POST-EVENT REPORT

Compatibility assessment of agroecology and CSA practices

DeSIRA LIFT

Biennial Climate-Smart Agriculture Conference in Accra, Ghana and online 14 September 2022

The 2022 edition of the Biennial Climate Smart Agriculture Conference was held during the Science and Partnership for Agriculture Conference (SPAC) led by the Forum for Agricultural Research in Africa (FARA) on 14th to 16th September 2022 in Accra, Ghana and online. It provided a platform to discuss sustainable models of agriculture which contribute to climate change adaptation and mitigation such as agroecology.

DeSIRA-LIFT facilitated a parallel session dedicated to research papers under the theme of "Compatibility assessment of agroecology and climate smart practices" focusing on findings from country research programmes. The event discussed agroecological practices contributing to climate resilience and concrete ways in which agroecology can support adaptation and mitigation strategies in African countries.

CAADP XP4 PROGRAMME

FARA Forum for Agricultural Research in Africa

Funded by the European Union

Main messages and recommendations

• Agroecology can contribute to climate resilience (adaptation and mitigation) and is thus compatible with the objectives of climate-smart agriculture.

• Agroecology can also contribute of the regeneration of natural resources (such as soils, forests, mangroves).

• Promoting diversity in practices and species is key to leverage the potential of agroecological approaches for climate resilience, food security and regeneration of natural resources (such as soils, forests, mangroves.

• Promoting diversity in practices and species is key to leverage the potential of agroecological approaches for climate resilience, food security and regeneration of natural resources.

• Agroecology practices need to be tailored to their agroecological and socioeconomic context, integrating local knowledge and practices with scientific insights.

• Extension and advisory services are a crucial instrument in knowledge exchange and co-creation of agroecological practices. Supportive agricultural policies and finance are also important.

Background

The second Biennial Africa Climate-Smart Agriculture Conference is part of the SPAC organised by the Forum for Agricultural Research in Africa - FARA. DeSIRA-LIFT co-organised events to showcase how agroecology and climate-smart agriculture (CSA) practices contribute to climate resilience, and adaptation and mitigation strategies:

• Thematic Paper Presentation on Compatibility assessment of agroecology and CSA practices (14th September 2022)

• Side event on The contribution of agroecology to climate change adaptation and mitigation (15th September 2022)

• Presentation of preliminary results from two commissioned studies: (i) 10 years analysis of Africa's progress on climate change; and (ii) Decadal Plan for the Africa Climate Smart Agriculture Framework (ACSAF) (operationalisation of the agricultural part of the AU strategy on climate change) (16th September 2022).

The next pages provide a summary of the presentations of the Thematic Paper Presentation on Compatibility assessment of agroecology and CSA practices.

Summary of the presentations

Maria Luisa Paracchini from the European Commission Joint Research Centre shared reviews of scientific literature on the effectiveness of agroecological practices.

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Key findings:

• There is evidence of overwhelmingly social, economic, and environmental positive outcomes associated with agroecology per agroclimatic zone in Africa (in general, fewer than 10% of all

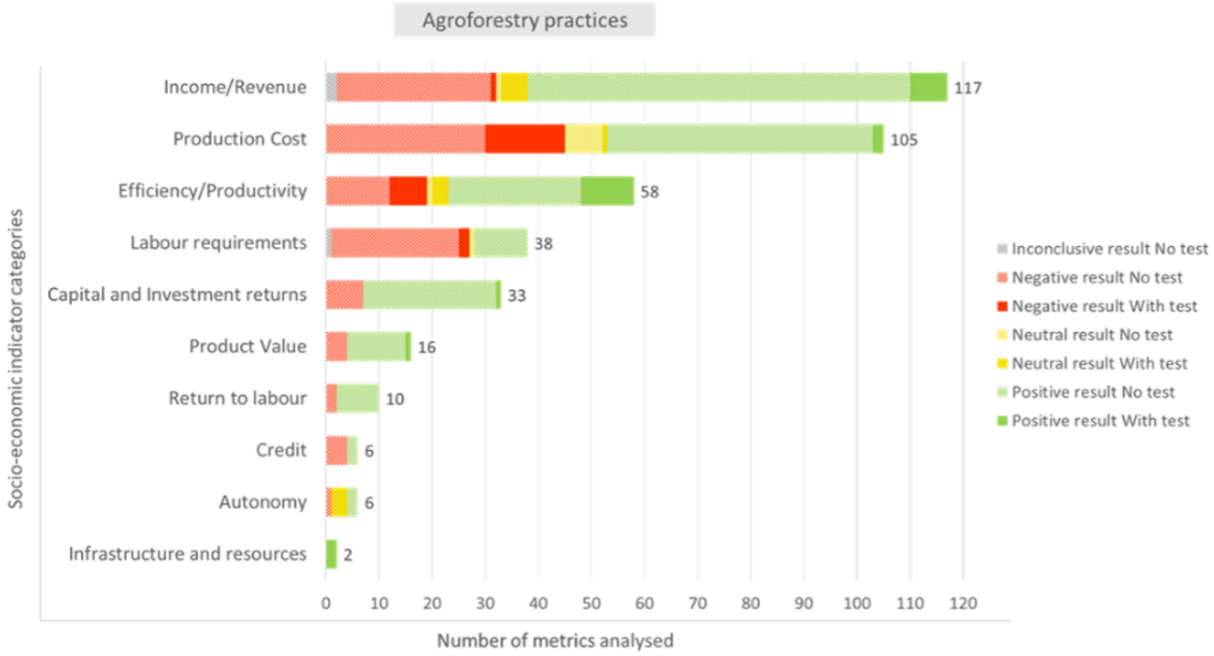

Figure 1. Meta-review of results (120 studies) on socio-economic performance of agroforestry (Parachinni et al. 2022)

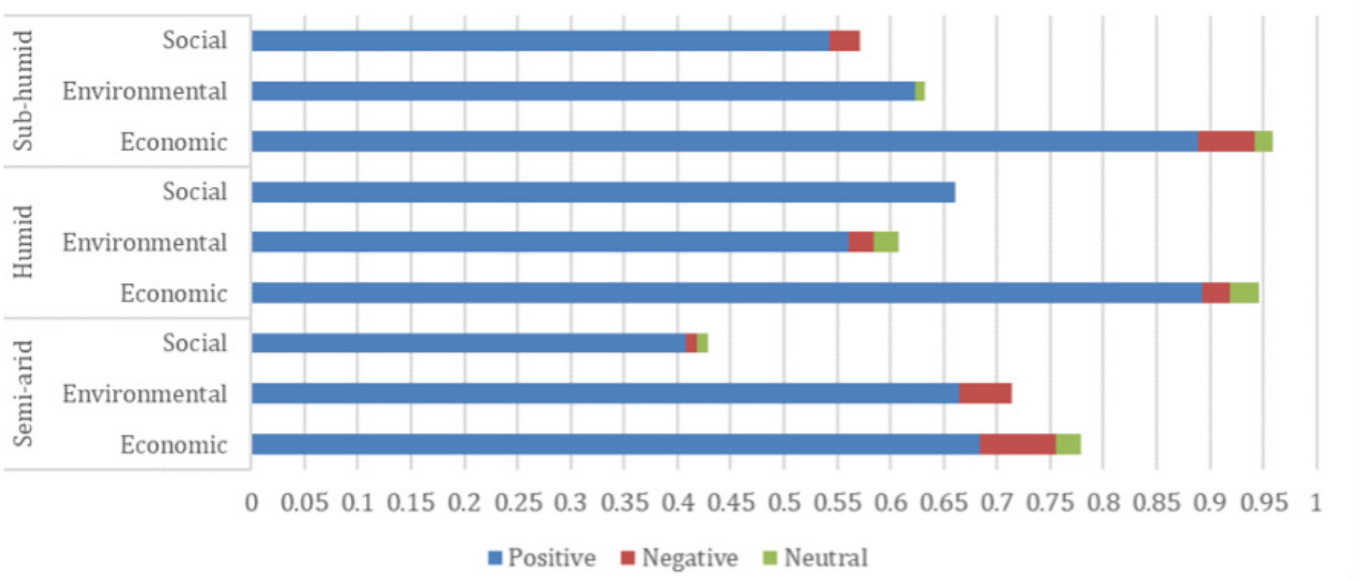

Figure 2. Meta-review of results (298 studies) on the performance of agroecology per agroclimatic zone in Africa (Parachinni et al., 2022).

reported outcomes were neutral or negative).
• Agroecology has an overall wide positive economic performance and a positive contribution to food security.
Agroecology is an option for climate change adaptation, through specific practices such as agroforestry, crop rotations, intercropping, and selection of locally adapted and resistant varieties.

Pablo Tittonell from CONICET/University of Groningen analysed the 'climate-smartness' of agroecology systems in comparison to conventional systems.

Key findings:
• Agroecological systems are as productive as conventional systems and produce less greenhouse gasses.
• Agroecological farming can be applied on both small- and large-scale systems.
• As the basic agroecological principles are the same. There is an opportunity to develop new knowledge between the farmers themselves and/or through co-creation with other stakeholders.
• Agroecologically farming requires to restore the degraded soils in Sub Saharan Africa which itself needs strong institutional support (farmers' cooperatives, policies, etc.) in addition to sustainable practices.

Suwilanji Sinyangwe from FANRPAN shared the findings on the contribution of agroecology to CSA.

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Key findings:
• Agroecology supports the achievement of several Sustainable Development Goals (SDGs) (mainly SDG 2, SDG 3, SDG 13, and SDG 15) having great potential to build climate change-resilient farming systems while enhancing ecosystem services and reducing biodiversity loss.
• CSA and agroecology are complementary concepts when observing the spatial scales at which they often operate in the ecosystem. The CSA is specifically designed to help manage agriculture and food systems under climate change and thus addresses very large scales (global, regional, national).
• Farmers need institutions and financial support to benefit the most from CSA. Public-private financing synergies are as well required, including climate and food security financing to support innovation in the agricultural sector.
• Agroecology is not a one-size-fits-all set of practices; techniques are adapted to meet specific needs and ecosystems.
• The research highlights the wide variety of techniques and practices used to achieve the benefits of agroecology, including plant diversification, intercropping, the application of mulch, manure or compost for soil fertility and the natural management of pests and diseases, agroforestry and the construction of water management structures.

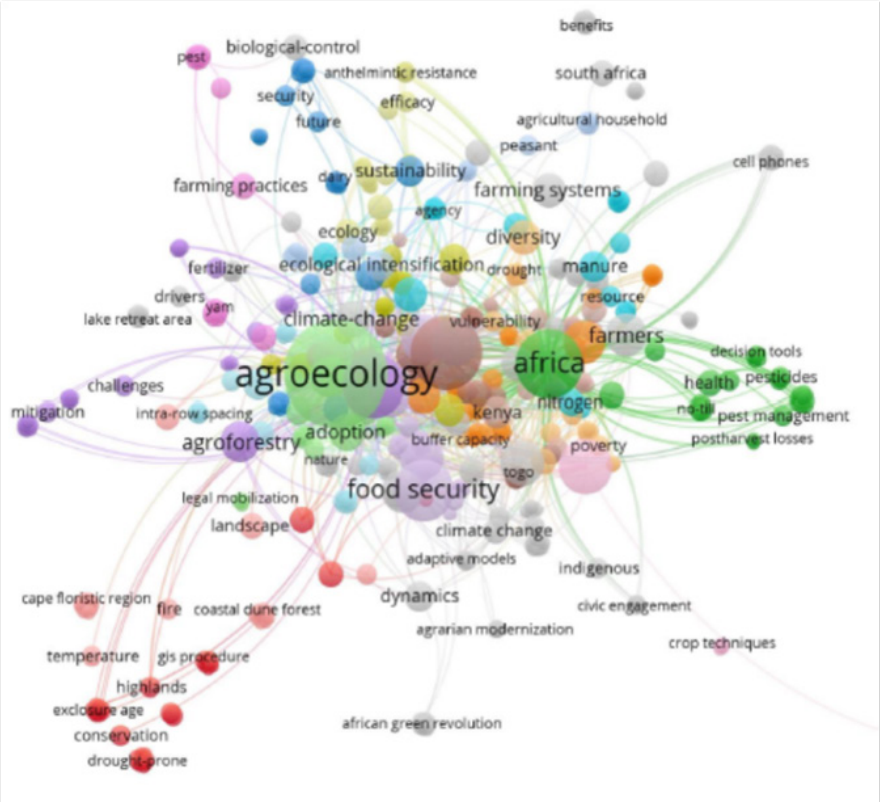

Figure 3. Meta-analysis of keyword co-currences (Sinyangwe, 2022).

Dr Adewoyin Oluyinka B. from Federal University Oye, Nigeria, studied the Ecological Organic Agriculture (EOA) as a mitigating alternative for climate change.

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Key findings:
• EOA reduces greenhouse gas emissions linked to food production, enhances sustainable development and restoration of ecosystems, offers protection of existing grasslands from conversion to crop land.
• There is a need to develop innovative systems with extension and education adapted to EOA systems, as well as new farming systems based on ecological approaches, new supply chains and conducive policies.
• EOA adopts feed-the-soil-not-the-plant approach, optimizes crop rotation with legumes, use of cover crops.
• EOA enhances nutrient and energy cycling by combining various plants and animals species (attracts new or re-colonizing species, pollinators and pest predators).
• EOA reduces temperature through tree canopy formation and evapotranspiration, volatilization and environmental heat.
• EOA reduced greenhouse emissions linked to food production and consumption.

Adebola Adedugbe from Farmideas, Nigeria, worked on smallholder farmers and the need for CSA in Nigeria.

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Key findings:
• CSA practices were observed to increase yields while also reducing environmental impacts.
• Combining both traditional agroecological practices with scientific knowledge is an effective strategy to adapt to climate change and support community resilience. CSA should be promoted among smallholder farmers.
• There is a need for a framework to integrate traditional ecological knowledge with scientific knowledge as an effective climate change adaptation strategy.
• CSA is an important adaptation measure to increase agricultural production but more capacity building amongst farmers on the opportunities offered by CSA is needed.
• A framework to integrate traditional ecological knowledge with scientific knowledge contributes to an effective climate change adaptation strategy.
• The use of improved varieties of crops contributes to reduce climate risks and supports community resilience.
• Agroecology can provide more options for climate change adaptation and mitigation than conventional agriculture.

Bernard Vanlauwe, Director at the International Institute of Tropical Agriculture (IITA), presented how agronomy and climate adaptation and mitigation as conceptualized by the CGIAR Excellence in Agronomy (EIA) Initiative.

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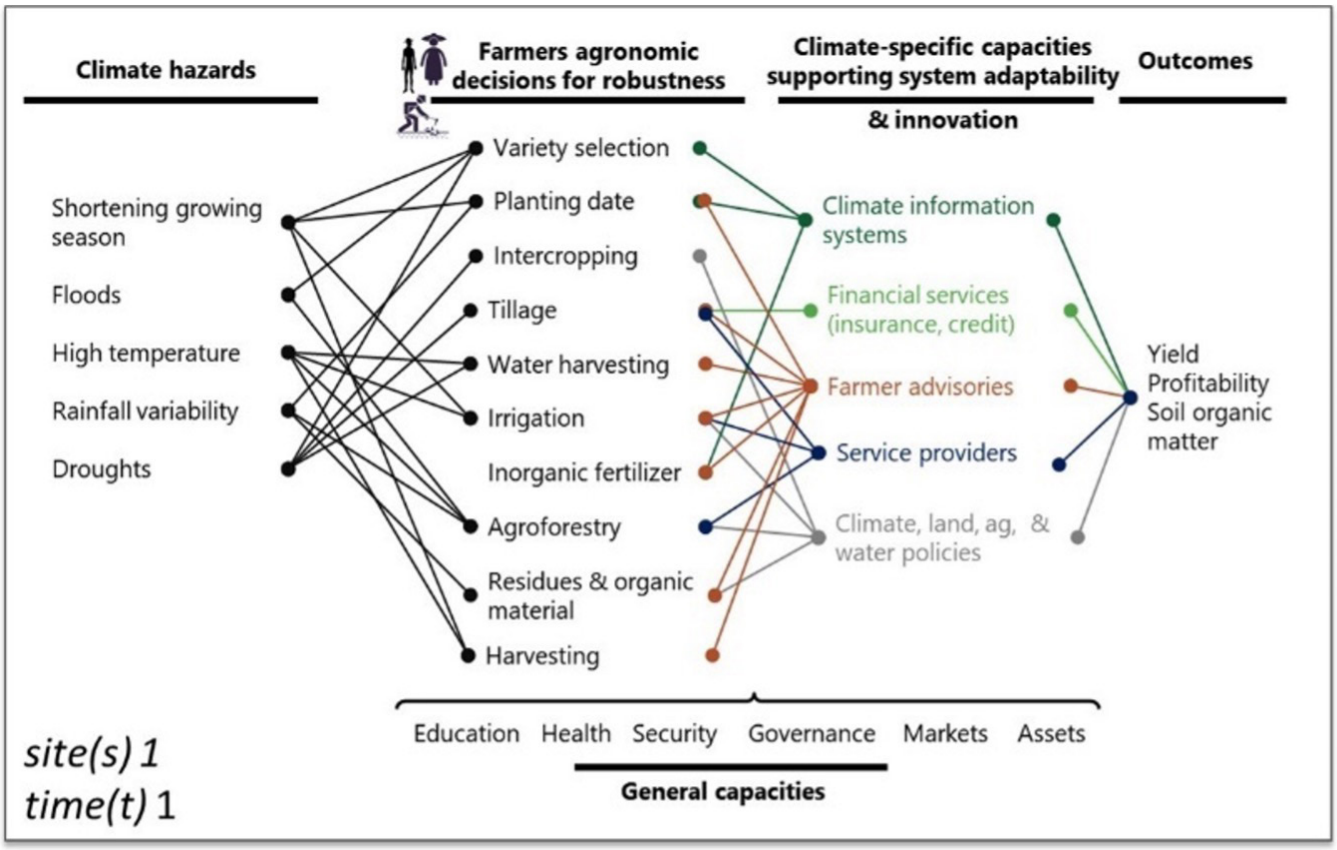

Figure 4. Farmers' agronomic decisions and supporting systems (Vanlauwe et al. 2022)

Key findings:
• The impacts of climate change on smallholder production systems are complex and vary between regions. Solutions need to be developed for the specific needs of a location.
• Climate-smart practices need to be implemented as they increase productivity, enhance resilience and reduced GHG emissions.

Uyiosa Genesis Osadedbamwen from the Innovation Lab for Policy Leadership in Agriculture and Food Security (PiLAF) presented a study that investigated CSA practices in nine agroecological zones from an agroecological perspective and how they can support a sustainable food system in Nigeria.

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Key findings:
• Agroecology outcomes varied from agro-ecological zones. Therefore, farmers should be encouraged to adopt CSA practices that suit their agroecological zones.
• There is a significant relationship between agroecological zones and yield for major staples.
• The design of an institutional framework that sufficiently addresses the needs of different agroecological zones is required.

Never Mujere, University of Zimbabwe, analysed how agroecology can ensure food security and environmental sustainability.

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Key findings:
• The study identifies the strengths, weaknesses, opportunities and threats of agroecology to gather information about agroecology and so to enhance its positive aspects and address its downfalls.
• The study found that agroecology is a critical strategy for socioeconomic and environmental development – improving environmental integrity and food and nutrition outcomes.
• It is critical to build capacities and empower grassroots communities with agroecology principles. Agriculture policies and practices should incorporate and support agroecology.

Strengths of agroecology	%
Improves health, food and nutrition security	96
Integrates different types of knowledge	47
Compatible with traditional farming knowledge	93
Preserves natural resources and biodiversity	78
High profitability-produces more from less resources	66
Consistent crop yield	24
Enhances resilience of rural farmers to droughts, pests and diseases	19
Strong political and policy support	75
Promotes seed sovereignty and conserves indigenous crop varieties	19
Reduce or curb dependence on imports of food and inputs	35

Table 1. Responses from members of agroecology Dgroups to online questionnaire (n=40) (Mujere, 2022)

Funmilayo Mary Oloyede from Obafemi Awolowo University, Nigeria, presented the biodiversity conservation of neglected and underutilized Nigerian horticultural crops.

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Key findings:
• Biodiversity provides stability to the ecosystem and allows for benefits in the form of food and nutrition, medicinal purposes, soil health, energy and more.
• Neglected and Underutilized Species (NUS) are crops that can be used as foods and have very high nutritional and medicinal properties. Their conservation will contribute to the reduction of poverty and health in Africa.
• Currently, NUS' potentials are ignored, or even considered as weeds. There is a need for recognition of their multiple contribution (through media and extension agents), conservation strategies (gene, feed banks) to foster the nutritional, medicinal, ecological, and economic benefits.
• Conserving NUS will foster nutritional, medicinal, and ecological and economic benefits.
• Embracing the conservation of the NUS has to be done deliberately by all stakeholders: governments, NGOs, farmers' groups and individuals.
• Conserving NUS is a means to mitigate and adapt to climate change.
• The promotion of NUS for industrial exploitation should be the priority of the national, continental and global agricultural research systems and the governments.

Victor Olowe from the Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR) conducted an agronomic evaluation of soybeans under five different crop rotation systems in the humid tropics.

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Key findings:

• Crop rotation schemes that include legumes is a key CSA strategy in the tropics.
• Soybeans are suitable and compatible with the preceding oilseed crops of sunflower and cotton.
• Crop rotation and continuous cropping with organic fertilizer application increased the number of seeds and pods per plant, as well as the weight of seeds.
• The agronomic performance of soybeans demonstrated the suitability and compatibility of the legume with the two preceding oilseed crops (sunflower and cotton) under organic production system in a crop rotation scheme.
• Crop rotation schemes that include legumes can be recommended as CSA strategy in the tropics.

Anthony Imoudu Oyeogbe, University of Ibadan, Nigeria, analysed the impact of conservation agriculture in maize-based cropping systems by comparing systems of conventional cropping, conservation, organic and regenerative agriculture.

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Key findings:
• Transitioning to conservation agriculture – then organic and regenerative agriculture in the early years sustains maize yields, improve soil fertility and improve weed management.
• Nurturing ecological cropping systems in the long-term can reduce mineral N fertilizer input while enhancing ecosystem services.
• Maize yields under conventional cropping and conservation agriculture increased by 24-31% compared to organic agriculture and regenerative agriculture.
• Weed growth reduced significant in conventional cropping and conservation agriculture in the early stage of maize than organic agriculture and regenerative agriculture but increased in conventional cropping compared to conservation agriculture at the later stage.
• Organic agriculture and regenerative agriculture marginally increased the soil organic matter, but total nitrogen and available phosphate were slightly higher in conservation agriculture and conventional cropping.
• Conservation agriculture (3.5 t ha-1) utilized 25% less nitrogen fertilizer doses in providing similar grain yields with conventional cropping (3.7 t ha-1).

Tenitayo Adeyemo from the Nigerian Institute of Social and Economic Research analysed agroecological differentials in crop production: evidence from smallholder rice producers in Nigeria.

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Key findings:
• This study suggests that agroecological practices may have significant impacts on the output of smallholder rice farms in Nigeria.
• Agroecology methods produced higher harvests and values, and the seed use increased output when using a system of irrigated agroecology.
• Since irrigated rice farming increases output, there is a need to provide irrigation technologies within the local context and to improve access to critical inputs.

• Need to provide irrigation technology adapted to the local context to ensure sustainability and management of the resource.

Adeola Oloyede from University of Ilorin, Nigeria, analysed agroforestry practices among small-scale farmers in Southern Guinea savannah zone of Nigeria.

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Key findings:
• The adoption of agroforestry practices increased land productivity.
• The study recommends a need for increased dissemination/outreach programmes and that the access to improved planting materials could encourage farmers' increased adoption of agroforestry practices.
• The commonest agroforestry practice undertaken by the farmers was the scattered trees on farm.
• Choice of agroforestry were influenced by age, land tenure, membership, labour availability and access to planting materials.
• The main return on investment of adopters of agroecology practices (2.07) was significantly higher than those who did not (1.34).
• Adoption increased the land productivity by 6581 grain equivalent.

Ogunnaike Gbemisola from Olabisi Onabanjo University, Nigeria, investigated nature-based solution for mangrove forest restoration in coastal communities.

The study examines the differences in the perception of mangrove forests (e.g. decline, climate change effects, the impact of mangrove degradation on agricultural practices) by age, gender and other socioeconomic factors.

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Key findings:
• Mangroves provide the best nature-based solution to climate change impacts along the coast.
• Mangrove restoration, a nature-based solution to climate change, can revamp livelihood potentials among rural coastal communities.
• The gender differentials in the coastal community shows that more male are involved in securing the livelihood of their households than the female.

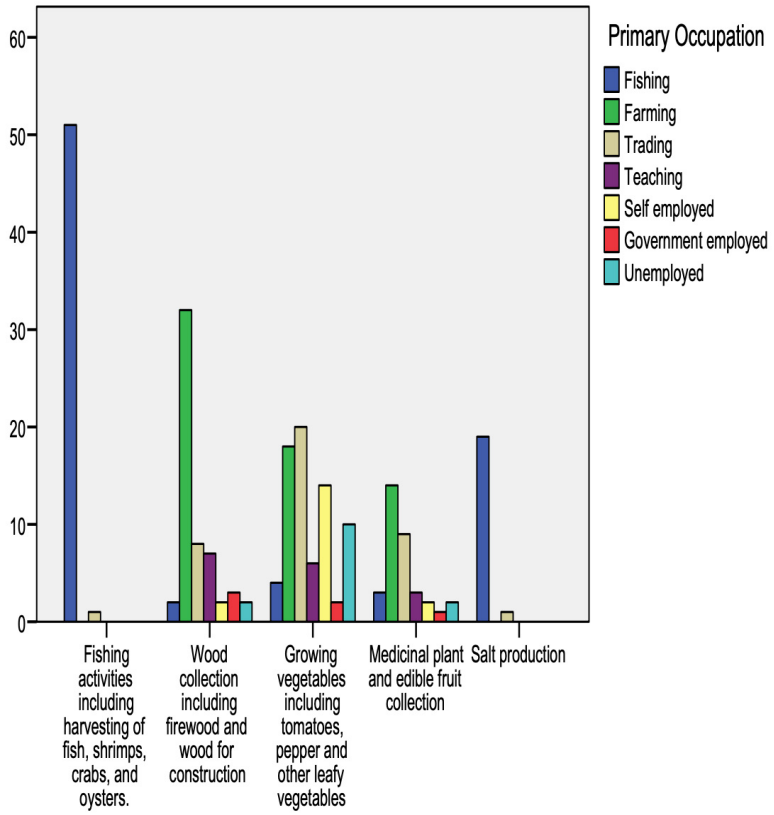

Figure 5. Household use of mangroves by primary occupation (Ogunnaike and Onafeso, 2022)

Mangrove restoration may therefore be another advantage for offsetting such gender inequality beyond proffering a nature-based solution to climate change.
• While many observed the changing climatic pattern, appreciation of the consequences and needed actions is lacking. Age, gender and income were found to pose significant influences on every aspect of the mangrove conversation from awareness to implementation of change.
• Human activities bare untold influences on the degradation of mangrove forests and the links to changing climate patterns are plausible.

Taofeeq Yekinni, University of Ibadan, Nigeria, assessed the stakeholders' satisfaction for sustainable ecological organic agricultural (EOA) practices that promote climate-smart agriculture in Nigeria.

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Key findings:
• EOA practices are essential to cope with the environment concerns that climate change poses and should be encouraged to achieve climate smart agricultural promotion. Stakeholders' involvement and satisfaction in EOA practices should be consciously pursued and entrenched for the symbiotic relationship.
• Stakeholders' satisfaction in ecological agriculture value chain has potentials to raise opportunities and remove barriers to sustainable agricultural practices. It is therefore recommended that ecological organic agricultural practices should be encouraged to achieve climate smart agricultural promotion.
• Stakeholders who benefited from climate smart elements (e.g. enhanced farm biodiversity) used less pesticides/harmful chemicals, and had greater net returns. They are highly involved and satisfied with issues related to the value chain of organic fruits, vegetables and spices.

Aline Mwintome Naawa from the WASCAL Doctoral Programme studied how enhancing agroecology can be an effective Climate Smart Agriculture approach to reduce wildfires vulnerability in the savannah ecological zone of Ghana.

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Key findings:
• Wildfires have damaged important ecotypes and severely reduced the productive capacity of many Ghanaian forests. Climate change has worsened the situation with the area experiencing longer drier periods- a catalyst for wildfire
• There is a need for a framework to integrate local agroecological knowledge with scientific knowledge as an effective climate change adaptation strategy.
• Agroecology should be prioritized in extension services, education and agricultural research especially on Farmer Managed Natural Regeneration (FMNR), soil and water conservation management.
• A framework to integrate local agroecological knowledge with scientific knowledge is an effective climate change adaptation strategy.
• Greater emphasis needs to be placed on developing local solutions that are sustainable and cost effective.

The DeSIRA Initiative (Development Smart Innovation through Research in Agriculture), funded by the European Commission, Directorate General for International Partnerships (DG INTPA), seeks to enhance an inclusive, sustainable and climate-relevant transformation of rural areas and of agri-food systems, by linking better agricultural innovation with research for more developmental impact. It supports actions in low- and middle-income countries (LMICs) to strengthen the resilience of their agri-food systems, the relevance of the national and regional research and innovation systems, and the coherence and efficiency of their agricultural public research and extension services related to climate change challenges.

DeSIRA-LIFT (Leveraging the DeSIRA Initiative for Agri-Food Systems Transformation) is a service project (June 2021 – May 2024) to the European Commission, DG INTPA, with the main objective to enhance the impact of the DeSIRA Initiative by providing (on-demand) services to DeSIRA project holders and partners. DeSIRA-LIFT includes three service areas aligned to the three DeSIRA Pillars: Service Area 1 supports country-led DeSIRA projects to enhance their impacts on climate-oriented innovation systems in line with more sustainable food system transitions. Service Area 2 supports the Comprehensive Africa Agriculture Development Programme (CAADP) ex-pillar IV organizations in their Agricultural Knowledge and Innovation Systems (AKIS) related roles. Service Area 3 is providing support to policy makers on themes related to agricultural research for development (AR4D) and innovation policies and programming.

DeSIRA-LIFT is implemented by members of the Agrinatura and EFARD, in particular the members: Wageningen UR, CIRAD ISA (University of Lisbon), NRI (University of Greenwich), SLU and COLEAD. Agrinatura (http://agrinatura-eu.eu) is the European Alliance on agricultural knowledge for development. The European Forum on Agricultural Research for Development (EFARD) (http://www.efard.org) is an umbrella network of European research and non-research stakeholders from public and private European organisations and the European Commission.

Disclaimer
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