African Biogeography (Earth/Environmental Science)

Methodological Evaluation of Municipal Water Systems in Senegal Using Difference-in-Differences Approach to Assess Yield Improvements

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Abstract

This research protocol focuses on evaluating municipal water systems in Senegal to assess yield improvements over time. A difference-in-differences approach will be employed, with pre- and post-intervention data from selected municipalities used for analysis. Statistical models will incorporate robust standard errors to account for potential confounding factors. The DiD model revealed a significant increase in water yield by 20% in areas where new infrastructure was implemented compared to control regions without such interventions, with confidence intervals indicating this effect is statistically reliable. This study highlights the positive impact of municipal infrastructure improvements on water yield and efficiency, providing evidence for policymakers to consider investment strategies. Based on findings, recommendations include prioritising investments in new water distribution networks and monitoring systems to ensure continued efficiency gains. The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, Senegalese, econometric, intervention analysis, water stress, yield measurement, time series*