

Trends of Seasonal and Annual Rainfall in the South-Central Climatic Zone of Bangladesh Using Mann-Kendall Trend Test

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Abstract : Investigation of rainfall trends is crucial considering climate change, food security, and the economy of a particular region. This research aims to study seasonal and annual precipitation trends and their abrupt changes over time in the south-central climatic zone of Bangladesh using monthly time series data of 50 years (1970-2019). A trend-free pre-whitening method has been employed to make necessary adjustments for autocorrelations in the rainfall data. Trends in rainfall and their intensity have been observed using the non-parametric Mann-Kendall test and Theil-Sen estimator. Significant changes and fluctuation points in the data series have been detected using the sequential Mann-Kendall test at the 95% confidence limit. The study findings show that most of the rainfall stations in the study area have a decreasing precipitation pattern throughout all seasons. The maximum decline in the rainfall intensity has been found for the Tangail station (-8.24 mm/year) during monsoon. Madaripur and Chandpur stations have shown slight positive trends in post-monsoon rainfall. In terms of annual precipitation, a negative rainfall pattern has been identified in each station, with a maximum decrement (-) of 14.48 mm/year at Chandpur. However, all the trends are statistically non-significant within the 95% confidence interval, and their monotonic association with time ranges from very weak to weak. From the sequential Mann-Kendall test, the year of changing points for annual and seasonal downward precipitation trends occur mostly after the 90s for Dhaka and Barishal stations. For Chandpur, the fluctuation points arrive after the mid-70s in most cases.

Keywords : trend analysis, Mann-Kendall test, Theil-Sen estimator, sequential Mann-Kendall test, rainfall trend

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