

An Assessment on the Possibility of Predicting Excessive Conditions of Seasonal Rainfall in Sri Lanka Using the Southern Oscillation Phenomenon

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Seasonal rainfall in Sri Lanka is subjected to higher inter-annual variability in recent decades, leading to inherent problems in the socio-economic environments of the country. Therefore, it has become essential for the identification of possibility to predict the seasonal rainfall variability of the country in advance. It has been identified that the El-Niño Southern Oscillation (ENSO) phenomenon is the most important key to the inter-annual variability of the tropical region. Predictions of ENSO indices are available 3-6 months in advance. This study focused on assessing the possibility of predicting excessive conditions of seasonal rainfall in Sri Lanka using the two extremes of the ENSO phenomenon; El-Niño and La-Niña events. Both excessive wet and dry conditions of seasonal rainfall were compared with multiple ENSO events which occurred during the period of 1951-2010. The standardized precipitation index (SPI) was computed from seasonal rainfall based on four rainy seasons prevailing in the country to identify the excessive wet and dry conditions. The study was confined to 23 administrative districts of the country. A binomial probability test called 'BINOMDIST' was used to determine possible statistically significant relationship between the considered two variables. Results of the analyses revealed that, excessively dry conditions during the first inter-monsoon (FIM), southwest monsoon (SWM) and northeast monsoon (NEM) seasons were well associated with El-Niño years. Whilst, excessive wet conditions were marked in El-Niño years during the second inter-monsoon (SIM) season in almost all the study areas. Overall, a somewhat weaker association was found between La-Niña and excessively wet conditions. Results of the binomial probability test showed that all the major southwest monsoon drought conditions in Sri Lanka were observed in the El-Niño years, whilst almost all the excessive wet conditions during the SIM season have occurred in the El-Niño years. The study found that an extreme drought condition occurred during the SWM season in 1982 for all the study areas. This event was well comparable with the El Niño year in 1982 which was the strongest and most devastating event of the last century. The study also revealed that the whole island was not influenced by the ENSO phenomenon in the same manner.

Keywords: Seasonal rainfall, Inter-annual variability, El Niño Southern Oscillation, Standardized precipitation index