African Food, Water, and Energy Nexus
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Technological Innovations in Water Conservation and Soil Moisture Management for Coffee Plantations in Central African Highlands: Metrics and Revenue Potential

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Abstract

Coffee plantations in Central African Highlands face significant challenges related to water conservation and soil moisture management due to climate variability and limited access to modern irrigation technologies. Theoretical analysis will be employed to assess the theoretical underpinnings of technological innovations, including models like Linear Regression (LR) for predicting KPIs such as water efficiency and soil moisture retention. Uncertainty in model predictions will be addressed through robust standard errors. The theoretical framework identifies key performance metrics for technological innovations in water conservation and soil moisture management, providing insights into their economic viability for Central African coffee plantations. Investment in infrastructure and training programmes should be prioritised to facilitate the adoption of these technologies by smallholder farmers in Central African Republic. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, Highlands, Sustainability, Precision Agriculture, Hydrology, Economics, Irrigation Systems*

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