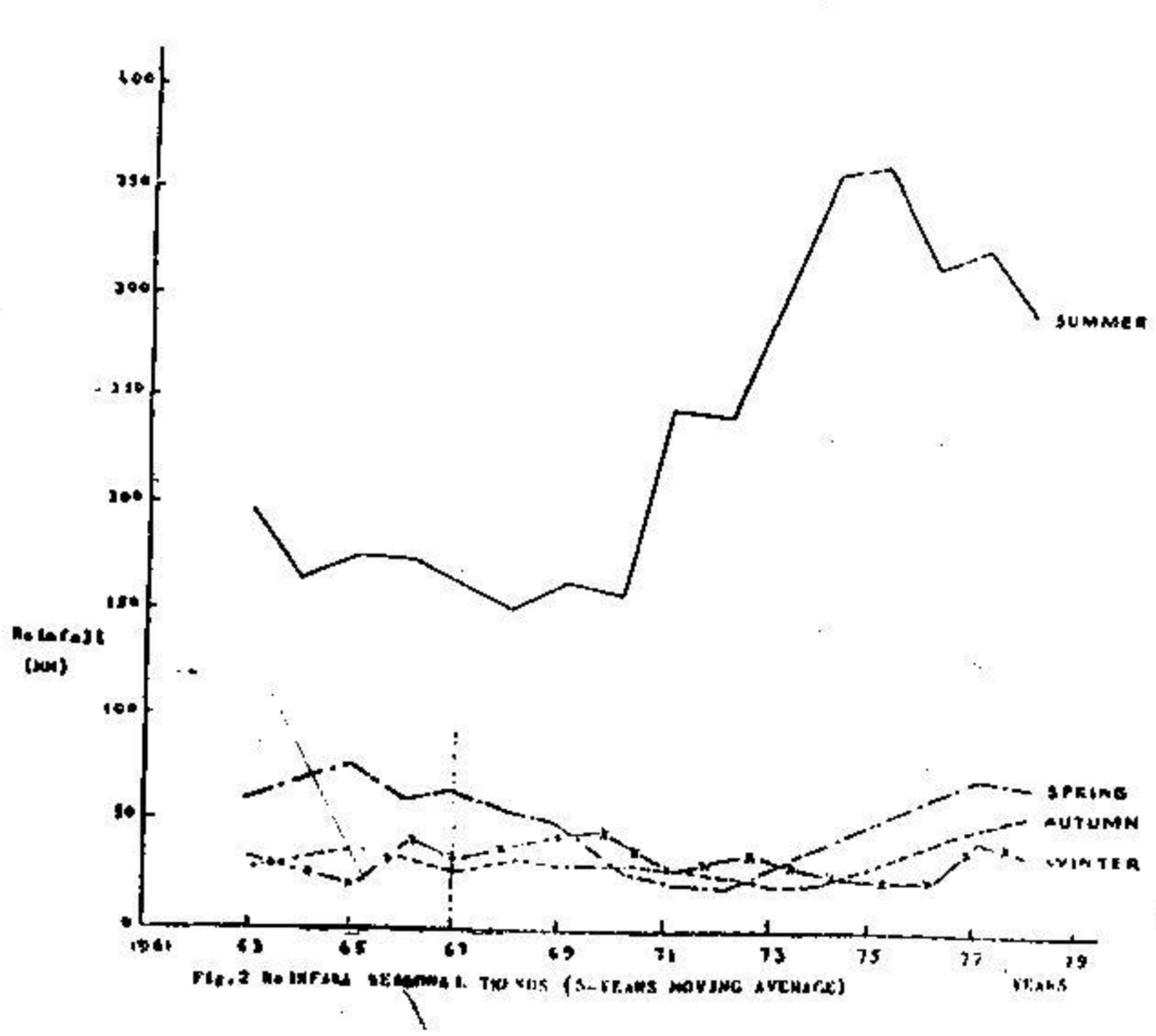

Fig.2 RAINFALL SEASONAL TRENDS (5-YEARS MOVING AVERAGE)

Rainfall Trends

Time series analysis of the data was performed to find out the trends and cyclic variations of the rainfall at Faisalabad. A year was divided into four seasons —— December, January, February as winter; March, April, May as spring; June,July, August as summer and September, October and November as autumn. Trend values were calculated by taking the 3-seasons centred moving average and the seasonal trends were calculated by taking 5—years moving average of the rainfall totals.

RESULTS AND DISCUSSIGN

Twenty years (1961-80) seasonal rainfall totals were analysed for the trends by taking the 3-seasons centred moving average and the results were plotted. The gragh in Fig. 1 shows a decreasing trend upto 1970. After 1970, there was a tendency for increasing rainfalls. The means of the seasonal rainfall total for 1961-1980 are shown in Table 1.

Table 1. *Mean of the seasonal rainfall totals for 1961-1980 with standard deviation*

	Winter	Spring	Summer	Autumn
Rainfall (minimum)	35.83	53.09	235.05	34.28
Standard deviation	30.88	29.81	119.96	25.20

Seasonal trends were calculated by taking 5-years moving averages of the rainfall totals for each season separately. The results are plotted in Fig.2. There does not seem to be any change in winter rainfall but spring and autumn rainfall increased slightly after 1972 and 1973, respectively, whereas there is a sharp increase in summer rainfall after 1970. The analysis was extended to find out the cyclic variations of rainfall at Faisalabad. These results are supported by Landsberg's findings (1945).

REFERENCES

Dyer, T.G.J. 1977. On the application of some stochastic models to precipitation forecasting. The quarterly Journal of Royal Met. Society, 103 : 177-189.

Landsberg, H. 1945. Handbook of Meteorology, McGraw-Hill, New York.

Murray, R. 1967. Sequences in monthly rainfall over England and Wales. Met. Mag. 96 : 129-135.

Murray, R. 1968. Sequences in monthly rainfall over Scotland. Met. Mag. 97 : 181-183.

Shaw, N. 1942. Manual of Meteorology Cambridge, London 2.