CIRAWA

Agroecological Solutions for Resilient Farming in West Africa

CIRAWA Agroecology Conference

Agroecology and Nature-Based Solutions for Sustainable Food Systems in Africa

Book of Abstracts

1 - 3 July 2026
Accra, Ghana

Venue
The Palms Hotel
(former Holiday Inn),
Airport City, Accra, Ghana

CO-ORGANIZERS

CORAF

FARA
Forum for Agricultural Research in Africa

CIRAWA

Funded by the European Union

Editors: Saa DITTOH and Josep CROUS-DURAN

1-3 JULY 2026, ACCRA, GHANA

Book of Abstracts

Abstract

Book of abstracts from the CIRAWA Agroecology Conference - Agroecology and Nature-Based Solutions for Sustainable Food Systems in Africa (Ghana) held in Accra during the 1-3 July 2026.

Editors:

Professor Saa Dittoh[1],
Dr. Josep Crous Duran[2]
[1] University for Development Studies, Tamale, Ghana
[2] REVOLVE, Barcelona, Spain

Editorial assistance:

Doreen Aviela D. Derzu[1]
[1] University for Development Studies, Tamale, Ghana

Project Scientific Committee

Prof. Saa Dittoh	University for Development Studies, Tamale, Ghana
Silvia Gómez Valle	CARTIF Technology Centre, Valladolid, Spain
Prof. Antonio Delgado Garcia	University of Seville, Seville, Spain
Prof. Jose Manuel Quintero Ariza	University of Seville, Seville, Spain
Dr. Marina Paneque	University of Seville, Seville, Spain
Prof. Luis Manuel Navas Gracia	University of Valladolid, Valladolid, Spain
Dr. Pablo Martín-Ramos	University of Valladolid, Valladolid, Spain
Dr. Dileyni Díaz De Oleo	University of Valladolid, Valladolid, Spain
Ouiam Fatiha Boukharta	University of Valladolid, Valladolid, Spain
Dr. Dzigbodi Adzo Doke	University for Development Studies, Tamale, Ghana
Dr. Mame Farma Ndiaye	Institut Sénégalais de Recherches Agricoles Saint-Louis, Senegal
Dr. Mbaye Diop	Institut Sénégalais de Recherches Agricoles Saint-Louis, Senegal
Dr. Josep Crous Duran	REVOLVE, Barcelona, Spain
Nicolas Minary	Landfiles, Paris, France
Miguel Ribeiro	Associação de Defesa do Património de Mértola, Mértola, Portugal
Ana Sanches	Associação de Defesa do Património de Mértola, Mértola, Portugal
María Fernández Marcos	CARTIF Technology Centre, Valladolid, Spain
Eva Fernández Palacios	CARTIF Technology Centre, Valladolid, Spain
Nuria Fernández Rico	CARTIF Technology Centre, Valladolid, Spain
Dr. Bárbara Diez	CARTIF Technology Centre, Valladolid, Spain

Local Organizing Committee

Dr. Dzigbodi Adzo Doke	University for Development Studies, Tamale, Ghana
Johnson Ukpong	Forum for Agricultural Research in Africa, Accra, Ghana
Dr. Joseph Bandanaa	Swiss Platform for Sustainable Cocoa, Accra, Ghana
Esther Nyamekye Opoku	FIDEP Foundation, Accra, Ghana
Benjamin Abugri	Forum for Agricultural Research in Africa, Accra, Ghana
Dr. Fructueuse Ouidoh Agbodjogbe	West and Central African Council for Agricultural Research and Development, Accra, Ghana
Prof. Margaret Atosina Akuriba	University for Development Studies, Tamale, Ghana
Dr. Francis Saa-Dittoh	University for Development Studies, Tamale, Ghana
Doreen Aviela D. Derzu	University for Development Studies, Tamale, Ghana
Wilhelm Nomu Kutah	Savana Agricultural Research Institute, Accra, Ghana
Philemon Ayambila	University for Development Studies, Tamale, Ghana
Francis Kpodo	Forum for Agricultural Research in Africa, Accra, Ghana
Gabriel Quansah	Forum for Agricultural Research in Africa, Accra, Ghana
Elias Kodiah	Forum for Agricultural Research in Africa, Accra, Ghana
Augustina Aduku	University for Development Studies, Tamale, Ghana
Priscilla Akoto	University for Development Studies, Tamale, Ghana

Table of Contents

Welcome message

This Book of Abstracts brings together the scientific contributions, practical experiences and policy-oriented reflections presented in the framework of the CIRAWA Conference 2026. Rather than serving only as a compilation of conference materials, it aims to provide a snapshot of current work on agroecology, Nature-based Solutions and resilient farming systems in Africa and beyond.

The CIRAWA project, *Agro-ecological strategies for resilient farming in West Africa*, is funded by the European Commission under the Horizon Europe programme, under Grant Agreement No. 101084398, was born from the conviction that the transition towards more sustainable and resilient food systems must be built together with farmers, researchers, local communities, policymakers, civil society organisations and practitioners. Agroecology and Nature-based Solutions are not only technical approaches; they are also ways of rethinking how we produce food, manage natural resources, value local knowledge and respond collectively to climate, environmental and social challenges.

This conference offers a space to exchange scientific evidence, field experiences and policy perspectives on some of the most urgent questions facing African and global food systems today. The Abstracts included in this volume cover a wide range of topics, including agroecological practices, soil health, agro-waste valorisation, circularity, monitoring and evaluation, gender, governance, policy, and the scaling-up of sustainable farming transitions. Together, they show the richness and diversity of ongoing work across West Africa and beyond, as well as the importance of connecting research with real farming contexts.

We would like to express our sincere gratitude to all keynote speakers, authors, presenters, workshop organisers and participants for their valuable contributions. Their work, commitment and willingness to share knowledge have made this conference possible. We also warmly thank all CIRAWA partners and collaborating institutions for their continuous support, and especially the local organisers and teams who have contributed to the preparation of this event.

We hope this Book of Abstracts will serve not only as a record of the conference, but also as a source of inspiration for future collaboration, dialogue and action. May the ideas gathered here contribute to strengthening agroecological transitions, supporting resilient farming communities, and building more inclusive and sustainable food systems.

Silvia Gómez Valle & Bárbara Díez
CIRAWA Coordinators
CARTIF Technology Centre, Valladolid, Spain

Sponsors and Partners

Organisers

CORAF

FARA
Forum for Agricultural Research in Africa

CIRAWA

Funded by the European Union

Sponsors

epa

IUCN

ACL

UNIVERSITY FOR DEVELOPMENT STUDIES

FARA
Forum for Agricultural Research in Africa

World Vision

Project Partners

CARTIF

ADPM mértola

AMUPAL

AJACM
Associação dos Jovens Agricultores de Casa do Meio

CIFOR

World Agroforestry

FIDEP FOUNDATION
Communities Matter

ISRA

landfiles

Ministério da Agricultura e Ambiente

NATIONAL AGRICULTURAL RESEARCH INSTITUTE THE GAMBIA

UNIVERSIDAD DE SEVILLA

NATIONAL SEED SECRETARIAT

N.A.T.C.

SAPIENTIA AEDIFICAVIT SIBI DOMVM

UNIVERSITY FOR DEVELOPMENT STUDIES

REVOLVE

Day 1
Wednesday | 1 July 2026

Time	Session	Convenor/ Chairperson
8:00 – 9:00	Registration	UDS/FIDEP
9:00 – 10:00	Brief welcome from CIRAWA Coordinator – CARTIF Statement by Sister Horizon Partner – CANALLS **Keynote 1: Harmonisation of Indigenous Knowledge and Transformative Education: Enabling Agroecology Transitions in Africa** Speaker: Edmond Moukala, UNESCO Representative to Ghana **Keynote 2: The IUCN Global Framework for the Design, Verification and Scaling Up of Nature-based Solutions** Speaker: Dr. Jacques Somda, IUCN, Ouagadougou **Q&A**	Chair: Prof. Osman Damba, Sec-Gen of Ghana Commission for UNESCO
10:00 – 10:30	Break	
10:30 – 12:00	**Opening Ceremony** **Special Guest of Honour:** **Representative of Her Excellency the Vice President of Ghana, Professor Naana Jane Opoku-Agyemang** Welcome Address – Professor Seidu Al-Hassan, Vice Chancellor, UDS, Tamale Welcome Address – Dr. Bárbara Díez, CARTIF, CIRAWA Brief Statements by EPA, IUCN, UNESCO, EU, FARA, CORAF, AGRA, MoFA, MESTI, WV, AMAATI Ltd., and others **Keynote 3: The State and Potential of Agroecology in Africa** Speaker: Prof. Saa Dittoh, UDS/CIRAWA **Special Guest of Honour's Speech** Vote of Thanks Group Photograph	Chair: Prof. Nana Ama Browne Klutse, CEO of EPA, Ghana
12:00 – 13:00	Poster Sessions and Exhibitions	FIDEP/UDS
13:00 – 14:00	Lunch break	
14:00 – 16:00	**Scientific Session 1:** **Agroecology – Technologies and Practices** Chair: Dr. Mama Farma Ndiaye, ISRA Discussant: Dr. Lamin Dibba, NARI	**Scientific Session 2:** **Nature-Based Solutions – Technologies and Practices** Chair: Dr. Sylvester Dickson Baguma, ASARECA Discussant: Dr. Papa Madiama Diop, ISRA
16:00 – 17:00	Poster Sessions and Exhibitions	FIDEP/UDS

Day 2
Thursday | 2 July 2026

Time	Session		Convenor/ Chairperson
9:00 – 10:00	**Keynote 4:** **Soil Health, Agro-Waste and Circularity - Recycling – Nature's Pathway to Healthy Soil** Speaker: Dr. Aggrey Aguyma **Keynote 5: Metrics, Indicators, M&E - Building evidence for agroecological transition: Metrics, indicators and Monitoring & Evaluation in West Africa** Speaker: Raúl Sanchez, CARTIF **Q&A**		Chair: Prof. Adriana Correa-Guimarães, UVa
10:00 – 10:30	Break		
10:30 – 12:30	**Scientific Session 3:** **Soil Health, Agro-Waste and Circularity** Chair: Dr. Catherine Dembelé, CIFOR-ICRAF Discussant: Dr. Gilbert Dagunga, St. John Boscos	**Scientific Session 4:** **Metrics, Indicators, M&E** Chair: Jules Bayala, CIFOR-ICRAF Discussant: Prof. Charles Okyere, Univ. of Ghana	
12:30 - 13:00	Poster Sessions and Exhibitions		FIDEP/UDS
13:00 – 14:00	Lunch break		
14:00 – 15:00	**Keynote 6:** **Agroecology Transition - Drivers and incentive mechanisms for employing sustainable farming and nature-based solutions in Africa** Speaker: Prof. Tilahun Amede, AGRA, Kenya **Keynote 7:** **Policy, Upscaling and Gender - Agroecology & Nature-Based Solutions for Sustainable Food Systems at Scale in Africa: critical pathways to adoption at scale** Speaker: Dr. Moumini Savadogo, CORAF **Q&A**		Chair: Prof. Michael Ayamga-Adongo, EPA Ghana
15:00 – 17:00	**Scientific Session 5:** **Agroecology Transitions** Chair: Dr. Erin Anders, Water for Food Institute, Univ. Nebraska, USA Discussant: Richard Appoh, WV	**Scientific Session 6:** **Policy, Upscaling and Gender** Chair: Prof. Oladimeji Idowu Oladele, UKZN, South Africa Discussant: Dorcas Owusuaa Agyei, IUCN	
17:00 – 18:00	Poster Sessions and Exhibitions		
19:00 – 22:00	Conference dinner		UDS / FIDEP

Day 3
Friday | 3 July 2026

Time	Session	Convenor/ Chairperson
9:00 – 9:10	**Opening:** Speaker: Hollie Fisher, Media Relations Manager, REVOLVE	
9:10 - 9:30	**Keynote 8:** **Policy, Governance and Way Forward** Speaker: Prof. Nana Ama Browne Klutse, CEO, EPA, Ghana **Q&A**	Chair: Prof. Margaret Akuriba, UDS
9:30 – 9:45	**Policy Briefs** Presenter: Suzan Naz Uzel, Policy Officer, REVOLVE	REVOLVE
9:55 – 10:45	**Roundtable Policy Discussion** Moderator: Dr. Jacques Somda, IUCN Panel: Dr. Moumini Savadogo, CORAF; Dr. Marc Corbeels, CIRAD; Prof. Osman Damba Tahidu, Sec-Gen of the Ghana Commission of UNESCO.	
10:45 - 11:00	Break	
11:00 – 11:30	Poster Sessions and Exhibitions	
11:30 – 13:00	**Workshop 1:** **Unlocking the Potential of Partnerships for Agroecology in Sub-Saharan Africa** Presenter: ASARECA et. Al. Chair: Demba Jallow, NSS **Workshop 2:** **Measuring What Matters: Co-designing Holistic Assessments of Agroecological Systems** Presenter: Gloria Kukurije Adeyiga and Mary Crossland, FORIG, Ghana Chair: Dr. Amos Yesutanbul, FIDEP	REVOLVE
13:00 – 14:00	Lunch break	
14:00 – 15:00	**Workshop 3:** **CIRAWA DSS: An Agroecological Decision-Support System for Soil-Based Crop Planning in West Africa** Nicolas Minary and Nabil Boukala, Landfiles, CIRAWA Chair: Miguel Ribeiro, ADPM	REVOLVE
15:00 – 16:30	**Workshop 4:** **Operationalising Agroecology at Scale: Insights from the Regreening Africa Project in Ghana** Presenter: Richard Appoh et. Al. Chair: Dr. Demba B. Jallow, NARI	REVOLVE
16:30 – 18:30	**Closing Session** Key Recommendations and Next Steps Acknowledgements and Closing Remarks – Dr. Bárbara Díez, CARTIF	FIDEP

Regreening Africa
PHASE II · GHANA PROJECT PROFILE

Restoring land, building climate resilience in Northern Ghana.

Strengthening the resilience of communities in Northern Ghana facing climate change, land degradation and food insecurity — through regreening.

6 districts | Oct 2024 – Sept 2028 | €2 million | Funded by the European Union

60,000	100,000	6	11
households targeted to adopt regreening	hectares of land under restoration	districts across Upper East & Northern regions	proven regreening practices promoted

35% UNDER DESERTIFICATION THREAT

Why regreening matters in Northern Ghana

Northern Ghana lies in the dry savannah belt — the country's land-degradation hotspot. An estimated **35% of Ghana's land is under threat of desertification**, where soil erosion, tree loss and erratic rainfall cut harvests and deepen food insecurity. Regreening restores soil, water and tree cover — rebuilding the climate resilience that land and livelihoods depend on.

Three objectives, one resilient landscape

Key objectives & outputs

1 Adoption of regreening practices

- Evidence-based awareness & advocacy to shift behaviour
- Local access to quality seeds & seedlings
- Capacity-building for farmers, women & youth
- Policy engagement to remove barriers

2 Use of restoration evidence

- Contextualised, inclusive solutions for local needs
- Build capacity to generate & use evidence
- Strengthen data on food security & carbon
- Share via digital tools & co-learning platforms

3 Green enterprise & employment

- Demand-driven value chains & entrepreneurship
- Enabling environments for rural business
- Targeted opportunities for women & youth
- Tree-based products: shea, honey, fuelwood

PROMOTED REGREENING PRACTICES

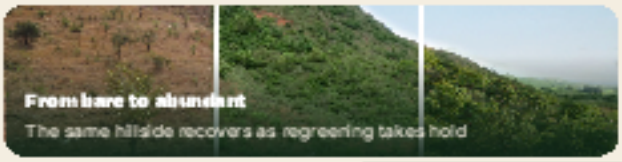
Community champions, savings groups, eco-clubs, policy dialogues and media advocacy carry proven models outward — with **lead farmers** driving behaviour change and adoption across the landscape.

- FMNR
- Agroforestry
- Enrichment planting
- Tree care & management
- Assisted natural regeneration
- Tree nursery management
- Soil & water conservation
- Composting
- Bushfire management
- Tree value chains
- Green enterprise

Expected impact

- Stronger resilience of smallholder farming systems
- Improved land health & ecosystem services
- Higher household incomes & diversified livelihoods
- Greater community ownership of regreening
- Enhanced policy & private-sector engagement

COMMUNITIES LEADING THE CHANGE



From bare to abundant
The same hillside recovers as regreening takes hold

Women-led champions
Restoring ecosystems & food security

Community fire teams
Protecting regenerating land

CROSS-CUTTING THROUGHOUT: Gender, Youth & Social Inclusion (GYSI) | Environmental sustainability | Disaster risk management

IMPLEMENTING PARTNERS

Richard Appoh
World Vision Ghana
richard_appoh@wvi.org
+233 24 333 6900

Edward Akunyagra
Catholic Relief Services
edward.akunyagra@crs.org
+233 20 673 7042

Gloria Adeyiga
CIFOR-ICRAF
gloriaadeyiga@gmail.com
+233 54 556 0500

Keynote speeches

Keynote 1 | Harmonisation of Indigenous Knowledge and Transformative Education: Enabling Agroecology Transitions in Africa

Day 1 Wednesday | 1 July 2026 | 9:10 – 10:00

DR. EDMOND MOUKALA
Head of Office
UNESCO Representative in Ghana
Accra, Ghana

Mr. Edmond Moukala is a Congolese sinologist who holds a master's degree in law, a bachelor's degree in design and planning, and a Civil Engineering Degree. He stands as a distinguished figure whose career is marked by significant contributions across the realms of international diplomacy, cultural dialogue, particularly he is recognized for his insightful contributions to understanding historical and societal development. His diverse roles reflect a deep commitment to cultural preservation, knowledge dissemination, and the promotion of education and peace globally. As a UNESCO Representative, previously to Mali and now to Ghana, Mr. Moukala has been instrumental in advancing the organization's mandates, particularly fostering international cooperation, implementing crucial projects, and advocating for policies that support sustainable development through culture and education. He has championed initiatives that bring communities together, ensuring their heritage is recognized, protected, and transmitted to future generations. Beyond his diplomatic endeavors, Mr. Moukala is also an accomplished lecturer. His ability to articulate complex ideas in an accessible manner has resonated with students and researchers, establishing him as a compelling voice on AFRICA and its Agenda 2063.

Abstract
At UNESCO, we believe that agricultural transitions are not merely technical adjustments. They are cultural movements. They are educational revolutions. They are, at their heart, the manifestation of humanity's relationship with the biosphere. As we explore the theme of harmonizing indigenous knowledge with transformative education, we do so with the recognition that Africa is not a 'problem to be solved,' but a 'laboratory of global solutions.'
This conference is an opportunity to look into the variety of Africa's rural communities' knowledge transmitted from generations: that the health of the soil and the health of

the person are one, and that our food security lies in the diversity of our landscapes rather than the uniformity of our industrial inputs.

For far too long, the global discourse on African agriculture was dominated by the 'Green Revolution' paradigm—a model characterized by high inputs, chemical dependency, and genetic uniformity. While it promised immediate yields, we have seen its long-term costs: depleted soil, eroded biodiversity, and the marginalization of the smallholder farmer. More importantly, this model often treated the African farmer as an empty vessel to be filled with external technology, rather than a master of an intricate, localized science.

Today, Africa is reclaiming the narrative. Agroecology is the science of the relationship between plants, animals, humans, and the environment. It is a science that Africa has practiced for millennia, even before the term 'ecology' was coined in Western textbooks. Our challenge today is to build a bridge between this deep-rooted wisdom and the frontiers of modern environmental science. This is the 'harmonization' of which we speak—a partnership of equals between the professor in the laboratory and the elder in the field.

We must recognize that agroecology is not a 'low-tech' alternative. On the contrary, it is a high-knowledge, high-observation art. It requires a sophisticated understanding of ecosystem services, nutrient cycling, and biological synergies. By grounding this transition in indigenous knowledge, we ensure that the transition is inclusive, sovereign, and deeply rooted in the African soil.

Keywords: Indigenous knowledge, Agroecology, Agricultural transition, Food security, Biodiversity

Keynote 2 | The IUCN global framework for the design, verification and scaling up nature-based solutions

Day 1 Wednesday | 1 July 2026 | 9:00 – 10:00

DR. JACQUES SOMDA

Deputy Regional Director of the Central and West Africa Programme of International Union for the Conservation of Nature (IUCN), Ouagadougou, (Burkina Faso)

Dr. Jacques SOMDA is the Deputy Regional Director of the Central and West Africa Programme of the International Union for Conservation of Nature (IUCN). Within IUCN, he held various positions, including the Country Director in Burkina Faso, the Regional Program Officer for planning, monitoring, evaluation and learning, and the Country Programme Coordinator in Guinea Bissau. Prior to IUCN, he was a Research Associate and the Institutional Programme Leader of socioeconomic, macroeconomics and policy research at the International Trypanotolerence Centre in The Gambia. He was scientist at the National Centre of Scientific Research and technology in Burkina Faso. He is also member of the IUCN Commission on Environmental, Economic and Social Policy (CEESP), an inter-disciplinary network of professionals whose mission is to act as a source of advice on the environmental, economic, social, and cultural aspects of nature conservation and to provide support towards effective policies and practices for sustainable development. He holds a doctorate degree in Rural Economics from the University of Abidjan, Cote d'Ivoire, and an agricultural engineer diploma from the University of Ouagadougou, Burkina Faso. He has several publications in scientific journals and has contributed chapters in books.

Abstract

The concept of nature-based solutions has been introduced in 2000s as an umbrella that encompasses many other concepts. Historically, nature-based solutions focused on natural resource management through the ecosystem approach. Rooted in nature, the temptation is great to consider any solution using natural resources as a nature-based solution. Irrespective to the various definitions of the nature-based concept, there is momentum from policy makers, scientists and practitioners that this could properly address major societal challenges at local and global levels. For this to happen, there was a need to fill the gap between the theoretical definition of the concept and the practical implementation of it. This keynote intends to disentangle

what can make a solution to be qualified as nature-based solutions. Although research on the nature-based solutions and its related concept is still very limited, the Global Standard developed by IUCN has suggested 8 criteria and 27 indicators to self-assessed whether a proposed solution can be qualified as nature-based solution. In doing so, the way for practical implementation of nature-based solutions was paved and any solution can be screened against those criteria and indicators. Therefore, whether a solution can be qualified as nature-based solutions will depend on the compliance of its implementation with the 8 criteria and the 21 indicators of the Global standard. A thorough application of the Global standard for nature-based solution is key to avoiding the abuse of this concept and ensuring that such solutions benefit to both people and nature. Indeed, some solutions may be beneficial to the people and detrimental to biodiversity, and vice versa.

Keywords: Nature-based solutions; Benefit; People; Biodiversity; Criteria; Indicator

Keynote 3 | The State and Potential of Agroecology in Africa

Day 1 Wednesday | 1 July 2026 | 10:30 – 12:00

PROF. SAA DITTOH
University for Development Studies (UDS) and
Ghana CIRAWA Coordinator
Tamale, Ghana

Professor Saa Dittoh is a distinguished Ghanaian agricultural economist, development strategist, and academic, whose career has profoundly shaped agricultural policy, food security, and rural development in Ghana and across Africa. He obtained his PhD in 1985 from the University of Ibadan, Nigeria, and is a Distinguished Fellow of the African Association of Agricultural Economists (AAAE). With decades of experience in teaching, research, consultancy and public service, Saa is widely respected for his expertise in agricultural economics, policy analysis, and sustainable livelihood systems. He has been Pro-Vice Chancellor of the University for Development Studies (UDS), Tamale, Ghana, where he contributed significantly to academic leadership, institutional development, and the training of generations of agricultural and development professionals. Saa's work has focused extensively on the promotion of smallholder agricultural systems, poverty reduction, and natural resources management, with particular emphasis on improving the livelihoods of rural communities. Through research, policy advisory roles, and international collaborations, he has helped influence strategies for agricultural transformation and sustainable development in Ghana and beyond. Known for bridging academic scholarship with practical policy solutions, Saa has served on numerous national and international platforms, offering thought leadership on food systems, economic resilience, and inclusive development. His dedication to evidence-based policy, capacity building, and equitable agricultural development, has made him a respected voice in Africa's development discourse and an enduring mentor to scholars, practitioners, and policymakers alike. He is currently the Ghana Coordinator of CIRAWA (www.cirawa.eu).

Abstract
There has been strong advocacy for, and equally strong opposition to, agroecology across the world, and particularly in Africa, which is understandable. The production and consumption system in Africa by its millions of smallholder households is rooted in agroecology. However, the "modern agricultural system" (conventional agriculture) that most African Governments and development partners have been promoting is largely the direct opposite. The general feeling among many people is that the two

systems cannot co-exist even though in practice, they have been co-existing, albeit uncomfortably, across the world. The paper discusses the present state of agroecology as a science, a practice and a movement in Africa and why there is strong advocacy for it, and also opposition to it by other people. The paper argues that there should not be any discomfort with the present co-existence of agroecology and conventional agriculture in Africa and globally, because there is increasing understanding of the huge economic, social (including nutritional and health) and environmental benefits of agroecology, which is resulting in increasing demand for agroecologically produced foods. The global geo-politics of the times also supports transition to agroecology. There is, however, great resistance from agrochemical, food and pharmaceutical conglomerates who currently control the prevailing global food system. The “Battle for African Agriculture” (i.e. transitioning to agroecology including food sovereignty and justice) is currently being fought by NGOs, civil society organizations and a few research groups. Some African governments, especially in Eastern and Southern Africa, are, however, beginning to show interest in the agroecology transition process. Deep-seated practical and political economy constraints remain. Constraints of labour and appropriate labour-saving technologies, political buy-in and commitments, strong lobbies by international food chains, limited systems-oriented research, finance and others will have to be overcome. The transition to agroecology has immense potential, but it will depend on responsible science research (research that promotes planetary, human and animal health), appropriate practice, and strong local, national, and continental movements.

Keywords: Smallholder households, Agroecology, Modern agricultural system, Economic, social and environmental benefits

Keynote 4 | Nature's Pathway to Healthy Soil

Day 2 Thursday | 2 July 2026 | 9:00 – 10:00

DR. AGGREY AGUMYA
Forum for Agricultural Research in Africa (FARA)
Accra, Ghana

Dr. Aggrey Agumya, a Ugandan national, is the Executive Director of the Forum for Agricultural Research in Africa (FARA)—the continental apex organization for agri-food research and innovation in Africa. FARA also serves as the lead technical support organization of the African Union Commission and the African Union Development Agency-(AUDA)-NEPAD on agricultural research and innovation. Prior to taking on the role of Executive Director, Dr. Agumya served for 17 years in various leadership and technical roles at FARA. Before joining FARA, Dr. Agumya served as a Geo-Information Systems Analyst at the World Agroforestry Centre, focusing on methodologies for targeting agroforestry technologies and innovations to their niches in Southern Africa. Dr. Agumya holds a PhD in Geo-Information Sciences (GIS) from the University of Melbourne, Australia. He is passionate about seeing science and research translating into innovation, and innovation in turn translating into livelihood and ecological impact at scale.

Abstract

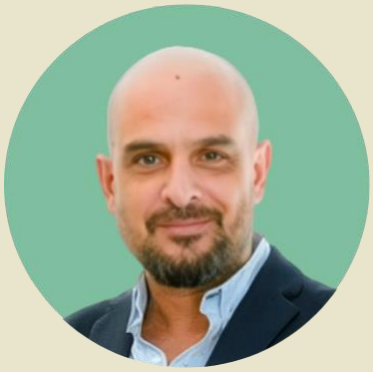
Across the globe, healthy soils are fundamental to food security, climate resilience, biodiversity conservation, and sustainable agriculture. This is more pertinent in Africa, where agriculture is the main sector to lead total development. Decades of poor agricultural practices have led to nutrient mining, erosion, organic matter depletion, and unsustainable land management, accelerating soil degradation across the continent. This review examines recycling as nature's primary pathway for maintaining the biological component of soil health and restoring ecosystem productivity. Drawing on evidence from African farming systems, this paper explores the role of biological, organic, and circular nutrient recycling processes, including crop residue management, livestock manure utilization, composting, agroforestry, biofertilizers, and the recovery of nutrients from organic waste streams. The review highlights how recycling enhances soil organic carbon, nutrient availability, water-holding capacity, and microbial activity while reducing dependence on external inputs. It further discusses policy, institutional, and technological innovations supporting circular soil management under the Soil Initiative for Africa and the Africa Fertilizer and Soil Health

Action Plan. The paper concludes that strengthening nutrient recycling systems offers a cost-effective and ecologically sustainable pathway to achieving healthy soils and resilient agrifood systems across Africa.

Keywords: Soil health; Nutrient cycling; Organic matter management; Circular agriculture; SIA/AFSH-AP

Keynote 5 | Building evidence for agroecological transition: metrics, indicators and monitoring & evaluation in West Africa

Day 2 Thursday | 2 July 2026 | 9:00 – 10:00



RAÚL SÁNCHE FRANCÉS
Director of the Natural Resources and Climate Area
CARTIF Technology Centre, Valladolid, Spain

Raúl Sánchez Francés is the Director of the Natural Resources and Climate Area at CARTIF, where he leads research lines related to agroecology, sustainable agriculture, agroforestry systems, biomass and bioproducts, climate adaptation, ecosystem services, biodiversity, water management and Nature-based Solutions. He is a Technical Forest Engineer from the University of Valladolid, with a Master's Degree in Research in Agroforestry Development Engineering and advanced research training in forest systems, agroforestry sciences and sustainable natural resource management. He is currently a PhD candidate in Conservation and Sustainable Use of Forest Systems at the University of Valladolid. He has carried out international research stays at the School of Environmental Sciences of the University of Liverpool, The Mersey Forest and Liverpool City Council, focusing on vegetation dynamics, ecosystem restoration, rewilding, urban forests and green infrastructure planning. His work combines applied ecological research with the development of innovative solutions for resilient farming systems, urban and peri-urban renaturalisation, and climate-resilient territories. He has coordinated and participated in numerous national and European R&D projects, including URBAN GreenUP, CIRAWA, NATMed, PRO-CLIMATE, PRO-COAST, REGIONS4CLIMATE, and other initiatives focused on agroecological transition, sustainable use of natural resources and climate adaptation.
ORCID: https://orcid.org/0000-0002-1975-9717

Abstract
Agroecological transitions require more than technical innovation: they require robust, context-sensitive and participatory systems to understand what changes, for whom, under which conditions, and with what long-term effects. This keynote will explore how metrics, indicators and Monitoring & Evaluation frameworks can support evidence-based decision-making, learning and scaling within agroecology and Nature-based Solutions.

Building on the CIRAWA project experience in West Africa, this keynote will discuss how SMART indicators, baseline information, stakeholder requirements and assessment protocols can be combined to evaluate agroecological performance across multiple dimensions: soil fertility, resource efficiency, biodiversity, productivity, climate resilience, farmers' livelihoods, social inclusion and adoption potential. Special attention will be given to the need to integrate scientific evidence with local and indigenous knowledge, ensuring that monitoring systems are not only technically sound, but also relevant, usable and meaningful for farmers, practitioners, researchers and policymakers.

The keynote will highlight that effective M&E is not a reporting exercise, but a strategic tool to guide agroecological transformation, strengthen accountability, capture learning, and support the scaling of resilient food systems across Africa.

Keynote 6 | Agroecology Transition - Drivers and incentive mechanisms for employing sustainable farming and nature-based solutions in Africa

Day 3 Friday | 3 July 2026 | 9:10 – 9:30

PROFESSOR TILAHUN AMEDE

Director of Climate Sustainable Productivity and Resilience Alliance for Green Revolution in Africa (AGRA), Nairobia (Kenya)

Professor Tilahun Amede is the African Scientist of the Year, 2025 awardee, currently the Director of Climate, Sustainable productivity and Resilience at AGRA, Nairobi, Kenya. He has been developing viable sustainable farming models, focusing on soil health and climate change adaptation and reshaping and institutionalizing integrated, regenerative and circular systems in Africa. Before joining AGRA, he served as a Principal Scientist in the CGIAR system (ICRISAT, ILRI, IWMI) for about 20 years. He has been developing, promoting and facilitating landscape management models and approaches and developed farming system-based niche identification for adoption of dryland technologies and practices in small scale farming of Eastern, Western and Southern Africa for the last 25+ years, with particular focus on Ethiopia, Kenya, Tanzania, Uganda, Malawi, Zimbabwe, Mozambique, Nigeria and Burkina Faso. He is also a Professor in Systems Agronomy in Bahir Dar University, Ethiopia. Tilahun has a PhD in plant nutrition from the University of Hohenheim, Stuttgart, Germany (1997). He published 130+ peer reviewed journal papers, predominantly in high impact journals in agronomy, soil fertility, drought physiology, legume intensification, biofortification and integrated watershed management. He has been serving as Editor and Guest Editor of multiple journals and won various national and international awards including member of Ethiopian Academy Sciences, ICRISAT Global Award winner for Best Partnerships (2017), Certificate for distinguished contribution to Ethiopian Institute of Agricultural Research (EIAR) (2016), Featured scientist in the ‘Nourishing the Planet’ weekly, New York. (Nov, 2012); international award as a ‘Fellow of the International society for Biological Science’ (2011); Member the New York Academy of Sciences (since 2003); Man of the week by Global Mountain Forum, Kathmandu (2007); Bibliography included in ‘Marquis Who is Who in Science and Engineering in the World’.

Keynote 7 | Policy, Upscaling and Gender – Agroecology & Nature-Base Solutions for Sustainable Food Systems at Scale in Africa critical pathways to adoption at scale

Day 2 Thursday | 2 July 2026 | 14:00 – 15:00

DR MOUMINI SAVADOGO

Executive Director of West and Central African Council for Agricultural Research and Development (CORAF), Dakar, Senegal

Dr Moumini Savadogo is the Executive Director of the West and Central African Council for Agricultural Research and Development (CORAF). With over 34 years of experience in both public and private sectors, he has made significant contributions to agricultural systems, climate change, energy, and environmental governance. A strong advocate for science-policy interfaces, Dr. Savadogo has led several high-impact initiatives aimed at sustainable development and climate change adaptation.
Before joining CORAF, Dr. Savadogo served as Managing Director of AKADEMIYA2063 and was the Executive Director of the West African Science Service Center on Climate Change and Adapted Land Use (WASCAL). Earlier, as the Country Representative for the International Union for Conservation of Nature (IUCN) in Burkina Faso, he managed over 20 projects focused on environmental sustainability.
Dr. Savadogo holds a PhD in Agriculture and Environmental Sciences from Wageningen University, the Netherlands, and an MSc in Rural Development from the University of Ouagadougou, Burkina Faso. He is also a certified executive business administrator and chartered environmentalist. His areas of expertise span climate-smart agriculture, biodiversity, disaster risk management, and circular economy, with numerous publications and key roles on international technical committees

Abstract

Agroecology and Nature-Based Solutions have the potential to build sustainable, climate-resilient food systems capable of feeding Africa's growing population (projected to reach 2.5 billion by 2050), whilst simultaneously restoring the ecosystems upon which all food production ultimately depends. This keynote provides evidence of their effectiveness and challenges current adoption pathways and attempts to identify the most critical pathways that can help accelerate the wider adoption of the proven NbS. Critical pathways must be followed to alleviate the challenges to the wider adoption of these solutions. The challenges are at conceptual, technical, policy,

market, funding and institutional levels. The first challenge is to change the narrative on agroecology and NbS. Proper understanding of the concept and deconstructing the anti-colonial-driven messages around the concept, or better contextualization of the concept, is a prerequisite for effective adoption. The second challenge is a structural lack of a coherent policy architecture that integrates agroecology into national agricultural strategies. Fragmented governance, competing ministerial mandates, and the dominance of input-subsidy models continue to create barriers to adoption. Agroecological and NbS interventions remain chronically underfunded relative to conventional agriculture. Innovative financing mechanisms, including blended finance instruments, green bonds, and results-based payment schemes, can be mobilized alongside traditional development aid to bridge the investment gap and de-risk private sector participation. Harmonizing policies across agriculture, environment, and trade ministries is essential to create an enabling environment for NbS at scale. The third, agroecological transitions are often labor-intensive, and evidence indicates that women disproportionately bear the additional workload without commensurate access to land, credit, or decision-making power. Gender-sensitive program design, targeted capacity building, and inclusive governance structures are prerequisites for equitable scaling that does not entrench existing inequalities. Fourth, accelerating adoption requires genuine collaborative multi-stakeholder engagement that brings together farmers' organizations, research institutions, governments, the private sector, and civil society. Therefore, inclusive co-design processes, farmer-to-farmer knowledge exchange networks, and south-south learning platforms can contribute to the expected transformative change. Finally, the development of efficient and profitable marketing models (short supply chains, value chain promotion, entrepreneurship) for agroecological products will boost the adoption of NbS.

Keywords: Agroecology, Nature-Based Solutions (NbS), Climate-resilient food systems, Policy and governance barriers, Multi-stakeholder collaboration

Keynote 8 | Policy, Governance and Way Forward

Day 3 Friday | 3 July 2026 | 9:10 – 9:30

PROFESSOR NANA AMA BROWNE KLUTSE
Chief Executive Officer
Environmental Protection Authority (EPA)
Accra, Ghana

Professor Nana Ama Browne Klutse is a distinguished Ghanaian climate scientist, physicist, and policy leader whose work has significantly advanced climate science, environmental governance, and sustainable development across Africa. She earned her academic foundation at the University of Cape Coast, Ghana, and later obtained a doctorate in climatology from the University of Cape Town, South Africa. She is celebrated as the first female full Professor of Physics at the University of Ghana and the first woman to lead its Department of Physics. She is internationally recognized for her expertise in West African climate systems, climate modelling, and adaptation strategies. She has served as a Lead Author for the Intergovernmental Panel on Climate Change Sixth Assessment Report and currently serves as Vice-Chair of Working Group I for the Seventh Assessment Cycle, helping shape global scientific understanding of climate change. In Ghana, she currently serves as the Chief Executive Officer of the Environmental Protection Authority, where she bridges science and policy to strengthen environmental protection and climate resilience. A passionate advocate for women in Science, Technology, Engineering and Mathematics (STEM) and evidence-based leadership, Professor Klutse continues to inspire a new generation of scientists while championing Africa's voice in global climate discourse.

Scientific sessions

Scientific Session 1 | Agroecology technologies and practices

ENHANCING AGROECOLOGY THROUGH SUSTAINABLE AGROFORESTRY PRACTICES IN WEST AFRICA

Catherine Ky-Dembele*, Jules Bayala

Center for International Forestry Research-World Agroforestry (CIFOR-ICRAF), Sahel Office, Ouagadougou, Burkina Faso

***Corresponding author:** c.dembele@cifor-icraf.org

Abstract

Across Africa, agroforestry, the integration of woody perennials with crops or livestock exists in diverse forms, ranging from random arrangements to organized lines of trees and shrubs on farmlands. Specifically, in West Africa, farmer-managed natural regeneration (FMNR) is a crucial, widely adopted practice, that creates park-lands with scattered trees. These systems enhance food security in vulnerable communities by providing food, fodder, fuel, and medicine, while simultaneously increasing farmer income. Beyond direct benefits, these on-farm trees improve soil health, control erosion, increase water retention, and reduce the need for external inputs. They boost biodiversity by providing habitat for pollinators and supporting climate resilience through carbon sequestration. By merging indigenous knowledge with modern innovation, current agroforestry aligns with key agroecological principles, particularly in biodiversity, soil health, and economic sustainability. However, these systems face challenges, including unsustainable tree cutting and inadequate fallow management, which threaten to reduce tree cover in West Africa. To address this, active engagement from farmers, policymakers, and researchers is essential to restore trees on farmland and strengthen the contribution of agroforestry to sustainable, ecological farming.

Keywords: Agroecology; Agroforestry; Ecosystem Services; Parkland; Trees

INTRODUCING AGROECOLOGY PRACTICES FOR RICE PRODUCTION UNDER SALINE SOIL CONDITIONS

Mame Farma Ndiaye[1]*, Rokhaya Diallo[1], Moussa Diouf [1, 2.]

[1]*Institut Sénégalais de Recherches Agricoles, Centre de Recherches Agricoles de Saint Louis*
[2]*Université Iba Der Thiam de Thiès, Ecole Nationale Supérieure d'Agronomie*

***Corresponding author:** farma.ndiaye@isra.sn

Abstract
The Senegal River valley is one of Senegal's main rice-producing areas. Thanks to hydro-agricultural infrastructure and the availability of water for irrigation, this region offers favorable conditions for irrigated rice cultivation. However, to meet the needs of a growing population, agricultural practices are largely based on intensive farming with chemical fertilization, thereby accelerating secondary salinization and limiting production. In this context, the objective of this study is to test the effectiveness of the combined application of phosphogypsum and cow manure as an agroecological practice against soil salinization and sustaining production. Trials were conducted in two sites during a rice cultivation cycle. At both sites, electrical conductivity decreased from 502 µS/cm and 64.7µS/cm to 302.5 µS/cm and 49.367 µS/cm respectively, when 1 $T.ha^{-1}$ of cow manure and 500 $kg.ha^{-1}$ of phosphogypsum were applied. The application of 1 $T.ha^{-1}$ of cow manure and 1 $T.ha^{-1}$ of phosphogypsum resulted in a decrease in EC ranging from 502 µS/cm and 64.7µS/cm to 99.5µS/cm and 44.8 µS/cm respectively. As for the control group that received mineral fertilization, the EC decreased from 502 µS/cm to 103.33 and from 64.7µS/cm to 39,367µS/cm. In terms of yields, no significant differences were observed regardless across sites or treatments. Thus, over one culture cycle, agroecological practices tested had a positive effect in reducing salinity and maintaining yields. This study opens a pathway for an agroecological transition of conventional rice farming systems, taking into account the challenges of organic matter availability.

Keywords: Agroecology Practices; Rice; Saline Soils; Senegal River Valley

PHENOLOGICAL MODELLING THROUGH THERMAL INTEGRALS: A DECISION SUPPORT TOOL FOR CEREAL-LEGUME-CUCURBIT DIVERSIFICATION IN WEST AFRICAN AGROECOSYSTEMS

Maria Virginia Ozcariz-Fermoselle[1]*, Dileyni Díaz De Oleo[1], Rosa Ibañez de Prado[2], Susana Luis del Río[1], Miguel Ribeiro[3], Morro Lamin Bah[4], Raquel Herrero Matesanz[2]

[1]Department of Agricultural and Forestry Engineering, School of Agricultural Engineering, University of Valladolid, Palencia, Spain
[2]Itagra.com (Centro Tecnológico Agrario y Agroalimentario), Campus Universitario La Yutera, University of Valladolid, Palencia, Spain
[3]ADPM (Associação de Defesa do Património de Mértola), Mértola, Portugal.
[4]National Seed Secretariat (NSS), Livestock Premises, Banjul, Abuko, Gambia.

***Corresponding Author** : mariavirginia.ozcariz@uva.es

Abstract

Climate variability in West Africa poses a significant challenge for smallholder farmers, demanding precise tools to optimize crop management. This study evaluates the usefulness of Thermal Integrals (Growing Degree Days, GDD) combined with the BBCH scale to predict phenological development in six key species: Maize (Zea mays), Lablab (Lablab purpureus), Melon (Cucumis melo), Watermelon (Citrullus lanatus), Bongolom (Vigna unguiculata), and Early Millet (Pennisetum glaucum). Using specific sowing dates, phenological stages were monitored from emergence to full maturity. Results indicate distinct thermal requirements that facilitate strategic crop diversification. Maize, a long-cycle crop, required 2674 GDD to reach full maturity (BBCH 89), with its critical nitrogen demand identified at stem elongation (BBCH 30, 1344 GDD). In contrast, Early Millet and Bongolom completed their cycles faster at 1836 GDD and 1736 GDD, respectively, and therefore required bird protection at BBCH 75. Among legumes, Lablab reached full flowering at 1311 GDD, providing a quantitative threshold for deciding between forage harvest (high-protein biomass) or seed production (2261 GDD). Cucurbits (Melon and Watermelon) showed shorter cycles (~1800–1950 GDD), with defined flowering windows (~1000–1300 GDD) critical for managing pollination under heat stress. We conclude that thermal integral mapping offers a low-cost, high-impact predictive tool. It enables precise timing of fertilization, irrigation during critical pollination phases, and pest management, thereby improving the resilience and resource use efficiency of the region's agroecological systems.

Keywords: Thermal Integrals (GDD); BBCH Scale; West Africa; Crop Diversification; Climate Resilience; Phenology

IMPACTS OF AGROECOLOGICAL SYSTEMS ON YIELDS, INCOME AND COSTS IN THE GLOBAL SOUTH: A META- ANALYSIS

Pietro de Marinis[1], Rodolfo Ceriani[1], Andrea Schievano[1], Carlo Rega[2], Caroline Callenius[2], Felix Rembold[2]

[1] *University of Milan*
[2] *European Commission, Joint Research Centre*

***Corresponding author:** Felix Rembold

Abstract

While the positive environmental impacts of agroecological farming are well documented in the scientific literature, knowledge of its socio-economic performance at farm level remains limited, especially regarding income, production costs, and yields. Existing evidence is predominantly qualitative, and quantitative data are generally limited to single-practice interventions. Here, we present results from a meta-analysis evaluating the effects of adopting diverse agroecological practices on farm yields and farmers' incomes. The analysis focuses on the Global South, encompassing 39 primary studies that report comparable output metrics for yield (215 observations), farmers' income (130 observations) and production costs (92 observations). Results indicate that the adoption of agroecological practices has statistically significant positive effects on yield (mean effect size +14.27%, 95% CI 2.97%-26.8%) and farmers' gross income (mean effect size + 44.47%, 95% CI +9.6%-90.6%). Results on costs were positive (i.e., the adoption of agroecological practices led to decreased costs) and statistically significant, but not robust due to the reduced sample size (n = 19). Irrigation methods, soil type and climate conditions were found to be statistically significant moderators of the relationship between the adoption of agroecological practices and the outcome variables. These significant results are demonstrated at the plot/field level, while the farm and landscape levels have hardly been reported in the literature. The research outcome shows the potential for agroecological transitions to deliver economic benefits and contribute to food security, countering the prevailing narrative that agroecological practices lead to lower yields and is less profitable than conventional agriculture. The findings provide a foundation for incorporating additional quantitative data on multi-practice agroecology in low- and middle-income countries in the next years.

Keywords: Agroecological Systems; Impacts; Yields; Income; Costs; Meta-Analysis

AGROECOLOGICAL PRACTICE BUNDLES AND USE INTENSITY PATHWAYS IN CAPE VERDE, GHANA, SENEGAL, AND THE GAMBIA

Margaret Akuriba[1], Joseph Bandanaa[2], Morro Lamin[3], Lamin Dibba[4], Dzigbodi Doke[1], Catherine Dembille[5], Doreen Derzu[1], Francis Saa-Dittoh[1], Philemon Ayambila[1], Wilhelm Kutah[6], Saa Dittoh[1] & Miguel Ribeiro[7]

[1]*University for Development Studies, Tamale, Ghana*
[2]*Swiss Platform for Sustainable Cocoa, Ghana.*
[3]*National Seed Secretariat (NSS), Livestock Premises, Banjul, Abuko, Gambia.*
[4]*National Agricultural Research Institute (NARI), The Gambia*
[5]*Center for International Forestry Research-World Agroforestry (CIFOR-ICRAF), Sahel Office, Ouagadougou, Burkina Faso*
[6]*Savanna Agricultural Research Institute, Nyankpala, Ghana*
[7]*ADPM (Associação de Defesa do Património de Mértola), Mértola, Portugal.*

***Corresponding Author** Margaret Akuriba

Abstract

Agroecology is increasingly recognized as a pathway for enhancing resilience, sustainability, and productivity in West African farming systems facing climate variability, land degradation, and socioeconomic constraints. While many agroecological practices such as crop diversification, agroforestry, soil and water conservation, and organic nutrient management have long been embedded in local farming traditions, their use intensity and combination vary widely across contexts. This study examines agroecological practice bundles and use intensity pathways across four West African countries: Cape Verde, Ghana, Senegal, and The Gambia. Using a harmonized household-level dataset, the analysis evaluates the use intensity of 28 agroecological practices across farming households. Practices are categorized into functional domains including soil cover and erosion control, water management, organic nutrient management, crop diversification, and system integration. The study applies a comparative descriptive interpretive approach to identify dominant practices in each country, examine how these practices co-occur as bundles, and assess the use intensity based on the number of practices combined. The results reveal a shared regional core of agroecological practices centered on soil cover and organic matter management. Mulching emerges as the most widely used practice across all countries, followed by crop residue management, compost or manure application, and diversification strategies such as legume intercropping and crop rotation. Despite these common elements, country-specific patterns show distinct agroecological constraints and farming system priorities. In Cape Verde, practice bundles emphasize water harvesting and erosion control, while Senegal and The Gambia show stronger integration of crop–livestock systems and manure-based fertility management. Ghana's patterns show diversification and agroforestry-based system redesign. Across countries, several frequently co-occurring practices such as manure application, agroforestry, composting, crop–livestock integration, and intercropping form a coherent agroecological bundle conceptualized as the MACCLI pathway. This bundle strengthens nutrient cycling, biomass recycling, and system diversification, contributing to resilience and reduced dependence on external inputs. The findings show the importance of promoting integrated practice bundles rather than isolated techniques and underscore the need for context-sensitive agroecological extension strategies in West African farming systems.

Keywords: Farming Systems; Agroecology; Use Intensity; Practice Bundles; MACCLI

MORE MAIZE LESS LAND: EVIDENCE FOR AGROECOLOGY-LED SUSTAINABLE INTENSIFICATION IN NORTHERN GHANA

Habtamu Alem[1], Emmanuel Tetteh Jumpah[2], Miroslava Bavorova[3]

[1]*Department of Economics and Society, NIBIO, Czech University of Life Sciences*
[2]*Department of Economics and Development/CSIR-STEPRI, Ghana*
[3]*Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague*

Corresponding author: Habtamu.Alem@nibio.no

Abstract

Sustainable food production in West Africa is increasingly challenged by declining soil fertility, erratic rainfall, and demographic pressures that intensify demand for land. In this context, farmers often respond to stagnating yields by expanding cultivated area, a strategy that accelerates the conversion of fallows and natural habitats into cropland. This study investigates whether agroecology informed sustainable intensification (SI) packages can improve technical land use efficiency and thereby reduce the incentive for agricultural expansion. The analysis focuses on smallholder maize systems across Northern Ghana, where land degradation and climate variability pose persistent constraints. Using farmer-level survey data from 372 maize producers across the Northern, Upper East, and Upper West regions, we estimate technical land use efficiency with a translog stochastic frontier model that treats land as a fixed input. This methodological choice provides a direct interpretation of efficiency as the effective land required to produce observed output. The SI package examined includes improved seed, more balanced fertiliser application, and agroecological practices such as residue retention and intercropping. A matched comparison group of non-adopters allows us to isolate adoption effects. The results show that SI adopters are, on average, 21% more land efficient than non-‘participants, implying that approximately 24% less land would be needed to produce the same quantity of maize. Efficiency improvements are most pronounced among farmers initially furthest from the production frontier, indicating substantial equity gains when targeting less efficient producers. The analysis further highlights the importance of enabling conditions: education, advisory services, and access to credit all significantly enhance the likelihood and effectiveness of adoption. These findings strengthen the argument for agroecological transition pathways that bundle technological, institutional, and financial interventions. Such integrated approaches can raise productivity, limit pressure on land expansion, and contribute to land degradation neutrality and climate resilience in the savanna agroecosystems of West Africa.

Keywords: Agroecology; Sustainable Intensification; Maize; Land; Northern Ghana

ASSESSMENT OF THE EFFECTS OF AGROECOLOGICAL FARMING PRACTICES ON FLORA DIVERSITY IN THE CENTRAL GONJA DISTRICT, GHANA

Raphael B. H. Gameli[1], Dzigbodi Adzo Doke[1], and Joseph Bandanaa[2]

[1]Department of Environment and Sustainability Sciences, University for Development Studies, Ghana.
[2]Swiss Platform for Sustainable Cocoa, Ghana.

Corresponding Author : ddoke@uds.edu.gh

Abstract

Agroecology integrates ecological principles into agricultural systems and is increasingly promoted as a sustainable alternative to conventional farming. This study assessed the effect of agroecological practices on floral diversity across 10 farms in the Central Gonja District of Ghana. A comparative cross-sectional design was employed during the four-month crop-growing season, when plant communities were monitored at peak agricultural activity. Plant species were identified in situ on a monthly basis, and diversity was quantified using Simpsons Index, Shannon-Wiener Index, and Pielou Evenness. Importance Value Indices and ranked abundance curves were used to characterize dominant species, while non-metric multidimensional scaling (NMDS) and PERMANOVA were applied to compare plant community structure between the two management systems. Agroecological plots recorded significantly higher total plant abundance (mean = 438.2) than conventional plots (mean = 147.4; p = 0.035), with greater mean species richness (13.6 versus 9.4). The Shannon-Wiener diversity index showed higher mean diversity in agroecological plots (Hâ€² = 2.47 Â± 0.50) compared to conventional plots (Hâ€² = 2.15 Â± 0.36). This pattern was further reinforced by Simpsons diversity index, which was higher in agroecological farms (1â€“D = 0.901 Â± 0.046) than in conventional farms (1â€“D = 0.871 Â± 0.052), indicating greater overall plant diversity under agroecological management. Pielou evenness values were comparable across systems, reflecting similar species distribution patterns. NMDS ordination showed more dispersion in agroecological plant communities, and PERMANOVA showed definite distinctions in plant community structure in agroecological and conventional plots (p = 0.001). The positive impacts of agroecological practices reported by farmers included better soil health and improved product quality, whereas the lack of policy support and inaccessibility of inputs were reported as the main limitations. In general, agroecological farming practices improves floral diversity. It is recommended that extension services be strengthened to support farmers practicing agroecology.

Keywords: Agroecology; Conventional farming; Flora diversity; Biodiversity indices; Central Gonja District; Ghana

AGROECOLOGICAL APPROACHES TO SOIL FERTILITY MANAGEMENT: EFFECTS OF ORGANIC INPUTS ON YIELD AND PROFITABILITY OF ORANGE-FLESHED SWEET POTATO ON SMALLHOLDER FARMS IN SIERRA LEONE

Keiwoma Mark Yila[1], Amadu Bah[2], Lansana Sesay[1], Isata Kamanda[1], Abdul Rahman Conteh[1], and Tom van Mourik[2]

[1]Sierra Leone Agricultural Research Institute, Tower Hill, PMB 1313, Freetown, Sierra Leone
[2]Helen Keller International, 16H James Macarthy Drive, Off Spur Road, Wilberforce, Freetown, Sierra Leone

Corresponding author: km_yila@yahoo.co.uk

Abstract

Orange-fleshed sweet potato (OFSP) has significant potential to improve food security and address vitamin A deficiency in sub-Saharan Africa. However, declining soil fertility remains a major constraint to its productivity. To address this, this study evaluated the effects of different soil fertility management practices on the yield and profitability of three OFSP varieties. The experiment was conducted across 8 locations in Sierra Leone during the 2025 cropping season, arranged in a split-plot design in 3 replications. The main plots were allocated to four fertiliser treatments: inorganic fertiliser (NPK 15:15:15), liquid organic fertilizer from Gliricidia sepium biomass and pigeon pea pod husk (LOF), green manure (Gliricidia sepium biomass), and a control (no fertilizer). The subplots received three OFSP varieties: Kaphulira, Chipika, and SLIPOT 5. Fertiliser application significantly ($P < 0.00001$) increased fresh root yield, with the highest yield increase observed under NPK 15:15:15 (4,063 kg ha-1, 68%), followed by LOF (3,932 kg ha-1, 66%) and Gliricidia sepium biomass (1,679 kg ha-1, 28%), compared to the no fertiliser. Varietal differences were also significant ($P = 0.0013$); among the varieties, Kaphulira produced the highest mean yield (8,760 kg ha-1, SE 273.87), followed by Chipika (8,594 kg ha-1, SE 301.52), and SLIPOT 5 (7,724 kg ha-1, SE 301.52). An economic analysis revealed that NPK 15:15:15 generated the highest income increase (SLL 12,190 ha-1), but had the lowest gross profit (SLL 1,590 ha-1). By contrast, LOF produced the highest gross profit (SLL 5,395 ha-1), followed by Gliricidia sepium biomass (SLL 2,637 ha-1), due to their lower cost and local availability. Supporting these results, farmer preference ranking also indicated that LOF was the most preferred soil fertility management practice. Therefore, the findings reveal that the liquid organic fertiliser is a cost-effective, farmer-preferred option for improving OFSP productivity among smallholder farmers in Sierra Leone.

Keywords: Agroecological Approaches; Soil Fertility Management; Organic Inputs; Yield; Profitability; Orange Fleshed Sweet Potato; Smallholder Farmers

International Union for Conservation of Nature (IUCN)

Vision: A just world that values and conserves nature.

Mission: Influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

IUCN is a membership Union uniquely composed of both government and civil society organisations. By harnessing the experience, resources and reach of its more than 1,500 Member organisations and the input of some 19,000 experts, IUCN is the global authority on the status of the natural world and the measures needed to safeguard it. With its Headquarter is Gland Switzerland, IUCN operates worldwide through 11 regional offices.

IUCN works for global life and livelihoods through: Nature-based Solutions; Biodiversity conservation; Responsible business engagements; Climate change adaptation and mitigation; Freshwater and water security; Responsible and responsive governance of natural resources, including protected areas and land use; Equality and equity; and Protection of oceans and coasts.

Join us

Scientific Session 2 | Nature-Based Solutions – Technologies and Practices

HARNESSING NATURE-BASED SOLUTIONS FOR CLIMATE RESILIENCE AND DISASTER RISK REDUCTION IN ETHIOPIA: A SYSTEMATIC REVIEW

Haimanot B. Atinkut[1],[2],*, Dessalegn C. Dagnew[1], Dessalegn Molla Ketema[3], Assefa A. Berhanu[4] & Mintesinot Taye[1]

[1] *Institute of Disaster Risk Management and Security Studies, Bahir Dar University, Bahir Dar 5501, Ethiopia*
[2] *College of Agriculture and Environmental Sciences, University of Gondar, Gondar 196, Ethiopia*
[3] *Bioversity International and CIAT, Addis Ababa, Ethiopia*
[4] *College of Agriculture and Environmental Sciences, Bahir Dar University, Bahir Dar 5501, Ethiopia*

***Corresponding author:** hey.china@yahoo.com

Abstract

Climate change, land degradation, and rising disaster risks all pose serious threats to Ethiopia's long-term growth and livelihood security. This research critically investigates nature-based solutions (NbS) in strengthening climate resilience and disaster risk reduction (DRR) in Ethiopia. Based on a systematic review of peer-reviewed literature, we evaluate the effectiveness of a variety of NbS interventions, including agroforestry, ecosystem-based disaster risk reduction (eco-DRR), sustainable land management, and ecosystem restoration, in addressing interconnected environmental and socioeconomic vulnerabilities. Our data indicate that NbS has multifunctional benefits, including both short-term risk reduction and long-term climate adaptation and mitigation outcomes. They also help to conserve biodiversity, improve livelihoods, and provide essential ecosystem services in rural and urban regions. However, NbS implementation in Ethiopia is hampered by weak institutional capability, fragmented policy frameworks, and insufficient funding mechanisms. To address these issues, the article suggests an integrated, multi-level governance strategy that encourages collaboration among local communities, policymakers, development practitioners, and researchers. We conclude that integrating NbS into national and subnational policies is critical to Ethiopia's egalitarian, sustainable, and climate-resilient development.

Keywords: Nature-Based Solutions (NbS); Climate Resilience; Ecosystem-Based Disaster Risk Reduction (eco-DRR); Livelihood Resilience; Climate Policy Integration; Community-Based Adaptation

NATURE-BASED SOLUTIONS FOR GENDER-TRANSFORMATIVE LANDSCAPE RESTORATION AND ENHANCED COMMUNITY LIVELIHOODS IN GHANA: A CASE STUDY OF THE GUINEAN FOREST NbS PROJECT

Agyei, D.O*., Bagulo I.K., Mba A.A., Sedenkor D.E., Somda J., Chabi Gonni ÉP. V.F, Fulutuni D.

The International Union for Conservation of Nature (IUCN)

***Corresponding author:** dorcas.gyimah@iucn.org

Abstract

Nature-based Solutions (NbS) are increasingly recognized as cost-effective approaches for restoring degraded landscapes, strengthening climate resilience, conserving biodiversity, and enhancing livelihoods. However, empirical evidence on their gender-transformative impacts in West African forest landscapes remains limited. In the Guinean Forest landscapes of West Africa—particularly in Ghana, Côte d'Ivoire, and Guinea—unsustainable agricultural practices, deforestation, and climate change have significantly reduced ecosystem productivity and undermined rural well-being. These pressures disproportionately affect women, who face structural constraints such as insecure land tenure, limited access to finance and extension services, restricted participation in decision-making, and heightened vulnerability to climate shocks. This study examines the gender-transformative potential of Nature-based Solutions implemented under the Nature-based Climate Adaptation in the Guinean Forests of West Africa Project, specifically in Ghana. The project applied the Restoration Opportunity Assessment Methodology (ROAM) to guide community-driven restoration interventions, including agroforestry, the Modified Taungya System (MTS), enrichment planting, buffer zone restoration, and gene bank establishment. These interventions were implemented through participatory approaches involving local communities and women-led groups and were complemented by gender-responsive capacity building and livelihood diversification strategies. Between 2023 and March 2026, 2,839.32 hectares of degraded land were restored using 15 indigenous and economic tree species, benefiting 3,726 community members. Restoration efforts improved soil organic matter, reduced erosion, enhanced water retention, moderated microclimates, and increased carbon sequestration, thereby strengthening local adaptive capacity. A total of 1,763 beneficiaries (622 men and 1,141 women) received training in Integrated Pest Management (IPM), Forest Landscape Restoration (FLR), NbS practices, biochar production, and economic empowerment. Women constituted 65% of trainees and assumed leadership roles in community nurseries and demonstration vegetable plots, generating income and increasing their influence in land-use planning and household decision-making. The results highlight that NbS can catalyze agroecological transitions and sustainable food systems while simultaneously advancing gender equity and resilient community livelihoods.

Keywords: Nature-based Solutions (NbS); Gender-Transformative Approaches; Forest Landscape Restoration (FLR); Climate Adaptation; Agroecology; Integrated Pest Management (IPM); Women's Leadership; Biochar; Climate Resilience

SCALING AGROECOLOGICAL TRANSITIONS THROUGH PARTICIPATORY TREE PORTFOLIO PLANNING: A NATURE-BASED SOLUTIONS APPROACH FOR DRYLAND FOOD SYSTEMS IN KENYA

Beatrice Adoyo*, Immaculate Edel, Sandhya Kumar, Sila Andrew, Alex Awiti

Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF)

***Corresponding author:** b.adoyo@cifor-icraf.org

Abstract

Tree-based systems are increasingly recognized as important agroecological and Nature-Based Solutions (NbS) for addressing climate change, land degradation, biodiversity loss, and food insecurity in dryland regions of sub-Saharan Africa. However, tree integration within smallholder systems often remains fragmented and focused on immediate household needs rather than broader landscape restoration objectives. This study examined how participatory tree portfolio planning can support intentional integration of trees within agroecological farming systems in Makueni County, Kenya. A participatory mixed-methods approach involving 76 farmers from different gender and age groups combined plenary discussions, focus group discussions, participatory scoring exercises, practical portfolio planning, and online survey tools. Participants documented existing tree portfolios, developed forward-looking tree integration plans, and identified key benefits, barriers, restoration priorities, and gender- and age-differentiated preferences influencing tree integration on farms. Findings indicate that land access, demographic characteristics, and intra-household decision-making dynamics play a critical role in shaping farmer's participation in on-farm tree integration. Older male farmers generally controlled larger landholdings and participated more actively in long-term tree investments, while youth had comparatively lower participation possibly due to limited land access and reduced decision-making influence. Despite this, planned tree planting showed strong intentions to expand tree integration across all farm sizes, particularly among farmers with 1–3-acre holdings, highlighting the strategic role of smallholder farms in scaling agroforestry interventions. Current tree planting was concentrated around homesteads and farms for livelihood purposes such as food, income, and shade provision. In contrast, envisioned tree portfolios showed increasing diversification toward boundaries, degraded areas, and water sources, reflecting a transition toward landscape-oriented restoration approaches. Persistent barriers included drought, water stress, pests, livestock browsing, and limited access to quality seedlings. The study demonstrates that participatory tree portfolio planning can support intentional and inclusive integration of trees within agroecological systems, providing a practical pathway for advancing restoration, resilience, and sustainable food system transformation in dryland landscapes.

Keywords: Nature-based solutions; Agroecological transitions; Dryland food systems; Tree-based systems

SUSTAINABLE REHABILITATION OF SALT-AFFECTED RICE SCHEMES AROUND LAKE GUIERS THROUGH AN INTEGRATED AND CLIMATE-RESILIENT APPROACH

Babacar Kane, Papa Madiama Diop*, Moussa Dieng

Senegalese Institute of Agricultural Research (ISRA), Senegal

*Corresponding author: madiama.diop@isra.sn

Abstract

Soil salinity represents a major constraint to the sustainability of rice cultivation in the Senegal River Valley, particularly around Lake Guiers, where nearly 66% of irrigated lands are affected by salt. The rehabilitation of these lands is therefore essential to improve rice productivity and strengthen national food security. This study evaluated an integrated approach combining a salt-tolerant rice variety (ISRIZ 10), an organo-mineral fertilization plan, and mechanized land preparation. The experiment was conducted in Mbane using a randomized complete block design with three treatments: T0 (farmer's practice: DAP + urea), T1 (compost + phosphogypsum + mechanized land preparation), and T2 (compost + mechanized land preparation). Soil physico-chemical analyses and agronomic observations showed that integrated practices significantly improved soil quality and rice performance. Soil organic carbon and organic matter increased in the surface layer, while sodium content decreased by more than 92% at the 10–30 cm depth. Mechanized land preparation also reduced weed pressure and improved seedbed quality. Treatment T1 recorded the best agronomic performance, with rice yields more than 15% higher than those obtained under the farmer's practice. The results demonstrate that the combination of a salt-tolerant variety, compost, phosphogypsum, and small-scale mechanization constitutes an effective strategy for rehabilitating salt-affected rice schemes around Lake Guiers.. This approach, which is sustainable, replicable, and climate-resilient, could contribute significantly to improving rice productivity and enhancing food security in West Africa.

Keywords: Integrated management; Salinity; Rice; Phosphogypsum; Compost; Small-scale mechanization, Lake Guiers; Senegal; Soil Restoration

ARE FARM HOUSEHOLDS WILLING-TO-PAY FOR ORGANIC SOIL AMENDMENTS? THE CASE OF BIOCHAR AND COMPOST IN NORTHERN GHANA

Charles Yaw Okyere[1*], Benjamin Musah Abu[2], Akwasi Mensah-Bonsu[1], Irene Susana Egyir[1] & Daniel Bruce Sarpong[1]

[1]Department of Agricultural Economics and Agribusiness, College of Basic and Applied Sciences, University of Ghana, P. O. Box LG 68, Legon-Accra, Ghana
[2]Department of Agricultural and Food Economics, Faculty of Agriculture, Food and Consumer Sciences, University for Development Studies, Tamale, Northern Region, Ghana

[*]Corresponding author: okyerecharles@gmail.com; cyokyere@ug.edu.gh

Abstract

Organic soil amendments, particularly application of biochar and compost have been recommended as potential strategies for the adaptation and/or mitigation to climate change and weather variability in developing countries. However, the adoption of these organic soil products is extremely low in developing countries. Using a contingent valuation approach, this study elicited the willingness to pay for organic soil amendments (i.e., biochar and compost) among 472 farm households in three semi-arid regions of Ghana. We found that the majority of farm households are willing to pay an amount lower than market prices for the organic soil amendments. Specifically, farm households in Northern Ghana are willing to pay an average of USD 6.43 and USD 6.06 for a 50-kilogram bag of compost and biochar, respectively. Therefore, a partial cost recovery approach would be beneficial in ensuring the demand for organic soil amendments in low-income settings. Employing the ordinary least squares (OLS) method, we also found that the correlates of the maximum willingness to pay include participation in capacity building initiatives on organic soil amendments and social protection programs, religion, education, distance to market and extension offices, risk attitudes, access to mechanization and digital services including mobile phone, telephone masts and internet services, access to road network, and location of residence. We conclude that there is a demand for organic soil amendments albeit at a lower value than the market price, and this is influenced by socio-economic status and access to social capital, social networks, digital and physical infrastructure.

Keywords: Biochar, Compost; Contingent Valuation; Economic Valuation; Organic Soil Amendments; Willingness to Pay

MAPPING RESILIENCE GAPS TO STRENGTHEN SMALLHOLDER FOOD SYSTEMS: EVIDENCE FROM BANGLADESH, KENYA, AND RWANDA

Charles Chigemezu Nwokoro[1,2],* Jenna Skinner[3], Moshfequel Alam Talukder[4], Elizabeth Imbo[5], Straton Habumugisha[6], Cornelia Speich[7,8], Sophie van den Berg[9], Helen Prytherch[7,8], Dominique Barjolle[9], Johan Six[1]

[1]Department of Environmental Systems Science, ETH Zurich, Switzerland
[2]Capacity for Sustainable Impact Foundation (CAPSIF), Umuahia, Abia State, Nigeria
[3]University of Cape Town, Cape Town, South Africa
[4]Sustainable Agriculture Foundation Bangladesh (SAF Bangladesh), Dhaka, Bangladesh
[5]Sustainable Agriculture Foundation – Africa, Nairobi, Kenya
[6]Sight and Life Foundation, Kigali, Rwanda
[7]Swiss Tropical and Public Health Institute, Allschwil, Switzerland
[8]University of Basel, Basel, Switzerland
[9]Enterprise for Society Center, University of Lausanne, Lausanne, Switzerland.

***Corresponding author: Charles C. Nwokoro** charles.nwokro@usys.ethz.ch

Abstract

Farming is a major source of rural livelihoods, supporting food security, employment, and local economies. However, farming households (FHHs) face socio-ecological and economic challenges that undermine productivity and resilience. Effective resilience-building interventions require context-specific data. A 2024 quantitative survey of 900 FHHs across six secondary cities in Bangladesh (Dinajpur, Rangpur), Kenya (Bungoma, Busia), and Rwanda (Rubavu, Rusizi) was conducted under the NICE project to identify resilience gaps and inform interventions to strengthen sustainable food production for vulnerable urban populations. Using the SHARP technical scoring framework, FHH's resilience was assessed across ecological self-regulation, social self-organization, reflective and shared learning, exposure to disturbance, and profitability dimensions. The study applied standardized resilience thresholds – low (≤3.5), medium (3.51–6.00), and high (6.01–10.00) – to evaluate household capacity, where higher scores indicate stronger knowledge, skills, and resources to address system shocks and stresses. Kenyan FHHs demonstrated high ecological self-regulation (Busia: 7.89; Bungoma: 6.30), though social organization was medium to low in Busia (3.93). Rwandan FHHs exhibited high social self-organization (Rubavu: 7.78; Rusizi: 7.11) and comparatively stronger reflective learning (Rusizi: 4.09), but low ecological capacity (Rubavu: 2.92). Bangladeshi FHHs showed medium ecological and social scores, the highest profitability (Dinajpur: 6.54), and higher exposure to disturbance (~3.4), indicating greater ecological vulnerability. Across cities, reflective learning largely remains low to medium, indicating a widespread capacity gap. Overall, the findings highlight important trade-offs across resilience dimensions. While Kenyan FHHs have the strongest ecological regulation, Rwandan FFHs demonstrate strong social cohesion and learning systems, and Bangladeshi FFHs lead in profitability but remain more exposed to risks. These context-specific differences underscore the need for tailored, multidimensional resilience-building strategies that address ecological and socio-economic dimensions simultaneously: an evidence base for refining targeted interventions within the NICE project and contribute to broader efforts to strengthen smallholder resilience in rapidly changing food systems.

Keywords: Global South; Resilience; SHARP Tool; Climate change; Smallholder farming households

ETHNOVETERINARY MEDICINAL PRACTICES AND FOOD SECURITY NEXUS OF LIVESTOCK FARMERS

Daniel Ziba[1,2], Gideon Danso-Abbeam[3,6], Franklin N. Mabe[1,4], Gilbert Dagunga[5,6]*, Abiodun A. Ogundeji[6]

[1]*Department of Agricultural and Food Economics, University for Development Studies, Ghana*
[2]*Department of Ecological Agriculture, Bolgatanga Technical University, Ghana*
[3]*Department of Agribusiness, University for Development Studies, Ghana*
[4]*Centre for Agricultural Productivity and Policy Studies, University for Development Studies, Ghana*
[5]*Disaster Management Training and Education Centre for Africa, University of the Free State, Bloemfontein, South Africa*
[6]*Department of Science Education, St. John Bosco's College of Education, Navrongo, Ghana*

Corresponding author: Dagunga.G@ufs.ac.za

Abstract

Small ruminants' production is critical to household food security in developing countries including Northern Ghana. Beyond serving as a source of food and income, small ruminants also act as a buffer or form of insurance against household shocks. As such, their health is pivotal to ensuring that these benefits are realized. Ethnoveterinary medicine (EVM), defined as the traditional or indigenous animal health practice which involves the use of plant extracts, is essential for increased household food security outcomes. These practices were promoted by the Association of Church-Based Development Projects (ACDEP) from 2019-2022 through their Ethnovet project. The study assesses the impact of ethnoveterinary medicine on food security outcomes using a cross-sectional data from 400 small ruminant farmers in Northern Ghana. Employing the endogenous ordered probit with treatment effect model, the results show that household adoption decisions for EVM were influenced by sociodemographic and institutional factors include, education, household size, off-farm income, distance to market, access to extension and access to credit. Awareness of EVM and perceived benefits also informed farmers' choices for EVM. The treatment effects estimates show that, adoption of EVM significantly influence household dietary quality, reduces the probability of falling into crises as well as exerting moderate effect on household food access. Specifically, adopting increases the probability of household to fall in acceptable food consumption by 27 percentage points, reduces the probability of falling in severe coping strategies situation by 43 percentage points and increases the probability of falling into moderate food security situation by 14 percentage points. The study thus recommends the need for sustainable animal health practices such as the integration of EVM in the delivery animal extension services. There should also be conscious scientific testing of these EVM practices and standardization to ensure effective utilization.

Keywords: Ethnoveterinary medicine; Endogenous ordered probit; Small ruminants; Food security

YAM SETTS TECHNOLOGY ADOPTION AND TECHNICAL EFFICIENCY: CASE STUDY IN THE NORTHERN REGION

Ibrahim Nabila Adam*, Adinan Bahahudeen Shafiwu, Abdulai Shamsudeen

Department of Agricultural and Food Economics, University for Development Studies, Nyankpala Campus, Ghana

***Corresponding author:** jnabila7@gmail.com

Abstract

This study examines the adoption of Yam Setts Technology (YST) and its implications for technical efficiency among yam farmers in the Northern Region of Ghana. Yam productivity remains constrained by traditional seed systems and low input efficiency despite its important role. Using a multi-stage sampling technique, data were collected from 400 yam farmers across selected districts. Descriptive statistics were employed to characterize farmersâ€™ socioeconomic attributes, production practices, and adoption patterns. In Addition, the study applied a stochastic frontier model with correction for sample selection to estimate technical efficiency. This approach accounts for both random production shocks and inefficiency effects, while controlling for endogeneity arising from farmersâ€™ adoption decisions. The results show that the determinants of YST adoption in the study area are age, farming experience, extension service, use of family and hired labour, information about YST and FBO. The mean TE from the frontier with sample selection highlight that adopter yam farmers are more efficient (TE=0.571) than non-adopters (TE=0.528). Furthermore, the factors influencing the inefficiency of yam farmers are years of education and YST adoption for adopters, while household size, farm experience and use of staking for non-adopters. The study concludes that the YST adoption has a positive effect on the efficiency of the yam farmers in the area and recommends that the regional office of agriculture should strengthen access to extension service, access to information, and adhesion to a farmer-based organisation (FBO) to enhance the adoption of yam set technology and maximize its productivity among smallholder yam producers.

Keywords: YST adoption; Yam production; Stochastic frontier; Technical efficiency; Northern Region

CO-CREATING AGROECOLOGICAL SOLUTIONS FOR SOIL HEALTH AND RESILIENT FARMING SYSTEMS: EVIDENCE FROM SOUTHERN MALAWI

Maganga K[1*], Kabambe V[2], Mhango W[1], Njira K[1], Nalivata P[1], Chimungu J[1], Mbewe E[1]

[1]*Lilongwe University of Agriculture and Natural Resources, Malawi*
[2]*Malawi Adventist University*

***Corresponding author:** kmaganga@luanar.ac.mw

Abstract

Agroecology integrates ecological principles in managing sustainable agricultural systems. In Malawi, degraded soils and erratic rainfall limit crop productivity yet over 80% of the population are farmers. Lilongwe University of Agriculture and Natural Resources, with support from Irish Aid through Trocaire, established 54 agroecology learning centres (LCs) in 2024 in Chikwawa, Machinga and Balaka in southern Malawi. The main objective is to co-assess the effect of selected soil health interventions on cereal crop performance. Specifically, the centres evaluated the effect of different agroecological interventions on chlorophyll content in maize, sorghum and pearl millet; evaluate the effect of different agroecological interventions on yield and yield components of the same crops and assess how participatory research influences farmer perceptions on different soil health interventions. Soil pH varied from 6.95 in Balaka, 7.41 in Chikwawa and 5.94 in Machinga. All soils had low organic matter (<2%) and nitrogen (<0.2%) but sufficient phosphorus (>20 mg/kg). Application of either organic or inorganic fertiliser increased leaf chlorophyll by an average of 66% in sorghum and pearl millet. Sorghum and pearl millet plants applied with both NPK and Urea fertiliser in Balaka and Chikwawa had slightly higher chlorophyll content (55.7 and 57.2 SPAD respectively) than those applied with manure only or manure and urea (average of 52.5 and 51.1 SPAD respectively). No significant differences in chlorophyll content were observed between maize plants applied with either organic or inorganic fertiliser. Highest sorghum grain yield was recorded in manure plots (1755 kg ha^{-1}) while the control yielded the lowest (1003 kg ha^{-1}). In pearl millet, leaf chlorophyll increased by 65% with fertiliser application. In both sorghum and pearl millet, grain yield was higher in plot applied with manure (1348 kg ha^{-1} and 1755 kg ha^{-1} respectively) was in manure plots whereas control was lowest (963 and 1003 kg ha^{-1} respectively). For maize in Machinga, fertiliser application increased leaf chlorophyll by 104%. Grain yield was highest (3546 kg ha^{-1}) in NPK+Urea and control was lowest (237 kg ha^{-1}). Farmers rated manure (4.4/5) and manure plus urea (4.3/5) citing moisture retention, reduced *striga* population and low cost. Only 11% of farmers indicated to have previously used manure, but 60% expressed willingness to adopt the practice. These findings demonstrate the potential of agroecological soil health

interventions and participatory research to improve crop productivity and promote adoption.

Keywords: Agroecology; Cattle manure; Cereal crop; Learning centre; Soil health

SOIL RESTORATIVE POTENTIAL OF INTEGRATED SOIL FERTILITY MANAGEMENT (ISFM) IN SMALLHOLDER FARMS OF NORTHERN GHANA

Narcisse Yehouenou*, Kwame Oppong Hackman, Charles Lamoussa Sanou, Dzigbodi Adzo Doke, Alhassan Lansah Abdulai, Latif Iddrisu Nasare

[1]*West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL)*
[2] *Department of Environment and Sustainability Sciences, University for Development Studies, Ghana*

***Corresponding author:** yehouenou.n@wascal.org

Abstract

Soil degradation under conventional intensification threatens agricultural sustainability across the Guinea savannah zone of northern Ghana, where nutrient mining, organic matter depletion, and tillage-induced soils' structural decline is common. Integrated soil fertility management (ISFM) is widely promoted as a restorative strategy, yet rigorous evidence of its soil quality benefits across depths and cropping stages remains limited in this agroecological context. This study quantified the restorative potential of ISFM relative to conventional intensification and relatively undisturbed Guinea savannah (ecological baseline) across smallholder farming landscape of the Savelugu and Tolon districts, Northern Ghana. Soil quality was assessed across four cropping periods (sowing, mid-cycle, post-harvest, fallow) and two soil layers (0–15 cm; 15–30 cm) using a principal component analysis-based minimum data set (PCA-MDS) of nine physicochemical indicators, aggregated into a weighted soil quality index (SQI) and analyzed with generalized linear mixed models (GLMM) beta family. ISFM delivered the highest topsoil SQI across logistic sigmoid and Glover scoring functions, substantially outperforming conventional farming topsoil by 12–16 percentage points. Strikingly, conventional farming exhibited a layer inversion where topsoil quality fell below subsoil quality indicating a surface degradation attributable to nutrient extraction and reduced organic inputs. ISFM reversed this pattern, maintaining topsoil superiority over subsoil, though its restorative effect was attenuated below 15 cm. The ecological baseline did not significantly differ from conventional farming in any soil layer, suggesting that natural soil capital alone, without active management, does not confer a quality advantage over ISFM. Across all systems, SQI declined monotonically from sowing to fallow with no post-harvest recovery, highlighting the nutrient replenishment deficit characteristic of these soils. These results establish ISFM as the most effective land management strategy for sustaining surface soil quality in Guinea savannah smallholder systems.

Keywords: Integrated soil fertility management; Soil quality; Conventional intensification; Smallholder farming; Northern Ghana

AGRO-WASTE VALORISATION THROUGH ROOT AND TUBER CROP BY-PRODUCTS FOR SUSTAINABLE LIVESTOCK FEEDING IN SMALLHOLDER SYSTEMS IN NIGERIA

Ibikunle Olaleru[1]*, Jane Jite[1], Olorunfunmi Solana[2], Ibukun Busari[3], Charles Okereke[1], Charles Nwokoro [4]

[1]*Farming System Research Programme, National Root Crops Research Institute, Umudike, Abia State, Nigeria*

[2]*Department of Home Science and Hospitality Management, College of Agricultural Sciences, Olabisi Onabanjo University, Ayetoro, Ogun State, Nigeria*

[3]*Safety, Health and Environment Division, School of Science, Engineering and Environment, The University of Salford, Salford, UK,*

[4]*The Sustainable Agroecosystem Group, Department of Environmental Systems Science, ETH Zürich, Switzerland.*

***Corresponding author:** olaleru.ibikunle@gmail.com

Abstract

The rising cost and limited availability of conventional feed ingredients such as maize and soybean meal continue to constrain sustainable livestock production in sub-Saharan Africa. Agroecological approaches that emphasize circular resource use and agro-waste valorisation provide promising alternatives for improving feed availability while reducing environmental waste. This study evaluates the nutritional potential of root and tuber crop by-products particularly cassava peels, cassava leaves, and sweet potato residues as alternative feed resources for monogastric livestock production in Nigeria. Proximate and fiber analyses showed that cassava leaf meal contained 21-24% crude protein (CP) while cassava peel meal provided moderate energy content suitable for partial replacement of maize in broiler diets. Feeding trials were conducted using broilers fed graded levels of cassava peel leaf composite meals replacing portions of maize and soybean meal in conventional diets. Broilers fed diets containing up to 20% composite cassava peel leaf meal achieved final body weights of 2.05-2.18 kg, which were not significantly different ($p > 0.05$) from birds fed the control diet (2.12 kg). Feed conversion ratios ranged from 1.82 to 1.91, also showing no significant difference ($p > 0.05$) compared with the control treatment (1.80). However, feed cost per kilogram of weight gain was significantly reduced ($p < 0.05$) by 12-18% in diets containing cassava by-products compared with the conventional maize-soybean diet. These findings demonstrate that root and tuber crop residues, often considered agricultural waste, can be effectively valorised as livestock feed ingredients without compromising growth performance. Integrating these by-products into livestock feeding systems promotes nutrient recycling, reduces feed production costs, and strengthens circular bioeconomies within smallholder farming systems. Scaling such crop-livestock integration strategies could contribute significantly to sustainable feed systems, improved farmer livelihoods, and enhanced food and nutrition security across the continent.

Keywords: Agro-waste valorisation; Roots and tubers by-products; Livestock feed; Crop-livestock integration; Nigeria

AGROECOLOGICAL VALORISATION OF AGRICULTURAL RESIDUES THROUGH PELLETISATION: EXPERIMENTAL INSIGHTS AND ENERGY POTENTIAL FOR CLIMATE MITIGATION IN WEST AFRICA

Juan Gonzalo Ardila-Marín[1,2]*, Luis Manuel Navas-Gracia[1], Dileyni Lizza Díaz-De-Oleo[1], Adriana Correa-Guimaraes[1], Doreen Derzu[3], Demba N. A. Trawally[4]

[1] *Doctorado en Ciencia e Ingeniería Agroalimentaria y de Biosistemas, Universidad de Valladolid, Palencia, España*
[2] *Ingeniería Agrícola, Universidad Surcolombiana, Neiva, Colombia*
[3] *University for Development Studies (UDS), Ghana*
[4] *National Agricultural Research Institute (NARI), Brikama, The Gambia.*

*** Corresponding author:** juan.ardila@usco.edu.co

Abstract

The sustainable use of agricultural residues is a central challenge for climate-resilient agrifood systems, and pelletisation offers a promising pathway to convert locally abundant biomass into a more valuable, energy-dense and transport efficient bioresource. This study was justified by the need to understand how processing parameters affect pellet quality when agricultural residues are densified under agroecological principles. We hypothesised that optimal combinations of feedstock moisture and pelletiser operating frequency would enhance pellet quality, expressed through greater bulk density and mechanical durability. Accordingly, the objective of this work was to experimentally assess the influence of frequency and moisture content on the physical performance of pellets produced from maize and rice residues. A structured experimental programme was carried out using milled maize and rice residues processed at four pelletiser frequencies. For each trial, the initial moisture content of the feedstock was measured before pelletisation, while bulk density, mechanical durability and final moisture were quantified after production. These variables were chosen to reflect both operational performance and the suitability of the pellets for handling, storage and bioenergy use. All measurements were performed using consistent laboratory procedures to ensure comparability between materials and processing conditions. Exploratory statistical analyses were applied to evaluate within-material variation, identify emerging trends across frequencies, and examine the relationship between moisture evolution and pellet quality attributes. The results show that pellet quality responds detectably to the processing conditions tested, with frequency and moisture contributing to observable differences in both materials, and with a clear and systematic reduction in moisture content during pelletisation.

Keywords: Agroecological valorization; Agricultural residues; Pelletization; Energy; Climate mitigation; West Africa

CURRENT AGRO-RESIDUES MANAGEMENT IN WEST AFRICAN SMALLHOLDER FARMING SYSTEMS AND THEIR VALORIZATION POTENTIAL

Dileyni Diaz De Oleo[1]*, Marina Paneque[2], Adriana Correa-Guimarães[1], Antonio Delgado García[2], Doreen Derzu[3], Philemon Ayambila[3], Augustina Aduku[3], Babacar Kane[4], Mame Farma Ndiaye[4], Demba N. A. Trawally[5], Lamin Dibba[5], Luis Manuel Navas Gracia[1], José Manuel Quintero[2]

[1]TADRUS Research Group, Department of Agricultural and Forestry Engineering, University of Valladolid, 34004 Palencia, Spain
[2]Department of Agronomy, University of Seville, Seville, Spain
[3]University for Development Studies (UDS), Tamale, Ghana
[4]Senegalese Institute for Agricultural Research (ISRA), Saint-Louis Agricultural Research Center, Saint-Louis, Senegal,
[5]National Agricultural Research Institute (NARI), Banjul, The Gambia

*** Corresponding author:** dldiazo@fundacion.uva.es

Abstract

Most agricultural residues in West African smallholder farming systems are inefficiently used. Despite their relative abundance, there are limited opportunities for circular agriculture due to lack of knowledge of their valorization potential and multiple-use purpose. Robust baseline data on residue types, quantities, current management practices, and technical properties are needed to match residues with feasible valorization pathways. This study combined field inventories and laboratory characterization to quantify agro-residues and evaluate their valorization potential across smallholder farms in The Gambia, Ghana and Senegal within the CIRAWA project framework. Structured surveys and participatory rural appraisal methods were conducted during 2023-2024 agricultural seasons to document residue types, quantities, and current uses. Representative samples underwent laboratory analysis for elemental composition, physicochemical and thermochemical parameters. Field inventories revealed that cereals and legume crops are the main sources of agro-residues across regions, and that a portion of these residues is currently dumped or burnt (up to 30% in some Gambian districts), representing significant untapped potential. Characterization results demonstrate that West African residues possess nutrient compositions and thermochemical properties suitable for multiple high-value applications, enabling a strategic shift from disposal to circular valorization. Nutrient analysis showed strong capacity for composting and vermicomposting, with millet stems containing the highest potassium levels (3.3%) and rice husks providing substantial phosphorus (0.4%). Thermochemical screening confirmed suitability for decentralized bioenergy, with all residues exceeding minimum calorific thresholds (>15 MJ/kg) and maize-based materials reaching 18-20 MJ/kg. Heavy metal concentrations remained below regulatory safety limits across all samples. Physical characterization indicated additional applications for sustainable building materials, with rice husk ash showing favorable characteristics for brick reinforcement. Findings highlight significant opportunities to transform agro-residues from low-value waste streams into circular resources that enhance soil fertility, support decentralized bioenergy systems, and contribute to low-cost sustainable construction in West African smallholder communities.

Keywords: Circular agriculture; Biomass characterization; West Africa; Residue valorization, Smallholder farming

PERFORMANCE-BASED EVALUATION OF WEST AFRICAN SOILS FOR COMPRESSED EARTH BLOCKS (CEB) PRODUCTION

Dileyni Díaz De Oleo[1]*, Jorge López-Rebollo[2], Juan Gonzalo Ardila-Marín[3], Luis Manuel Navas-Gracia[1]

[1]*TADRUS Research Group, University of Valladolid, Spain*
[2]*Universidad de Salamanca, Spain*
[3]*Universidad Surcolombiana, Colombia*

***Corresponding author:** dldiazo@fundacion.uva.es

Abstract

The construction sector faces increasing pressure to reduce reliance on energy- and carbon-intensive conventional materials. In this context, compressed earth blocks (CEBs) represent a promising low-carbon alternative, particularly in regions where locally available soils can be utilized. However, the performance of CEBs depends strongly on soil suitability, compaction characteristics, and appropriate stabilization strategies. This study evaluates the geotechnical suitability of selected soils from Ghana and The Gambia for CEB production and investigates optimized soil–clay matrix compositions to enhance material performance. Four soil samples were characterized using particle size distribution analysis and Proctor compaction tests. The soils were classified as silty sands (SM according to the Unified Soil Classification System), with sand contents ranging from 62% to 76%, silt from 19% to 24%, and clay from 1% to 5%. Maximum dry density (MDD) values ranged from 2043 to 2250 kg/m³, while optimum moisture content (OMC) varied between 6.8% and 9.6%. To improve compaction performance, three clay dosage levels (5%, 10%, and 15%) were experimentally evaluated. The Ghanaian soil achieved optimum performance at 15% clay addition and 9% moisture content, whereas the Gambian soil reached its maximum dry density at approximately 10% clay and 8% moisture content. The results demonstrate that, when systematically characterized, several local soils meet the technical requirements for earth construction. Soils that fall outside conventional granulometric recommendations, as observed for the unstabilized samples in this study, may be improved through sieving, controlled blending, or clay addition to achieve suitable performance parameters. These findings contribute to the development of context-specific guidelines for CEB production in West Africa and support the broader adoption of low-carbon earthen construction technologies.

Keywords: Compressed earth blocks; Granulometric composition; Soil suitability; West Africa countries; Optimum soil mix

TEMPERATURE EFFECTS ON COCOA HUSK BIOCHAR AND BIO-OIL COMPOSITION USING AN IMPROVED TRADITIONAL KILN

David Kabutey Akuaku, Shadrack Kwadwo Amponsah, Kodwo Miezah, Jerome Dela Lavie, Theophilus Frimpong, Francis Kemausuor

[1]*Kwame Nkrumah University of Science and Technology, Ghana*
[2]*Department of Renewable Energy, Cape Coast Technical University*

***Corresponding author:** dkakuaku1@st.knust.edu.gh

Abstract

Cocoa husks are an abundant yet underutilized agricultural residue with strong potential for sustainable biochar and bio-oil production. This study investigates the effect of pyrolysis temperature on the biochar yield, iodine number, physicochemical properties, and functional performance of cocoa husk derived products produced using an improved traditional kiln, addressing inconsistent product quality common in conventional systems in sub-Saharan Africa. Cocoa husks were pyrolyzed at 300 Â°C and 500 Â°C with a residence time of 12 h, and the resulting products were comprehensively characterized. Results show a clear temperature-dependent trade-off between yield and quality. Biochar yield decreased from 52 % at 300 Â°C to 41 % at 500 Â°C due to intensified devolatilization, while the iodine number, a crucial indicator of surface area, significantly increased from 136.7 to 338.9 mg gâ» Â¹, indicating enhanced microporosity and adsorption capacity. At 500 Â°C, fixed carbon content reached 43.6 %, pH exceeded 11, indicating enhanced alkalinity and mineral concentration beneficial for acidic soil correction, and the higher heating value (HHV) peaked at 17.33 MJ/kg at 300Â°C but slightly declined at 500Â°C due to extensive devolatilization. Carbon concentration increased to 63 %, reflecting greater aromaticity, thermal stability, and long-term carbon sequestration potential. XRD, SEM, and FTIR analyses confirmed the transformation from lignocellulosic structures to a highly porous, amorphous aromatic carbon matrix. Higher pyrolysis temperature also improved bio-oil yield and quality, increasing production from 0.003 to 0.00575 mÂ³ and calorific value from 15.2 to 20.7 MJ kgâ»Â¹, with reduced moisture and acidity. Mass balance analysis indicates that 300 Â°C favours solid carbon retention, whereas 500 Â°C promotes energy-dense bio-oil formation. Overall, controlled temperature operation enables targeted dual valorization of cocoa husks for soil amendment, pollutant adsorption, renewable energy generation, and carbon sequestration.

Keywords: Cocoa husks; Carbon sequestration; Agricultural residue; Biochar; Valorization; Temperature

Scientific Session 4 | Metrics and Indicators

MULTIDIMENSIONAL PERFORMANCE OF AGROECOLOGY IN NORTHERN GHANA: A COMPREHENSIVE ASSESSMENT USING TAPE

Harry Quaye Amankwah[1,3], Alhassan Lansah Abdulai[4], Michelle Bonatti[2,3], Stefan Sieber[2,3], Johannes Schuler[1]*
[1]Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany
[2&3] ZALF / Humboldt-Universität zu Berlin, Germany
[4]Savanna Agricultural Research Institute (SARI), Tamale, Ghana

***Corresponding author:** HarryQuaye.Amankwah@zalf.de

Abstract
Smallholder farming systems in Ghana's savannah ecosystems are under increasing pressure, particularly from climate change and declining soil fertility. While agroecology is often promoted as a solution for building resilience, empirical evidence for policy traction supporting the transition to agroecology remains limited. Most of the existing agroecological research in the region remains predominantly qualitative, applies unstandardised assessment techniques, and is localized within grey literature. This lack of standardized, multidimensional, and quantitative evidence limits policy makers ability to integrate agroecological transitions into national agricultural policies. To bridge this gap, this study employs the FAO's Tool for Agroecological Performance Evaluation (TAPE) , a standardized and participatory framework designed to provide a multidimensional evidence base for agroecological performance. We applied the TAPE on 210 farms in Northern Ghana to characterize the degree of transition and quantify performance across four farm typologies. Our results show that transition levels across elements focusing "on-farm" (diversity, efficiency, and synergy) were low, while "Systemic" focus elements (Human and Social Values, Culture and Food Traditions, and Circular and Solidarity Economy) were high for all farm types. Overall, our findings show that higher levels of agroecological transition directly associated with better performance across three dimensions of sustainability. The study provides strong evidence for leveraging the high socio-cultural "will" as the engine to drive the "on-Farm" (technical) elements towards agroecological transition. It also provides a concrete evidence base for policymakers and NGOs to prioritize agroecological extension services and trainings as a viable strategy to narrow the implementation gap and enhance general rural development.

Keywords: Agroecology; Assessment; TAPE; Transition; Multidimensional

KPI-BASED MONITORING OF AGROECOLOGICAL PRACTICES IN WEST AFRICA SMALL-SCALE FARMING SYSTEMS

María Fernández-Marcos*, Esther San José, Bárbara Díez, Nuria Rico, Raúl Sánchez, Silvia Gómez

[1]*CARTIF Technology Centre, Valladolid, Spain*

***Corresponding author:** marfen@cartif.es

Abstract

The implementation of agroecological practices requires robust and site-specific monitoring frameworks that capture measurable changes in farming system performance under real field conditions. This contribution presents a Key Performance Indicator (KPI)-based monitoring approach, developed within the CIRAWA project, to assess changes in agronomic, environmental and economic parameters associated with the implementation of agroecological practices in West African small-scale farming systems. The approach is being applied across plot sites in Cape Verde, The Gambia, Ghana and Senegal, covering rice, market gardening and cereal-legume systems under both rainfed and irrigated conditions. A consistent set of KPIs and harmonised assessment protocols was defined to monitor key dimensions of agroecological performance, such as soil fertility, crop performance, resource-use efficiency and input management. These indicators include soil organic matter content, nutrient availability (N, P and K), water use efficiency, crop yields, reuse of agricultural residues, utilisation of valorised inputs and changes in production costs. Data collection combines farmer surveys, field measurements, and laboratory soil analyses, using unified protocols. Field notebooks were developed to support data collection at plot level and are currently used during field monitoring activities. Agroecological practices were selected through a participatory, plot-level process to address site-specific constraints such as soil degradation, salinity, water scarcity and low input efficiency. The practices implemented include composting, crop residue management, intercropping, mulching, agroforestry, soil amendments and the use of adapted crop varieties. KPI monitoring was carried out before implementation (baseline) and is currently ongoing, enabling assessment of performance changes associated with implementating combinations of agroecological practices. The definition of CIRAWA KPIs, together with standardised data collection protocols and field notebooks, establishes a common framework for consistent data collection across sites. The data currently being collected will support future assessment of performance changes associated with combined agroecological practices.

Keywords: Monitoring and Evaluation, Agroecology, Key Performance Indicators (KPIs) Smallholder Agriculture, Sustainable Farming Systems

TOWARDS APPROPRIATE METRICS FOR SMALLHOLDER FARMER PRODUCTION SYSTEMS

Saa Dittoh[1]*, Silvia Gomez[2], Margaret Akuriba[1], Philemon Ayambila[1], Maria Fernandez-Marcos[2]

[1]University for Development Studies, Ghana
[2]CARTIF Technology Centre, Valladolid, Spain

***Corresponding author:** saaditt@gmail.com

Abstract

It is generally accepted that mixed cropping and mixed farming are most appropriate for agroecological practices, especially smallholder production systems. Current research on metrics for what is produced on smallholder farms is highly inappropriate. Over 90% of crop research in Africa has been on monocropping systems when smallholder farming systems typically have mixtures of 4 and more crops, and with 'minor crops' that are hardly mentioned or greatly undervalued. There have lately been attempts at crop-mixture research but most of that has been limited to 2 crops (mainly cereal/legume) due to the complexities of analysis. That is clearly inappropriate and unacceptable because it misrepresents smallholder production systems with consequences of wrong findings, wrong conclusions and very wrong policy implications. Information on cropping systems in Cape Verde, Ghana, Senegal and The Gambia clearly shows the inappropriateness of metrics used. Suggestions are being made to develop more appropriate metrics for better informed decision-making.

Keywords: Smallholder Production Systems; Metrics; Mixed and Mono Cropping; West Africa

CARBON FOOTPRINT ASSESSMENT OF WEST AFRICAN AGROECOLOGICAL CROPPING SYSTEMS USING PRIMARY FIELD DATA AND LIFE CYCLE ASSESSMENT

Diana Alexandra Murcia-Velasco[1]*, Adriana Correa-Guimaraes[1], Saa Dittoh[2], Dileyni Diaz De Oleo[1], Doreen Derzu[2], Luis Manuel Navas-Gracia[1]

[1]*TADRUS Research Group, University of Valladolid, Spain*
[2]*University for Development Studies (UDS), Tamale, Ghana*

***Corresponding author:** dianaalexandra.murcia@uva.es

Abstract

Agroecological systems are increasingly recognized as key pathways for climate-resilient and sustainable food production in West Africa. However, robust, field-based quantification of greenhouse gas (GHG) emissions from diverse staple and horticultural crops remains limited. This study assesses the carbon footprints of nine major crops: maize, cabbage, lettuce, sorghum, millet, pepper, cassava, groundnut, and soybean, using primary data collected directly from West African farms. The research aims to (i) quantify cradle-to-farm gate GHG emissions (kg CO_2-eq per kg product), (ii) identify emission hotspots across cropping systems, and (iii) evaluate how agroecological practices contribute to climate mitigation and Nature-based Solutions (NbS). The methodological framework follows ISO 14040/14044 Life Cycle Assessment standards to ensure methodological consistency, transparency, and reproducibility. System boundaries extend from soil preparation to harvest. Primary inventory data include input use (fertilizers, seeds, agrochemicals), energy consumption, irrigation practices, machinery use, crop residues management, and yields. Emission factors are integrated from internationally recognized life cycle inventory (LCI) databases and adapted to local contexts. Preliminary results indicate substantial variability in carbon footprints across crops and management systems, with synthetic fertilizer application and fuel use emerging the dominant contributors of emission. Leguminous crops demonstrate comparatively lower net emissions due to biological nitrogen fixation and reduced synthetic inputs. Diversified agroecological practices show mitigation potential through CARTIF *Technology Centre, Valladolid, Spain* reduced inputs, improved soil management, and enhanced resource efficiency. This research provides context-specific carbon footprint benchmarks for West African agroecological systems and supports evidence-based monitoring and evaluation frameworks. The findings contribute to climate-smart agriculture strategies, strengthen the role of NbS in food systems transformation, and inform policy development aligned with sustainable development objectives and regional climate mitigation strategies.

Keywords: Carbon Footprint, Life Cycle Assessment, Smallholder Agriculture, West Africa, Agroecology

EARTH OBSERVATION FOR MAPPING AND MONITORING AGROECOLOGY: POTENTIALS AND LIMITATIONS

Teresa De Marzo[1], Kasimir Orlowski[2], Michele Meroni[3], Ilaria Palumbo[3], Melissande Machefer[4], Felix Rembold[4]*

[1]ARCADIA SIT S.r.l., Milan, Italy
[2]FINCONS S.P.A., Milan, Italy
[3]Seidor Consulting, Barcelona, Spain
[4]European Commission, Joint Research Centre (JRC), Ispra, Italy

***Corresponding author:** felix.rembold@ec.europa.eu

Abstract

Earth Observation (EO) is widely used to monitor crop growth, crop conditions and forecast crop yield across large areas. It helps to detect land cover and deforestation, drought and soil degradation, irrigation and water management, vegetation health and crop stress. The Joint Research Centre of the European Commission explores the use of EO for agroecology in collaboration with RMRNs (Regional Multiactor Research Networks on Agroecology in Africa) and with the FAO Tool for Agroecology Performance Evaluation (TAPE) project. Among the possible uses of EO to support agroecology, we currently focus on the characterisation of landscape level crop diversity and on developing methods to map agroforestry systems in cocoa and coffee plantations. The diversity of crops across different landscapes can serve as basis to identify more complex, ecologically integrated configurations in the country that influence nutrient cycling, microclimate regulation, pest and disease dynamics, and on-farm biodiversity. Spatially explicit data on agroforestry and mixed-cropping systems are essential for evaluating resilience and sustainability at the landscape level. In this contribution, we present examples of recent activities in landscape crop diversity mapping in Kenya and agroforestry mapping for cocoa producing areas in West Africa. For diversity mapping, we briefly outline the full processing line encompassing the design and implementation of a large field campaign to collect ground observations, followed by the production of a crop type specific map using EO methods, and finally the derivation of landscape level diversity indicators. Similarly, for agroforestry mapping, we present the overall workflow, from the collection of reference data through ground truthing and photo-interpretation of Very High Resolution (VHR) imagery to the development of Deep Learning models and agroforestry mapping. Finally, we present two new pilot studies planned with RMRN members:

1) production of a crop diversity map at landscape level in Zambia
2) agroforestry mapping for coffee areas in Kenya

Keywords: Earth Observation; Mapping; Monitoring; Landscape Analysis

AGRICULTURAL GREEN EFFICIENCY IN AFRICA: A SLACK-BASED MEASURE DEA WITH UNDESIRABLE OUTPUTS

Michael Lawer Tetteh[1]*, Charles Andoh[2], Anthony Q. Q. Aboagye[2], Godfred Amewu[2]

[1]Department of Banking and Finance, University of Professional Studies, Accra
[2]Department of Finance, University of Ghana Business School, Legon

***Corresponding author:** michael.t.lawer@upsamail.edu.gh

Abstract

Agriculture underpins economic growth and livelihoods across Africa, yet its productivity is constrained by environmental inefficiencies. We present the first continent-wide assessment of the green efficiency of agricultural production, analysing 48 countries from 2000 to 2019 using a slacks-based data envelopment analysis incorporating undesirable outputs. Results reveal an average efficiency score of 66%, with unsustainable input use and high on-farm emissions as the principal drivers of inefficiency. By estimating optimal input allocations and emission reductions, we identify actionable pathways to enhance productivity while reducing environmental costs. These findings underscore the dual challenge of sustaining agricultural output and mitigating climate impacts, highlighting the need for integrated policies that promote resource efficiency and low-carbon farming practices. Our study provides empirical evidence to guide strategies for greener agricultural growth in Africa, contributing to global debates on aligning food security, economic development, and environmental sustainability.

Keywords: Agriculture, Green Efficiency, DEA, SDGs

MEASURING WHAT MATTERS: DEVELOPING A HOLISTIC METRICS FRAMEWORK FOR FARMER MANAGED NATURAL REGENERATION AS A NATURE-BASED SOLUTION FOR SUSTAINABLE FOOD SYSTEMS IN NORTHERN GHANA

Gloria Kukurije Adeyiga[1]*, Maxwell Amedi[2], Mary Crossland[3]

[1]Forestry Research Institute / CIFOR-ICRAF Consultant
[2]World Vision International, Ghana
[3]CIFOR-ICRAF

***Corresponding author:** gloriaadeyiga@gmail.com

Abstract

Farmer Managed Natural Regeneration (FMNR) is a low-cost nature-based solution for restoring degraded landscapes, enhancing biodiversity, and strengthening rural livelihoods across Africa. However, conventional monitoring approaches often focus on narrow productivity indicators such as yield and income, limiting the ability to capture the broader socio-ecological impacts of agroecological interventions. To strengthen evidence on FMNR's broader impacts for sustainable food systems, this study presents the outcomes of participatory stakeholder engagement conducted in Northern Ghana with World Vision Ghana to develop a holistic metrics framework for assessing FMNR interventions. Using CIFOR-ICRAF's TRANSITIONS Metrics Meta-Framework, stakeholders were engaged collaboratively to review FMNR system boundary, map key actors, and review existing FMNR indicators to identify overlaps and significant gaps for possible recommendations. Findings revealed that while current monitoring frameworks capture several social and environmental dimensions, significant gaps exist in governance, policy, and market-related indicators needed to understand the full contribution of FMNR to sustainable food systems. The participatory process resulted in a refined matrix of indicators spanning social, ecological, economic, and governance domains, enabling more comprehensive assessment of ecosystem restoration, livelihood diversification, food security, and community resilience outcomes. The participatory process demonstrated the value of aligning metrics with local priorities and policy contexts, and reinforced local ownership of restoration outcomes. This co-developed framework will enable comprehensive monitoring of FMNR's impacts in line with sustainable development goals

Keywords: Farmer Managed Natural Regeneration, Nature-Based Solution, Monitoring and Evaluation, Indicator, Sustainable Food Systems

AMAATI

One Crop, People + Planet

we grow more than grain. We grow nutrition, climate resilience, and health.

We combine poverty reduction, food security, and Non-Communicable Diseases (NCD) prevention in one ancient crop: Fonio

IMPACT FOR PEOPLE AND PLANET

Climate

Drought resilient Fonio mature in 6-8 weeks with minimal water. Each acres planted improves soil structure and pull carbon from the atmosphere,helping communities adapt to climate shocks.

NCD Solution

43% of Ghana Deaths =NCDs; Fonio offers an affordable, local food-based solution for Africa's fastest growing health crisis

Nutrition

DIM Fonio is low glycemic, gluten-free and rich in micronutrients. Approved by Ghana Health Service as a dietary food for diabetes and hypertension management. A local answer to imported diabetes foods that most patients can not afford.

Health + Income

Women grow Fonio first to nourish their families. The surplus nourishes the world. Giving clinics, pharmacies and consumers access to affordable,culturally rooted nutrition for NCD prevention

For people and planet, we made a promise:

leave the soil better than we found it.

We plant with our future children in mind. To grow, to nourish, to replenish, while building climate resilience and community stability.

THIS IS AGROECOLOGY IN ACTION

One crop, Healthier soil. Stronger families
A more resilient Africa

Women | Fonio | Nutrition | Climate Resilience

Grown by women. Powered by nature .
For a resilient Africa

Info@amaatigroup.com
WWW.amaatigroup.com
0200775144

Scientific Session 5 | Agroecology Transitions

ASSESSMENT OF AGROECOLOGICAL TRANSITION IN SMALLHOLDER FARMING SYSTEMS USING THE TAPE FRAMEWORK: EVIDENCE FROM AGROECOLOGICAL LIVING LABS IN CENTRAL AND EASTERN AFRICA

Wivine Munyahali[1]*, Janvier Mulumuna wa Lola[1], Damas Birindwa[1], Espoir Bisimwa[1], Diego Cerrudo[2], Isaac Balume[3], Charles Sivirihauma[4], Jules Ntamwira[5], Ruphine Batumike[5], Kokou Kintche[5], Emmanuel Rukundo[6], Audace Niyonzima[7], Pierre Claver Ngendakumana[8], Adoph Kemga[9], Alvine Tchouga[9], Beatriz Herrera[10], Tim Ndah[10], Marc Corbeels[2]

[1]Université Catholique de Bukavu (UCB), DRC
[2]CIRAD, Montpellier, France
[3]ETH Zurich, Switzerland
[4]Rikolto International, DRC
[5-9]International Institute of Tropical Agriculture (IITA)
[10]University of Hohenheim, Germany

***Corresponding author:** wivine.munyahali@ucbukavu.ac.cd

Abstract

This study assessed the level and performance of agroecological transitions across eight Agroecological Living Labs (ALLs) in Burundi, Cameroon, DR Congo, and Rwanda as part of the CANALLS baseline. Using the FAO's Tool for Agroecology Performance Evaluation (TAPE), the research evaluated farming systems, agroecological transition levels, and theenvironmental, social, and economic performance. Data were collected through quantitative surveys, participatory assessments, and stakeholder validation workshops. Across ALLs, agroecological transition levels were moderate, with a mean CAET score of 45.6, indicating an intermediate level of adoption of agroecological principles. Transition levels varied substantially among ALLs: Bunia in the DRC achieved the highest score (CAET = 53.8), while Giheta (32.9) and Bujumbura (34.3) in Burundi showed limited adoption. Agroforestry systems were particularly well established in Kabare and Biega in the DRC and Ntui in Cameroon, where tree integration contributes to improved biodiversity and ecological resilience. Despite ecological progress, significant socio-economic vulnerabilities remain pronounced. Over 70% of farmers in Biega and Kabare reported recurrent food insecurity, reflected in skipped meals, limited dietary diversity, and frequent household shortages. In contrast, Bunia displayed comparatively favorable conditions, with over 75% of respondents reporting minimal exposure to food insecurity. Dietary diversity remains a critical challenge in Kabare, Biega, Giheta, and Kamonyi (Rwanda), where over half of households fall into unsustainable categories. The study also identifies structural constraints affecting agroecological transitions, including land tenure insecurity, labour shortages, weak recycling practices, and limited market access. Although women and youth form the backbone of family labour systems, indicators of women's empowerment remain largely unsustainable across most ALLs, reflecting persistent gender gaps in participation and decision-making. The findings indicate that agroecological transition in humid tropical systems is highly

context-dependent and heterogeneous. Although diversification and agroforestry are increasingly adopted, food security, market integration, and gender equity need to be improved to achieve sustainable livelihoods.

Keywords: Agroecological Transition, Living labs, TAPE, Farming Systems

SOCIO-ECONOMICS OF FARMING HOUSEHOLDS IN GHANA AND THE GAMBIA AND IMPLICATIONS FOR AGROECOLOGY TRANSITIONS AND UPSCALING

Saa Dittoh[1]*, Alpha Sey[2], Silvia Gomez[3], Margaret Akuriba[1], Joseph Bandanaa[4], Philemon Ayambila[1]

[1]University for Development Studies, Ghana
[2]Njawara Agricultural Training Centre, Banjul, The Gambia
[3]CARTIF Technology Centre, Valladolid, Spain
[4]Swiss Platform for Sustainable Cocoa, Ghana

***Corresponding author:** saaditt@uds.edu.gh

Abstract

Many indigenous and introduced agroecological practices are relatively well-known among farming households in West African countries. Several of the practices are, however, not being practiced by both men and women due to varying constraints and challenges. The literature generally points to women experiencing more serious resource constraints than men, and land and labour are the most critical. This paper reports on a gendered cross-sectional study that assessed the socio-economic characteristics of smallholder farming households in Ghana and the Gambia, and analysis of various constraints confronting men and women farmers and their potential impact on agroecological transition, and upscaling of agroecological technologies and practices. The results confirm the precarious situations women farmers face with respect to land, labour and other production resources, but point to the fact that the challenges they face are far less severe under agroecological than conventional (agro-industrial) practices. Many men farmers also face several of the constraints and challenges. Recommendations are made towards successful agroecology transition and upscaling in the two West African countries.

Keywords: Agroecological Practices; Men and Women; Agroecological Transition; Ghana; The Gambia

DETERMINANTS OF TRANSITIONING TO AGROECOLOGICAL PRACTICES AMONG SMALLHOLDER FARMERS IN BENIN, ETHIOPIA, KENYA AND MADAGASCAR

Max Olupot & Oladimeji Idowu Oladele*

Department of Agricultural Extension and Rural Resources Management, University of KwaZulu-Natal (UKZN), South Africa

***Corresponding author:** oladeleo@ukzn.ac.za

Abstract

The paper examined the factors that determine the transition to agroecology practices across Benin, Ethiopia, Kenya, and Madagascar. A cross-sectional research approach was used with 1,293 respondents comprising smallholder farmers from GIZ ProSoil and ProSilience intervention regions. Results indicate that the majority of farmers are male, have no formal education in Benin, allocate farm sizes less than 1 ha to agroecological practices, and have farming experience of more than 5 years. Farmers ranked use of farms as trial sites and seating allowance (cash) as key incentives for participation and sharing agroecology. The binary logistic regression model for each country showed a good fit. The significant predictor variables for transitioning to agroecological practices are farm size, farming experience, incentives for participation in agroecology, incentives for sharing agroecology, and knowledge co-creation. In Benin, gender, farming experience, and incentives for participation were significant predictors. In Ethiopia, gender, education, farming experience, and incentives for sharing agroecology were significant. The study recommends tailored extension services and training as well as financial support to accelerate the agroecology transition.

Keywords: Agroecology, Extension Approaches, Advisory Services, Farmers Education

BEYOND FARM PRACTICES: ASSESSING AGROECOLOGICAL PERFORMANCE THROUGH LOCAL CONTEXTUAL LENSES IN KENYA AND TANZANIA

Beatrice Adoyo*, Andrew Sila, Sandhya Kumar, Immaculate Edel, Matthias Geck

Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF), Nairobi, Kenya

***Corresponding author:** b.adoyo@cifor-icraf.org

Abstract

Socioeconomic and policy contexts are widely recognized as key drivers of agroecological transition pathways, shaping the conditions under which food system actors adopt and sustain agroecological practices. However, most agroecology assessments primarily attribute performance outcomes to farm-level practices and technical interventions, often overlooking the broader contextual and policy environments that influence agroecological performance. Beyond examining variations in agroecological integration and its associated multidimensional performance, this study investigates how these outcomes relate to local contextual conditions and policy landscapes. The study applies the FAO Tool for Agroecology Performance Evaluation (TAPE) to assess agroecological performance among 200 households in the Lake Victoria Basin of Kenya and Tanzania. A mixed-methods explanatory framework that combined statistical analysis with qualitative context analysis was used to identify associations between agroecological performance and contextual and policy factors. Spearman's correlation assessed relationships between agroecological integration and performance indicators, while principal component analysis identified key drivers shaping agroecological transitions. The enabling environment was further examined through key informant interviews and analysis of relevant policy provisions coded according to Committee on World Food Security (CFS) recommendations on agroecology. Preliminary findings show that higher agroecological integration is associated with improved productivity, household income, land tenure security, dietary diversity, and youth engagement in farming. Kenya records slightly higher agroecological integration (CAET = 58%) than Tanzania (CAET = 52%) but faces stronger structural constraints related to land fragmentation and limited youth access to land, which contribute to lower youth engagement in agriculture. These conditions appear to encourage intensification within existing landholdings, reflected in greater emphasis on practice-based agroecological elements of recycling (81%), resilience (59%), and efficiency (58%) relative to Tanzania. We conclude that agroecological performance reflects interactions between farm-level practices and broader contextual environments, highlighting the need for integrated policy approaches that address structural constraints while supporting diversified and resource-efficient farming systems.

Keywords: Agroecology; Assessment; Performance; Context; Policy

BEYOND DEPENDENCE ON DONOR GRANTS: UNDERSTANDING COMMUNITIES' CONTRIBUTION TO CLIMATE CHANGE ADAPTATION – EVIDENCE FROM FMNR-BASED LANDSCAPE RESTORATION PROJECT IN GHANA

Maxwell Amedi[1]* & Prince Addey Owusu[2]

[1]*Food Security & Resilience Technical Program Manager, World Vision International, Ghana*
[2]*Knowledge Management and Research Manager, World Vision International, Ghana*

***Corresponding author:** maxzy5050@gmail.com

Abstract

Climate change poses risks to agriculture, natural resources, and rural livelihoods in Ghana. Declining soil fertility, and land degradation threaten food security and ecological stability, particularly in savannah landscapes where communities depend heavily on agriculture. In response to these challenges, multiple stakeholders, including national governments, CSOs and development partners, have implemented various climate-related policies and interventions. These actions reflect global commitments under frameworks such as the UNFCCC, the Paris Agreement, and the Sustainable Development Goals, the Nationally Determined Contribution (NDC), which collectively respond to adaptation issues. Over the years, donors have significantly supported Ghana's climate agenda, enabling reforestation programs and community resilience initiatives. However, despite donor-led actions, an important gap persists in both research and practice insufficient attention to the contribution of local communities to climate adaptation and landscape restoration in this era of shrinking donor financing and growing climate pressures. Many interventions engage communities primarily during implementation, limiting their influence in project design, planning, monitoring, and decision-making. This imbalance is jeopardizing the sustainability of restoration efforts. This paper therefore shares how communities participate in FMNR Landscape Restoration Project in Ghana using a project-cycle perspective, tracing how engagement unfolds from design, and planning to implementation, M&E and eventual project closure rather than treating participation as a single event. Drawing on participatory governance, decentralization, and natural resource management, the paper analyzes the institutional conditions that shape community engagement and highlights pathways for strengthening local stewardship. The analysis suggests that community participation is most visible during implementation, when activities are already defined and operational, while engagement remains limited during design, planning, and evaluation, where strategic decisions and resource allocations are determined. The paper argues that strengthening participation requires adjustments that embed shared authority, participatory monitoring, and sustainability across project phases

Keywords: Farmer Managed Natural Regeneration, Community Participation, Community-Led Adaptation, Local Governance, Sustainability

ASSESSING HOW AGROECOLOGY ADDRESSES WATER SCARCITY IN VEGETABLE GARDENS IN THE GAMBIA

Lamin Dibba[1]*, Demba N.A. Trawally[1], Demba Jallow[2]

[1]National Agricultural Research Institute (NARI), The Gambia
[2]National Seed Secretariat (NSS), The Gambia

***Corresponding author:** ldibba@nari.gm

Abstract

Water is a fundamental resource in plant physiological processes, directly influencing photosynthesis, nutrient uptake, and overall crop productivity. In The Gambia, water scarcity remains a critical constraint in vegetable production systems, particularly during the dry season. Many smallholder farmers rely on inefficient manual irrigation methods, which limit their ability to adequately meet crop water requirements, in some cases, restrict irrigation to once per day or less. This study evaluated the effectiveness of agroecological water management practices by comparing traditional manual irrigation (bucket-based watering) with drip irrigation systems in accordance with Irrigation Advisory Service (IAS) recommendations. The findings revealed that when farmers switch from manual irrigation to drip irrigation following IAS recommendations, they can save up to 87 cubic meters of water per hectare per day. Manual irrigation methods result in substantial over-application of water, with farmers using approximately 10 times more water than those employing drip irrigation systems. In contrast, drip irrigation demonstrated significantly improved water use efficiency by delivering water directly to the root zone, thereby minimizing evaporation and runoff losses. The results highlight the potential of agroecological approaches – particularly efficient irrigation technologies – to mitigate water scarcity challenges and promote sustainable intensification of vegetable production in The Gambia.

Keywords: Drip Irrigation; Water Use Efficiency; Agroecology; The Gambia; Vegetable Production; Irrigation Advisory System

INTEGRATING DIGITAL AGRICULTURE AND AGROECOLOGY TO ACCELERATE SUSTAINABLE FARMING TRANSITIONS IN KENYA AND UGANDA

Joshua Sikhu Okonya[1]*, Geoffrey Wafula Ongoya[2], Mohammed Ssemwanga[3], Rosemirta Birungi[4], Kwaku Dei Antwi[5]

[1]Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), Entebbe, Uganda, Entebbe, Uganda
[2]Koppert Biological Systems, Nairobi, Kenya
[3]AGRENES, Kampala, Uganda
[4]AFAAS, Kampala, Uganda
[5]FARA, Accra, Ghana

***Corresponding author:** j.okonya@asareca.org

Abstract

Background & Objectives: Smallholder farmers in East Africa face declining soil fertility and climate risks. The EU-funded AIRTEA project (2021–2026) was launched in Kenya and Uganda to drive sustainable agrarian transformation. Its primary objectives were to promote agroecological practices, co-create farmer-led solutions, deploy digital monitoring tools, and strengthen market access for youth and women. Approach: The project utilized a participatory scaling model that involved demonstration farms and dairy learning centers. Key interventions included organic fertilization, integrated crop–livestock systems, and biodigester-based nutrient recycling. Digital integration was achieved through the CropDig AI mobile application, which provides real-time crop health diagnostics and advisory services. Key Outcomes: (i) Productivity: Maize yields in demonstration plots surged from 2 t/ha to 6.5 t/ha through ecological soil management. (ii) Capacity Building: Over 3,080 farmers were trained in circular bioeconomy practices. (iii) Digital & Youth Impact: 108 youth-led ICT businesses were established, serving 65,338 farmers, while 92 jobs were created in green input distribution; (iv) Sustainability: Biogas production (1,200 kg/month per center) successfully replaced 1,670 kg of firewood monthly, reducing deforestation pressures. Challenges & Conclusion: Scaling remains hindered by high certification costs, slow regulatory approvals for biopesticides, and short-term project funding. However, AIRTEA demonstrates that combining agroecology with digital tools and farmer-led innovation networks significantly improves productivity and resilience. Long-term success requires supportive policies and strengthened public-private partnerships to institutionalize these transitions.

Keywords: Digital Agriculture, Crop-Livestock Integration, Biofertilizers, Biopesticides, AIRTEA

SIMULATING AGROECOLOGY POLICY OPTIONS FOR THE RESILIENCE OF SMALLHOLDER FOOD SECURITY TO CLIMATE SHOCKS

Gilbert Dagunga[1,2]*, Michael Ayamga[3], Wolfram Laube[4], Isaac Gershon Kodwo Ansah[3], Joseph A. Awuni[3], Bekele Hundie Kotu[6], Francis Muthoni[6], Gideon Danso-Abbeam[2,6], Abiodun A. Ogundeji[2]

[1]*Department of Science Education, St. John Bosco College of Education, Navrongo, Ghana*
[2]*Disaster Management Training and Education Centre for Africa, University of the Free State, Bloemfontein, South Africa*
[3]*School of Economics, University for Development Studies, Tamale, Ghana*
[4]*Department of Political and Cultural Change, Center for Development Research, University of Bonn, Germany*
[5]*International Institute of Tropical Agriculture, Accra, Ghana*
[6]*Department of Agribusiness, University for Development Studies, Tamale, Ghana*

***Corresponding author:** dagungagilbert@gmail.com

Abstract

The sixth assessment report of the Intergovernmental Panel on Climate Change (IPCC) projected increasing incidence of climate shocks including, droughts, floods and heat stress in Africa. Building the resilience capacity of smallholders to the impact of these shocks are of utmost importance since they are largely rainfall dependent. Against this backdrop, the study simulated the future potential of agroecology in moderating the impact of shock-resilience nexus of smallholders in northern Ghana based on projected precipitation and temperature changes. Using the correlated random regression model as a base model, four alternative scenarios were estimated. The results showed that a projected 11% decrease in rainfall and a 1.8℃ increase in temperature will intensify future drought and heat stress, which will adversely affect household resilience. But a policy that stimulates a 25% increase in the intensity of agroecological practices adoption will exert a net positive moderation effect on drought's impact on resilience capacity due to projected decrease in precipitation. Agroecology, however, could not significantly moderate the impact of heat stress due to projected increase in temperature. The simulated results support calls for agroecological transitioning as a suitable food-system approach for smallholders in developing Africa. Hence, deliberate government policy and social movements that support this transition is recommended. Specific policies such as the Feed Ghana Initiative should prioritize components of agroecology. This could be promoted by creating a price premium for smallholders and structured demand for farmers engaged in agroecological practices where produce could be purchased for the ongoing school feeding programme.

Keywords: Agroecology; Resilience capacity; Climate change; Simulation; Ghana

PARTICIPATORY GOVERNANCE AND AGROECOLOGICAL RESTORATION FOR RESILIENT SEMI-ARID LANDSCAPES IN TANZANIA

Jacob Emanuel Joseph[1]*, Elirehema Swai[1], Peter Ngowi[1], Ashura Ally Dulazi[1], Andrew Chota[1], Gizaw Desta[2], Lester Botoman[2], Anthony M. Whitbread[1]

***Corresponding author:** J.Emanuel@cgiar.org

Abstract

The Kongwa–Mpwapwa landscape of central Tanzania faces severe soil erosion, cropland expansion, and recurrent livestock feed shortages, compounded by weak enforcement of environmental by-laws. This study examines how participatory processes translated diagnostic evidence into institutional activation and measurable landscape outcomes across 11 villages. Participatory land and common property mapping were conducted in each village to identify hotspots of degradation and resource-use conflicts. Communities co-developed restoration plans, negotiated collective monitoring arrangements, and completed all procedural steps for formal approval of village environmental by-laws. Operationalization dialogues embedded enforcement responsibilities within existing governance structures and linked by-law activation directly to restoration measures. These institutional mechanisms were coupled with field interventions: the installation of contour terraces reinforced with multipurpose fodder trees, establishment of 12 demonstration plots for improved fodder species, and development of community fodder banks. Governance activation was associated with installation of 241 terraces and expansion of sustainable land management to 411.4 ha. Forage interventions initiated in 2024 established demonstration plots and fodder banks in 7 of the 11 villages (≈64%), ensuring the availability of hay and silage during the 2025 dry season. Participating farmers reported improved livestock productivity, with preliminary observations indicating an average increase of 1.5 liters of milk per cow per day during periods of feed scarcity, compared to negligible production in previous dry seasons. In parallel, intercropping combined with soil and water conservation increased land productivity by 60%–220% relative to sole cropping. Embedding participatory by-laws within restoration planning and forage-linked incentives strengthened local governance while delivering tangible biophysical and livelihood benefits. This integrated approach demonstrates a locally grounded Nature-based Solution pathway for enhancing landscape resilience in semi-arid Tanzania.

Keywords: Participatory By-Laws, Agroecological Practices, Semi-arid Tanzania, Soil and Water Conservation, Nature-Based Solutions

SCALING SUSTAINABLE AGRICULTURE IN EASTERN AND CENTRAL AFRICA: IMPLEMENTATION LESSONS AND POLICY IMPLICATIONS

Joshua Sikhu Okonya*, Julian Barungi & Moses Odeke
ASARECA, Entebbe, Uganda

***Corresponding author:** j.okonya@asareca.org

Abstract
ASARECA is implementing an EU-funded and IFAD-managed CAADP-XP4 project (2019 to 2026) scale agroecological innovations and best practices aimed at fostering resilience and sustainability of the agroecological ecosystem in Africa. This paper aims to highlight lessons learned during the implementation of this project as well as policy implications arising from them. Approach: We used mixed methods that included: (i) engagement of policy makers through policy dialogues to enhance integration of agroecology into the CAADP Kampala Process (ii) investment in agro-waste valorization through establishment of black soldier fly (BSF) farms for production of animal feed and organic fertilizers, (iii) enhancing capacity of stakeholders to use agroecological practices through trainings, demonstration fields and farmer field days, (vi) facilitated linkages of farmers to output markets through digital agricultural platforms. Outcomes (i) Key stakeholders (including researchers, policy makers, farmers' organizations, civil society, academia and development partners) supported to draw a roadmap for integrating agroecology into implementation of the CAADP Kampala interventions at national level (ii) supported the establishment and strengthening of BSF farms to turn waste into organic fertilizers and fish feed providing more affordable alternative feed sources (iii) increased nutritional knowledge and health as a result of increased production and consumption of biofortified crops in refugee hosting communities of Uganda (iv) increased uptake of six climate resilient potato varieties among smallholder farmers including PWDs in Rwanda and Kenya, and (v) enhanced digital literacy of potato farmers in the utilization of four digital platforms for market linkages in Kenya, Uganda and Rwanda. Barriers to utilization of agroecology: (i) limited resources to sustain agroecology multistakeholder platforms, hindering knowledge sharing and convenings. Recommendations: Our findings indicate that increased adoption of agroecological practices requires supportive policies, co-creation of solutions with farmers, peer-to-peer learning and knowledge sharing, markets linkages, and continuous advocacy.

Keywords: Agroecology, Climate -Smart Agriculture, Multistakeholder Platforms, CAADP-XP4

SCALING AGROECOLOGICAL PRACTICES THROUGH LANDSCAPE RESTORATION: EVIDENCE FROM THE LOGME INITIATIVE IN BURKINA FASO, GHANA, AND NIGER

Agyei, D.O.*, Sedenkor, D.E., Chabi Gonni ÉP. V.F., Somda J.

International Union for the Conservation of Nature (IUCN)

***Corresponding author:** derickekem.sedenkor@iucn.org

Abstract

Agroecology and Nature-based Solutions (NbS) are increasingly recognized as key pathways to support sustainable land management and ecosystem restoration. This study presents insights from the project Creating Lands of Opportunity: Transforming Livelihoods through Landscape Restoration in the Sahel (LOGMe I) implemented in Burkina Faso, Ghana and Niger, which promotes agroecological practices through an integrated landscape approach. Using a framework combining Restoration Opportunity Assessment Methodology (ROAM), Sustainable Value Chains (SVC) and Nature-based Solutions (NbS), the project promoted sustainable land and water management practices including soil conservation, agroforestry, livelihood diversification, biodiversity conservation and participatory planning. The analysis draws on monitoring data, project reports, and beneficiary statistics collected between 2021 and 2024. Results indicate significant scaling impacts, including the restoration of approximately 34,910 hectares of degraded lands using agroforestry, sylvo-pastoral restoration, natural regeneration etc, 684,963 beneficiaries' livelihoods were enhanced through diversified income-generating activities such as cereal production, honey production, vegetable gardening, agro-processing and cosmetics. The initiative also supported the development of 32 community-driven restoration and watershed management plans. There was also provision of 419,802 seedlings, tools, and other agricultural inputs to land users across the three countries, alongside extensive capacity-building on sustainable agricultural techniques and biopesticide use. Community nurseries, farmer trainings, knowledge exchange fairs, and regional dialogues facilitated dissemination of agroecological technologies and practices such as crop diversification, soil health management, biological pest control, water-efficient, and irrigation management. Overall, the LOGMe experience demonstrates the potential of integrated landscape approaches to scale agroecological practices while strengthening ecosystem resilience and improving rural livelihoods in West African dryland landscapes.

Keywords: Agroecology, Sustainable Land Management, Climate-Smart Agriculture, Value Chain Development, Community-Based Approaches

GENDERED DIFFERENCES IN AGROECOLOGICAL USE INTENSITY AND DIETARY DIVERSITY IN WEST AFRICA

Joseph Bandanaa[1]*, Doreen Derzu[2], Margaret Akuriba[2], Dzigbodi Doke[2], Francis Saa-Dittoh[2], Philemon Ayambila[2], Wilhelm Kutah[3]

[1]*Swiss Platform for Sustainable Cocoa, Ghana*
[2]*University for Development Studies (UDS), Tamale, Ghana*
[3]*Savanna Agricultural Research Institute (SARI), Nyankpala, Ghana*

***Corresponding author:** josephbandanaa@gmail.com

Abstract

Smallholder farming systems in West Africa face challenges from soil degradation, climate variability, erratic rainfall, and rising agricultural input costs. Agroecology has increasingly been promoted as a sustainable pathway. At the same time, dietary diversity remains an important indicator of household nutritional well-being in rural areas, where diets are often dominated by staple foods and access to nutrient-rich foods remains uneven. Gender dynamics are central to these processes, as women and men frequently differ in their access to land, productive resources, agricultural knowledge, extension services, and decision-making power. This study examines the relationship between gender, agroecological practice use intensity, and dietary diversity among smallholder households in four West African countries: Cape Verde, The Gambia, Ghana, and Senegal. A cross-sectional mixed-methods design was employed, combining household survey data from over 300 respondents with focus group discussions, key informant interviews, and semi-structured interviews. Agroecological use intensity was measured using an Agroecological Practice Use Intensity Index based on seven practices and categorized into low, medium, and high levels. Household dietary outcomes were assessed using the Household Dietary Diversity Score (HDDS). Data were analyzed using descriptive statistics, chi-square tests, and logistic regression models. The results show a statistically significant relationship between gender and agroecological use intensity. Men were more likely to be represented in the high-use category, while women were disproportionately concentrated in the low-use category, reflecting structural inequalities in access to land, labor, and extension services. No significant gender differences were observed in overall household dietary diversity, although men reported slightly higher consumption of selected nutrient-rich foods. Higher agroecological use intensity was positively associated with greater consumption of fruits and vegetables. These findings suggest that agroecological diversification can improve diet quality in West African smallholder systems, but achieving equitable nutritional benefits requires addressing gender-related barriers to participation in agroecological transitions.

Keywords: Agroecology, Gender Disparities, Use intensity, Dietary Diversity

BEYOND PARTICIPATION: PATHWAYS TO GENDER-TRANSFORMATIVE AGROECOLOGY IN SMALLHOLDER FARMING SYSTEMS IN KENYA

Edel, I.*, Kumar, S., Adoyo, B., Sila, A.

Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF), Nairobi, Kenya

***Corresponding author:** i.edel@cifor-icraf.org

Abstract

This study examines how gender dynamics influence the adoption of agroecological practices among smallholder farmers in Kiambu and Makueni Counties in Kenya and explores pathways to advance gender-transformative approaches co-developed with farming communities. The study employed a qualitative and participatory research design involving 120 farmers across four wards, and used the Gender and Social Norms Assessment (GENSoNA) Tool. Key findings include: women and youth farmers face limited land ownership and control, with land access largely mediated through male relatives; women carry disproportionate agroecological and domestic labour burdens; youth disengagement reflects structural exclusion from resources and decision-making rather than lack of interest; and household decision-making norms are shifting,but male authority remains dominant. Co-developed interventions include promoting joint land registration through community dialogues, expanding inclusive financial services, delivering civic education on land rights, designing couple-based joint decision-making workshops, investing in labour-saving technologies to reduce women's time poverty, and creating financial incentive structures that recognize youth labour contributions. The study demonstrates that the adoption and scaling of agroecology in smallholder contexts requires multi-level approaches that transform social norms, power relations, and institutional structures alongside technical interventions.

Keywords: Gender-transformative agroecology; Kenya; Social Norms; Land tenure; Women's empowerment; Youth

GENDER DIMENSIONS OF SUSTAINABLE AGRICULTURAL PRACTICES AND CASSAVA PRODUCTIVITY IN NIGERIA

[1]Obi-Egbedi, O., [1]Onireti, I. D. & [2, 3]Awoyemi, A. E.

[1]Department of Agricultural Economics, University of Ibadan, Nigeria
[2]Department of Agricultural and Food Economics, University for Development Studies, Ghana
[3]Department of Agribusiness and Extension Management, School of Agricultural Technology, Gateway ICT Polytechnic, Nigeria

Corresponding author: gheneobi@gmail.com

Abstract

Globally, Nigeria is the largest producer of cassava, though productivity has been affected by climate change and other factors, leading to lower welfare outcomes for both male and female farmers. Utilization of Sustainable Agricultural Practices (SAPs) could improve productivity. However, unequal access to resources could constrain SAP utilization, leading to gendered SAP use and productivity. Previous studies assessed SAPs effect on productivity but not the gender dimensions. Therefore, this study explores the gender dimensions of SAPs utilization and the effects on cassava productivity in Nigeria. Data on 538 cassava-farming households obtained from Nigeria's 2023/2024 General Household Survey Panel was used and analyzed using descriptive statistics, multivariate probit regression, total factor productivity and ordinary least squares regression. Results revealed that 79.2% of the farmers were males having significantly larger farms (1.23 ha) than the female farmers (0/76 ha). The most commonly used SAP was intercropping, especially by females (64.3%) compared to males (53.1%). Male farmers had significantly higher productivity of 0.81 kg/₦ compared to 0.47 kg/₦ for females. Utilization of SAP by males was influenced by age, access to farm size, extension services, membership of cooperative and access to access to credit, while farm size, being married, and membership of cooperative influenced the utilization for females. SAP utilization (intercropping) increased productivity for females (0.656) more than males (0.232). Therefore, it was concluded that SAPs enhanced cassava productivity, though gender disparities in farm size and extension services persist. Hence, gender-responsive policies are recommended to enhance SAP utilization and improve cassava productivity in Nigeria.

Keywords: Gendered utilization; SAPs; Cassava productivity; male and female farmers

ADVANCING AGROECOLOGY IN AFRICA THROUGH A SOCIAL MOVEMENT LENS: INSIGHTS FROM RECENT RESEARCH

George Agana Akuriba[1*], Joseph Bandana[2], Margaret Akuriba[3]

[1]*Cape Coast Technical University, Cape Coast, Ghana*
[2]*Swiss Platform for Sustainable Cocoa, Ghana*
[3]*University for Development Studies, Ghana*

***Corresponding author:** makuriba@uds.edu.gh*

Abstract

This literature review examines how social movements contribute to advancing agroecology across Africa, drawing on recent empirical research from multiple countries. By analyzing 45 peer-reviewed studies, we identify key dynamics, challenges, and opportunities in the agroecological transition. Our findings reveal that while agroecology has gained momentum as a transformative approach integrating science, practice, and social mobilization, its advancement faces significant structural barriers including donor dependency, limited farmer autonomy, and institutional resistance. The review highlights successful elements including farmer-to-farmer networks, territorial approaches, and participatory learning systems, while identifying critical gaps in gender equity, racial justice, and political engagement. We conclude that realizing agroecology's transformative potential requires strengthening grassroots organizations, ensuring political and financial autonomy, and maintaining the movement's counter-hegemonic character while navigating risks of co-optation and depoliticization.

Keywords: Agroecology, Social Movement, Farmer Networks, Participatory Learning, Food Security

DECENTRALIZED INNOVATION COMMUNICATION SYSTEMS FOR BRIDGING THE KNOWLEDGE-TO-PRACTICE GAP IN AGROECOLOGICAL PRACTICES IN LOW-RESOURCED COMMUNITIES IN NORTHERN GHANA

Wilhelm Kutah*, Francis Saa-Dittoh, Augustina Aduku

Savanna Agricultural Research Institute (SARI), Tamale, Ghana

University for Development Studies, Ghana

***Corresponding author:** alshaknome@gmail.com

Abstract

The gap between agricultural knowledge and its practical application remains a major challenge for sustainable farming, especially in low-resource communities. Agroecological practices are widely promoted to improving soil health, resilience, and farmer' livelihoods. However, these practices are knowledge-intensive and require continuous learning and adaptation. In many cases, existing communication systems do not effectively support farmers in translating knowledge into practice. This study examines how decentralized innovation communication systems can help bridge this knowledge-to-practice gap in Northern Ghana. The study draws on Diffusion of Innovations theory (Rogers, 2003) and Agricultural Innovation Systems perspectives (Klerkx, van Mierlo, & Leeuwis, 2012), which view innovation as a social process shaped by communication and interaction among different actors. While previous research has focused mainly on formal extension systems, this study shifts attention to decentralized communication channels such as farmer networks, peer learning, and community interactions. An explanatory sequential mixed-methods design is employed, in which quantitative data are collected and analyzed first, followed by qualitative data to explain and deepen the initial results (Creswell & Plano Clark, 2018). The quantitative phase uses survey data to identify patterns in information access, communication channel use, and adoption of agroecological practices. The qualitative phase, using interviews, focus group discussions, and observations, explores how farmers interpret these communication processes and why certain patterns of adoption occur. This sequential integration enables a more nuanced understanding of how decentralized communication systems influence practice. The study contributes to theory by advancing understanding of decentralized communication within innovation processes. It also offers practical insights for designing more effective and context-responsive communication strategies to support agroecological adoption in low-resourced settings.

Keywords: Agroecology, Decentralized Communication, Innovation Systems, Knowledge-to-Practice Gap, Low-Resource Communities

Poster presentations

BASELINE STUDY OF SOIL FERTILITY IN THE GAMBIA AND CAPE VERDE TO SUPPORT AGROECOLOGICAL STRATEGIES

Marina Paneque[1]*, Antonio Delgado[1], Miguel Ribeiro[2], Demba N. A. Trawally[3], José Manuel Quintero[1]

[1]Department of Agronomy, University of Seville, Seville, Spain
[2]Associação de Defesa do Património de Mértola, Mértola, Portugal
[3]National Agricultural Research Institute (NARI), Banjul, The Gambia
***Corresponding author:** marinapaneque@gmail.com*

Abstract

Agroecology is recognized as a promising strategy to improve soil quality and, consequently, enhance crop yields and food security. Agricultural production in The Gambia and Cape Verde could benefit from agroecological approaches; however, detailed knowledge of current soil conditions is required to support context-specific decision-making. Within the CIRAWA project (Agro-ecological strategies for resilient farming in West Africa) a total of 51 farms were selected across the North Bank (NB) and Central River (CR) regions in The Gambia, and the islands of Maio (MA) and Santo Antão (SA) in Cape Verde. Soils from these farms were sampled and characterized to support data-informed agroecological planning for the 2025 and 2026 cropping seasons and to establish a baseline for future impact assessment. In The Gambia, soils were generally slightly acidic to neutral and coarse-textured, and some salinity issues. Soil organic matter (SOM) and total nitrogen (N) were very low in both regions (average 0.8% SOM, 0.03% total N). Phosphorus (P) and potassium (K) deficiencies were prominent, with Olsen P below agronomic thresholds in all farms, and K deficiencies observed in 92.3% (NB) and 83.3% (CR) of farms. Soils in Cape Verde also exhibited coarse textures with pH ranging from neutral to alkaline, and some salinity issues. SOM contents were under 1.5%, while total N was very low in SA (average 0.04%) and slightly higher than 0.1% in MA. In contrast, no P or K deficiencies were detected. This baseline soil assessment highlights the need for improved nutrient management in both The Gambia and Cape Verde. CIRAWA interventions include the use of locally available organic resources (e.g., compost and manure) that sustainably enhance nutrient availability and increasing SOM levels. Consequently, moderate improvements in the above-mentioned parameters are expected following reassessment at the end of the 2026 cropping season.

Keywords: Soil fertility; Agroecology; Soil organic matter; Baseline

EFFECT OF AGROECOLOGICAL PRACTICES ON SOIL HEALTH IN NABDAM DISTRICT, GHANA

Yasmin Alhassan[1]*, Dzigbodi A. Doke[1], Margaret Akuriba[2], Joseph Bandanaa[3]

[1]Department of Environment and Sustainability Sciences, University for Development Studies, Ghana
[2]Department of Applied Economics, University for Development Studies, Tamale, Ghana
[3]Swiss Platform for Sustainable Cocoa, Ghana

***Corresponding author:** alhassanyasminkaburise@gmail.com

Abstract

Soil health plays a vital role in sustainable agriculture by supporting plant growth, biodiversity, and ecosystem functions. In Ghana's Nabdam District, where rocky terrain and shallow soils pose challenges and limit productivity, agroecological practices offer practical solutions. This study evaluates the effects of mulching, composting, manual weeding, and organic control of pests and diseases on key soil health indicators, including organic carbon sequestration, pH balance, macro-organism diversity and abundance, and water holding capacity. A comparative case-control design is used to assess how these practices enhance soil structure, nutrient cycling, and biological activity. The results revealed that agroecological systems showed a substantial improvement in soil organic carbon (SOC) and water-holding capacity (WHC) and a higher diversity of macro-organisms than conventional systems. Even though the soil pH did not change significantly between the treatments ($p>0.05$), the combined action of mulching and composting was critical to conserve moisture and reestablish soil structure in the unstable and rocky soils of the district. By addressing this gap, the study aims to provide practical insights to help smallholder farmers improve soil management and build resilience to climate change. The results highlight the potential of agroecology to restore soil fertility, enhance food security, and strengthen climate adaptation strategies. The study recommends that the Ministry of Food and Agriculture (MoFA) and local government agencies prioritize the integrating composting and mulching into agricultural extension services, as these specific practices proved most effective for moisture retention and carbon sequestration in the district's fragile, rocky terrains. This research contributes valuable knowledge to farmers, policymakers, and researchers, supporting the transition to more sustainable and climate-resilient agricultural systems in vulnerable regions.

Keywords: Conventional farms; Soil macro-organism; Macro-organism diversity and abundance; Agroecological farms; Composting

CONTRIBUTION OF WORLD VISION FARMER MANAGED NATURAL REGENERATION (FMNR) APPROACH TO IMPROVED AGRICULTURE AND FOOD SECURITY IN GHANA

Maxwell Amedi[1]*, Prince Addey Owusu[2], Samuel Abasiba[3]

[1]Food Security & Resilience Technical Program Manager, World Vision International, Ghana
[2]Knowledge Management and Research Manager, World Vision International, Ghana
[3]Project Manager, World Vision International, Ghana

***Corresponding author:** maxzy5050@gmail.com

Abstract

Over the last decade, the rate of depletion of natural resources and the extent of degradation have become global environmental and developmental concerns for all stakeholders. There has been a growing concern of both empirical and anecdotal evidences pointing to changing climatic conditions and its effects. Although the causes of climate change are numerous, it is believed that the destruction of forest resources is a key influential causal factor. This paper presents evidence from the field on how Farmer Managed Natural Regeneration (FMNR) Approach of World Vision has contributed to improved Agriculture, Food Security and Sustainable Development Goal (SDG) in Ghana. Evidence from the field was gathered through an evaluation approach. A mixed approach (both quantitative and qualitative) was used. The evaluation design allowed observation of changes that occurred in beneficiaries lives during the project phase. The evaluation used data from multiple sources (household survey, focus group discussions, and key informant interviews-decentralized departments and NGOs working in the project location. Primary data was collected from 463 households comprising both lead farmer households and neighbouring farmer households while secondary data was gathered from literature and various organizations. Multistage random sampling technique was used to select the respondents. Obtained data were analysed using descriptive statistics and frequencies. Results from the study showed that Farmer Managed Natural Regeneration (FMNR) has contributed to improved Agriculture, improved forest restoration, and food security (availability, accessibility and utilization).

Keywords: FMNR; Climate change and environment; Agriculture and food security

RESTORATION ECONOMIC MODELLING AND VALUATION: A DECISION-MAKING TOOL FOR SCALING UP AGROECOLOGY

Dorcas Owusuaa Agyei, Godwin Evenyo, Anslem B. Nyour, Emmanuel Aziiba, Iddrisu Yahaya*

International Union for the Conservation of Nature (IUCN)

***Corresponding author:** wunpiddi@gmail.com

Abstract

Small-scale farmers' production and productivity in sub-Saharan Africa is hindered by scarce and degraded natural resources. This degradation increases vulnerability to climate change and extreme weather events and coupled with poor soil fertility, leads to low yields and poverty. Both the Sudan and Guinea Savannah areas of northern Ghana are very vulnerable to climate change events. They experience a decline in water availability, vegetation cover, droughts and floods and unsustainable food production leading to food insecurity security and resource depletion. Restoration Opportunity Assessment Methodology (ROAM) was used to explore the various opportunities for restoration in order to offer economic opportunities in these areas with the aim of having positive impact on land fertility, agricultural productivity, riverbank protection, landscapes and ecosystem service. An economic evaluation of various Forest Landscape Restoration (FLR) options was undertaken in eight communities in the Upper East and West regions of Ghana. The FLR options were promoted by a project implemented by IUCN titled “Creating Lands of Opportunity: Transforming Livelihoods Through Landscape Restoration in the Sahel". The data used for the cost estimates were obtained primarily from the communities that established the various FLR options. The benefits used are the timber products and some non-timber products, animal grazing fruits, and crops yields, especially for agroforestry. The analysis used the Net present value (NPV) (with a discount rate of 12%) and the benefit-cost ratio (BCR) as decision tools. A further look at how the discount rate affects the NPV was carried out through a sensitivity analysis. The agroforestry options gave a higher benefit and were stable both ecological zones compared to the other FLR options. Financial returns to the landscape are higher in all the zones for all FLR options. Even though there were undervalued benefits, agroforestry will give stable returns if adopted.

Keywords: Net Present Value; Agroforestry; Sahel Project; FLR Options; ROAM

CHARACTERISTICS OF COMPOST PRODUCED BY FARMERS AND METHODS USED AND THE POTENTIAL FOR IMPROVEMENT IN THE NABDAM DISTRICT

Doreen Derzu[1]*, Marina Paneque[2], Saa Dittoh[1], Philemon Ayambila[1], Augustina Aduku[1]

[1]*University for Development Studies (UDS), Tamale, Ghana*

[2]*Department of Agronomy, University of Seville, Seville, Spain*

***Corresponding author:** derzudoreen@gmail.com

Abstract

Th use of farmyard manure and compost as soil amendments in the Nabdam District of Ghana has been a normal practice. How the composts are made in the various households, however, differs from one household to another; thus, the quality also differs. Samples of seven composts from different households representing different production methods were obtained and analyzed. They were ranked from “best” to “worst”. The farmers were also asked for their perceptions of the fertility of the soil in which they have been using their composts (very fertile, fertile, average, and poor). The materials used for the composts and other aspects of the composting processes were documented. All the information obtained was then used to determine how each of the seven types of compost can be improved upon.

Keywords: Compost, Nabdam District, Quality, Fertility perceptions, Improvements

ANALYSIS OF COST OF AGRICULTURAL EXTENSION APPROACHES FOR PROMOTING AGROECOLOGY TRANSITION IN BENIN, KENYA, ETHIOPIA AND MADAGASCAR

Max Olupot & Oladimeji Idowu Oladele*

Department of Agricultural Extension and Rural Resources Management, University of KwaZulu-Natal, South Africa

***Corresponding author:** oladeleo@ukzn.ac.za

Abstract

Agroecology has emerged as a transformative solution to intersecting crises of climate change, soil infertility and unsustainable livelihoods facing smallholder farmers across East Africa. This study examined the costs of agricultural extension approaches for promoting agroecology transition in Benin, Kenya, Ethiopia and Madagascar, covering a total of 993 farmers. In Benin, Farmer Field Schools stood out as the most expensive method for promoting agroecology (total cost: 33,913,500 FCFA per season), while e-extension emerged as the most cost-effective approach (4,060,000 FCFA). In Ethiopia, training and visits were found to be the most expensive approach (EB 715,804 per season). In Kenya, the Training and Visit method had the highest cost, while e-extension had a total cost of 37,185 Kenya Shillings per season. In Madagascar, Farmer Field School had the highest cost, while farmer-to-farmer had the lowest. There is a need to balance impacts and cost in terms of training and transferability of skills for the accuracy of implementation of these agroecology practices.

Keywords: Cost, Agricultural Extension Approaches, Agroecology Transition

COST BENEFIT ANALYSIS OF AGROECOLOGICAL PRACTICES: THE WEST AFRICAN CASE

Francis Saa-Dittoh[1], Doreen Derzu[1], Miguel Ribeiro[2], Jose Manuel Quintero Ariza[3], Saa Dittoh[1*], Margaret Akuriba[1], Raul Sanchez[4],

[1]*University for Development Studies (UDS), Tamale, Ghana*

[2]*ADPM (Associação de Defesa do Património de Mértola, Mértola), Portugal*

[3] *Department of Agronomy, University of Seville, Seville, Spain*

[4]*CARTIF Technology Centre, Valladolid, Spain*

***Corresponding author:** franditt@gmail.com

Abstract

A major skepticism of agroecological practices in Africa and other places has been with regard to production effectiveness, efficiency and profitability. It has been partly because cost-benefit analyses have been largely seen through the neo-classical short-run economic lens and not holistically to include social and environmental concerns. It has also been due to several wrong measurements and misconceptions of smallholder farmer production systems. That is not to discount the importance of economic profitability; it is a critical measure of survival. Economic, social, and environmental cost-benefit analyses using quantitative and qualitative information of prevailing agroecological practices as well as agro-industrial (conventional) farming practices were conducted in Cape Verde, Ghana, Senegal, and the Gambia. The Benefit-Cost Ratios and Net Present Values for agroecological practices and conventional practices were comparable in most cases. Agroecological practices, however, had far higher social and environmental assessment scores in all cases, confirming the economic, social and environmental sustainability potential of agroecological practices.

Keywords: Agroecological Practices, Economic Profitability, Social and Environmental Concerns, Sustainability Potential, West Africa

FROM PILOT TO POLICY: SCALING CLIMATE-RESILIENT AGROECOLOGICAL INNOVATIONS IN WEST AFRICA

Murugan Shanthakumar*, Vidya Padmakumar

EcoDiversity Research Centre, India

***Corresponding author:** muruganshanthakumar3986@gmail.com

Abstract

Climate variability, soil degradation, and biodiversity loss are intensifying vulnerability in West African smallholder farming systems. While localized agroecological pilots demonstrate measurable gains in soil restoration, yield stability, and ecosystem service enhancement, a persistent gap remains between experimental success and systemic adoption. This study proposes a biodiversity-centred, evidence-driven framework to scale agroecological innovations from field-level pilots to policy-supported, climate-resilient food systems. We examine integrated practices including diversified intercropping, agroforestry integration, compost-based soil restoration, phytoremediation of degraded soils, and agro-waste valorisation, evaluating ecological performance through soil organic carbon, microbial biomass, biodiversity richness, water retention, and carbon sequestration. Socio-economic indicators include yield stability, input cost reduction, and livelihood diversification. Findings indicate that biodiversity-enhanced systems improve soil structure, naturally regulate pests, buffer climate shocks, and reduce dependency on synthetic inputs, translating ecological gains directly into farmer resilience and income stability. To enable scalable adoption, we propose a three-pillar framework: (1) participatory co-design integrating indigenous knowledge with ecological modelling, (2) adaptive monitoring systems linking biophysical and socio-economic indicators, and (3) policy harmonization mechanisms embedding measurable agroecological outcomes into national agricultural and climate adaptation strategies. By connecting rigorous scientific evidence with policy instruments and community engagement, this framework moves innovations from pilot experimentation to institutional adoption. This approach positions biodiversity not as a supplementary feature, but as a structural driver of climate-resilient agroecology. By demonstrating measurable impact and a clear pathway for scaling, it provides actionable insights for governments, investors, and practitioners, supporting the transition to resilient, sustainable, and inclusive food systems in West Africa.

Keywords: Climate-resilient agroecology; Biodiversity-based farming; Soil restoration and ecosystem services; Scaling and policy integration; Nature-based solutions

COMPARATIVE ANALYSIS OF AGROECOLOGICAL PRACTICES IN SMALLHOLDER FARMER-LED IRRIGATION IN NORTHERN GHANA

Philemon Ayambila[1]*, Doreen Derzu[1], Wilhelm Kutah[2], Augustina Aduku[1], Dzigbodi Doke[1], Francis Saa-Dittoh[1]

[1]University for Development Studies (UDS), Tamale, Ghana
[2]Savanna Agricultural Research Institute (SARI), Nyankpala, Ghana

***Corresponding author:** philayambila@gmail.com

Abstract

It is estimated that farmer-led irrigation (FLI) accounts for over 75% of irrigated agriculture in Ghana. The practice has been going on for decades with almost no public or formal private-sector investments. Most of the investments have been by the smallholder irrigators and had been limited to locally available inputs until the introduction of "modern farming practices" in the form of fertilizers and agrochemicals. That, however, seems to have compounded the problems faced by the irrigators. Many are turning to agroecological practices. This paper is based on in-depth analyses of the use of indigenous and introduced agroecological practices, the costs and benefits, and the challenges of four different FLI systems in northern Ghana. It provides evidence that investments in agroecological practices in smallholder FLI contribute significantly to food and nutrition security, the provision of quality and safe vegetables, incomes, employment as well as improvements in soil health and agricultural water use efficiency. The paper recommends that national and local governments should pay attention to, and invest in, these irrigation systems since what is required to more than double production and incomes in the short- and long-term is relatively small.

Keywords: Farmer-led irrigation (FLI); Investments; Agroecological practices; Cost benefit analysis; Challenges

LESSONS LEARNED FROM DEVELOPING A CROP MANAGEMENT DECISION SUPPORT SYSTEM (DSS) FOR AGROECOLOGICAL FARMING SYSTEMS IN WEST AFRICA

Esther San Jose Carreras, Bárbara Díez*

CARTIF Technology Centre, Valladolid, Spain

***Corresponding author:** bardie@cartif.es

Abstract

Decision Support Systems (DSS) are promoted as high-tech tools to assist sustainable crop and resource management in agroecological farming. However, their practical implementation in small-scale farming systems in West Africa faces challenges related to data availability, digital access and local management practices. This contribution presents the development and initial testing of a crop management DSS within the CIRAWA project, focused on irrigation and fertilisation, and discusses key lessons learned from its design and early validation. The DSS was developed to support agricultural technicians working with farmers by providing locally adapted recommendations based on soil fertility, crop requirements, residue management, and available water resources. The system was conceived to remain robust under low-resource conditions, ensuring reliable performance in smallholder farming systems. The tool was designed to support technical decision-making rather than direct use by farmers, due to limited digital connectivity in the implementation areas. The system integrates simplified fertilisation modules for nitrogen, phosphorous and potassium, and the irrigation module adapted to local infrastructure, including manual irrigation practices and rainfed conditions, while ensuring that the resulting recommendations remain understandable and practically applicable for farmers The development process generates valuable experience-based lessons: first, the availability and quality of input data strongly influence DSS applicability in agroecological contexts, requiring simplified data entry and to work with limited datasets. Second, agroecological practices are often implemented in combination, making it difficult to isolate single-practice effects and requiring flexible system configuration. Third, the process highlighted the essential role of trained intermediaries in interpreting DSS outputs and translating recommendations into actionable field decisions. Although field validation is ongoing, the DSS development process has generated insights on aligning decision-support tools with agroecological approaches and local conditions. Together, these lessons underline the importance of adaptive design, stakeholder involvement, and realistic expectations regarding the potential and limitations of digital DSS.

Keywords: Decision Support Systems – DSS; Agroecology; Irrigation and fertilisation management; West Africa; Lessons Learned

AGROECOLOGICAL WEED MANAGEMENT IN FONIO (DIGITARIA EXILIS) SYSTEMS OF SOUTHERN SENEGAL: BIODIVERSITY CHARACTERIZATION AND OPTIMIZATION OF ECOLOGICAL LEVERS

Moussou Kéba CISSOKO*, Samba Laha KA, Ndongo DIOUF, Moustapha GUEYE, Mame Samba MBAYE

Institut Sénégalais de Recherches Agricoles (ISRA), Senegal

***Corresponding author:** moussou.keba-cissoko@isra.sn

Abstract

Fonio (*Digitaria exilis*), a neglected and underutilized cereal in West Africa, plays a strategic role in climate-resilient food systems due to its short cycle, drought tolerance, and nutritional value. However, low productivity remains a major constraint, partly due to inadequate ecological management of weed communities. This research, conducted in Eastern Senegal and Casamance, aimed to characterize weed flora structure, assess infestation levels and harmfulness, and identify agroecological management levers based on seed rate optimization and critical weeding periods. Phytosociological surveys across agroecological zones identified 117 species belonging to 85 genera and 31 families. Therophytes dominated (76.9%), reflecting adaptation to seasonal disturbance regimes. Floristic similarity indices exceeded 50% across zones, indicating ecological homogeneity despite climatic gradients. Five species were identified as priority weeds based on partial harmfulness indices and infestation levels. Experimental trials (2019-2020) demonstrated that optimal fonio seed rates (45-60 kg ha^{-1}) enhanced crop competitiveness while significantly reducing weed biomass. The critical competition period ranged from 20 and 60 days after sowing; targeted intervention during this window could restore up to 644 kg ha^{-1} of grain yield. By combining biodiversity assessment with ecological crop management strategies, this study proposes nature-based weed management approaches adapted to low-input systems. Optimizing crop density and synchronizing weeding interventions contribute to improved productivity, reduced labor burden, and enhanced resilience of smallholder fonio systems. These findings support agroecological transitions in dryland West African farming landscapes and reinforce the strategic role of neglected crops in sustainable food system transformation.

Keywords: Digitaria Exilis, Weed Flora, Agroecological Weed Management, Seeding Rate, Critical Damage Period

AGROECOLOGICAL FARMING AND BIOCIRCLAR TRAINING PROGRAMME (AFBTP)

Abdul Salam Napari Saani[1]

[1]Wuntira Foundation

Northern Ghana's youth (aged 15 to 30) face high unemployment, food insecurity, and climate impacts like erratic rainfall and waste pollution, disproportionately affecting rural/peri-urban communities. Building on our proven AFBTP pilot, this project will empower 200 young people with hands-on climate education in two interconnected areas: Climate-Smart Agriculture (CSA) and Biocircular Practices.

CSA training uses participatory, praxis-led workshops in community settings, teaching youth to practice horticulture and husbandry in limited spaces (backyards/peri-urban plots) via water-efficient techniques, soil regeneration, and organic methods. This builds practical skills for household food production and agribusiness, reducing carbon footprints from food transport and synthetic inputs while enhancing resilience to climate shocks.

Biocircular training focuses on transforming biomass waste into renewable products (organic fertilizers, pesticides, animal feeds, detergents, etc) through demonstrative sessions. Youth learn scientific processes for waste segregation and value addition, enabling them to launch green SMEs and commercialize eco-friendly inputs.

Implemented in Tamale, Savelugu, and Kumbungu districts populous indigenous areas with high biomass waste the project integrates indigenous knowledge, local languages, and offline-accessible materials (e.g., printed guides, projector-based videos) for inclusivity.

Systemic change: By equipping youth as climate educators, farmers and agripreneurs, the project fosters community-wide adoption of low-emission practices, reduces GHG from waste/farming, and advocates for youth-inclusive policies. Graduates will form networks to share knowledge, influencing households and local governance toward sustainable systems promoting intergenerational justice and rights-based climate action.

Workshops

Workshop 1 | Unlocking the Potential of Partnerships for Agroecology in Sub-Saharan Africa

Day 3 Friday| 3 July 2026 | 11:30 – 13:00
Presenter: ASARECA et. Al.
Chair: Dr. Demba Jallow (NSS)

UNLOCKING THE POTENTIAL OF PARTNERSHIPS FOR AGROECOLOGY IN SUB-SAHARAN AFRICA

Lead Organizer: *Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), Entebbe, Uganda*
Co-organizers: *Forum for Agricultural Research in Africa (FARA), West and Central African Council for Agricultural Research and Development (CORAF) Centre for Coordination of Agricultural Research and Development in Southern Africa (CCARDESA), African Forum for Agricultural Advisory Services (AFAAS) & International Fund for Agricultural Development (IFAD)*

Main Presenter: Joshua Sikhu Okonya
Email: j.okonya@asareca.org

Background: Traditional monoculture and crop intensification are failing to sustain African food systems under climate change. The CAADP-XP4 consortium argues that Agroecology (AE) and Nature-Based Solutions (NBS) offer a resilient pathway, yet scaling these innovations remains a challenge. This side event, held during the CIRAWA Agroecology Conference, aligns with the EU Green Deal and IFAD's mission to accelerate inclusive rural transformation through knowledge transfer and multi-stakeholder partnerships.
Objectives: The event aims to bridge the gap between agroecological theory and large-scale adoption by: (i) Disseminating lessons from CAADP-XP4 and pilot projects. (ii) Discussing barriers to scaling and how African governments can integrate agroecology into national planning processes. (iii) Highlighting the link between Climate-Smart Agriculture (CSA) and the agroecological transition. (iv) Fostering partnerships to develop actionable recommendations for financing agroecology-based agribusinesses.
Methodology: This participatory session will feature case studies and stakeholder dialogues focusing on the "policy-to-practice" pipeline. By unpacking the institutional and incentive environments, the event will showcase replicable models and identify concrete financial pathways for resource mobilization.

Expected Outcomes (i) Heightened awareness of AE/NBS as viable food system solutions (ii) Enhanced visibility for innovations to attract development partners and investors. (iii) Creation of actionable recommendations to inform national strategies and donor programming. (iv) Strengthened networks among state and non-state actors for a unified agroecological transition.

Keywords: Multistakeholder partnerships; Eastern and Central Africa; Regional Agroecology Policy Frameworks; CAADP

Workshop 2 | Measuring what matters: Participatory monitoring for farmers and agroecology practitioners using the TRANSITIONS metrics meta-framework

Day 3 Friday| 3 July 2026 | 11:30 – 13:00
Presenter: Gloria Kukurije Adeyiga and Mary Crossland (FORIG, Ghana)
Chair: Dr. Amos Yesutanbul (FIDEP)

MEASURING WHAT MATTERS: CO-DESIGNING HOLISTIC ASSESSMENTS OF AGROECOLOGICAL SYSTEMS

Gloria Kukurije Adeyiga[1]
Mary Crossland[1]

[1]*Forestry Research Institute of Ghana (Ghana)*

Abstract
Understanding the impact of agroecology practices is essential for improving farm productivity, ecosystem health, and community well-being. This hands-on workshop equips participants with practical skills for developing a holistic assessment of agroecological performance, guided by the meta-framework and principles of the TRANSITIONS Metrics project. The meta-framework is a practical 10-step approach for designing holistic assessment of food and agricultural systems.
Using the meta-framework, session participants will co-develop a suite of holistic metrics that reflect local priorities and realities, and capture ecological, social, and economic outcomes. Emphasis is placed on participatory design, inclusivity, simplicity, and adaptability, ensuring monitoring efforts are actionable and relevant to farmers and communities for decision-making.
Through interactive exercises, small-group work, and plenary discussions, participants will:

1. Identify what matters most in their farm systems and communities.
2. Co-create simple, practical indicators using locally available materials and expertise.
3. Discuss key considerations for recording, interpreting, and applying monitoring results to improve decision-making.
4. Explore gender-sensitive and socially inclusive approaches.

By the end of the session, participants will have drafted farm- or community-level monitoring plans that are practical, locally relevant, and aligned with the TRANSITIONS Metrics principles: holistic, multi-dimensional, participatory, adaptable, and context-sensitive.

Measuring What Matters: Co-designing Holistic Assessments of Agroecological Systems" and I believe that it will be presented by Gloria Kukurije Adeyiga but also

Workshop 3 | CIRAWA DSS: An Agroecological Decision-Support System for Soil-Based Crop Planning in West Africa

Day 3 Friday| 3 July 2026 | 14:00 – 15:00
Presenter: Nabil Boukala (Landfiles, France)
Chair: Miguel Ribeiro (ADPM)

CIRAWA DSS: AN AGROECOLOGICAL DECISION-SUPPORT SYSTEM FOR SOIL-BASED CROP PLANNING IN WEST AFRICA

Nicolas Minary[1] , Nabil Boukala[1]

[1]*Landfiles (France)*

Abstract
Climate change is intensifying the frequency and severity of environmental risks, posing significant challenges to ecosystems, infrastructure, and communities worldwide. Addressing these challenges requires not only advanced modelling and data integration, but also effective communication and stakeholder engagement. This workshop, organised within the framework of the CIRAWA project, aims to bring together researchers, practitioners, and policymakers to explore innovative approaches to climate risk assessment and resilience-building.
The session will present key methodologies and tools developed in CIRAWA, focusing on the integration of climate data, risk analysis, and decision-support systems. Participants will gain insights into how interdisciplinary collaboration can enhance understanding of complex climate impacts and support more informed adaptation strategies. The workshop will also highlight lessons learned from pilot applications, showcasing how scientific knowledge can be translated into actionable solutions for stakeholders at different scales.
In addition to technical presentations, the workshop will include interactive discussions designed to foster exchange between participants, identify existing challenges, and co-develop recommendations for future research and implementation. By facilitating dialogue between diverse actors, the workshop seeks to strengthen the link between science, policy, and practice, ultimately contributing to more resilient and climate-ready societies.

Workshop 4 | Operationalizing Agroecology at Scale: Insights from the from the Regreening Africa project in Ghana

Day 3 Friday| 3 July 2026 | 15:00 – 16:30
Presenter: Richard Appoh (WV, Ghana)
Chair: Dr. Demba B. Jallow (NARI)

OPERATIONALIZING AGROECOLOGY AT SCALE: INSIGHTS FROM THE REGREENING AFRICA PROJECT IN GHANA

Richard Appoh[1], Edward Akunyagra[2], Gloria Kukurije Adeyiga[3],4 Maxwell Amedi[1], Philip Yelmongmine[1], Richard Sulemana[2], Margaret Kyiu[2], Seth Frimpong[1], Joshua Adombire[1]

[1]World Vision Ghana
[2]Catholic Relief Services, Ghana
[3]Forestry Research Institute of Ghana
[4]World Agroforestry Centre

Abstract
This workshop (side event) critically examines the Regreening Africa Project as a large-scale, multi-country intervention positioned at the intersection of Agroecology and Nature-based Solutions. Focusing on implementation in northern Ghana, the session interrogates how landscape restoration initiatives operationalize agroecological principles, particularly diversification, ecological synergies, and social inclusivity within degraded dryland systems. It situates regreening not merely as a technical response to land degradation, but as a socio-ecological transformation process that reshapes land governance, resource access, and local livelihood systems. The session is structured around four analytical objectives. First, it provides a concise synthesis of the project's theory of change, implementation modalities, and empirically grounded outcomes in Ghana. Second, it interrogates the extent to which core interventions such as Farmer-Managed Natural Regeneration, agroforestry systems, and soil and water conservation align with, or diverge from, agroecological transition pathways. Third, it evaluates how these practices contribute to multifunctional landscapes by simultaneously enhancing ecosystem services, climate resilience, and food system sustainability. Fourth, it facilitates a critical exchange on the scalability of community-led restoration models, with attention to institutional constraints, knowledge systems, and equity considerations. Methodologically, the workshop adopts a reflexive and participatory learning approach that integrates short expert inputs with empirical case analyses and facilitated dialogue. Participants will engage with evidence from project sites to assess trade-offs, co-benefits, and context-specific outcomes, and to identify enabling conditions for embedding agroecological restoration within policy and development programming. Emphasis is placed on bridging scientific knowledge with practitioner experience to foster actionable insights. The session targets a transdisciplinary audience, including policymakers, researchers, development practitioners, civil society actors, farmer organizations, private sector stakeholders, and donors engaged in sustainable agriculture, climate adaptation, and rural transformation. Expected outcomes include a strengthened conceptual and practical understanding of how regreening interventions can advance agroecological

transitions; enhanced capacity to design context-responsive, inclusive restoration strategies; and the consolidation of cross-sectoral networks to support the scaling of socially just and ecologically grounded food system transformations.

Sponsors and Partners

Organisers

CORAF

FARA
Forum for Agricultural Research in Africa

CIRAWA

Funded by the European Union

Sponsors

epa

IUCN

ACL

UNIVERSITY FOR DEVELOPMENT STUDIES

FARA
Forum for Agricultural Research in Africa

World Vision

Project Partners

CARTIF

ADPM mértola

AMUPAL

AJACM
Associação dos Jovens Agricultores de Casa do Meio

CIFOR

World Agroforestry

FIDEP FOUNDATION
Communities Matter

ISRA

landfiles

Ministério da Agricultura e Ambiente

NATIONAL AGRICULTURAL RESEARCH INSTITUTE THE GAMBIA

UNIVERSIDAD DE SEVILLA

NATIONAL SEED SECRETARIAT

N.A.T.C.

SAPIENTIA AEDIFICAVIT SIBI DOMVM

UNIVERSITY FOR DEVELOPMENT STUDIES

REVOLVE