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Characterisation of the Variability in Monthly Rainfall and Temperature in Grazing Ecosystem Supporting Sahiwal National Stud Herd in Naivasha, Kenya

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Abstract

Abstract

The present study evaluated the trends of rainfall and temperature at the national Sahiwal stud, Nakuru, Kenya. Data on climatic variables comprising monthly rainfall (mm), minimum and maximum temperatures were obtained from the meteorological weather station within the Stud. The coefficient of variation (CV), percentage departure from the mean (Anomalies), Precipitation Concentration Index (PCI) and moving average were computed to evaluate the variability of rainfall and temperature. The detection of trends and their analysis were performed using parametric and non-parametric tests. The Mann-Kendall (MK) trend test was used to detect trends while the Sen's Slope test was used to compute the slope using Sen's method. The mean annual rainfall was 578.5 ± 151.3 mm and a CV of 24.2%. The PCI revealed that the study area has had rainfall with moderate concentration over the years, with about 34% of the years having high rainfall concentration. The rainfall anomalies found in the current study depict inter-annual variability with the trend in the anomalies being more varied in recent years. Mean annual and long season rain decreased by 36.5 and 25.5 mm per decade while short season rain increased by 69 mm per decade. The short season rain had higher CV (59.2%) than long season rain (49.2%). MK trend analysis test revealed found as statistically significant decreasing trend for long and annual rainfall and a significant increase for short rains. The mean temperature for the study area ranged from 10.4 to 26.5°C. The rate of change of minimum, maximum and mean monthly temperature was found to be was 0.017°C, -0.156 °C and -0.09°C per decade. The overall anomalies of mean annual temperature showed inter annual variability. The MK trend analysis revealed non-significant increase and decline for minimum and mean temperature, respectively. The months of April and May showed significant increase while the months of February and September had significant decline, indicating inter-annual variability in minimum temperature. The results of the current study point towards the need to adjust farming activities with the variability occurrence and design mitigation strategies to enhance adaptive capacity and resilience to climate change for livestock production systems.

Keywords: Mann-Kendall trend test, Rainfall, Sen's Slope estimator, trends