



Climate Smart Agriculture Technologies in Southern Sudan: Ecosystem Services Contribution to Smallholder Farming Communities

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Abstract

Climate change poses significant challenges to agricultural productivity in Southern Sudan, particularly for smallholder farmers who depend on rain-fed agriculture. A mixed-methods approach combining socio-economic surveys, satellite data analysis, and field observations was employed to assess CSA technology adoption and impact on biodiversity, soil health, and water management. CSA technologies led to a 30% increase in crop yields over the five-year period, particularly in areas with higher rainfall variability, contributing to enhanced ecosystem services such as improved soil fertility and reduced erosion. The integration of CSA technologies has significantly contributed to sustaining smallholder farming communities' livelihoods while promoting environmental resilience in Southern Sudan. Policy makers should incentivize the adoption of CSA technologies through targeted interventions, including extension services, subsidies for inputs, and improved infrastructure development. Climate Smart Agriculture, Smallholder Farmers, Ecosystem Services, Southern Sudan

Keywords: *African Development, Smallholder Farming, Climate Change Adaptation, Ecosystem Services, Integrated Pest Management, Participatory Rural Appraisal, Longitudinal Studies*

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