



FACULTY OF ENGINEERING
DEPARTMENT OF AGRICULTURAL MECHANISATION AND IRRIGATION
ENGINEERING
FINAL YEAR PROJECT REPORT

OPTIMIZATION OF WATER DISTRIBUTION FOR IMPROVED WATER USE
EFFICIENCY IN CHECK BASIN IRRIGATION.
A CASE STUDY OF KIBIMBA IRRIGATION SCHEME.

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ABSTRACT

This research presents a model developed to optimize water distribution in check basin irrigation to maximize water use efficiency, with the case study of Kibimba irrigation scheme. The model utilizes spatial inputs, including slope, soil type, and elevation extracted from GIS, to simulate field conditions and determine optimal design parameters. Guided by FAO recommendations and crop water requirements, the model computes key hydrological parameters such as infiltration, runoff, percolation, and effective water use to evaluate irrigation performance. Model performance was evaluated using the mean absolute (MAE), coefficient of determination, and root mean square error. Model results indicate a water use efficiency (WUE) of approximately 70%, demonstrating the model's potential to significantly improve water distribution and minimize losses within the basin. Model results also indicate the optimal irrigation depth, total volume and time for irrigation, considering the supplemental rainfall contributions. Root mean square error (RMSE), yielded extremely low values: 0.0007 for water input, 0.0002 for infiltration and effective water use, and 0.0417 for WUE, with zero error in runoff and percolation. These results confirm the model's reliability and practical relevance in guiding check basin design under site-specific conditions.

DECLARATION

I, AINAMAANI JOYCE, hereby declare to the best of my knowledge that this research report is an outcome of my original work. It has not been presented to any institution for any academic qualification or award. All sources of information used in this have been duly acknowledged. Any material borrowed from other authors has been properly cited and referenced

NAME.....

SIGNATURE.....

DATE.....

APPROVAL

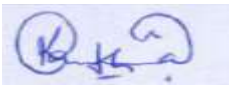
This final research report, titled Optimization of Water Distribution in Check Basin Irrigation Systems for Water Use Efficiency in Paddy Fields; has been submitted to the Department of Agricultural Mechanization and Irrigation Engineering for examination with the approval from my supervisor.

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DATE.....16/05/2025.....

DEDICATION

I dedicate this final year research report to myself for the tireless efforts towards its accomplishment and to my family and loved ones for their unwavering support, encouragement, and patience throughout my academic journey. Their belief in my abilities and constant motivation has been the driving force behind this work.

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