



Impact Assessment of Climate-Smart Agriculture Practices on Soil Fertility in Southern Sudanese Highlands: A Longitudinal Study

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Abstract

This study addresses a current research gap in Environmental Science concerning Impact Assessment of Climate-Smart Agriculture Practices on Soil Fertility in Southern Sudanese Highlands: Longitudinal Study in South Africa. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured review of relevant literature was conducted, with thematic synthesis of key findings. 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. Impact Assessment of Climate-Smart Agriculture Practices on Soil Fertility in Southern Sudanese Highlands: Longitudinal Study, South Africa, Africa, Environmental Science, scoping review This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The empirical specification follows $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African Highlands, Climate Change, Soil Fertility, Sustainable Agriculture, GIS, Data Analysis, Longitudinal Studies*

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