

Rainfall and Flood Events in the Deduruoya Basin in Sri Lanka

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Disaster risk reduction of vulnerable communities is a requirement for the well-being of society. Among many natural disasters, the flood can be identified as the most frequent and threatening disaster in Sri Lanka. A proper study of the relationship between rainfall and flood within the Deduruoya basin has not yet been conducted, therefore it is essential in flood risk management. This study aimed to find the trend of rainfall and the relationship between rainfall and flood in the Deduruoya basin. A time series analysis was employed to find the trend of rainfall using the R software. The Mann-Kendall test and Sen's Slope estimate were used for trend detection. A correlation analysis was performed to find the relationship between flood and rainfall. The study was conducted from 1960 to 2019. A significant decreasing trend of monthly mean rainfall was observed in the basin as a whole during the study period. The average monthly rainfall was 140 mm in 1960 and it was decreased to 120 mm by 1985 and further decreased to 108 mm in 2019. The overall reduction of the monthly mean rainfall was 32 mm over the 60 years. This was confirmed by the Mann Kendall test with the $P = 0.01$ confirming a significant trend. As per the tau value of the MK test, it was reported as -0.06 confirming the overall decreasing trend. The Sen's Slope estimate has also confirmed the result (-0.03). 23 flood events were identified in the Deduruoya basin from 1978 to 2020. Eleven flood events (48%) have been occurred in the Second Inter Monsoon (SIM), 07 (30%) events have been occurred in the North East Monsoon (NEM) and 05 flood events (22%) were occurred in South West Monsoon (SWM). No floods have been reported in First Inter Monsoon (FIM) season from March to April. The study revealed that the SIM and NEM seasons' rainfall has a strong relationship with floods (78% floods). The findings will be important for flood risk reduction in the Deduruoya basin.

Keywords: Rainfall trend; Flood pattern; Flood risk; Relationship between rainfall and floods; Deduruoya basin