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Rainwater harvesting practices among residents of Mutama-Bweengwa, Pemba district, southern province, Zambia

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Abstract

Rainwater harvesting is an important coping strategy in rural areas characterised by limited and unreliable water supply. This study investigates rainwater harvesting practices among residents of Mutama-Bweengwa in Pemba District, Southern Province, Zambia, with a focus on the methods employed, the factors influencing their adoption, and the associated benefits and constraints. The study is informed by the need to understand how local communities respond to water scarcity under conditions of climate variability, particularly within the context of rural water supply challenges.

A mixed-methods approach was adopted, combining household surveys, key informant interviews, and field observations to generate both quantitative and qualitative data. The findings reveal that rainwater harvesting practices in Mutama-Bweengwa are predominantly traditional and reflect traditional water management approaches that are closely linked to the nature of the catchment. Common methods include the use of buckets, wells, dams, trenches, soil bunds, ponds, contours, and limited use of storage tanks. These methods are largely catchment-based systems, adapted to local environmental conditions. Rooftop rainwater harvesting is largely absent, as most households are constructed with grass-thatched roofs, which are unsuitable for effective water collection.

The study further establishes that rainfall variability is a key determinant of rainwater harvesting practices. Irregular and insufficient rainfall significantly limits water availability and reduces the effectiveness of harvesting systems. Additional factors influencing adoption include the nature of the catchment, high installation and maintenance costs, limited storage capacity, and lack of technical knowledge on system design and management. Water quality concerns, arising from contamination during collection and storage, also present notable challenges.

Despite these constraints, rainwater harvesting provides several benefits to the community. It serves as a supplementary source of water for domestic use, reduces pressure on conventional water sources, and supports smallholder agriculture, particularly dry-season gardening. The practice contributes to improved household resilience and has the potential to enhance food security. However, its effectiveness remains constrained by environmental, technical, and socio-economic limitations. The study highlights the need for context-specific interventions that strengthen existing systems through technical support, community education, and improved water management strategies.

Keywords: Catchment-based systems, climate variability, rainwater harvesting practices, rural water supply, smallholder agriculture, traditional water management, water scarcity, Zambia