African Water Security Studies (Environmental/Cross-disciplinary)

Precision Irrigation in Maize Yields: A Six-Month Impact Study in Comoros Rift Valley Villages

Mamadou Ndiaye[1], **Ismaiel Mwinyi**[1], **Fatin Mohamed**[1,2]

[1] University of the Comoros

[2] Department of Artificial Intelligence, University of the Comoros

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Correspondence: mndiaye@hotmail.com

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Author notes

Mamadou Ndiaye is affiliated with University of the Comoros and focuses on Computer Science research in Africa.
Ismaiel Mwinyi is affiliated with University of the Comoros and focuses on Computer Science research in Africa.
Fatin Mohamed is affiliated with Department of Artificial Intelligence, University of the Comoros and focuses on Computer Science research in Africa.

Abstract

Precision irrigation is a technique designed to deliver water directly to plant roots at optimal times, aiming for increased crop yields and reduced environmental impact. A randomized controlled trial was conducted with four experimental sites, each equipped with precision irrigation systems. Control plots were used for comparison. Precision irrigation led to an average yield increase of 25% compared to control plots, with significant reductions in water usage by 18%. Data analysis using a linear regression model showed yields increased from baseline at $p < 0.001$ (95% CI: [20%, 30%]). Precision irrigation systems significantly enhanced maize yields and reduced water use, providing a viable solution for sustainable agricultural practices in resource-limited settings. Further research should focus on scalability and economic feasibility of precision irrigation technologies across different regions and soil types. Precision Irrigation, Maize Yields, Comoros Rift Valley, Six-Month Study Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *Geographical Information Systems, Precision Agriculture, Remote Sensing, Water Management, Soil Moisture Sensors, Randomized Controlled Trials, Agroecology*

ABSTRACT-ONLY PUBLICATION

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