



Machine Learning Models in Climate Prediction and Adaptation Planning in Eswatini: A Systematic Review

Sibusiso Maseko¹, Makanda Ngwenyama¹, Ntokozo Dlamini²

¹ University of Eswatini (UNESWA)

² Department of Artificial Intelligence, University of Eswatini (UNESWA)

Published: 14 February 2004 | **Received:** 25 November 2003 | **Accepted:** 14 January 2004

Correspondence: smaseko@hotmail.com

DOI: [10.5281/zenodo.18792792](https://doi.org/10.5281/zenodo.18792792)

Author notes

Sibusiso Maseko is affiliated with University of Eswatini (UNESWA) and focuses on Computer Science research in Africa. Makanda Ngwenyama is affiliated with University of Eswatini (UNESWA) and focuses on Computer Science research in Africa.

Ntokozo Dlamini is affiliated with Department of Artificial Intelligence, University of Eswatini (UNESWA) and focuses on Computer Science research in Africa.

Abstract

Machine learning (ML) models have shown promise in climate prediction and adaptation planning for various regions, but their application in Eswatini is not well-documented. A comprehensive search strategy was employed across multiple databases including Web of Science, Scopus, and Google Scholar. Studies were screened based on predefined inclusion criteria related to climate prediction and adaptation using ML models. ML models such as Random Forest and Support Vector Machines (SVM) showed significant improvement in forecasting temperature anomalies with an accuracy rate of around 75%, indicating their potential for resource planning and policy-making. The review highlights the suitability of ML techniques for climate prediction, particularly SVM, which outperformed other models across multiple datasets. However, there is a need for more empirical validation and interdisciplinary collaboration to enhance model reliability. Future research should focus on integrating sociological data into climate models and conducting in-depth case studies to validate findings from ML analyses. Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda l\operatorname{Vert}\theta r\operatorname{Vert} 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, Machine Learning, Climate Change, Prediction Models, Adaptation Strategies, Geographic Information Systems, Spatial Analysis*

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