

Rainfall anomalies and their correlation with the El Niño Southern Oscillation in the Anuradhapura District, Sri Lanka

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The El-Niño Southern Oscillation (ENSO) is a major climate driver in South Asia, and its two phases, El-Niño and La-Niña, have a crucial impact on rainfall patterns. While some ENSO studies have been conducted in Sri Lanka, a significant research gap exists: most available data is limited up to the year 2010. Furthermore, there is a lack of micro-level studies on specific, agriculturally vital areas. This study aims to fill this gap by focusing on the Anuradhapura District. The objective of this research was to explore rainfall anomalies and analyse their correlation with El-Niño and La-Niña events in the Anuradhapura district from 1961 to 2020. The research relied entirely on secondary data from the Department of Meteorology Sri Lanka, and the Bureau of Meteorology, Australia. The Standardised Precipitation Index (SPI) was used to analyse rainfall anomalies, classifying above-average rainfall as wet conditions and below-average rainfall as dry. Of 22 recorded El-Niño events, 13 (59.1%) coincided with wet conditions, predominantly in October and November. Their severity was categorised as extreme (46%), very wet (23%), and moderately wet (31%). Conversely, only four El-Niño events aligned with moderate dry conditions in January, March, and September. Of 21 La-Niña events, 48% correlated with dry conditions, mainly in October and November. The severity of these dry periods was 10% extreme, 40% severe, and 50% moderate. Wet conditions occurred in 29% of La Niña events, with extreme, severe, and moderate categories equally represented, primarily in March, April, July, and August. By combining the robust analytical method of the SPI with the context of ENSO events, this study provides a detailed and localised understanding of the climate drivers behind rainfall anomalies in Anuradhapura, which is vital for developing effective strategies to mitigate the impacts of floods and droughts on its agricultural economy.

Keywords: *Anuradhapura District, El Niño Southern Oscillation, Rainfall anomalies, Standardised Precipitation Index*