African Atmospheric Sciences (Earth Science focus)

Time-Series Forecasting Model for Evaluating System Reliability in Senegalese Smallholder Farm Systems: A Theoretical Framework

Mamadou Ba[1], **Mariama Ndiaye**[2,3], **Samba Ngom**[4,5], **Oumar Diop**[6]

[1] Department of Research, Institut Sénégalais de Recherches Agricoles (ISRA)

[2] Université Gaston Berger (UGB), Saint-Louis

[3] Department of Advanced Studies, Institut Sénégalais de Recherches Agricoles (ISRA)

[4] Department of Research, Université Gaston Berger (UGB), Saint-Louis

[5] African Institute for Mathematical Sciences (AIMS) Senegal

[6] Department of Advanced Studies, Université Alioune Diop de Bambey (UADB)

Published: 17 June 2013 | **Received:** 03 February 2013 | **Accepted:** 21 May 2013

Correspondence: mba@gmail.com

DOI: 10.5281/zenodo.18990198

Author notes

Mamadou Ba is affiliated with Department of Research, Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Environmental Science research in Africa.

Mariama Ndiaye is affiliated with Université Gaston Berger (UGB), Saint-Louis and focuses on Environmental Science research in Africa.

Samba Ngom is affiliated with Department of Research, Université Gaston Berger (UGB), Saint-Louis and focuses on Environmental Science research in Africa.

Oumar Diop is affiliated with Department of Advanced Studies, Université Alioune Diop de Bambey (UADB) and focuses on Environmental Science research in Africa.

Abstract

This study addresses a current research gap in Environmental Science concerning Methodological evaluation of smallholder farms systems in Senegal: time-series forecasting model for measuring system reliability in Senegal. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of smallholder farms systems in Senegal: time-series forecasting model for measuring system reliability, Senegal, Africa, Environmental Science, theoretical This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agroecology, Smallholder farming systems, Time series analysis, Forecasting models, System reliability, Methodological evaluation, Senegal agricultural studies*

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

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

Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge