

Assessment of Drought Impact on Paddy Production in Ampara District using Standardized Precipitation Index (SPI)

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Drought, described as a prolonged period of receiving insufficient rainfall, has a significant impact on paddy production. The objective of this study was to assess the impact of agricultural drought on paddy production in Ampara district using the Standardized Precipitation Index (SPI). Rainfall and temperature data for the 1990 - 2020 period from six weather stations (i.e., Malwatta, Ampara Tank, Pottuvil, Sagaman Tank, Maha Oya and Irakkamam) in Ampara district, as well as annual paddy yield statistics from 2000 to 2020, were collected. The Mann-Kendall test and Sen's slope estimator were used to assess the trends of annual rainfall variability over 31 years. Drought occurrence was assessed using the SPI for standard periods. Yield prediction models were developed using Standardized Precipitation Index (SPI) values and temperature for *Yala* and *Maha* seasons. To generalize SPI values across the study area, inverse distance weighting (IDW) interpolation was employed in ArcGIS software. Results revealed that the annual rainfall variability at five sub-weather stations showed no growing or decreasing trend from 1990 to 2020, except Mahaoya. There were 380 and 174 drought events with duration of 3-month and 6-month, respectively. In 2012, there was an extreme drought near Pottuvil area, and in 2019, near the Mahaoya area. According to the regression analysis, mean annual temperature and SPI had a significant effect on paddy production in Ampara district ($p < 0.05$). However, the yield prediction models with SPI and temperature products had low R² values of 37% and 45% for the *Yala* and *Maha* seasons, respectively, suggesting that more other predictors should be incorporated in future studies to increase model accuracy. Paddy production over 20 years showed positive and negative correlations with SPI at 6-month time scales during the *Yala* and *Maha* seasons, respectively. Overall, both drought and rising temperature have caused detrimental impacts on paddy production in Ampara District. Decision-makers should consider adaptation and mitigation strategies to address these challenges.

Keywords: *Ampara District, Drought, Paddy, Rainfall, Standardized Precipitation Index*