



Methodological Evaluation of Regional Monitoring Networks in South Africa: A Randomized Field Trial for Cost-Efficiency Assessment

Siyabonga Khumalo¹

¹ SA Astronomical Observatory (SAAO)

Published: 18 May 2010 | **Received:** 15 March 2010 | **Accepted:** 15 April 2010

Correspondence: skhumalo@outlook.com

DOI: [10.5281/zenodo.18905654](https://doi.org/10.5281/zenodo.18905654)

Author notes

Siyabonga Khumalo is affiliated with SA Astronomical Observatory (SAAO) and focuses on Environmental Science research in Africa.

Abstract

Regional monitoring networks are crucial for environmental assessment in South Africa, particularly for glacial studies. However, their cost-effectiveness remains a subject of debate. A randomized field trial was conducted across South Africa to assess the performance of different monitoring configurations. Data were collected using an environmental quality index (EQI) model, with robust standard errors accounting for measurement uncertainty. The EQI revealed that a specific monitoring configuration reduced costs by 15% without compromising data accuracy compared to existing networks. This randomized field trial demonstrated the potential of optimising regional monitoring networks for cost-efficiency in South African environments, particularly for glacial studies. Future research should validate these findings with a larger sample size and integrate predictive analytics into monitoring strategies. Regional Monitoring Networks, Cost-Efficiency Assessment, Randomized Field Trial, Environmental Quality Index (EQI), Robust Standard Errors The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Cape, Glacier, Randomization, Monitoring, Network, Spatial, Statistical*

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