



# Bayesian Hierarchical Model for Assessing Risk Reduction in Rwanda's Field Research Stations Systems

Ndayishimiye Innocent<sup>1,2</sup>, Kabagwiriza Josephine<sup>1,2</sup>

<sup>1</sup> University of Rwanda

<sup>2</sup> Rwanda Environment Management Authority (REMA)

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**Correspondence:** [ninnocent@outlook.com](mailto:ninnocent@outlook.com)

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## Author notes

*Ndayishimiye Innocent is affiliated with University of Rwanda and focuses on Energy research in Africa. Kabagwiriza Josephine is affiliated with Rwanda Environment Management Authority (REMA) and focuses on Energy research in Africa.*

## Abstract

Rwanda's field research stations play a critical role in energy sector development, but their operational efficiency and risk management require careful evaluation. A Bayesian hierarchical model was employed to analyse data from multiple stations, accounting for variability in system performance across different environmental conditions and operational contexts. The analysis revealed that implementing adaptive management strategies reduced the mean risk level by approximately 25% compared to baseline conditions. This study underscores the importance of proactive risk assessment and strategic interventions in enhancing the resilience of Rwanda's field research station systems. Field managers should prioritise the adoption of adaptive management practices, particularly those involving real-time monitoring and feedback loops. Bayesian hierarchical model, Field research stations, Risk reduction, Adaptive management, Energy sector The empirical specification follows  $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Geography, Africa, Bayesian, Multilevel, Analysis, Risk, Modelling*

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