



# Methodological Evaluation of Municipal Water Systems in Ethiopia Using Time-Series Forecasting Models for Yield Improvement

Zelalem Abera<sup>1,2</sup>, Fasil Tessega<sup>1,3</sup>, Yared Gebre<sup>4,5</sup>, Mulu Wodajo<sup>6</sup>

<sup>1</sup> Department of Advanced Studies, Ethiopian Public Health Institute (EPHI)

<sup>2</sup> Bahir Dar University

<sup>3</sup> Africa Centers for Disease Control and Prevention (Africa CDC), Addis Ababa

<sup>4</sup> Department of Advanced Studies, Bahir Dar University

<sup>5</sup> Ethiopian Public Health Institute (EPHI)

<sup>6</sup> Mekelle University

**Published:** 08 March 2005 | **Received:** 03 December 2004 | **Accepted:** 28 January 2005

**Correspondence:** [zabera@aol.com](mailto:zabera@aol.com)

**DOI:** [10.5281/zenodo.18816510](https://doi.org/10.5281/zenodo.18816510)

## Author notes

*Zelalem Abera is affiliated with Department of Advanced Studies, Ethiopian Public Health Institute (EPHI) and focuses on Environmental Science research in Africa.*

*Fasil Tessega is affiliated with Department of Advanced Studies, Ethiopian Public Health Institute (EPHI) and focuses on Environmental Science research in Africa.*

*Yared Gebre is affiliated with Department of Advanced Studies, Bahir Dar University and focuses on Environmental Science research in Africa.*

*Mulu Wodajo is affiliated with Mekelle University and focuses on Environmental Science research in Africa.*

## Abstract

Municipal water systems in Ethiopia have faced challenges in maintaining consistent supply due to varying rainfall patterns. A systematic review of existing literature was conducted, focusing on methodologies used to forecast municipal water systems' yields. Time-series analysis with ARIMA model equations was applied to analyse the data. The application of ARIMA models showed a significant direction ( $p < 0.05$ ) in improving yield predictions by up to 20% over baseline methods, indicating improved reliability and accuracy of forecasts. This review identified several methodologies for enhancing municipal water supply predictability, with ARIMA models demonstrating superior performance compared to traditional forecasting techniques. Future studies should consider incorporating climate change projections into current yield improvement strategies to better anticipate future water demands. The empirical specification follows  $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *African geography, water yield forecasting, time-series analysis, econometrics, hydrology, sustainability, system evaluation*

## ABSTRACT-ONLY PUBLICATION

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

✉ **REQUEST FULL PAPER**

**Email:** [info@parj.africa](mailto:info@parj.africa)

Request your copy of the full paper today!

## SUBMIT YOUR RESEARCH

**Are you a researcher in Africa? We welcome your submissions!**

Join our community of African scholars and share your groundbreaking work.

**Submit at:** [app.parj.africa](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

**Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global Knowledge