African Climate Change Impacts & Adaptation (Interdisciplinary - incl

Methodological Evaluation of Municipal Water Systems in Uganda: Randomized Field Trial

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Abstract

Ugandan municipal water systems are critical infrastructure under pressure from climate change impacts such as increased precipitation variability and rising temperatures. A randomized controlled trial was conducted to assess the performance of municipal water systems under varying climatic conditions. A mixed-methods approach included hydrological data collection and interviews with stakeholders. The trial revealed that system reliability improved by 20% in areas experiencing increased rainfall, while energy consumption decreased by 15% due to optimised pumping mechanisms. Randomized field trials can be a robust method for evaluating municipal water systems' resilience and efficiency under climate change pressures. Immediate investments should focus on enhancing pump system efficiencies in areas with higher rainfall, alongside community education programmes to improve water usage practices. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, African, Randomized-Controlled-Trial, RiskAssessment, Sustainability, Microbiome, ClimateChange*