African Human Geography

Methodological Evaluation of Regional Monitoring Networks in Senegal Using Bayesian Hierarchical Models for System Reliability Assessment

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Abstract

This study addresses a current research gap in Environmental Science concerning Methodological evaluation of regional monitoring networks systems in Senegal: Bayesian hierarchical 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 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. Methodological evaluation of regional monitoring networks systems in Senegal: Bayesian hierarchical model for measuring system reliability, Senegal, Africa, Environmental Science, systematic review 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: *Sub-Saharan, Bayesian, Hierarchical, Monitoring, Reliability, Senegal, Spatial*

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