Journal of
Agriculture, Food and Sustainable Development
econsciences.com
Volume 1 September 2025 Issue 1

Agroforestry as Climate Change Adaptation: The Case of Cocoa Farming in Ghana

Olwig, M. F., Bosselmann, A. S., & Owusu, K. (Eds.) Springer 2024

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Abstract. Agroforestry as Climate Change Adaptation: The Case of Cocoa Farming in Ghana explores how cocoa farmers in Ghana adapt to climate change through agroforestry systems. The book provides a multidisciplinary examination of ecological, economic, and institutional dimensions affecting cocoa production resilience. Through empirical studies and case analyses, the authors show that integrating shade trees improves soil fertility, mitigates climatic stress, and diversifies farmers' incomes. Yet, adoption barriers such as insecure land tenure, economic trade-offs, and insufficient policy support are emphasized. The editors advocate for participatory approaches, secure tenure rights, and targeted policy interventions to enhance agroforestry adoption. Combining scientific rigor with practical insights, this volume contributes to the growing body of knowledge on climate adaptation strategies in tropical agriculture. It is an essential reference for researchers, policymakers, and development practitioners focused on sustainable agriculture and climate resilience.
Keywords. Agroforestry, Climate Change Adaptation, Cocoa Farming, Ghana, Sustainable Agriculture.
JEL. Q12, Q54, Q56.
SDGs. SDG13, SDG15.

Book Review

Climate change presents profound challenges for agricultural systems worldwide, particularly in the Global South, where millions of smallholder farmers depend on weather-sensitive crops for their livelihoods. Cocoa farming in Ghana, a cornerstone of the country's economy and rural employment, is particularly vulnerable to rising temperatures, erratic rainfall patterns, and increased pest pressures.

Agroforestry as Climate Change Adaptation: The Case of Cocoa Farming in Ghana, edited by Mette Fog Olwig, Aske Skovmand Bosselmann, and Kwadwo Owusu, offers a meticulous and multidisciplinary exploration of agroforestry as a promising adaptation strategy. By bringing together contributions from agronomy, economics, social sciences, and policy studies,

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the book presents a comprehensive analysis of the opportunities and constraints involved in integrating shade trees into cocoa farms to build resilience against climate stresses.

This review provides a detailed critical analysis of the book's content, highlighting its major contributions, methodological approaches, case studies, policy recommendations, and areas for future research.

Structure and Content Overview

The book is organized into thematic chapters that progressively deepen the reader's understanding of agroforestry within cocoa landscapes:

Part I introduces the rationale for agroforestry and its historical development in Ghanaian cocoa farming.

Part II examines ecological dimensions, such as tree-crop interactions, soil health, and microclimate regulation.

Part III addresses socioeconomic factors, including labor, market dynamics, and household decision-making.

Part IV focuses on institutional and policy contexts, discussing land tenure regimes, extension services, and climate policies.

Part V synthesizes findings and proposes pathways for scaling agroforestry innovations.

Each section blends empirical findings from field studies with conceptual frameworks, offering both theoretical and practical insights.

Biophysical Dimensions: Enhancing Cocoa Farm Resilience

The book's ecological chapters are particularly strong in demonstrating how integrating shade trees enhances farm microclimates, stabilizes soil moisture, improves nutrient cycling, and supports biodiversity. Studies cited in the book show that shade can reduce heat stress on cocoa trees by several degrees, prolonging flowering and pod development periods.

Specific attention is given to species selection: not all shade trees confer the same benefits. Some fast-growing exotics, such as Cedrela odorata, offer quick returns but may not support soil biodiversity or long-term resilience as effectively as indigenous species like Milicia excelsa.

Furthermore, empirical data suggests that well-managed shade regimes (around 30-40% canopy cover) optimize cocoa productivity and ecosystem service provision, countering the myth that full-sun cocoa cultivation necessarily results in higher yields.

Socioeconomic Considerations: Barriers and Incentives

Agroforestry adoption is not merely a biophysical choice; it is deeply embedded in farmers' economic realities. The book illustrates that while agroforestry can yield long-term benefits, such as diversified income (timber, fruits, and non-timber forest products), many farmers are deterred by short-term financial and labor constraints.

A critical insight from the socioeconomic chapters is the heterogeneity among farmers: wealthier landowners are more likely to invest in

agroforestry systems, while resource-poor farmers prioritize immediate returns over long-term sustainability. Thus, adoption is not uniform and depends on farmers' asset portfolios, risk perceptions, and market access.

The opportunity cost of land use change, access to shade tree seedlings, labor availability for tree management, and perceived tenure security are identified as key determinants of agroforestry practices.

Land Tenure and Institutional Barriers

One of the book's most significant contributions is its examination of institutional dimensions, especially land and tree tenure. In Ghana, customary land rights often intersect confusingly with statutory laws, creating uncertainty about who owns trees planted on farmland.

This tenure ambiguity disincentivizes tree planting, as farmers fear losing either the trees or their land without compensation. The book argues convincingly that without clear, secure tenure arrangements, agroforestry initiatives are unlikely to scale effectively.

Policy analysis chapters recommend legal reforms that formally recognize farmers' rights to planted trees and suggest decentralized land governance models that strengthen community-level institutions.

Participatory Approaches and Local Knowledge Integration

Rather than imposing top-down solutions, the editors advocate for participatory, farmer-centered approaches to agroforestry promotion. Chapters document how co-design processes, where farmers actively participate in selecting tree species and designing farm layouts, lead to higher rates of adoption and better ecological outcomes.

The importance of integrating indigenous knowledge — about tree-crop interactions, pest dynamics, and soil management — is emphasized throughout the volume. Agroforestry systems must reflect local environmental conditions and cultural preferences to be sustainable.

Empirical Evidence: Case Studies Across Ghana

The book draws on case studies from the Western, Ashanti, and Brong-Ahafo regions of Ghana. These empirical accounts reveal considerable variability in agroforestry outcomes:

Some farmers experienced yield increases, improved household food security, and higher resilience to dry spells.

Others reported challenges related to increased labor demands, limited technical support, and difficulties accessing markets for tree products.

These cases underscore the book's central argument: agroforestry is not a panacea, and its success hinges on supportive social, institutional, and policy environments.

Policy Recommendations

Drawing from empirical evidence, the editors propose a multi-pronged policy framework to support cocoa-agroforestry systems:

Secure Land and Tree Tenure: Clarify legal rights and streamline tree registration processes.

Expand Extension Services: Provide farmers with technical assistance, especially in tree management and agroforestry system design.

Develop Agroforestry Incentive Schemes: Offer subsidies, tax incentives, and payments for ecosystem services to offset initial adoption costs.

Facilitate Access to Seedlings: Establish decentralized tree seedling nurseries linked to community organizations.

Enhance Market Linkages: Promote value chains for timber, fruits, and non-timber forest products from agroforestry systems.

Critical Reflections

While the book is thorough, some areas warrant deeper exploration:

Gender Dimensions: Although women are critical actors in cocoa farming, their specific roles and barriers in agroforestry adoption are underexplored.

Comparative Perspectives: Insights from other cocoa-producing countries (e.g., Côte d'Ivoire, Indonesia) could have enriched the analysis.

Climate Projections: Future climate scenarios and their differentiated impacts on agroforestry models could be discussed more extensively.

Nonetheless, these limitations do not detract significantly from the overall strength and utility of the volume.

Future Research Directions

The book opens several avenues for future research:

Longitudinal studies to track agroforestry impacts over multiple cocoa cycles.

Economic modeling of agroforestry adoption under different climate and market scenarios.

Investigation into youth engagement in agroforestry and generational knowledge transfer.

Studies on the role of digital technologies (e.g., mobile apps for extension) in scaling agroforestry adoption.

Conclusion

Agroforestry as Climate Change Adaptation: The Case of Cocoa Farming in Ghana is a significant scholarly contribution that advances understanding of sustainable agricultural adaptation strategies. By integrating ecological, socioeconomic, and institutional analyses, the book provides a nuanced and actionable roadmap for fostering resilient cocoa production systems.

Its emphasis on local participation, tenure security, and context-specific interventions resonates with broader global debates on climate adaptation, sustainability, and rural development.

For researchers, policymakers, and practitioners seeking to promote resilient agricultural systems in the face of climate change, this book is an indispensable resource.

Author statements
Acknowledgements: Not applicable.
Author contributions: The contribution of the authors is equal.
Funding: No funding was received for this study.
Availability of data and materials: Not applicable.
Ethics declarations
Ethics approval and consent to participate: Not applicable.
Consent for publication: Not applicable.
Consent to participate: Not applicable.
Competing interests: The authors declare that they have no competing interests.
Informed consent: Not applicable.
Consent for publication: All authors agreed with the content and gave explicit consent to submit the manuscript to *Journal of Agriculture, Food and Sustainable Development*
Data Availability Statement: Not applicable.