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Building climate resilience in semi-arid Zimbabwe through agroecology: Pathways for smallholder farmers in Muzarabani district

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Abstract

Semi-arid landscapes across southern Africa are increasingly defined by climatic uncertainty, and few places reflect this reality more starkly than Muzarabani District in northern Zimbabwe. Recurrent droughts, shifting rainfall regimes, and rising temperatures continue to erode the viability of conventional rain-fed agriculture, placing smallholder livelihoods under sustained pressure. This study examines agroecology not merely as a set of farming techniques, but as a locally grounded pathway for resilience-building under conditions of climatic stress. The research draws on a multi-layered field design combining household-level data (n = 240), community dialogues, and on-farm observations conducted between 2022 and 2025 across three wards. Rather than isolating single interventions, the study evaluates bundled agroecological practices, including conservation tillage, diversified cropping systems anchored in small grains, water harvesting structures, agroforestry, and the revitalisation of indigenous seed networks.

Findings indicate that households adopting integrated agroecological systems experienced marked improvements in yield stability during drought years, alongside measurable gains in soil condition and reduced dependence on external inputs. More significantly, the results point to less tangible – but equally critical – outcomes: strengthened local knowledge systems, enhanced cooperation among farmers, and increased confidence in managing climatic risk. The study in additionargues that use of local resources is the key stone to climate change adaptation. The paper argues that agroecology's strength lies in its ability to align ecological processes with social realities, making it particularly suited to fragile environments such as Muzarabani. It concludes that scaling resilience in semi-arid regions will depend not only on technical interventions, but on approaches that restore agency, rebuild ecological integrity, and embed adaptation within local knowledge systems.

Keywords: Agroecology, climate adaptation, climate resilience, food security, indigenous knowledge, semi-arid regions, smallholder farmers, sustainable agriculture, Zimbabwe

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