



Time-Series Forecasting Model Assessment of Municipal Water Systems in Uganda,

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Abstract

Ugandan municipal water systems face challenges in reliability due to fluctuating demand and infrastructure constraints. A comprehensive analysis using autoregressive integrated moving average (ARIMA) model to forecast municipal water demand and supply based on historical data from to . Robust standard errors are employed to account for uncertainty in model predictions. The ARIMA model demonstrated a moderate accuracy in forecasting monthly water usage, with an R^2 value of 0.75 indicating that approximately 75% of the variance is explained by the model. ARIMA models provide valuable insights into municipal water system reliability but require further refinement to improve predictive accuracy and robustness. Further research should include additional data sources, such as weather patterns and economic indicators, to enhance forecasting precision. Implementation of adaptive control mechanisms is also recommended for improving system responsiveness and sustainability. Municipal Water Systems, ARIMA Model, Time-Series Forecasting, Reliability Assessment The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Uganda, Water Systems, Infrastructure, Reliability, Time-Series Analysis, Forecasting Models, Autoregressive Models

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