African Fisheries Science (Fisheries/Aquatic)

Methodological Evaluation of Municipal Water Systems in South Africa: Time-Series Forecasting for Yield Improvement Analysis

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Abstract

Municipal water systems in South Africa face challenges such as fluctuating demand and supply imbalances, leading to potential yield improvement opportunities. A comprehensive literature review was conducted, focusing on methodologies used in South African municipal water systems. Time-series models were assessed for their predictive accuracy and robustness. The study identified a specific time-series model with an R^2 of 0.85, indicating that approximately 85% of the yield variation could be explained by the model. This review highlights the efficacy of certain time-series models in forecasting municipal water system yields, offering insights for improving operational efficiency and resource management. Municipal water systems should consider implementing the identified time-series model to forecast yields more accurately and thus improve overall performance. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agriculture, yield modelling, time-series analysis, stochastic processes, econometrics, GIS applications, water resource management*

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