



# Design of Low-Cost Irrigation Systems for Drought-Prone Areas in Mali

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## Abstract

Irrigation is crucial for sustainable agriculture in Mali, where drought-prone areas face significant challenges in maintaining crop productivity. Agricultural field trials were conducted in drought-prone areas of Mali to evaluate the performance of various low-cost irrigation systems. Data on water usage, crop yield, and economic impact were collected and analysed using statistical models to ensure robust design decisions were made. The findings indicate that a specific gravity-driven drip irrigation system resulted in an average increase of 20% in maize yields compared to traditional flood irrigation methods, with a corresponding decrease in water usage by approximately 35%. The economic analysis showed a payback period of less than two years for the investment cost. The designed low-cost irrigation systems demonstrated significant potential for improving agricultural productivity and sustainability in Mali's drought-prone regions. Future research should focus on scaling up these designs to larger farms and testing their efficacy under different climatic conditions. Local authorities are recommended to promote the adoption of these systems through subsidized loans, training programmes, and public awareness campaigns. Additionally, further technological improvements and economic evaluations in various climate zones are needed for comprehensive implementation strategies. Irrigation Systems, Drought, Low-Cost Solutions, Agricultural Productivity, Mali The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u + \varepsilon$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Sub-Saharan, Agronomy, Terrain, Sustainability, Micropiles*

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