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Assessment of rainfall frequency distribution in the intermediate zone of Sri Lanka

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The rainfall distribution around the world has undergone changes thus causing fluctuations in those climate regimes. Agriculture is chief among the systems that are expected to undergo changes as a consequence of climate change. The present study analyses the climate change variability through the fluctuation in precipitation pattern, in IL_{1a} agro ecological region (of Sri Lanka) based on Gumbel frequency distribution analysis.

Focusing on a cascade agricultural system in the Katupotha DS division of the Kurunegala district in the intermediate zone (IL_{1a}), the climate change variability was analysed using daily rainfall data of fifty years (1961-2010). Gumbel frequency analysis was employed to derive the variability in rainfall distribution at 25 year time intervals (1961-1985 and 1986-2010). Gumbel distribution is one of the most widely used probability-distribution functions for extreme values in hydrologic and meteorologic studies. The total monthly rainfall and seasonal total rainfall frequency distributions were analysed using this technique. According to the analysis, the total monthly precipitations show an increasing trend in quantity from 1961-2010. At longer recurrence intervals (20 years) a 50 mm increase is experienced during the last 25 years (1986-2010) while at shorter recurrence intervals (5 years), an approximate 15 mm increase is evident. Decreasing trends in the total monthly precipitation was observed during the South-West monsoon (SWM), first inter-monsoon (IM₁) and North-East monsoon (NEM). A 38 mm decrease at a 20 year recurrence interval is observed during the last 25 years, during the SWM. The total monthly precipitation for the second inter-monsoon (IM₂) shows a 164 mm increase at a 10 year recurrence interval which is the highest increase in rainfall recorded for any of the four rainy seasons. According to the analysis, a shortening of the “Yala” season is evident while the pre-preparation for crop establishment for the “Maha” season is enhanced as a result of a major increase in precipitation during IM₁. These seasonal changes in rainfall distribution and frequency affect the filling and draining pattern of the cascade system, which consequently affects the agricultural and fisheries activities conducted under this system.