African Nanotechnology in Engineering

Designing Economical Irrigation Solutions for Drought Afflicted Mali Terrains

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Abstract

Drought-prone regions in Mali require innovative solutions for sustainable agricultural productivity. Agricultural modelling using Geographic Information Systems (GIS) was employed to identify suitable locations and optimise system design parameters. Field testing validated the efficacy of the proposed solutions under local conditions. An analysis of field data indicated that water usage efficiency improved by an average of 30% in tested systems, with a success rate of 85% in reducing soil erosion compared to traditional farming methods. The designed irrigation systems significantly enhance agricultural productivity and environmental health in Mali's arid regions. Implement the recommended low-cost irrigation solutions across targeted areas to mitigate water scarcity and promote sustainable agriculture. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African Geography, GIS Modelling, Low-Cost Design, Sustainable Water Management, Precision Agriculture, Irrigation Systems, Remote Sensing*

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