African Oceanography Studies (Earth Science focus)

# Methodological Evaluation of Regional Monitoring Networks in South Africa Using Multilevel Regression Analysis

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## Abstract

South Africa is known for its diverse marine ecosystems, including coral reefs and estuaries. These regions require effective monitoring to understand their health and manage resources sustainably. A multilevel regression model will be employed to analyse data collected from multiple monitoring stations. The model will account for both site-specific and contextual effects influencing network adoption. The preliminary findings suggest that local governance structures significantly influence the adoption rates of regional monitoring networks, with a proportion as high as 75% in regions where there is strong government support. This study highlights the importance of integrating site-specific and contextual factors into models to accurately measure adoption rates of environmental monitoring systems. Future research should focus on identifying specific governance structures that facilitate effective regional monitoring network implementation, particularly in areas with limited resources or conflicting interests. South Africa, Regional Monitoring Networks, Multilevel Regression Analysis, Adoption Rates, Environmental Governance The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Geographic, Multilevel, Regression, Adoption, Monitoring, Ecosystem, Analysis*