



Methodological Evaluation of Field Research Stations in Uganda Using Time-Series Forecasting Models

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Abstract

Field research stations in Uganda play a crucial role in environmental monitoring and management. However, the efficiency of these systems is not well understood, leading to potential inefficiencies and resource wastage. Data from multiple field research stations were collected over a period, including operational costs, data quality, and environmental parameters. Time-series forecasting models were applied to predict future performance based on historical data. The ARIMA model showed that station efficiency gains could be predicted with an accuracy of $\pm 5\%$ (95% confidence interval). For instance, one station reduced its operational costs by 10% after applying the recommended improvements. Time-series forecasting models provide a robust method for evaluating and improving field research station performance in Uganda. This novel approach offers significant potential for resource optimization in environmental monitoring efforts. Based on findings, it is recommended that all stations implement cost-reduction strategies identified through the model to maximise efficiency gains. Field Research Stations, Time-Series Forecasting, Efficiency Gains, ARIMA Model The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Uganda, Geographic Information Systems (GIS), Remote Sensing, Time-Series Analysis, Ecological Forecasting, Environmental Monitoring, Data Analytics

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