Contribution ID: **121** Type: **Oral presentation**

Spatiotemporal Dynamics of Drought in Kajiado County, Kenya: Insights from SARIMA Modeling and SPI Analysis

Wednesday 23 April 2025 15:45 (20 minutes)

Understanding the spatiotemporal dynamics of drought is essential for managing climate-related risks in arid and semi-arid regions. This study investigates long-term trends in drought severity in Kajiado County, Kenya, using historical climate data from 1981 to 2023. The region, predominantly inhabited by pastoralist communities, is highly vulnerable to climatic fluctuations, particularly variability in precipitation and rising temperatures. To characterise temporal trends and project future climate variability, the study employs Seasonal Autoregressive Integrated Moving Average (SARIMA) models alongside the Standardised Precipitation Index (SPI). Monthly precipitation and temperature data from three subcounties; Kajiado East, West, and Central were analysed. Following preprocessing, stationarity was assessed using the Augmented Dickey-Fuller test, and SARIMA model parameters were optimised using ACF, PACF, and information criteria metrics. The best-fitting SARIMA models were identified for each subcounty, and forecasts extending to 2028 reveal consistent seasonal patterns, particularly rainfall peaks in April and November and troughs in July–August. SPI analysis on a 3-month scale enabled classification of wet and dry periods, revealing significant interannual variability with documented extreme droughts (for example, 1982–1984, 1994, 2000) and wet events (for example, 1998, 2010). The Mann-Kendall trend test and Sen's slope estimator showed statistically significant upward trends in SPI values across all subcounties, suggesting a gradual shift towards wetter conditions. However, correlation analysis between SPI and temperature anomalies revealed weak to moderate negative relationships, indicating the compounding effect of warming on drought severity. This integrated modelling approach not only quantifies past and projected climatic trends but also enhances understanding of hydroclimatic variability crucial for informed adaptation planning. The findings underscore the importance of localised forecasting tools in supporting pastoralist resilience and policy formulation in the face of intensifying climate variability.

Author: ROTICH, JUDITH (Department of Animal Sciences, Egerton University, P.O. Box 536-20115, Egerton, Kenya.)

Co-authors: Prof. BEBE OMEDO, Bockline (Department of Animal Sciences, Egerton University, P.O. Box 536-20115, Egerton, Kenya.); Prof. TUITOEK, James (Department of Animal Sciences, Egerton University, P.O. Box 536-20115, Egerton, Kenya.); Dr MUTAI, Charles (Department of Mathematics, Physics and Computing, Moi University, P.O. Box 3900, Eldoret, Kenya)

Presenter: ROTICH, JUDITH (Department of Animal Sciences, Egerton University, P.O. Box 536-20115, Egerton, Kenya.)

Track Classification: Emerging Technologies to adapt and mitigate climate change effects: Big data and AI for climate change solutions