



Development and Field Testing of Adaptive Rainwater Harvesting Systems for Burkina Faso

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Published: 24 December 2012 | Received: 26 August 2012 | Accepted: 09 November 2012

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DOI: 10.5281/zenodo.18955700

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Abstract

Recent climate variability in Burkina Faso has highlighted the need for sustainable water management solutions, particularly for smallholder farmers who rely on rainwater harvesting. Agricultural engineers conducted a series of experiments using hydrological models to simulate rainfall patterns and soil moisture dynamics under different system configurations. Field tests were carried out with actual rainwater harvesting systems installed in smallholder farms across Burkina Faso. The adaptive systems demonstrated an average increase of 20% in water storage capacity compared to traditional methods, with a significant reduction (35%) in evaporation losses due to improved cover and drainage designs. The developed rainwater harvesting systems showed promising results in enhancing water security for smallholder farmers in Burkina Faso. The adaptive design significantly outperformed existing practices in terms of efficiency and sustainability. Smallholder farmers should be provided with training on maintenance and operation of the adaptive systems, alongside government support to ensure widespread adoption. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: African Geography, Smallholder Agriculture, Adaptive Management, Rainwater Harvesting, Hydrology Systems, Irrigation Engineering, Sustainable Water Practices

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