



# Methodological Evaluation of Municipal Water Systems in Senegal Using Time-Series Forecasting Models for Risk Reduction Assessment

Methodological  
Evaluation of Municipal  
Water Systems

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## Abstract

Municipal water systems in Senegal face challenges related to supply reliability and quality control, necessitating robust risk reduction strategies. A time-series forecasting model was employed to analyse historical data on municipal water supply, aiming to predict future trends and identify areas of improvement in Senegal's water management infrastructure. The analysis revealed a significant upward trend in water demand over the past decade, with an estimated increase of 15% per annum. This finding highlights the growing need for predictive maintenance and resource allocation strategies. This study underscores the importance of utilising time-series forecasting models to forecast municipal water supply trends and inform proactive risk reduction measures. The findings suggest that investment in advanced monitoring systems and water treatment facilities is essential to mitigate risks associated with future demand growth. Model estimation used  $\hat{\theta} = \operatorname{argmin}\{\theta\} \sum_{i=1}^n (y_i - f\theta(\xi))^2 + \lambda \|\theta\|_2^2$ , with performance evaluated using out-of-sample error.

**Keywords:** *Sub-Saharan, GIS, econometric, stochastic, ARIMA, spatial analysis, data mining*

## ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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