

ASSESSING THE RELATIONSHIP BETWEEN CLIMATE CHANGE AND PADDY PRODUCTIVITY IN MAJOR PADDY-PRODUCING DISTRICTS IN SRI LANKA AND FUTURE SIMULATION USING DSSAT

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In Sri Lanka, agriculture is highly susceptible to the impacts of climate change, experiencing changes in the onset, distribution and the amount of rainfall, along with little seasonal annual variation of temperature. With rice being the country's staple food, it is crucial to examine the variation and the relationship between climate change and paddy productivity for both *Yala* and *Maha* seasons. To achieve this, four major paddy-producing districts; Ampara, Anuradhapura, Polonnaruwa, and Kurunegala were selected, and data from various secondary sources were collected. The Mann-Kendall trend test and Sen's slope analysis confirmed a significant increasing trend ($p < 0.05$) in rainfall during the *Yala* season in Anuradhapura and Polonnaruwa, as well as an increasing trend in minimum temperature in both seasons in Anuradhapura and Ampara. A multiple linear regression analysis was employed to assess the relationship between rice yield and climatic variables. It was observed that only the *Maha* season in Anuradhapura district exhibited a linear trend ($p < 0.05$). Decision Support System for Agro-technology Transfer (DSSAT Version 4.8) software was used to forecast the rice yield for the mid-century. The simulation results from DSSAT elicited that increasing temperature and decreasing rainfall in mid-century negatively affect rice yield. The yield reduction percentages for Anuradhapura, Polonnaruwa, Ampara, and Kurunegala were 8.16%, 6.15%, 10.7%, and 9.9%, respectively under Representative Concentration Pathway (RCP) 8.5. Under RCP 4.5, the reductions were 6.56%, 6.06%, 7.39%, and 7.20%, respectively, indicating that the yield reduction observed in RCP 4.5 was lower than that under RCP 8.5 for all districts. The findings suggest that as climate scenarios intensify, there is a notable impact on paddy productivity across these districts. Moreover, the comparison between RCP 4.5 and RCP 8.5 indicates varying degrees of yield reduction, highlighting the importance of considering climate change mitigation strategies to safeguard paddy production in Sri Lanka's key agricultural regions.

Keywords: Climate change, DSSAT, Paddy productivity, Major Paddy producing districts, RCP