



[Digital Transformation, Sustainable Innovations and Development in the African Continent]

[Thursday 31st July and Friday 1st August 2025]

[KWUST 2025 Conference Proceedings]

ABSTRACT NO. 38

Time Series Analysis of Monthly Amount of Rainfall in Uasin Gishu County

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ABSTRACT

Rainfall distribution significantly influences agricultural productivity, water resource management, and socio-economic activities, particularly in agriculturally dependent regions such as Uasin Gishu County, Kenya. This study investigates the temporal dynamics of rainfall patterns in the county through time series analysis of historical rainfall data spanning multiple decades. The analysis explores seasonal patterns, inter-annual variability, and long-term trends using statistical techniques including classical decomposition, autocorrelation analysis, and forecasting models such as Autoregressive Integrated Moving Average (ARIMA) and Seasonal Decomposition of Time Series (STL). The results indicate pronounced seasonal variability, with distinct peaks during the long rains (March–May) and short rains (October–December). The analysis also reveals cyclical fluctuations and anomalies associated with large-scale climate phenomena such as El Niño–Southern Oscillation (ENSO). Trend analysis suggests modest but notable changes in rainfall magnitude and temporal distribution, which may be indicative of broader climate change impacts. These findings underscore the utility of time series models in detecting and interpreting rainfall variability and trends. The study provides empirical evidence to support the development of adaptive, data-driven strategies for sustainable water and agricultural resource management in Uasin Gishu County.

Key Words:

Rainfall, Agriculture, time series, Forecasting and Variability



