SPATIAL AND TEMPORAL VARIATIONS OF RAINFALL AND RAINY DAYS OVER THE WET ZONE OF SRI LANKA

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Introduction

Rainfall variability over space and time must be regarded as the most remarkable aspect of the monsoon climate in Sri Lanka. In summer season, warm and moist air blowing from the ocean towards land with southwest monsoon (SWM) wind crossing the island. The spatial difference has been observed specially between the southwest and northeast monsoon period in the country. A large percentage of the total population in Sri Lanka derives its income from agriculture from wet zone. Therefore, the economic significance of southwest monsoon is enormous to Sri Lanka. Hence, it is a timely need to understand spatial and temporal variations of rainfall in the wet zone in order to formulate appropriate policy responses to mitigate the possible negative impacts of the water resources. The present study examined the spatial and temporal variations of annual rainfall and rainy days and SWM rainfall and rainy days in the Wet zone. The amount of the total rainfall and rainy days must be regarded as a rigorous event causing drought or floods as hydrological threats in the Wet zone. Such characteristics seriously affect the water cycle over the year defining a rainfall surplus period against a rainfall deficit period.

Materials and Methods

The daily rainfall data has been collected from Meteorological Department at Colombo, for eight selected stations in the wet zone namely: *Annifield, Helboda, Holmwood, Kandy, Rathnapura, Colombo, Galle and Negombo* from 1975 to 2007. The annual average rainfall and number of rainy days have been calculated for each station for the above period. The criterion for a *rainy day* has been taken with a minimum 0.3 mm rain/per day according to the definition given by the Meteorology Department. The annual average rainfall and rainy days, SWM average rainfall and rainy days have been calculated using time series analysis. Linear trend/ regression analysis was also utilized to apply a best-fit straight line to display simple linear trend to observe the increase or decrease trend at a steady rate. Mathematically, the best fit line was represented by the equation: $y = mx + b$: where `$m$` is the *slope* and `$b$` the *intercept*. For testing the significance of trends the trend to noise ratio was also applied.

Results and Discussions

It has been observed that the average annual rainfall at *Rathnapura* is 3680 mm distributed over 220 rainy days while at *Negombo*, it was 1461 mm distributed over 82 days. However, the highest annual rainfall and rainy days was recorded in *Rathnapura* among the stations selected. It has been observed that the SWM rainfall at *Rathnapura* was 1821 mm distributed over 108 rainy days while at

Negombo, it was 568 mm distributed over 36 days (Table 1 and figure 1). The rainfall intensity was very high at *Rathnapura*. The second highest value was recorded at Kandy. The lowest value of the intensity was noticed at *Helboda*.

Table 1: Annual Average Rainfall (mm) and SWM Average Rainfall*_Rainy days_ on the Wet zone: 1975-2007

Wet-zone stations	Annual average rainfall	Annual average rainy days	SWM average rainfall	SWM average rainy days
Annifield	2657	179	1466	94
Colombo	2241	158	988	77
Galle	2456	159	1163	81
Helboda	2578	151	1345	79
Holmwood	1743	156	813	80
Kandy	1751	166	627	77
Negombo	1461	82	568	36
Rathnapura	3680	220	1821	108

Source: Calculated by the author, based on rainfall records of Department of Meteorology, Colombo

Notes: (* *Rainy day* = ≥ 0.3mm) SWM: South West Monsoon

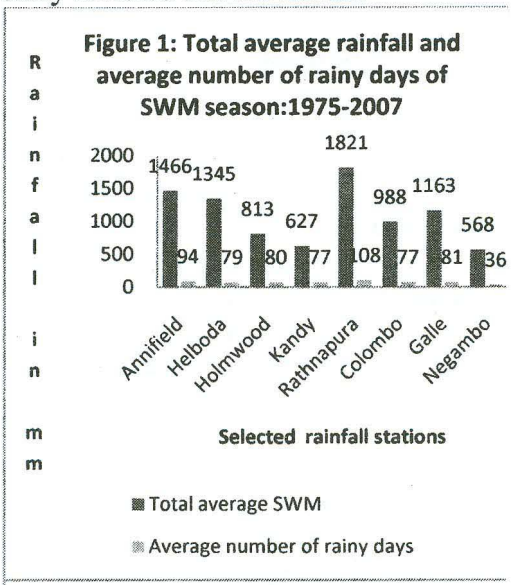
Total average rainfall was 2321 mm and average *rainy day* was 159 for Wet zone. Total average rainfall of the SWM season was 1099 mm and average rainy days was 79 for Wet zone. The complex diversities of daily rainfall variability were also shown by comparing stations as daily rainfall totals at *Rathnapura* and *Negombo* for July, 2007 (Fig. 2). The greater number of rainy days at *Rathnapura* results from the strong SWM activity in July whereas *Negombo* experience less number of rainy days due to less influence of the SWM. The study revealed that the rainfall intensity was highest in *Rathnapura* and lowest at *Helboda*. Trends of computations for the total annual average rainfall showed a negative development (with the exception of *Galle*, *Helboda*, *Negombo* and *Rathnapura*) but the values were not significant due to their small magnitude. Regression analyses showed that the annual average rainfall had been decreasing at the rate of -25mm/per year at *Holmwood* (Figure 3). The annual average of rainfall had been increasing at the rate of +33mm/per year at *Galle*. The SWM average rainfall had also been increasing at the rate of +32mm/per year at *Galle*. All the other stations also indicated non-significant decreasing or increasing trends when apply the trend to noise ratio.

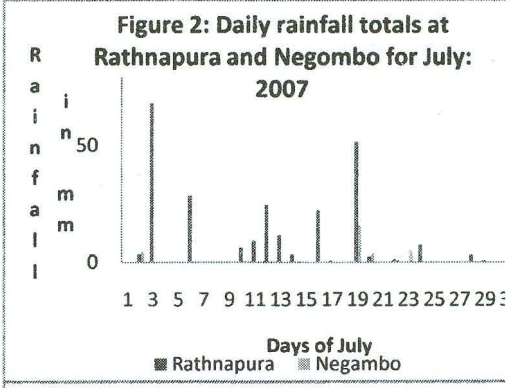
Trend computations for the annual total rainy days demonstrated a negative development (exception of *Kandy*) but the values were negligible due to their small magnitude for the observation period. Trend computations for the SWM rainy days show a negative development for all the stations but the values were negligible due to their small magnitude in the observation period of 1975-2007.

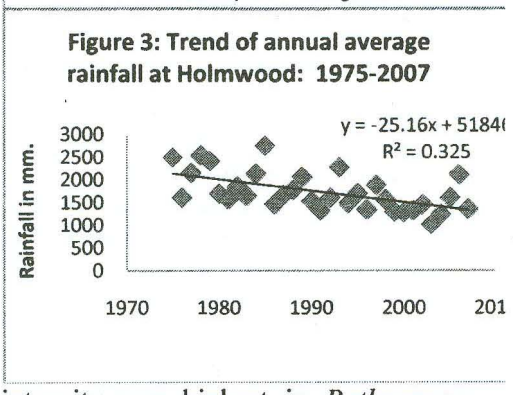
Conclusion

It has been observed that the highest annual average rainfall and rainy days were recorded at *Rathnapura* while lowest rainfall values and rainy days were recorded at *Negombo*. The highest SWM rainfall and rainy days were also recorded at *Rathnapura* while lowest SWM rainfall and rainy

days were recorded at *Negombo*. The study revealed that the rainfall







intensity was highest in *Rathnapura* and lowest at *Helboda*. The complex diversities of daily rainfall variability were also noticed at *Rathnapura* and *Negombo*. Trend computations for the total annual average rainfall showed a negative development (exception of *Galle, Helboda, Negombo and Rathnapura*) but the values were negligible due to their small magnitude. Trends computations for the SWM average rainfall showed a negative development (exception of *Galle* and *Helboda*) but the values were not significant. It can be concluded that, there were no significant shifts or jumps present in the monthly time series data on the study period. However, it is also require more time series data to arrive at more concrete conclusion. Since, there were no significant variations in the mean of the time series and trends; it is necessary to use long term series of historical records for identifying the actual variations and trends. The more detail investigations should be carried out with long term data series with spatially scattered rainfall stations to obtain a higher reliability of estimation.

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References

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