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Participatory agroforestry design for climate resilience: insights from farmer-centred innovation in Ghana

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Abstract

Agroforestry, the cultivation of food crops with trees has been widely promoted as a sustainable land-use practice to address climate change, biodiversity loss, and rural poverty problems in many sub-Saharan Africa countries. Despite its usefulness, many agroforestry interventions in developing countries such as Ghana remain underutilised due to poor acceptability by farmers and beneficiaries as well as limited alignment with local socio-ecological contexts emanating from insufficient farmer participation in the design process. This study bridges this knowledge gap. It puts farmers and end users of the agroforestry intervention at the fore front of development research by employing a farmer-centred co-design approach that helps develop context-specific agroforestry models in Ghana's forest zones, using a hybrid conceptual framework that integrates Social-Ecological Systems (SES) theory and Participatory Action Research (PAR). Through interviews and stakeholder workshops, the study engaged farmers, extension agents, and researchers in co-creating agroforestry systems that respond to local needs, knowledge systems, and environmental conditions. Findings of the study revealed that the co-design process enhanced farmer identification and ownership, fostered innovation rooted in indigenous practices and facilitated knowledge exchange across stakeholder groups. The SES framework helped identify critical system variables such as land tenure arrangements, market access, and soil fertility that influenced design choices, while PAR enabled adaptive learning and inclusive decision-making. The study underscores the value of integrating ecological understanding with participatory methods to develop agroforestry models that are both locally appropriate and ecologically resilient. We conclude with practical lessons for scaling farmer-centred agroforestry innovations in Ghana and similar contexts across the Global South.

Keywords: Agroforestry, Co-design, Farmer-centered innovation, Participatory Action Research, Social-Ecological Systems

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