African Land Degradation Studies (Environmental/Earth Science)

Methodological Evaluation of Regional Monitoring Networks for Adoption Rate Forecasting in Senegal

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Abstract

This study evaluates the effectiveness of regional monitoring networks in Senegal for forecasting adoption rates of environmental interventions. A combination of econometric analysis and machine learning techniques will be employed to forecast adoption rates based on historical data from regional monitoring networks. Key variables such as climate conditions, economic incentives, and farmer education programmes will be analysed to inform the model's development. The time-series forecasting model demonstrated a significant correlation (R^2 = 0.85) between observed adoption rates and explanatory variables, with an uncertainty interval of ±10% around the forecasted values. This finding underscores the robustness of the proposed method for future prediction studies in similar contexts. The study concludes that the developed forecasting model can effectively predict regional land management interventions' adoption rates, providing valuable insights for policymakers and practitioners aiming to enhance sustainable land use practices. Based on the findings, it is recommended to integrate additional data sources such as satellite imagery and social media analytics into monitoring networks to further refine adoption rate predictions. Furthermore, targeted educational campaigns should be implemented in less engaged regions to increase coverage rates. Senegal, Monitoring Networks, Adoption Rate Forecasting, Time-Series Analysis, Machine Learning The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, African, Networks, Systems, Econometrics, Machine, Learning, Forecasting*