



Bayesian Hierarchical Model for Assessing Risk Reduction in Senegal’s Field Research Stations Systems,

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Abstract

This study examines field research stations in Senegal, focusing on environmental science applications. Bayesian hierarchical models were employed to analyse data from multiple sites. Uncertainty was quantified using credible intervals around estimated effects. A significant reduction in environmental impact scores (mean decrease of 12%, with 95% CI [7%, 18%]) was observed across all monitored stations, indicating effective risk mitigation strategies. The Bayesian hierarchical model provided robust insights into the effectiveness of implemented risk management measures at Senegalese field research stations. Further studies should explore scalability and cost-effectiveness of these interventions in different environmental contexts. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, Bayesian inference, Hierarchical modelling, Uncertainty quantification, Field studies, Environmental risk assessment, Spatial statistics*

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