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FACULTY OF ENGINEERING AND TECHNOLOGY

**DEPARTMENT OF AGRICULTURAL MECHANISATION AND IRRIGATION
ENGINEERING**

**ASSESSMENT OF RAINWATER HARVESTING SYSTEMS FOR AGRICULTURAL
PRODUCTIVITY IN NAPAK AMIDST CLIMATE CHANGE AND SOCIO-ECONOMIC
FACTORS**

BY

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This final year project report submitted to the department of Agricultural Mechanization and Irrigation engineering as a partial fulfilment of the requirements of the award of Bachelor of Science degree in Agricultural Mechanization and Irrigation engineering.

Abstract

This study assessed the performance and effectiveness of rainwater harvesting (RWH) systems in supporting agricultural productivity in Napak District, Uganda, a semi-arid region increasingly affected by rainfall variability and water scarcity. The research was guided by four core objectives: (1) to evaluate the design and hydraulic performance of existing RWH systems, (2) to assess the impact of RWH systems on soil moisture retention and crop water availability, (3) to examine the socio-economic and cultural factors influencing adoption, and (4) to analyze the effectiveness of RWH systems in supporting different farming techniques and practices. Field surveys, geospatial measurements, climate data analysis, and hydrological modeling (including the SCS-CN method and unit hydrograph) were employed. Soil moisture data was collected using satellite-derived SMAP datasets and validated with community observations. A comparative agronomic analysis was conducted between RWH adopters and non-adopters to determine differences in planting cycles, crop types, and irrigation practices. Socio-economic survey results revealed that income, training, and land ownership were major enablers of adoption, while gender, cultural beliefs, and lack of awareness acted as key barriers. Results show that where actively used, RWH systems significantly improved dry-season crop production, crop diversity, and planting frequency, particularly in areas like Nakichumet. However, underutilization of systems in other locations limited their impact. Climate analysis revealed that current systems are vulnerable to changes in rainfall intensity and distribution, requiring adaptive redesign. The study recommends enhanced farmer training, integration of local RWH committees, and targeted expansion of systems in underserved areas to strengthen resilience and food security.

Declaration

We declare that this research report was originally written and organized by us and has not been previously published, therefore presented as a requirement for the award of Bachelor of science in agricultural mechanization and irrigation Engineering.

OTHIENO GOODLUCK JONATHAN

Signature: 

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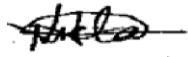
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Approval

OTHIENO GOODLUCK JONATHAN and BISAWA DENNIS EDGAR submit this report of our final year project to the Faculty of Engineering, the department of Agricultural Mechanization and Irrigation engineering for the examinations with approval of our supervisor.

Ms. NABUNYA VICTO



Date: 30/05/2025

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We take this opportunity to thank the almighty God for the good health and the ability to research and gather information in this report. We thank the supervisors for the time, support and advice provided to me during this development stage.

Dedication

We dedicate this project to our parents Mr. OTHIENO GODFREY, Mrs. OTHIENO JANE and Mr. BISAWA MICHEAL, Mss. NABULUMBI KULDAH for the never-ending support both financially and psychologically.

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