African Remote Sensing Applications
(Environmental/Earth Science Methodology)

Bayesian Hierarchical Model for Evaluating Cost-Efficiency in Tanzania's Regional Monitoring Networks Systems

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Abstract

Tanzania's regional monitoring networks are critical for environmental and agricultural management. However, their cost-effectiveness is not well understood. A Bayesian hierarchical model was employed to assess the performance and cost-effectiveness of these networks across different geographic regions. The model accounts for spatial variability and heterogeneity in resource allocation and environmental impact. The analysis identified distinct patterns of resource utilization, revealing that some areas within Tanzania benefit more from centralized monitoring systems compared to decentralized ones. This study provides a robust framework for evaluating the cost-effectiveness of regional monitoring networks, offering insights into optimising resource allocation in future monitoring efforts. Adopting the findings of this study can lead to more efficient and equitable use of resources in Tanzania's environmental management systems. Bayesian Hierarchical Model, Cost-Efficiency, Regional Monitoring Networks, Tanzania Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, Africa, Bayesian, Model, Hierarchical, Econometrics, Geospatial*

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