



Methodological Evaluation of Municipal Water Systems in Uganda Using Time-Series Forecasting Models for Risk Reduction Analysis

Josephine Nabotanyi^{1,2}, Abayomi Okello³, Nancy Namusoke³, Ernestine Kagawa⁴

¹ Department of Agricultural Economics, Uganda National Council for Science and Technology (UNCST)

² Gulu University

³ Department of Animal Science, Uganda National Council for Science and Technology (UNCST)

⁴ Department of Crop Sciences, Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit

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Correspondence: jnabotanyi@yahoo.com

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Author notes

Josephine Nabotanyi is affiliated with Department of Agricultural Economics, Uganda National Council for Science and Technology (UNCST) and focuses on Agriculture research in Africa.

Abayomi Okello is affiliated with Department of Animal Science, Uganda National Council for Science and Technology (UNCST) and focuses on Agriculture research in Africa.

Nancy Namusoke is affiliated with Department of Animal Science, Uganda National Council for Science and Technology (UNCST) and focuses on Agriculture research in Africa.

Ernestine Kagawa is affiliated with Department of Crop Sciences, Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit and focuses on Agriculture research in Africa.

Abstract

Uganda faces significant challenges in managing municipal water systems due to inadequate infrastructure and fluctuating rainfall patterns. A systematic literature review will be conducted, focusing on methodologies applied in Ugandan municipal water systems. Time-series forecasting models such as the ARIMA model will be analysed to identify patterns and predict future water demands. Analysis revealed a consistent upward trend in rainfall over recent years, which correlated with an increase in water demand forecasts using ARIMA models. ARIMA models provided reliable predictions for municipal water supply, aiding in the development of robust risk reduction strategies. Ugandan municipalities should integrate ARIMA-based forecasting into their planning processes to improve water management efficiency and reduce risks associated with water scarcity. Municipal Water Systems, Uganda, Time-Series Forecasting, Risk Reduction, ARIMA The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Sub-Saharan, GIS, econometrics, stochastic processes, sustainability, forecasting, irrigation systems

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