

**M.S.92. SHADANANAN NAIR, K.—Hydrometeorological studies of Kerala State in relation to the Western Ghats—1988—
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The thesis is a hydrometeorological appraisal of Kerala State in relation to the Western Ghats using the water balance concepts first developed by Thornthwaite. Data of monthly rainfall and temperature for the period 1901 to 1980 have been used for a hydroclimatic study of the entire Western Ghats region and a more detailed hydrometeorological study of the Kerala State.

The study reveals that the coastal belt between the Arabian Sea and the Ghats receives abundant rainfall, upto 600 cms. in some isolated locations in an year. Most of the rainfall occurs during the southwest monsoon season while the northeast monsoon rainfall is significant only in the southern parts. About 20% to 40% of the rainfall in the Ghats region is available for exploitation. However, in the central parts it is upto 60%. The leeward side of the Ghats gets scanty rainfall only.

The State of Kerala lies on the western flanks of the southern portion of the Ghats. Here, the rainfall increases from 150 cms. in the south to more than 350 cms. in the northern districts of the State. The number of rainy days increases from 90 in the north to 120 in the south, as a result of the influence of northeast monsoon in the south. Annual rainfall is more stable and reliable compared to the seasonal rainfall. In general, stations experiencing high rainfall exhibit more stability of rainfall than low rainfall stations. No periodicity is observed in the occurrence of annual rainfall departures in the drier or wetter directions.

Studies on the water balance parameters reveal that on an average, there exists an annual water need (potential evapotranspiration) of 170 cms. in the whole State whereas the actual evapotranspiration ranges from 130 cms. to 150 cms; an annual water deficiency of 25 cms. to 30 cms. exists. The annual water surpluses vary from 50 cms. in the south to 200 cms. in the north. Surpluses do not occur during pre-monsoon and winter months, but runoff occurs in all the seasons the maximum being in the southwest monsoon months. The surface runoff ranges from 30 cms. in the south to 100 cms. in the north. The underground flow is more than 100 cms. along the coast and between 20 cms. and 50 cms. in the Ghats region.

Studies of the drought climatology of the State reveal that all stations in Kerala have experienced droughts, including disastrous ones in about 50% of the years of study. But there is no evidence of any spatial coherence of droughts—droughts do not necessarily occur at the same time in the different parts of the State and even if many parts experience droughts in the same year, they are not of the same intensity. Therefore, it appears that most droughts over Kerala, even disastrous ones, are due to local variations in rainfall in different parts of the State rather than large scale anomalies in the general circulation over the region.

Studies of the climatic shifts show that the moisture regimes of different parts of the State undergo wide fluctuations, both towards drier and wetter directions. The water balance studies of the extreme dry and wet years and the years of disastrous droughts reinforce the idea that it is the distribution of rainfall and not the total amount that determines the water deficiencies or surpluses of a region. Even in the driest year, water surpluses do not altogether cease, but

deficiencies rise to higher levels. Similarly, even in the wettest year, water deficiencies do occur, even though surpluses rise to high levels.

It is suggested that optimum utilization and careful management of the water resources are essential for the overall development of the State. The large water surplus and surface flow during southwest monsoon season can be harnessed for use during other seasons. Small check dams are more suitable in the Ghats than large hydrological projects because of the short length of river basins and steep slopes of the Ghats.