AUDA-NEPAD
AFRICAN UNION DEVELOPMENT AGENCY

Scaling Climate-Smart Agriculture for accelerated agri-food systems transformation in Africa

Briefing Paper - October 2023

Tel: +27-11 256 3600
Email: info@nepad.org
Website: www.nepad.org

Twitter@Nepad_agency
#TheAfricaWeWant

ISBN: 978-1-77634-909-8

October 2023

Overall coordination:
Nardos Bekele-Thomas
Estherine Lisinge Fotabong

Scientific coordination:
Manyewu Mutamba
Sabrina Trautman
Romy Chevallier
Laura Cramer
Amanda Gosling
Caroline Mwongera
Osana Bonilla-Findji
Sophia Huyer
Alison Rose
Desire Kagabo
Ivy Kinyua

About AUDA-NEPAD

The African Union (AU) Development Agency-NEPAD (AUDA-NEPAD) is Africa's first-ever continental technical and development agency. The foundation of AUDA-NEPAD is built on the New Partnership for Africa's Development (NEPAD) that was established as Africa's continental renewal and development programme by AU in 2001 and championed through the then NEPAD Secretariat, based in Midrand, South Africa. The NEPAD vision represented a common pledge by African leaders to eradicate poverty and foster Africa's sustainable economic growth and development through the promotion of regional and continental integration, through the inclusion of Africa in global processes and through the empowerment of socially disadvantaged groups, such as women and children.

About AICCRA

The AICCRA project contributes to the construction of an African future that is climate-smart and driven by science and innovation in the agricultural field. It is led by Alliance of Bioversity International and CIAT and supported by a grant from the World Bank's International Development Association (IDA). AICCRA works to increase access to climate information services (CIS) and Climate Smart Agriculture (CSA) technologies for millions of smallholder farmers across Africa. AICCRA investments are concentrated in six main countries namely Ethiopia, Ghana, Kenya, Mali, Senegal and Zambia with the implementation of four components (i) Knowledge Generation and Sharing, (ii) Strengthening Partnerships for Delivery, (iii) Validating Climate-Smart Agriculture Innovations through Piloting and (iv) Project management. The sub-regional component of AICCRA in West Africa is implemented through the creation of multi-stakeholder partnerships of existing scientific and educational networks and centres in order to achieve results that cannot be achieved easily, or not at all, by engaging with individual partners at national level. Explore AICCRA's work at aiccra.cgiar.org.

This work was conducted with generous support from the Norwegian Agency for Development Cooperation (NORAD) under the Ministry of Foreign Affairs (MFA), Norway.

Images: ©Kelvin Trautman courtesy of AICCRA

Foreword

The latest **2022 African Union (AU) Biennial Review (BR)** calls on countries to urgently shift their focus from planning, dialogue and consensus-building toward more effective implementation. This includes concrete and bold interventions at various levels to support the implementation of countries' national agricultural policies, their climate plans, and broader resilient development priorities.

In addition, the **AU's Business Plan (2022-2025**) provides the strategic roadmap around which all continental actors and partners can mobilise to assist in the delivery of the **Comprehensive Africa Agricultural Development Programme (CAADP)**. The Business Plan identifies five key intervention areas around which action is urgently required. These include addressing food and nutrition security within the context of agricultural food system development, as well as increasing the resilience of countries and communities through enhanced adaptation measures.

Climate-smart agriculture (CSA) offers a solution for Africa to achieve the objectives outlined in CAADP and the Malabo Declaration. CSA has proven, through multiple case examples and a large evidence base, that it can play a key role in addressing the interlinked challenges of food security, farmer resilience and productivity, as well as climate change adaptation and mitigation. CSA actions and interventions therefore offer key opportunities for countries to practically accelerate the CAADP Agenda to maximise its impact, as well as deliver on the recommendations of the recent BR and the latest Business Plan. In addition, the objectives of CSA are well aligned and support the intervention areas of the AU's long-term development plan, namely, the intervention areas outlined in the Common Africa Position on Food Systems, and AU's long-term Agenda 2063.

To pave the way for climate-compatible agricultural transformation, accelerated action is needed across the continent to enhance CSA adoption, scaling, and financing. This paper provides practical tools and suggestions for African countries to develop the technical policy and investment conditions to achieve sustainable agricultural development for food security under climate change. These tangible actions can in turn lead to more resilient and inclusive food system approaches, which will in turn support the continent on its journey towards a low emissions, climate-resilient and inclusive development future.

CSA is not just a set of practices, but ***"an approach to develop the technical, policy and investment conditions to achieve sustainable agricultural development for food security under climate change"***.[1]

H.E Ms. Nardos Bekele-Thomas
CEO – African Union Development Agency (AUDA-NEPAD)

Table of Contents

Acronyms and abbreviations

AICCRA	Accelerating Impacts of CGIAR Climate Research for Africa
AU	African Union
AUDA	African Union Development Agency
BR	Biennial Review
CAADP	Comprehensive Africa Agriculture Development Programme
CCAFS	CGIAR Research Program on Climate Change Agriculture and Food Security
CCARDESA	Coordination of Agricultural Research and Development for Southern Africa
CIS	Climate Information Services
CORAF	West and Central African Council for Agricultural Research and Development
CSA	Climate-Smart Agriculture
CSAIP	Climate-Smart Agriculture Investment Plan
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization of the United Nations
FNS	Food and Nutrition Security
GCF	Green Climate Fund
ICT	Information and Communications Technology
MSP	Multi-Stakeholder Platform
NAIP	National Agricultural Investment Plan
NDC	Nationally Determined Contribution
NEPAD	New Partnership for Africa's Development
REC	Regional Economic Community
SADC	Southern African Development Community

Introduction

The third Biennial Review (BR) of the CAADP, undertaken in 2022, revealed that **countries are still falling short on meeting their national commitments towards agricultural transformation and climate resilience**. In particular, the BR highlighted poor results in the commitment areas dedicated to reducing hunger, halving poverty, and enhancing the resilience of livelihoods and production systems in the face of climate variability and other related risks. In addition, the overall results of the BR illustrate that the pace at which implementation of Comprehensive Africa Agriculture Development Programme (CAADP) is taking place on the ground is not good enough to lead to the intended food and climate goals of the continent.

Emphasis therefore needs to be placed on tangible actions and intervention areas that can lead to accelerating CAADP implementation and directly support Africa in building its resilient food system. There is a large evidence base, and many country case examples, that highlight the key benefits that climate-smart agricultural (CSA) approaches and innovations can bring to the continent. Through enhanced planning, integration, ownership, implementation and scaling, CSA offers African countries practical solutions to realise the multiple goals set out in countries national agricultural and development plans, the CAADP Agenda, and more broadly within the continent's Agenda 2063.

CSA practices and technologies can simultaneously increase Africa's agricultural productivity, promote its climate adaptation, reduce carbon emissions and ultimately enhance the resilience of food systems throughout the continent. These CSA objectives directly feed into Malabo Commitments 3, 4 and 6 which address hunger, poverty, and climate resilience respectively. In addition, increased attention in building systemic resilience and managing climate risks will not only help to address Africa's existing and underlying vulnerabilities and governance concerns, but also help to implement policy and programmatic changes needed to strengthen the continents holistic approach to food systems to ultimately achieve food and nutrition security (FNS) for all.

However, while **CSA has been widely embraced as a guiding framework for adaptation and mitigation action for the agricultural sector, the current pace of transformation is deemed inadequate to meet the food, agricultural, nutrient and climate challenges and needs facing the continent**. Despite successful projects and initiatives, the adoption and scaling of CSA technologies and practices across many countries in Africa remains poor.[2] As such, this paper calls African governments to support and strengthen actions that prioritise increased productivity, resilience and livelihoods opportunities of smallholder farmers. For example, national and regional investment plans must increasingly incorporate CSA objectives and more action must be taken to expand programmes that have proven impactful and scalable. In addition, resources – both private and public - need to be dedicated specifically to CSA interventions that support implementation and scaling. This includes support for capacity building and training to drive the CSA agenda at multiple scales – including at the level of the farm, landscape, the market, and at the national, regional and global policy levels.

This briefing paper provides practical guidance and key recommendations to member countries, and Africa at large, on implementing a comprehensive CSA approach. It discusses successful country cases and highlights the necessary enabling conditions for effective CSA scaling. It also suggests key areas of focus for countries hoping to adopt, scale and finance these innovative practices. These include activities

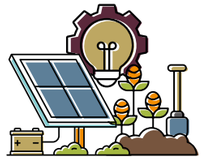
to strengthen policy coherence, build capacity development and inclusion, enhance partnerships and dialogue, support research and development and market access, and increase financial provisioning.

Significant evidence exists to guide countries on this journey and there are many innovative agricultural practices and success stories that need to be scaled across countries and contexts.

SECTION 1
Africa's policy roadmap to address agricultural transformation and food security

SECTION 2
The performance of countries in achieving the Malabo Commitments

SECTION 3
Enhancing the delivery of CAADP through re-invigorating CSA in Africa



SECTION 4
Promoting the adoption and implementation of CSA in African countries

SECTION 5
Scaling the adoption of CSA

Key recommendations to support CSA implementation and scaling

- **Strengthen CSA policy coherence and mainstream CSA** within climate, agricultural and development planning and budgeting processes.
- **Enhance the capacity of institutions responsible for planning and implementing** CSA activities at the local and national levels.
- **Enhance sectoral and stakeholder collaboration** at all levels, including through enhanced institutional coordination and multistakeholder platforms.
- **Unlock new and innovative financial resources and channels** to support CSA implementation, such as responsible banking, impact funds and global specific funds.
- **Engage local farmers** to ensure CSA interventions are context appropriate and respond effectively to their needs and priorities.
- **Bundle CSA technologies and practices** for holistic solutions that demonstrate multiple development gains and maximise benefits across stakeholder groupings.
- **Use information and communications technology (ICT)** to share market and agro-weather information with smallholder farmers to enable them to make anticipatory and informed decisions.
- **Communicate successful, bankable and evidence-based CSA practices and technologies** to encourage large-scale investment.
- **Develop and revise robust CSA profiles and investment plans** as key drivers of CSA implementation and coordination.
- **Align CSA investment plans with national planning instruments**, such as existing climate policy processes and agricultural policies, as well as with the CAADP process broadly.

Section 1

Africa's policy roadmap to address agricultural transformation and food security

In **2003, the CAADP was adopted as the flagship policy framework for agricultural development and FNS in Africa**. After 10 years of the implementation of CAADP, the African Heads of state and government appraised the extent of achievement under it and recommitted to its basic principles in a 2014 declaration known as the Malabo Declaration on Accelerated Agricultural Growth and Transformation (hereafter to be referred to as the Malabo Declaration).

The Malabo Declaration sets out clear principles and targets for the period 2015-2025. Amongst these are seven commitments towards achieving development and economic growth objectives, including ending hunger, tripling intra-African trade in agricultural goods and services, ensuring that agriculture contributes significantly to poverty reduction, as well as resilience building and climate change adaptation.

Figure 1. The African Union's Seven Malabo Commitments

The Malabo Declaration is achieved through CAADP country processes which **supports the domestication of countries' National Agriculture Plans (NAPs)** and their associated National Agricultural Investment Plans (NAIPs). While these plans are intended to be closely aligned with other national planning frameworks and encourage inter-ministerial coordination and inclusive partnership development, countries vary in their levels of adoption and implementation. Unfortunately, thus far, not all Member States have fully embraced this process and many countries are failing to meet the targets set under Malabo. **The Malabo Implementation Strategy and Roadmap** is linked with the CAADP Results Framework 2015-2025, an essential component of CAADP's implementation and accountability process. **This Framework calls countries, regional economic communities (RECs) and continental level actors to conduct biennial agricultural reviews**[i] that involve tracking, monitoring and reporting on implementation progress. Through the development of indicators, baseline data and targets, this Framework serves to guide the development, planning and implementation of investments in agriculture and food systems, as well as to foster alignment and harmonisation of agricultural initiatives across sectors. In addition, this review process enhances peer review, learning and dialogue among national, regional and continental state and non-state actors. The first consolidated report based on the CAADP Results Framework was produced in 2017. Since then, there have been a total of three biennial reports endorsed by the African Union Commission (AUC).

Although the **BR process is a valuable means for understanding CAADP's progress, there is an urgent need to initiate policy and programmatic reforms** in countries where BR results are poor. In addition, this process should help countries improve the implementation of the key intervention areas highlighted in the review, to maximise their impact. For this reason, the 3rd BR review was titled ***"Accelerating CAADP Implementation for a Resilient African Food System"*** aimed to specifically support evidence-based reflection and adaptive implementation of the Malabo Declaration.

BOX 1: The CAADP Biennial Review process has sparked policy and programmatic changes in some African countries

Following the first and second BRs in 2017 and 2019, respectively, the review process has sparked **actions to improve the performance of countries towards meeting the Malabo goals**.[3] For example, Lesotho and Mozambique have recommitted to allocate at least 10% of their national budget to the agriculture sector. In addition, Mozambique and Togo have incorporated BR indicators in their national agricultural surveys, while Côte d'Ivoire and Niger have adopted laws to promote private sector agriculture investments. Furthermore, in over 10 countries, governments have established dedicated data clusters, made up of local experts that span the different Malabo commitments, to lead the BR data sourcing and reporting effort. The data clusters have been instrumental in improving reporting rates and data quality in some countries. Mozambique has also worked to improve its agriculture sector coordination and planning by issuing a decree to formalize and reinvigorate its Agriculture Sector Coordination Committee. Today this Committee operates as a decentralised multistakeholder platform aiming to strengthen Mozambique's NAIP processes through consultation with key stakeholders, as well as in alignment with the objectives and targets recommended in the BR.

However, while there are cases where changes have occurred, **much effort is still needed to raise awareness of the BR results among country stakeholders and to implement the recommended policy and programmatic adjustments to improve countries' performances**. This includes, amongst others, matching political will with actual budgetary investments; the promotion of cross-country learning; the improvement of quality data, analysis and reporting, as well as aligning existing country processes and the BR (the CAADP process is yet to be fully anchored in NAIPs). In addition, many countries still need to improve the participatory nature of developing their country action plans and co-identifying priority areas and actions to achieve sustainable transformation in the agricultural sector.

[i] The Inaugural Biennial Review report was drafted in 2018, followed by the 2nd Biennial Review report in 2020, and most recently, in 2022, the 3rd Biennial Review was conducted.

BOX 2: The AU-CAADP Business Plan

To help achieve the commitments outlined in the Malabo Declaration, as well as support the effective implementation of the CAADP, the **AU has developed a strategic Business Plan**. This is the principal framing document that **guides the strategic direction of the AU, its member states and partners, towards enhanced implementation**. Through setting out consolidated and harmonised priority programme areas and strategies for championing and catalysing Africa's goals and targets, the Business Plan works towards an action-orientated agenda that supports agricultural transformation. It is the intention of the Business Plan to highlight key practical priorities, programmes, strategies and policies for implementation by the AU institutions that ***"will make things happen"***, with a clear focus on results and action.

A review of the first AU Business Plan (2017-2021) was undertaken in 2021.[ii] The findings of this review chartered the way forward for the preparation of the 2nd AU Business Plan (2022-2025).

The Business Plan priority programmes and their components are aligned with the 7 Malabo commitments. Amongst others, the Plan highlights 5 strategic drivers/ key thematic priority intervention areas to guide CAADP implementation.

These include:

1. The commercialisation and modernisation of smallholder agriculture by intensification of market linked production.
2. Addressing FNS within the context of agricultural food system development.
3. Expanding and linking domestic markets to regional markets to ensure market stability and reduce dependence on global food markets.
4. Increasing resilience through coping and adaptation measures, including the promotion of risk mitigation and shock reduction measures especially those that improve the functioning of markets.
5. Improving the management of natural resources and permit increased participation of local communities, civil society organisations and non-state actors.

Importantly, the Plan seeks to align and guide all partners – national governments, regional economic communities s, development partners, and other CAADP partners – to coordinate their activities and actions around the priority areas. This includes a renewed institutional arrangement in which all stakeholders can play an increased role in facilitating implementation of the Business Plan. The Business Plan also provides a four-year roadmap and operational plan and a recommended budget.

[ii] Some of the key lessons from this review include a need to enhance coordination; build capacity; promote ownership and support, strengthen planning systems, inclusivity and partnerships; improve governance and financing; document lessons to inform implementation; and improve adaptive M and E.

Section 2

The performance of countries in achieving the Malabo Commitments

Figure 2. The CAADP biennial review process[4]

Objective

Evaluate country performance towards achieving the CAADP Malabo goals and targets by 2025.

1st Biennial Review (2017)		2nd Biennial Review (2019)		3rd Biennial Review (2021)
7 thematic areas		**7** thematic areas		**7** thematic areas
23 performance categories	**+1**	**24** performance categories	**+2**	**24** performance categories
43 indicators	**+4**	**47** indicators		**49** indicators

The third BR was conducted in 2022, reporting country performance against **46 indicators**. **51 countries, out of 55, reported areas of progress** (up from 49 countries in 2019 and 43 in 2017). In addition, **25 countries have increased their overall score between 2019 and 2021**, and while not on track, the majority of countries are making progress towards their goals and targets by 2025. However, of the 51 reporting countries, only one country, namely Rwanda, is on-track to meet all 7 Malabo commitments by 2025.

Progress on Commitment 06: 'Enhancing Resilience to Climate Variability'

According to the third BR, only 15 countries, out of a total of 51, are on-track to achieve Commitment 6 which specifically mentions the need to strengthen resilience of livelihoods and production systems in the face of climate change. Within this commitment, a target is set to ensure that at least 30% of farm/

pastoral households are resilient to shocks by 2025. It includes CSA, sustainable land management, as well as agriculture and food insecurity risk management as tools to achieving this goal. It also includes targets to enhance investments for resilience building initiatives, including social security for rural workers and other vulnerable social groups, and other initiatives to protect vulnerable ecosystems. Commitment 6 also has a target to mainstream climate adaptation, resilience and risk management into country's policies, strategies and investment plans.

- Ensure that by 2025, **at least 30% of farm/pastoral households** are resilient to shocks.
- Enhance **investments for resilience initiatives**.
- Mainstream **resilience and risk management**.

This Commitment is tracked through 3 indicators:

1. The share of agricultural land and water under sustainable land management practices, including CSA practices;
2. The existence of government budget lines to respond to spending needs on resilience building initiatives; and
3. The percentage of farm, pastoral, and fisher households that have improved their resilience capacity to climate and weather-related shocks.

Of these 3 indicators, only 16 countries are on-track to meet indicator 1 on sustainable land practices. Countries performed badly on indicator 2, with a low performance being attributed to the impact of the coronavirus disease pandemic on governments' investment on resilience building initiatives. The 3rd indicator is not reported by countries due to a lack of data in their national agricultural systems.

For example, only 20 and 31 Member States were able to report on reduction of post-harvest losses and the proportion of women empowered in agriculture, respectively, yet these issues are key components in the Malabo Declaration.

It is evident from these scores that much work is still needed by AU Member States to improve their performance related to Commitment 6. This includes the need to rapidly improve and sustain their investments in resilience building initiatives, with attention to measures that increase their share of land under sustainable land and water management practices (by 30% by 2025, from the 2015 baseline). This includes the number of countries that have successfully adopted and scaled CSA initiatives and practices. In addition, AU Member States and technical partners need to invest in strengthening national data systems and capacities to enable them to generate adequate and quality data on all the CAADP indicators to sustain production of high-quality BR reports.

To assist this process, partners should allocate sufficient resources to support the technical working groups in developing the BR reports. In addition, governments must continue to establish inclusive data clusters, with local experts leading the data gathering and reporting process. Many governments are calling for support from non-state actors to help provide data to inform the BR. In addition, the BR may be supplemented with additional indicators related to climate resilience to better inform a more comprehensive planning, implementation, and tracking of transforming Africa's food systems.

Progress on Commitment 03: 'End Hunger by 2025'

- At least **double agricultural productivity** (focusing on inputs, irrigation, mechanization).
- **Reduce Post-Harvest Losses** at least **by half** by 2025.
- Improve Nutrition: **reduce stunting to 10%** and **underweight to 5% by 2025**.

Under Commitment 3 countries have pledged to improve access to agricultural inputs and technologies; increase agricultural productivity; reduce post-harvest losses; improve food safety, reduce food and nutrition insecurity; and enhance social protection coverage for vulnerable groups. However, the 3rd BR revealed that only Kenya was on track to achieving this commitment. Countries scored poorly, for example, with only 7 countries managing to show progress related to the doubling of the growth rates of their 5 national commodities by 2025, and only 7.3% of countries allocating a certain threshold of budget towards social protection. See Annex 1 for more detailed information on these scores.

Progress on Commitment 04: To halve poverty through agriculture by 2025

While this is a key goal of Member States, the 3rd BR found that only 2 of 51 countries were on track to achieving this commitment. Countries scored poorly on related indicators, including on women empowered in agriculture. Only 10 out of 51 countries were on track to meet the performance targets related to women's enhanced decision-making positions or their empowerment related to access of productive resources/ control of use of their income. In addition, only in 50% of countries are youth at least 5% engaged in new job opportunities in agriculture value chains. For further information, please see Annex 2.

- Sustain annual **agricultural GDP growth of at least 6%**.
- Establish / strengthen **inclusive public-private partnerships for at least 5 priority agricultural commodity value chains** with strong linkage to smallholder agriculture.
- Create **job opportunities for at least 30% of the youth** in agricultural value chains.
- Preferential entry and participation by **women and youth** in gainful and attractive agri-business.

From the above information it is evident that the number of countries on track to achieving Malabo Commitments is very low. The results and recommendations of the 3rd BR are an important tool to guide countries to urgently enact policy and programmatic changes and to devise plans and pathways to alter their course of action towards better outcomes for climate-resilient agricultural transformation.

To enhance the delivery of commitment 3, 4 and 6, countries can accelerate the implementation and scaling of CSA. CSA is a key driver for agricultural transformation and can play an important role in addressing the interlinked challenges of food security, farmer resilience and productivity, as well as climate change adaptation and mitigation. Moreover, the implementation and scaling of CSA practices and technologies can enhance the resilience of food systems throughout the continent.

Through increased attention to building resilience in rural and urban areas and managing climate risks, existing and underlying vulnerabilities and weaknesses in food systems and governance will be addressed. In addition, the objectives of CSA are well aligned with key areas identified in the first ten-year implementation plan of the AU Agenda 2063, as well as three of the five priority areas outlined in the AU Business Plan (2022-2025) – namely, to increase agricultural productivity and strengthen nutrition and food security; increase inclusive and sustainable agricultural production and accelerated agricultural growth; and enhance resilience to climate change and improved risk management.

Therefore, **enhanced CSA implementation can be an effective means to accelerate CAADP's delivery for maximum impact** and these initiatives should be included and scaled in country and regional development plans. However, while African countries, RECs, and other actors, have demonstrated political support for CSA adoption (such as making high level statements and developing strategies and policies to promote CSA), these intentions need to be translated and reflected in the quantity and quality of resources – both public and private - dedicated specifically to interventions that support their implementation and scaling. In addition, political will needs to be reflected in support for capacity building and training to drive the CSA agenda at country and regional level.

The following sections of this report will discuss the key opportunities linked to CSA for African countries, providing practical guidance on strengthening the enabling conditions for effective CSA implementation and scaling.

Section 3

Enhancing the delivery of CAADP through re-invigorating CSA in Africa

Given its reliance on rainfed agriculture and projected climatic and weather changes, **Africa faces multidimensional challenges in ensuring FNS, as well as preserving its ecosystems**. This challenge can be addressed through the adoption of more resilient, productive, sustainable and equitable agriculture, or CSA. CSA offers Africa a 'triple win' solution by increasing smallholder farmers' resilience and productivity and reducing climate-related risks.

Figure 3. Climate-smart agriculture offers a 'triple win' solution

CSA practices aim to achieve three closely related objectives[5]

Sustainably increase **agricultural productivity** and incomes from crops, livestock and fish, without having a negative impact on the environment which, in turn, improves food and nutritional security.

Reduce the exposure of farmers to short-term risks and build their capacity **to adapt to shocks and longer-term stresses**, thereby enhancing their resilience.

Reduce and/or remove greenhouse gas emissions, wherever possible, by avoiding deforestation and managing soils and trees to maximise their potential as carbon sinks.

Figure 4. The three pillars of climate-smart agriculture[6]

BOX 3: The implementation and scaling of CSA practices and technologies can enhance the resilience of food systems in Africa.

Resilience is defined as the capacity to prepare for, respond to, and recover from the impacts of hazardous climatic events, while incurring minimal damage to societal wellbeing, the economy and the environment. **Building climate resilience requires holistic, system-wide, multi-dimensional approaches to enhance communities' social, human, natural, physical and financial capacities to cope with and recover from the impacts of climate change.**[7]

A critical component of resilience is the need to secure or maintain a sustainable livelihood, which is dependent on access to a variety of livelihood resources e.g. human, natural, physical, social, and institutional capital. Livelihood assets can be accumulated and exchanged at the community or household level and used to minimise the impacts of climate change.

Table 1. Types of livelihood capital and examples of relevant CSA interventions[8]

Capital type	Description	Examples of interventions
Human	Personal development ability including education, skills, and technical competence	■ Farmer field schools ■ Demonstration plots ■ Integrated weather and market advisory services
Natural	Stocks of natural assets such as soil, air, water, and all living things that sustain life	■ Protected areas ■ Biogas ■ Integrated soil fertility management ■ Agroforestry
Physical	Man-made goods that assist in the production process rather than being outputs themselves	■ Flood control and erosion protection structures ■ Grain storage infrastructure (e.g. silos) ■ Irrigation equipment
Social	Ability of farmers and other actors to secure benefits through social networks	■ Farmers' cooperatives ■ Social protection systems ■ Water-user associations
Institutional	Formal and informal institutions that reduce uncertainty and influence agricultural outcomes	■ Farmer input support programmes ■ Warehouse receipt systems

CSA is not just a set of practices, but *"an approach to develop the technical policy and investment conditions to achieve sustainable agricultural development for food security under climate change"*.[9] Therefore, CSA entry points vary from the development of technologies and practices to climate change models and scenarios, information technologies, insurance schemes, and processes to strengthen the institutional and political enabling environment, with a focus on marginalised groups.[10]

CSA can be implemented at various levels, including at the farm level (through crop diversification, livelihood diversification and the introduction of new varieties); at the landscape level (through watershed management and restoration of degraded rangelands); at the market level (by introducing climate-smart and sustainable value chains); and regional, national and global policy level (through climate change policies and long-term climate resilient strategy).

Examples of CSA practices

According to the CGIAR CSA resources tool, there are seven types of CSA interventions, each of which comprise a variety of practices and technologies. In the context of CSA, a practice is the application of a method, such as intercropping or mulching, and a technology is a new material used, such as improved seeds or efficient irrigation equipment.

Table 2. Types of livelihood capital and examples of relevant CSA interventions[11]

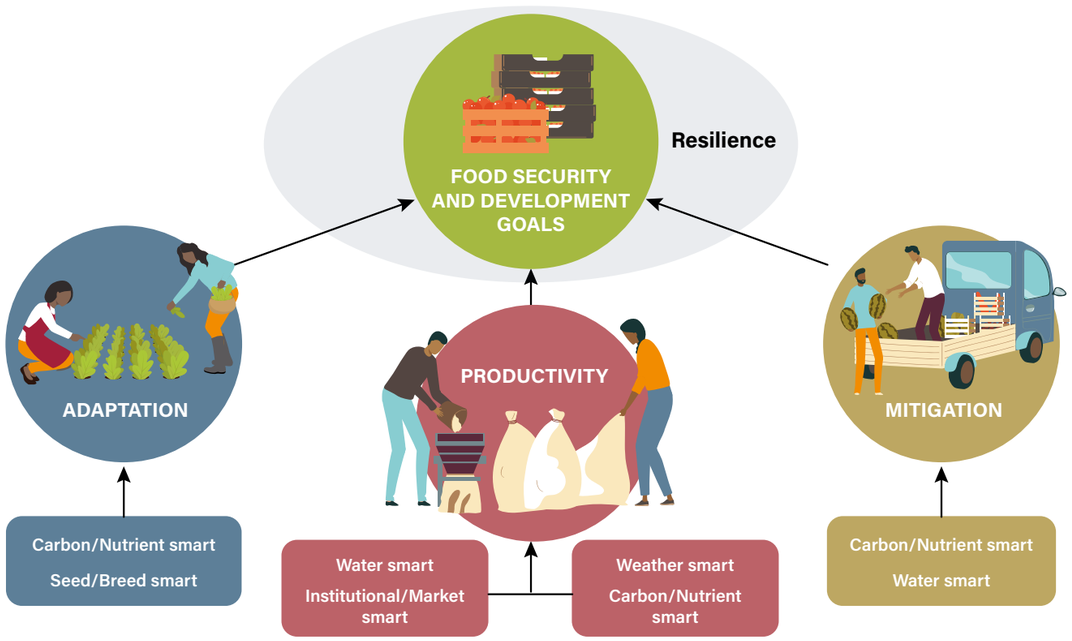
Type of CSA intervention	CSA practices and technologies
Crop management	▪ Intercropping with legumes ▪ Crop rotation ▪ Improved crop varieties ▪ Improved storage techniques ▪ Crop diversification
Livestock management	▪ Pasture management (e.g. rotational grazing) ▪ Manure management ▪ Improved feeding strategies ▪ Improved breeds ▪ Integrated pest and disease control
Aquaculture and fisheries management	▪ Improved fish stock ▪ Water sharing systems ▪ Regulated fuel use ▪ Physical/biological structures for sea level rise or storm surges ▪ Disease management
Soil management	▪ Conservation tillage ▪ Contour planting ▪ Cover crops ▪ Mulching ▪ Intercropping with legumes
Water management	▪ Water harvesting and storage ▪ Efficient irrigation systems (e.g. drip) ▪ Water efficient crop varieties and livestock breeds ▪ Soil moisture retention practices (e.g. mulching) ▪ Alternate wetting and drying (rice)
Forestry and agroforestry	▪ Boundary trees, hedgerows and windbreaks ▪ Silvopasture ▪ Nitrogen fixing trees ▪ Multipurpose trees (e.g. forage, fruit, wood) ▪ Fertiliser shrubs
Energy management	▪ Zero tillage ▪ Renewable energy (e.g. solar pumps) ▪ Fuel efficient engines ▪ Insulation of cool storage ▪ Biogas

CSA smartness

CSA technologies and practices promoted for climate change adaptation and mitigation are categorised into different 'smartness criteria':[12]

- **Weather and knowledge-smart** – Generate and disseminate weather and meteorological information to farmers to assist them in making informed decisions. This may involve the use of ICT and/or the media (e.g. radio, television).
- **Water-smart** – Minimise yield losses due to extreme weather conditions by adopting appropriate technologies and practices e.g. rainwater harvesting and storage, drip irrigation, drainage management, cover crops, and flood/drought tolerant varieties.
- **Nutrient/carbon-smart** – Reduce greenhouse gas emissions, e.g. soil nutrition management using organic fertiliser, intercropping, residue retention, manure management, and zero/minimum tillage.
- **Seed/breed smart** – Enhance productivity by adopting high quality seeds of locally adapted varieties and improved livestock breeds e.g. drought/disease/flood tolerant crop varieties, heat tolerant livestock breeds, pest and disease resistant cultivars, and nutrient efficient cultivars.
- **Institution/market-smart** – Strengthen institutions to assist farmers in accessing resources, information and markets as well as to address gender inequality, e.g. inter-sectoral linkages, capacity building, financial services, and market information dissemination.

Figure 5. All climate-smart options contribute to food security and development goals



All climate-smart options ultimately enhance resilience to climate change and contribute to food security and development goals.

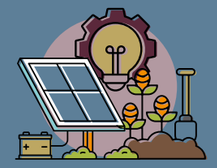
BOX 4: Cost-benefit analysis of CSA practices

A **cost-benefit analysis can be used to compare the costs and returns of any given CSA practice in relation to those already existing** (or Business as Usual). This is an important tool as farmers apply conventional practices to cope with climate change variabilities, some of which are effective whilst others are not. There are three cost-benefit analysis indicators, the Net Present Value (NPV), Internal Rate of Return (IRR), and payback period to show the profitability associated with an improved practice or technology. The NPV is used to understand the incremental flow of net benefits from the practice over its lifecycle, whereas the IRR is the discount rate that equates NPV to 0. A higher IRR signifies a high profitability potential. The payback period is the time in years required to repay the initial investment.

COUNTRY CASE: NIGERIA

A cost-benefit analysis was conducted for the use of drought-tolerant potato varieties in Nigeria.[13] The CSA intervention contributes to both climate change adaptation and improved productivity. It was found that the use of drought-tolerant potato varieties required around 43% and 32% more capital for installation and maintenance respectively, when compared with BAU.

The main benefit arising from the use of drought-tolerant tuber varieties was the decrease in the operation costs and the increase (nearly 100%) in yield per hectare. The NPV associated with the use of drought tolerant varieties was US$ 6,301 over its lifecycle per hectare with an IRR of 196%, which is higher than the prevailing discount rate of 10%. The payback period for investing in the use of drought-tolerant potato varieties was calculated as two years and risk assessment modelling found it to be a moderate-risk investment (30%). Therefore, even though the CSA innovation was seen as promising, without sufficient financial support most farmers would be deterred from adopting the improved varieties. Therefore, despite the benefits of improved yields, the high installation and maintenance costs in combination with the long payback period were seen as barriers to adoption and scaling of the CSA innovation amongst smallholder farmers in Nigeria.



Section 4

Promoting the adoption and implementation of CSA across Africa in African countries

For **CSA implementation** to be effective it is imperative that the following components are considered in planning and operationalisation:

1. A supportive and **enabling institutional and policy environment**;
2. System-wide, integrated and inclusive **capacity development**;
3. **Innovative partnerships** that are mutually beneficial, inclusive and transparent;
4. Functional **multi-stakeholder platforms** (MSPs) to enhance communication, dialogue and knowledge sharing;
5. Meaningful **gender and youth inclusion**;
6. **Research** based on farmers' needs and used to inform policy development;
7. **Diverse markets** to enhance farmers' resilience to climate change impacts;
8. Adequate **financial provisioning** through public and private channels;
9. **Bundling of CSA** practices to maximise on-farm benefits and ensure complementarity of practices.

A supportive and enabling institutional and policy environment for CSA

Over the past decade, **CSA has become an increasingly well-recognised approach to address food security and developmental challenges**. Stemming from the Malabo Declaration, in 2014, African leaders and member states adopted the Africa CSA Vision 25X25, which aims to support at least 25 million farm households in practicing CSA by 2025. This CSA vision has been an important vehicle to help achieve the first ten-year Implementation Plan of Africa's Agenda 2063.

In addition, in 2014, the **AU endorsed the NEPAD Programme on CSA**, with a core mandate to develop the African CSA Coordination Platform. In turn, NEPAD convened the Africa CSA Alliance to drive its Vision 25X25, facilitating open dialogue and enhancing alignment of efforts for implementing and scaling CSA practices and technologies in Africa.[14] Also, the adoption of the Adaptation of African Agriculture Initiative emphasised the importance of adaptation in Africa's key productive sectors,

with the agricultural sector receiving priority. This Initiative further cements the common agenda on CSA at an Africa-wide level and aims to attract finance for the adaptation priorities of member countries in the agriculture sector. More recently in 2022, the AU adopted its Climate Change and Resilient Development Strategy and Action Plan (2022-2032) which includes key sectors where systemic transitions are required. Agriculture, land use and food systems are all highlighted within the Strategy as key areas to address in Africa's climate strategy. Farmers and farming organisations are also clearly mentioned as key role players in this continental climate response.

According to a recent AICCRA policy coherence review,[15] while varying in efforts, **Africa's RECs have developed multiple initiatives to strengthen and guide their regional responses to climate change and agriculture**. This includes regional agricultural policies that intend to promote the harmonisation of national agricultural policies, as well as climate change strategies, and other resilient development strategies. In terms of policy integration for CSA, some regions have made more headway than others. For example, the Economic Community of West African States (ECOWAS) has made good progress in developing integrated regional policy frameworks and developing mechanisms to achieve sustainable and inclusive food systems. The revised 2015 ECOWAS Agricultural Policy (ECOWAP) sets out a new Strategic Framework for ECOWAP (2015-2025) which addresses the interlinkages of food security, nutrition, climate change, youth employment in agriculture and gender, amongst others. To implement ECOWAP, ECOWAS developed a Regional Agricultural Investment Plan and Food and Nutrition Security (RAIPFNS), which establishes a mechanism in the review process of member countries to ensure that plans integrate cross-cutting themes beyond agricultural development, such as nutrition, resilience and sustainable and inclusive food systems. ECOWAS has also implemented specific sustainability indicators and criteria against which these policies are reviewed. One criterion is that National Agricultural Investment Plans and Food Nutrition Security (NAIP-FNS) must take account of climate change commitments under the Nationally Determined Contributions (NDCs). ECOWAS also supports capacity development at the national level to integrate various issues into the formulation of their NAIP-FNS. In 2021, ECOWAS worked towards developing a long-term Regional Climate Strategy on climate action in West Africa. Other policy tools have been developed in ECOWAS to foster improved synergies, coherence and effectiveness in resilience and environmental sustainability initiatives. This includes the Global Alliance for Resilience Initiative (AGIR), a policy tool aimed at channelling the efforts of regional and international stakeholders towards a common results framework. In addition, AGIR, through its regional roadmap, encourages each country to conduct an inclusive dialogue process to formulate its own National Resilience Priorities.

In addition to **ECOWAS, the Southern African Development Community (SADC) has set up the Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA) to coordinate CSA at the regional level, as well as to play a coordinating role to lead and sustain actions in promoting the resilience of farmers, women and farming systems of the region in the face of climate change**. CCARDESA's Climate Change Adaptation Strategy specifically highlights the important role it must play in mainstreaming adaptation and CSA, strengthening capacity by fostering national development planning processes to align CSA practices. There are also other mechanisms that SADC has developed to encourage policy coordination and synergies, including the Council of Ministers platform, the Inter-Ministerial Committee, Summits of Heads of States and Sector Committees.

In addition, **CSA policy integration must also take place at the national level**. Some countries have made substantial progress in terms of developing a robust and supportive policy environment. Examples include South Africa that has a well-developed policy architecture to support the integration of climate, agriculture and food systems into policy design at the national level. Besides an array of policy frameworks (including a national vision for CSA, a draft climate change bill, a Climate Change Sector Plan for Agriculture, Forestry, and Fisheries, etc.), South Africa also has a vast institutional apparatus to support inclusive planning and enhance policy coherence. For example, its low carbon, climate resilient transition is being led by the National Planning Commission and various national climate structures and intergovernmental processes have been established to enhance intergovernmental and multi-sectoral coordination. In September 2020, South Africa established a Presidential Climate Change Coordinating Commission to coordinate and oversee its just climate and energy transition.

In addition, South Africa has a national CSA Steering Committee, involving several key departments, such as water, science, technology, treasury, as well as the department of monitoring and evaluation, the private sector and farmer. In addition, South Africa's National Climate Change Response Policy requires sectors to develop their own adaptation and mitigation sector plans, in compliance with the national regulatory legislation and the National Development Plan. Other countries have also been working to include CSA in their NDCs and Low Emissions Development Pathways. Benin, for example, has included CSA goals in its recent Low Carbon and Climate Resilient Development Strategy (2016-2025), while Rwanda has made headway by including agriculture-sector mitigation and adaptation actions within its 2020 NDC. Malawi similarly has set ambitious agriculture-related mitigation targets within its NDC.

Table 3. Summary of recommendations to support policy coherence across African countries

No.	Suggested actions
01	Mainstream CSA into Africa's green and blue economy growth strategies, at all levels.
02	Promote the integration of CSA programmes within NAIPs to ensure a stronger focus on climate change and extreme weather events.
03	Develop long-term, economy-wide adaptation and mitigation sector plans, in compliance with national regulatory legislation and national development plans.
04	Integrate CSA into mid- to long-term country investment and development plans, including sectoral budgets and sectoral development plans, sub-national budgets and sub-national development plans, and national budgets and national development plans.
05	Develop guidelines to enhance economywide and sector-based Long-Term Strategies, including a toolkit of suggested policy coherence interventions and actions.
06	Support the strengthening and revision of NDCs by adopting targets and indicators for agricultural mitigation and adaptation interventions.
07	Develop CSA investment strategies and programmes within the context of the NAIPs and NDCs to enhance the alignment of CSA programmes with national public sector budgets.

System-wide, integrated and inclusive capacity development

CSA is knowledge-intensive and requires multi-sectoral and multi-actor collaboration. Therefore, countries need appropriate system-wide capacities for sustainable and transformational transitions towards CSA at scale. This can be achieved through capacity development that is integrated and inclusive and that empowers people, strengthens organisations, institutions and networks as well as enhances the enabling policy environment. Implementing a system-wide capacity development approach requires working with stakeholders to:

- Undertake system-wide capacity assessments;
- Develop targeted capacity development interventions; and
- Monitor, evaluate and document progress.

System-wide capacity development is applied across three different dimensions and is based on assessed needs:

- **Individual** (e.g. knowledge, skills, and competencies) – capacity can be built through the continuous engagement of national and local actors, and educational and training institutions. Innovative capacity building initiatives such as Farmer Field Schools can be established for developing CSA capacity at the local level. The schools provide a participatory and interactive learning environment that encourages problem solving and discovery-based learning. It is important to note that capacity development typically focuses on CSA practices and technologies, but soft skills are also necessary. For example, smallholder farmers (particularly women, youth and disadvantaged groups) may need their capacity built to access financial services or to engage effectively in climate policy processes.
- **Organisations, institutions and networks** (e.g. performance, mandates and procedures, cross-sectoral, horizontal, vertical and multi-stakeholder coordination and networks) – align mandates and improve horizontal and vertical coordination within and amongst sectors, stakeholders, organisations, institutions and supporting networks. Focus should also be placed on strengthening local institutions at the landscape level to foster coordination, collaboration, ownership, and commitment for joint CSA action.
- **Enabling environment** (e.g. regulatory and policy frameworks, institutional linkages and political commitment) – ensure that policy is coherent, CSA is mainstreamed in national policies and programmes, and science-policy linkages are established and undertaking of participatory governance assessments.

According to the Food and Agriculture Organization of the United Nations (FAO), there are three key areas of the CSA implementation approach that require capacity assessment and development. These include:

- **Information management capacity** needed to carry out timely data analyses to determine climate change risk and vulnerabilities and advise appropriate responses. This may include strengthening the capacities of national meteorological institutions, universities, and research institutions.
- **Research capacity** from multiple disciplines, such as agro-meteorology, science, agronomy and economics, to adequately build the evidence base for CSA implementation. The evidence base requires ongoing research to ensure that changes in the dynamic system are identified and timeously addressed. For example, this may require strengthening the capacities of central statistical offices to improve agricultural data collection. National capacities to analyse agricultural data may also need to be improved through the inclusion of climate change and agriculture into the curricula of higher education institutions. Capacity can also be built by partnering with international organisations involved in scientific and policy research.
- **Decision making capacity** to make evidence-based decisions, critical for successful CSA implementation, requiring continuous feedback loops between science and policy. Funding for CSA interventions typically requires monitoring and evaluation and the generation of robust evidence to demonstrate the performance of programmes. Capacity building may also be required by national institutions responsible for preparing CSA proposals for funding.

CAPACITY BUILDING FOR EXTENSION AGENTS

Increased access to CSA practices and technologies needs to be accompanied with the technical and agronomic information necessary to maximise the benefit of their usage. Capacity development initiatives need to improve CSA related skills, knowledge, and attitudes for both extensionists and farmers. Developing capacities using bottom-up and participatory approaches based on inclusive capacity assessments is imperative due to the context specificity of CSA.

Extension agents are a critical source of information and tools for farmers and are key actors in bringing national policy to the local level and CSA to scale. Extension agents need to become knowledge brokers for supporting decision making on CSA. Extension agents need to be aware of and understand the latest research on CSA to enable farmers to capitalise on strategies to cope with

climate change and variability in crop production. However, to provide effective support to farmers, extension agents themselves need to be supported by a conducive environment formed by appropriate policies, governance, legislation, infrastructure, financial and human resources, and strongly linked with local communities. Despite their importance, extension agents tend to be restricted by a lack of specific extension strategies or guidelines; inadequate personnel and funds, and a lack of capacities, tools and products; and generic extension manuals/guidelines.

To enable extension agents to effectively support farmers in adopting CSA practices and technologies the following should be considered:[16]

- **Enabling environment:** Extension agents need to engage with local institutions to gain political commitment to promote the CSA approach.
- **Organisational level:** Extension agents need to be aware of national level policies and action plans and have their capacity strengthened to become key knowledge brokers for supporting decision making on CSA.
- **Individual level:** Extension agents need to possess effective communication, networking, facilitation and partner engagement capacities to best support farmers in implementing CSA approaches.

BOX 5: Capacity support through strengthening the agency of local organisations in policy engagement

A challenge impeding greater climate advocacy amongst civil society and grassroot actors is the lack of policy capacity and engagement knowledge. Farmers, for example, often have limited understanding of the importance of climate policies which leads to a lack of appreciation of the strategic importance of participation in related policy processes, as well as potentially limited technical, human, and financial resources to effectively engage policy makers on a sustained basis, especially considering the drawn-out nature of the policy process. In addition, these opportunities tend to be monopolised by a relatively small group of actors who are well informed and have the necessary capacity to act.

Capacity development initiatives can help to provide technical training and partnership support to understand CSA-related global and regional policy processes. Through training and evidence-based research, entities like the African Group of Negotiators' Expert Support (AGNES), strengthen the technical capacities of African experts, institutions and governments to enhance their effective participation and influence in national, regional and global policy processes and decision making.

Capacity development related to the access to climate finance for CSA is also a priority. There are many entities operating in this space, including AUDA-NEPAD, who supports engagements with Green Climate Fund (GCF) accredited entities in government ministries in developing concept notes and project proposals for submission to the GCF, and CCARDESA, who recently conducted a country level assessment of climate finance readiness so that it could capacitate the SADC Secretariat, which would in turn capacitate member states.

Table 4. Summary of capacity development recommendations for African countries

No.	Suggested actions
01	Countries should undertake system-wide capacity assessments and use the results to develop targeted capacity development interventions.
02	Establish Farmer Field Schools or similar innovative capacity building initiatives for developing CSA capacity at the local level.
03	Assess the soft skill needs of farmers and roll out appropriate capacity building programmes (e.g. how to access finance).
04	Assess the information management needs of national meteorological institutions, universities and research institutions.
05	Determine the national capacities needed to analyse agricultural data and where necessary improve through the inclusion of climate change and agriculture into the curricula of higher education institutions.
06	Build the capacity of researchers and decision makers by partnering with international organisations engaged at the science-policy interface.
07	Identify research gaps for CSA implementation and the required capacities to fill them.
08	Assess the science-policy feedback loop in place for CSA and the capacity needs of relevant research and government actors.
09	Where required, build the capacity of national institutions responsible for preparing CSA proposals for funding.
10	Ensure agricultural extension agents have the necessary resources, knowledge, skills and capacity to support farmers in implementing CSA practices.

Innovative partnerships that are mutually beneficial, inclusive and transparent

Successful partnerships for CSA implementation and scaling build upon existing structures and mechanisms, are inclusive and participatory, are mutually beneficial to all stakeholders, and ensure transparency in decision-making processes.[17] Leveraging existing CSA initiatives and establishing partnerships with institutions already engaged in CSA is key to rapid uptake and scaling. Stakeholders tend to have differing interests in CSA interventions but have shared value in its successful scaling. The shared value encourages stakeholders to partner and leverage one another, bringing their comparative advantages to the partnership to achieve project objectives. For example, the private sector offers market information and the targeting of potential beneficiaries. Farmers' organisations provide access to farmer databases and information, which in turn benefits the private sector in market expansion.

Government agencies benefit from capacity-building interventions offered by development projects and programmes, as well as contributions to their objectives of enhancing agricultural productivity, food security and climate resilience and combating poverty. Agro-dealers benefit from CSA-linked business, e.g. increased orders from farmers for drought-tolerant seeds.

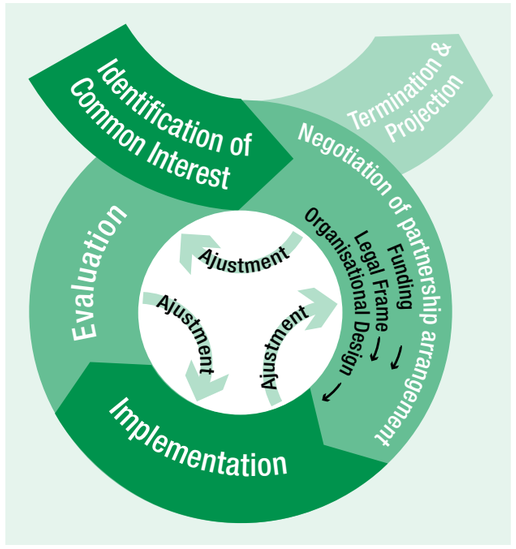
In addition to mutual benefits, inclusivity and transparency, successful partnerships for CSA implementation require:[18]

- **Private sector involvement** – to enhance sustainability;
- **Strong institutional leadership** – to garner interest for action and leverage financial incentives;
- **Financial incentives** - for private sector buy-in and investment; and
- **Existing value chain innovations** – provide mechanisms and processes to build upon.

Establishing partnerships for enhancing the adoption of CSA innovations involves:

- **Identifying the common interest** – such as a common challenge or market opportunity;
- **Negotiating a partnership contract** – discuss partnership activities, interests and capacities, assess the costs and benefits to each partner, source financing, and develop an organisational structure;
- **Implementation** – share knowledge, provide open access to information on resources used and progress made, address cultural barriers between partners, and determine a mid/long-term vision;
- **Monitoring and evaluation** – evaluate the use of funds relative to results, identify the strengths and weaknesses of the partnership and opportunities for improvement; and
- **Termination** – decide whether to terminate or continue the partnership.

Figure 6. Cycle for building partnerships[19]



BOX 6: Multilateral partnership for CSA scaling in Zambia

The Zambia Open University, Musika Development Initiatives (Musika), and the Professional Insurance Company of Zambia (PICZ) formed a multilateral partnership in collaboration with officers and field workers from the Ministry of Agriculture and Livestock to enhance the resilience of smallholder farmers through diversified, adaptive, climate smart production systems. Each partner had a specific role to play: the Zambia Open University ensured government engagement in the project, coordinated and implemented the project, and managed the research components; Musika mobilised farmers using existing staff, structures and networks previously established during the Vuna project;[iii] and PICZ developed a weather index insurance product for farmers and provided the digital platform for their registration.

Each partner benefited from the collaboration. PICZ attained new clients; Musika (which uses a market facilitation approach to link farmers with agribusinesses) mobilised new farmers for their market linkages; and Zambia Open University received training for their students, gained project management experience and generated research outcomes.

Table 5. Summary of recommendations for countries to strengthen partnership

No.	Suggested actions
01	Engage with prospective partners (e.g. government institutions, private sector players, non-governmental organisations) in the design and planning stages of the CSA initiative and communicate the mutual benefits for buy-in.
02	Identify charismatic and dynamic individuals within the partnership to champion the CSA initiative, generate interest and attract funding.
03	Establish financial incentives for private sector buy-in.
04	Identify and build upon existing value chains, partnerships and stakeholder relationships.

Functional multi-stakeholder platforms to enhance communication, dialogue and knowledge sharing

A key challenge to building climate resilience in Africa is the weak linkages between policymaking, climate research and implementation. MSPs present an opportunity to address this challenge by bringing actors together from different interest groups (e.g. government departments, farmers, private sector, financing institutions, research/ academia, civil society and partners) at national and subnational levels, to discuss shared issues, opportunities, policy actions

[iii] Musika previously implemented the DFID-funded project 'Vuna' to promote CSA through the creation of a supportive policy environment. Musika trained farmers and agro-dealers on the benefits of CSA, and the use of pesticides, herbicides and post-harvest technology.

and advocacy strategies for CSA implementation and scaling.[20] MSPs enable the sharing of information between diverse stakeholders and allow participatory approaches for influencing policy recommendations across multiple governance levels. Furthermore, MSPs enhance the science-policy interface by providing channels for improved communication and dialogue, thereby contributing to evidence-based policy making.

MSPs provide an arena for government officials and value chain actors, including the public and private sector, to communicate and collaborate. By working together and combining their expertise, stakeholders are better able to identify challenges and co-design solutions. The value of MSPs lies in:

- **Bringing together government, civil society and the private sector** to address complex challenges that no single entity has the ability, capacity or resources to efficiently achieve on their own.
- **Adopting a 'learning by doing' cyclical approach**, using biophysical and social feedback to shape policy, followed by further experimentation.
- Enhancing the **mobilisation and sharing** of knowledge, expertise, technologies, and financial resources to achieve an end goal.
- Contributing to **gender and social equity**, if well designed.
- Enhancing **project sustainability** by creating a long-term space for stakeholders to communicate.
- Generating **broader ownership, greater trust and understanding between actors**.

MSPs are not a new concept in Africa and there are numerous initiatives already addressing smallholder agriculture, food security, and related challenges, including:

- **Knowledge sharing** - Global Alliance for Climate Smart Agriculture and African Climate Smart Agriculture Alliance;
- **Targeted solutions** - Initiative for Smallholder Finance; and
- **Systems integration** (market/country level) - World Food Programme's Patient Procurement Platform and Rockefeller's YieldWise.

Collaborating with existing functional platforms, and where needed, developing new, action-focused partnerships, improves efficiency, and prevents oversaturation, competition, and stakeholder fatigue.[21]

Key lessons for successful MSPs for CSA include:

- **Prioritise challenges** through tools such as root cause analysis and scenarios;
- **Identify goals and agree on strategies**, including actions, roles and responsibilities;
- **Cultivate trust and commitment** by building consensus and political will;
- Ensure stakeholders have **adequate capacity for knowledge sharing**;
- **Secure financial resources and support**;
- **Co-design and implement detailed action plans**;
- **Generate evidence to revise relevant policy**; and
- **Ensure monitoring and feedback mechanisms**.

BOX 7: African CSA alliances, networks and other multi-stakeholder platforms

MSPs important forums for advocacy, experience sharing, peer learning and capacity development in agriculture resilience to climate change. It is within these platforms that CSA practitioners can engage policy makers, and ultimately contribute to enhanced policy formulation and implementation.

The Africa CSA Alliance was established in 2014 at the Malabo Summit to take stock of progress towards the AU CSA Vision 25x25. This pan-African, MSP facilitates peer exchange and learning, and seeks to align various climate change and agriculture programmes across Africa, at multiple scales. This Alliance is a collaborative partnership between numerous multilateral organisations and technical partners. This Alliance initiated the formation of other regional CSA Alliances, including the West Africa CSA Alliance, the Eastern Africa CSA Agricultural Platform, the Southern African CSA Alliance, as well as NEPAD International NGOs Alliance on CSA and the Africa CSA Youth Network.

At the national level there are also several platforms and alliances that have been created to spearhead and galvanise stakeholder involvement and participation for CSA. In Tanzania, for example, the Tanzanian CSA Alliance is used to discuss pertinent issues and then collectively advocate these challenges and needs to the government, to inform the basis of government and development partner interventions and policy decisions. Similarly, there is also a Kenyan multistakeholder platform for CSA, and multiple others across Africa. There are also MSPs that include African stakeholders, such as the Global Alliance for CSA, that can create transformational partnerships to encourage action and CSA policy implementation.

Table 6. Summary of recommendations for establishing successful MSPs

No.	Suggested actions
01	Identify existing MSPs and relationships relevant to the CSA agenda to leverage and build upon.
02	Prioritise challenges to the implementation of CSA interventions through tools such as root cause analysis and scenario planning.
03	Identify the goals of the CSA intervention and agree on a strategy (including actions, roles and responsibilities) for the way forward.
04	Cultivate trust and commitment between stakeholders by building consensus and political will.
05	Ensure stakeholders have adequate capacity for knowledge sharing.
06	Identify and secure financial sources and support.
07	Co-design and implement a detailed action plan for the CSA intervention.
08	Generate data and evidence to develop and/or revise relevant policy.
09	Establish monitoring and feedback mechanisms.

Gender and youth inclusivity in CSA

GENDER

Women are major contributors to Africa's agricultural sector, yet they face major gaps in capturing the benefits of CSA and are typically more vulnerable to climate change impacts. Women farmers have lower access to technologies, information, resources, and finance which impacts their agricultural output. The gender productivity gap in agriculture reduces countries' food security and has high economic costs. For example, UN Women estimates that the gender productivity gap in agriculture is US$ 100 million in Malawi, US$ 105 million in Tanzania, and US$ 57 million in Uganda.[22]

CSA adoption by women smallholder farmers in Africa remains low.[23] The influence of gender on CSA adoption is complex, locally specific, and involves multiple socio-cultural factors. For example, in patriarchal societies most productive assets required for climate resilience and adaptation are controlled by men. In customary marriages women tend to lose major productive assets upon the death of their husbands or divorce. Furthermore, CSA decision making is constrained by a lack of ownership of, access to and control of land and other productive assets. Women's empowerment in decision making therefore requires improvements in land ownership and access to productive assets to improve CSA adoption.

Women's adoption of CSA practices and technologies is further constrained by lower levels of literacy and education. As CSA is knowledge intensive, capacity-building strategies to improve CSA adoption need to be inclusive of people with differing levels of education and literacy.

Rural women are faced with increased responsibilities and workloads, especially in areas where climate change is driving the out-migration of men and young people. This increase in workload deters women from adopting new adaptive practices out of concern that their workload might increase further. It is therefore imperative that women have equitable access to CSA technologies that reduce their work burden and increase their productivity and therefore household food security and nutrition.

Figure 7. Understanding the gender- climate change – agriculture nexus[24]

Climate change impacts	Gender inequality implications
Crop failure	Household food provision; increased workload
Fuel shortage	Household fuel provision; increased time to collect fuelwood
Water scarcity	Household water provision; water contamination; increased time to collect water
Natural disasters	Women have a higher incidence of mortality
Disease	Lack of access to health care; increased burden as women provide care
Displacement	Forced migration increases women's vulnerability
Conflict	Loss of lives and livelihoods; violence against women

To enhance CSA adoption by women, the multifaceted local realities need to be understood. Workable solutions for making CSA initiatives gender equitable and transformative include:[25,26]

- **Strengthening the capacity of decision makers** in mainstreaming gender and social inclusivity for CSA through robust and responsive policies;
- **Establishing a continental mechanism to monitor progress on gender mainstreaming** within CSA interventions;
- Member States' governing bodies on agricultural and environmental issues should commit to **advancing gender equality and women's empowerment in CSA outcomes**;
- **National investment plans** should incorporate gender budgeting, women's leadership, and monitoring of gender outcomes;
- Working with **financial institutions to increase women's access to credit**; and
- Strengthening the role of **women in farmer cooperatives and businesses**.

It should be noted that gender is not the only discriminatory divide affecting CSA uptake, others include race, ethnicity, sexual orientation, disability, and class, which intersect to create unique contexts.

BOX 8: Gender-smart agriculture framework

To address the gender gap, Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) a World Bank funded programme, has developed a gender-smart agriculture framework to plan, implement and assess gender-responsive CSA. The framework includes gender gap analysis, identification and prioritisation of gender-responsive CSA, participatory and consultative implementation models, and gender-targeted CIS and value chain approaches.

Table 7. Gender-responsive CSA practices currently applied in different regions globally

Gender-responsive practice	Region	Gender-responsive dimensions
Raised bed planting	South Asia	Income generation activity
Crop diversification / vegetable gardens*	South Asia, West Africa, Latin America, East Africa	Increased income; dietary diversity
Intercropping/ agroforestry	South Asia, West Africa	Crop diversification for household nutrition and market
Nutrient expertise	South Asia	Women need support and capacity development; may also contribute to decision making
Green seeker	South Asia	
Leaf colour chart	South Asia	
Irrigation*	South Asia, Latin America	Reduces workload significantly
Water meters	South Asia	Reduces workload
Solar pumps	South Asia	Reduces workload; women can play a role in decision making
Integrated farming system	South Asia	Increases livestock and crop options for women; dietary and crop diversification
Organic and micro dose fertilisers*	South Asia, West Africa, Latin America	
Reduced tillage	South Asia, West Africa	
Agroforestry*	South Asia, West Africa, Latin America, East Africa	Dietary diversity, market production and increased decision making
Cut and carry	East Africa	Additional income and improvements in food diversity and yields
Terraces and Desho grass	East Africa	
Controlled grazing	East Africa	
Improved wheat	East Africa	
Livestock (sheep and goats)	West Africa, East Africa	Depends on access to grazing
Livestock (cattle)	West Africa, East Africa	Some control of dairy
Contour farming	West Africa, East Africa	Increased productivity and income

*Top practices

YOUTH

The engagement of Africa's youth in agricultural development is key to sustainably increasing productivity and realising food security goals. Africa's agricultural sector has the potential to increase employment and support the livelihoods of the burgeoning youth population. Youth also have a vital role to play in protecting the environment and implementing innovative climate change solutions such as CSA. However, governments tend to provide few to no opportunities for youth to participate in policy or climate change adaptation processes.[27] Improving youth inclusion in CSA requires:[28]

- **Improved mentorship** to address the lack of experience of youth entrepreneurs and to provide role models;
- **Improved education** in areas that could enhance CSA adoption such as climate change, agriculture, numeracy and literacy, digital agriculture and ICT, and managerial and business skills;
- **Inclusion in agriculture and climate-related policy development processes**;
- **Access to finance and risk insurance**;
- **Access to land and natural resources**; and
- **Capacity building on CSA practices**.

The capacity of youth to adopt CSA can be built in the following ways:

- **Incorporating climate change and CSA** into school curricula and training teachers to pass on the knowledge to students;
- **Providing training and extension services on CSA practices and technologies** to youth who no longer attend school;
- **Sharing knowledge on climate-smart indigenous farming practices**, i.e. passing knowledge from the elderly to the youth in a systematic way;
- **Including CSA in the curricula of higher education institutions, universities and agricultural colleges**, to increase information dissemination and generate relevant research;
- **Establishing youth networks** to enhance peer-to-peer learning and problem solving;
- **Hosting workshops and seminars** to increase youth's awareness of CSA and global socio-economic and environmental agendas; and
- **Offering apprenticeships** to youth to grow their practical skills and knowledge.

African youth are typically excluded from agricultural and climate policy-making processes. There is a need for increased engagement with youth to understand the challenges they face in the agricultural sector such as access to finance, risk insurance, land and natural resources. Agriculture and climate policy should be informed by evidence generated through research and youth engagement to incorporate the needs of youth.

Table 8. Summary of recommendations for gender and youth

No.	Suggested actions
Gender	
01	Strengthen the capacity of decision makers in mainstreaming gender and social inclusivity for CSA through robust and responsive policies.
02	Address gender inequality in land tenure and access to productive assets.
03	Establish a continental mechanism to monitor progress on gender mainstreaming within CSA interventions.
04	Governing bodies on agricultural and environmental issues should commit to advancing gender equality and women's empowerment in CSA outcomes.
05	National Investment Plans should incorporate gender budgeting, women's leadership, and monitoring of gender outcomes.
06	Work with financial institutions to increase women's access to credit.
07	Strengthen the role of women in farmer cooperatives and businesses.
08	Ensure CSA capacity development strategies are inclusive of people with differing levels of education and literacy.
09	Ensure women have equitable access to CSA technologies that reduce their work burden and increase their productivity.
Youth	
01	Improve mentorship on CSA practices and technologies to address the lack of experience of youth entrepreneurs and to provide role models.
02	Improve education in areas that could enhance CSA adoption by youth such as climate change, agriculture, numeracy and literacy, digital agriculture and information and communications technology (ICT), and managerial and business skills.
03	Engage youth in agriculture and climate-related policy development processes.
04	Improve youths' access to agriculture finance and risk insurance.
05	Improve youths' access to land and productive assets.
06	Build the capacity of youth on CSA practices by: • Incorporating climate change and CSA into school curricula and training teachers to pass on the knowledge to students; • Providing training and extension services on CSA practices and technologies to youth who no longer attend school; • Encouraging knowledge sharing on climate-smart indigenous farming in a systematic way; • Including CSA in the curricula of higher education institutions such as universities and in agricultural colleges to increase information dissemination and generate relevant research; • Establishing youth networks to enhance peer-to-peer learning and problem solving; • Hosting workshops and seminars to increase youth's awareness of CSA and global socio-economic and environmental agendas; and • Offering apprenticeships to youth to grow their practical CSA skills and knowledge.

Research and development based on farmers' needs and used to inform policy developments

Scientific, technological and social research and innovation is key to the development of context-appropriate CSA practices and technologies, for example:

- Climate research **informs early warning systems** and improves farmers' decision making;
- Agricultural research programmes **generate evidence for improved policy development and the prioritised adoption of CSA practices**;
- **Technological research and innovation** such as robotics, artificial intelligence and mobile communications for precision agriculture, improve the efficiency of CSA monitoring, implementation and uptake;
- **Big data analytics** can be used to quantify the productivity, adaptation and mitigation results attained through CSA interventions and allow for their prioritisation.

Research institutions need to engage relevant partners such as farmers' organisations and extension agents to understand their needs and to co-develop innovative and appropriate CSA practices and technologies and generate evidence-based knowledge. Furthermore, research institutions have a key role to play at the science-policy interface by ensuring decision making is informed by accurate and timely evidence. Strong partnerships between research institutions and policy developers are needed to ensure the drafting of scientifically sound CSA policy. Building the evidence base required for scaling up CSA is an ongoing process that requires the collaboration of numerous stakeholders across multiple disciplines (e.g. agro-meteorology, biophysical sciences, agronomy, economics, social sciences, and political science). As research needs to be accessible to a variety of stakeholders with diverse backgrounds and capacities it should be communicated in targeted and user-friendly formats together with capacity development efforts to enhance implementation.[29]

BOX 9: The importance of collaborative governance

The CAADP process is complex and far removed from sub-national decision-making. To be useful for bottom-up, locally-driven reform efforts, certain actors need to serve as translators that contextualize the framework and interpret commitments for stakeholders at sub-national levels. Local citizens from the community and village level can contribute to the prioritisation, design, and monitoring of agricultural investments at local levels. This approach requires relatively little investment but adds significant value to the quality of decision-making. For example, policymakers tend to prioritise infrastructure projects over investments in agriculture. While this issue ultimately depends on political will, civil society can help highlight the return on investment for CSA projects and generate evidence on the impact on food security and nutrition outcomes. Since most agricultural activities are implemented at the community levels, the partnership between citizens and local governments is critical. When government leadership at the local level is open and receptive to collaboration, there is a unique window of opportunity for reform and for achieving effective results for grassroots communities through collaborative governance.

BOX 10: Research needs based on a review of CCAFS

In 2021, a review was conducted on the outcomes of the CGIAR Research Programme on Climate Change, Agriculture and Food Security's (CCAFS's) programme on climate change and FNS. The review focused on evidence for the impacts of climate change on FNS and the impacts of climate-related interventions on FNS. It was found that CCAFS' work provided insufficient evidence related to the impact of CSA interventions on FNS. Furthermore, there were gaps in the knowledge of linkages between climate change and FNS, impacts of interventions, policy initiatives, and the required financing.[30]

The following knowledge-generating priorities were therefore recommended:

- Quantitative assessment of the impacts of climate change on FNS, particularly at the household and individual levels;
- Quantitative assessment of the impacts of CSA interventions on FNS, particularly at the household and individual levels;
- Quantitative and conceptual assessment of the impact pathways linking climate change and FNS at the household level, with focus on post-farm activities, gender roles and empowerment, impacts on water access and quality, and heat stress impacts on labour productivity and migration; and
- Quantitative assessment on policy initiatives for improving FNS outcomes in the face of climate change, as well as funding requirements for implementation of knowledge-generating activities, relevant development programs and policy change.

Table 9. Summary of recommendations for research and development

No.	Suggested actions
01	Research institutions need to engage with partners such as farmers' organisations and extension agents to understand their needs to co-develop innovative and appropriate CSA practices and technologies and generate evidence-based knowledge.
02	CSA research needs to be communicated in targeted and user-friendly formats together with capacity development efforts to enhance implementation.
03	Research institutions need to work closely with policy developers to ensure the drafting of scientifically sound, evidence-based CSA policy.
04	Conduct a systematic review of the current state of knowledge on linkages between climate change and FNS, and the impacts of CSA interventions.
05	Conduct a quantitative assessment of the impacts of climate change on FNS, particularly at the household and individual levels.
06	Conduct a quantitative assessment of the impacts of CSA interventions on FNS, particularly at the household and individual levels.
07	Carry out a quantitative and conceptual assessment of the impact pathways linking climate change and FNS at the household level, with focus on post-farm activities, gender roles and empowerment, impacts on water access and quality, and heat stress impacts on labour productivity and migration.
08	Carry out a quantitative assessment on policy initiatives for improving FNS outcomes in the face of climate change.
09	Ensure future research: • Is measurable according to appropriate FNS outcomes, as well as overarching indicators and targets; • Analyses the impacts on multiple stakeholders (e.g. considers inequality); • Adopts a food systems approach comprising assessments of pre- and post-farm activities and impacts; • Addresses intertemporal dynamics; and • Identifies synergies and trade-offs amongst CSA intervention approaches.

Diverse markets to enhance farmers' resilience to climate change

The diversification of agricultural production is a key strategy for enhancing smallholder resilience and improving food security and nutrition. A diversification strategy requires increasing marketing opportunities to encourage smallholder farmers to invest in alternative crops such as high value horticulture and agroforestry initiatives, amongst others. This can be achieved by supporting commodity traders, buyers and processors to establish long-term commercial relationships with smallholders for assured off-take. Market support bundled with improved access to climate-smart inputs and the provision of extension services is integral to scaling CSA and smallholder resilience.

Table 10. Summary of recommendations for market diversification

No.	Suggested actions
01	Identify high value agricultural produce opportunities and link farmers to the appropriate markets.
02	Build the capacity of farmers in producing diverse high-value crops.
03	Support commodity traders, buyers and processors in establishing long-term commercial relationships with farmers for assured off-take.
04	Market support should be bundled with improved access to climate-smart inputs and the provision of extension services.

Adequate finance through public and private channels

Climate finance for smallholder farmers is disproportionately low when considering the importance of agriculture to the gross domestic products of developing countries.[31] Rural areas in Africa typically have inadequate credit markets restricting smallholder farmers' access to formal credit from financial institutions and thereby limiting their ability to invest in new CSA practices and technologies. Some of the challenges facing the continent when it comes to CSA financing include:[32]

- **Overlapping policies** on climate change that are weakly enforced;
- **Inadequate and unstructured provision** for climate funding in countries' national budgets;
- **Insufficient government capacity** to satisfy the required standards and procedures needed in developing viable programmes and following funding processes;
- **Inadequate knowledge and awareness** on the sources of climate finance and limited private sector engagement; and
- **Siloed approaches** to climate change that restrict access to financing and impair problem-solving.

Engaging the private sector is key to the financing needs of CSA implementation. Agri-enterprises need additional financing to grow their businesses and to invest in technology or transport to reach remote farmers. For example, in Sub-Saharan Africa this amounts to US$ 132 billion per year.

Public resources can be used to de-risk investment in agricultural development and to facilitate funding from the private sector. To address the climate finance deficit, it is important to understand the needs of smallholder farmers. This requires data collection on financial flows from public domestic sources and from international and domestic private actors.

To enhance CSA uptake, financial institutions need to provide tailored credit options to smallholder farmers. The amount, the procedure for granting the loan, as well as the schedule of granting and repayment are key factors affecting the accessibility and usefulness of loans for farmers. The payback rates and amounts loaned should be tailored to the cost and return structure of the farmers' investments. There is therefore a need for research on CSA adoption, cost-benefit analyses, and investment types to allow financial institutions to develop appropriate loan options.

CSA uptake in Africa can be increased by unlocking financial resources such as responsible banking, impact funds, and global specific funds such as the GCF, Global Environment Facility, Global Adaptation Fund, and Africa Climate Change Fund. Countries' national designated institutions can access financing from the GCF to coordinate across economic sectors and develop integrated projects that mainstream CSA.

The following recommendations are given to channel climate finance for CSA adoption by smallholder farmers:

- **Mitigate risk** by improving collaboration between public and private sector actors involved in agricultural investment and leverage additional financial resources.
  - Adopt blended finance mechanisms, including guarantees and first-loss tranches, to improve the risk-return profile of smallholder CSA investments.
  - Reduce the risk of adopting new practices and technologies for smallholder farmers by establishing weather indexed insurance. There is a need for public and private funders to develop low cost and easily accessible insurance products using technology.
  - There is a need for governments to make more effective use of public resources and improve policies that address risk management and capacity building for climate-related finance at the local level.
  - The provision of subsidies to smallholder farmers and agri-businesses needs to be conditional on the implementation of CSA practices and technologies and should be bundled with technical assistance specific to the agro-ecological context.
  - National governments could improve the reach of finance service providers by providing subsidies for weather insurance bundled with loans.
  - Novel finance transfer instruments should be established by national governments to incentivise the implementation of CSA at farm and landscape levels.
  - Climate finance from international and domestic sources should be used to encourage the transition of agribusinesses and finance service providers towards climate-resilient and low-emission supply chains.
- **To maximise the impact of climate finance investmen**t needs to be bundled with building the capacity of agribusinesses and financial institutions to assist them in mainstreaming climate-smart requirements.
- **Recipient governments should use domestic climate finance tracking** to monitor progress of CSA adoption and to support policy development and review.
  - Ministries of finance and national treasuries should request relevant government ministries and agencies to regularly report on their CSA investments. This may require capacity development on climate finance definitions, standards, and tools.
  - As CSA involves multiple actors across a variety of levels, data collection should not be restricted to the local level and should include other primary and secondary information sources.

In addition, the development of **robust proposals to unlock global climate funds** is important, as well as the establishment of savings groups (see Box 11 on following page).

BOX 11: Savings groups

The adoption and scaling of CSA interventions is hindered by inadequate finance. Household savings present an opportunity for farmers to accumulate capital and invest in CSA technologies. To encourage farming households to save there is need to strengthen local community savings groups. Relevant government and institutional actors should share their expertise on financial literacy and group management to assist smallholder farmers in developing strong social capital. The impact and sustainability of community savings groups can be enhanced through government interventions such as the Uwezo Fund in Kenya. Furthermore, agricultural capacity building programmes and trainings should provide guidance on saving for investment and emphasise its importance. Cooperative societies with effective savings groups can increase market access and return on investments leading to further accumulation of savings and investment in CSA practices.[33]

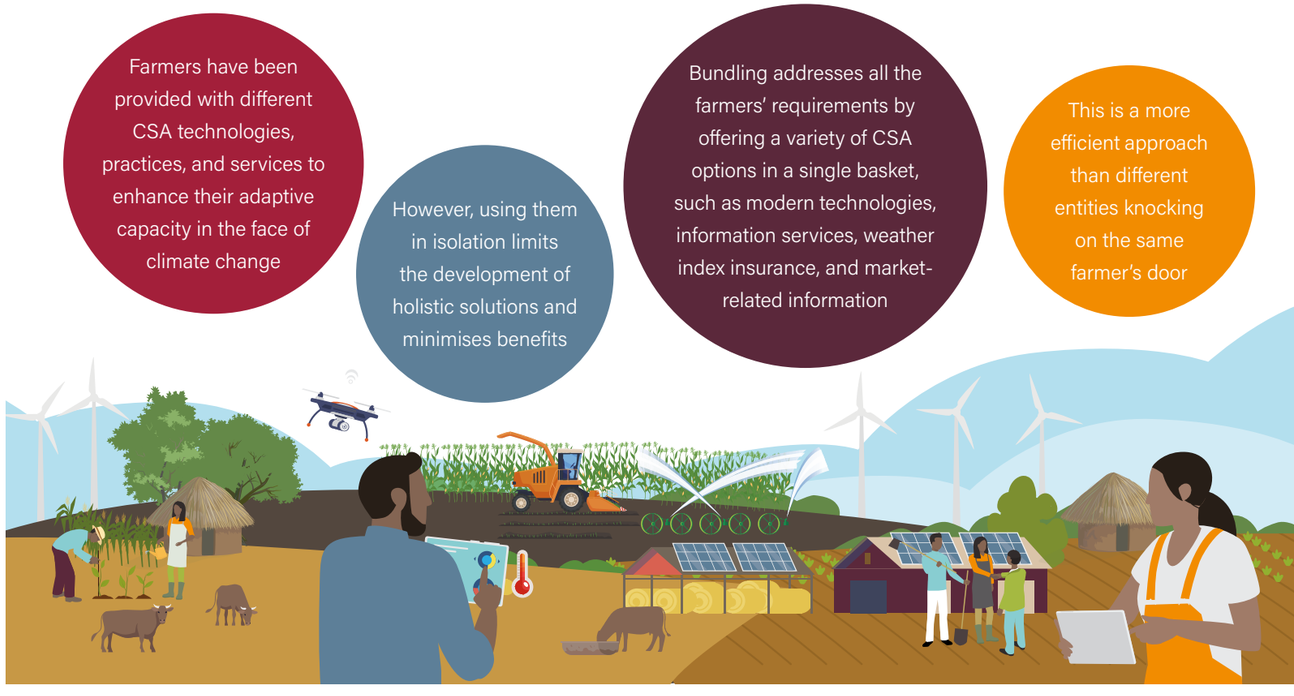
Table 11. Summary of recommendations for improving access to financial resources

No.	Suggested actions
01	Carry out cost-benefit analyses and determine investment types for CSA to allow financial institutions to develop tailored loan options for farmers.
02	Engage the private sector.
03	Collect data on financial flows from public domestic sources and international and domestic private actors to understand the needs of smallholder farmers.
04	Adopt blended finance mechanisms, including guarantees and first-loss tranches, to improve the risk-return profile of smallholder CSA investments.
05	Reduce the risk of adopting new practices and technologies for smallholder farmers by developing low-cost weather indexed insurance.
06	Subsidies should be conditional on the implementation of CSA practices and technologies and should be bundled with technical assistance specific to the agro-ecological context.
07	National governments could improve the reach of finance service providers by providing subsidies for weather insurance bundled with loans.
08	Novel finance transfer instruments should be established by national governments to incentivise the implementation of CSA at farm and landscape levels.
09	Research institutions need to work closely with policy developers to ensure the drafting of scientifically sound, evidence-based CSA policy.
10	Climate finance from international and domestic sources should be used to encourage the transition of agri-businesses and finance service providers towards climate-resilient and low-emission supply chains.
11	To maximise the impact of climate finance investment needs to be bundled with building the capacity of agri-businesses and financial institutions to assist them in mainstreaming climate-smart requirements.
12	Government ministries and agencies should regularly report to the ministries of finance and national treasuries on their CSA investments.
13	Relevant government and institutional actors should share their expertise on financial literacy and group management to assist smallholder farmers in developing strong social capital.
14	Agricultural capacity building programmes and trainings should provide guidance on saving for investment and emphasise its importance.

Bundling of CSA practices to maximise on-farm benefits and ensure the complementarity of practices

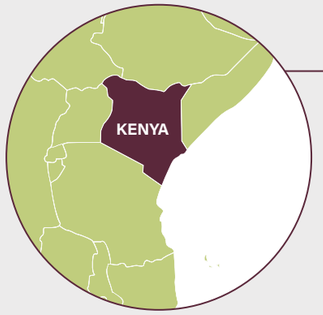
Farmers are presented with different CSA technologies, practices, and services to enhance their adaptive capacity in the face of climate change, however, using them in isolation limits the development of holistic solutions and minimises benefits. Bundling addresses all the farmers' requirements by offering a variety of CSA options in a single basket, such as modern technologies, information services, weather index insurance, and market-related information. CSA bundling can:

- Enhance farm outcomes through optimisation;
- Enhance complementarity;
- Improve the management of trade-offs; and
- Maximise the benefits to farmers.



BUNDLING CASES

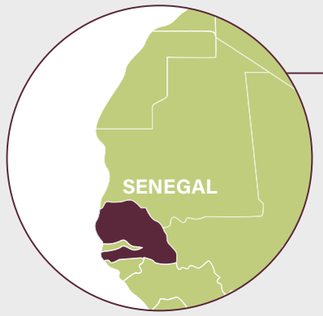
Examples of innovative CSA bundling exist in Kenya, Senegal, Mali and Zambia:[35]



AMAIZING PROJECT IN KENYA

The Kenyan aMaizing project uses index-based insurance products and an associated distribution model to support improved farmer outcomes in the maize value chain. The distribution model integrates a selection of bundled service options such as CIS, provision of inputs, access to credit, recommendations to improve nutrition on the value chain, and non-agriculture insurance projects. The project adopts a gender-responsive approach.

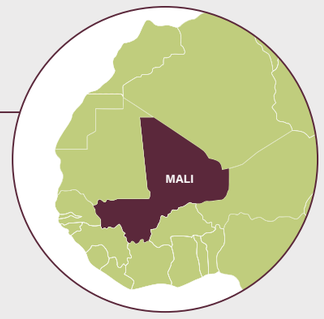
A potential challenge to the sustainability of the project is the need for specialised infrastructure and skills, such as to conduct photo-based loss verification, data management and processing, and the application of the index insurance model itself. Furthermore, there is no hard link between the insurance product and the use of advisory services, i.e. the farmers are not required to use advisory services to enhance their performance.



BUNDLING CIS WITH AGRICULTURAL INPUTS IN SENEGAL

Agricultural inputs are bundled with CIS in Senegal offering farmers improved crop varieties, certified fertilisers, tailored agro-advisories, and agricultural insurance. Farmers pay for the improved inputs as well as a small additional fee to receive CIS for improved decision making. The willingness of farmers to pay the extra costs to access CIS highlights the relevancy of the bundling approach.

INTEGRATED SOIL NUTRIENT AND CLIMATE RISK MANAGEMENT PROGRAMME IN MALI



This programme in Mali combines Smart-Valleys,[iv] stress tolerant crop varieties, and climate information (drought and flood occurrence and duration) using mobile phones. Several partners are involved including the Institut d'Economie Rurale, Agence Nationale de Meteorologie du Mali, e-Prod, and the Syngenta Foundation for Sustainable Agriculture. Crop calendars are used to assist farmers in choosing the most appropriate crop types and varieties. For example, it is recommended to plant rice if the season is projected to be normal to wet, or vegetables and legumes if the season is expected to be dry. Farmers are also informed of the appropriate fertiliser application rates and timings via applications such as Rice Advice or Crop Manager. The target farmers are members of the Centre for Mechanized Agriculture, a nationwide farmers' organisation that specialises in supporting farmers with mechanisation and improved technologies adoption. The Centre for Mechanized Agriculture has contracts in place with local banks for loans to buy equipment and inputs and to pay service providers.

[iv] A water-harvesting technique in the rain-fed lowlands.

CLIMATE RISK INSURANCE AND INFORMATION IN ZAMBIA

A private-sector approach is used to support the market for climate risk insurance and the dissemination of climate risk information in Zambia. The project works with climate service providers to build the capacity of farmers and communicate accurate and location-specific information through radio broadcasts. The package is tailored to locally relevant crops, livestock, and livelihood options. Furthermore, the approach uses participatory tools to assist farmers with decision making. In addition, according to AICCRA research, a range of bundled CSA innovations have been recognised for their gender and youth 'smartness.' These include drought, pest and disease tolerant, early maturing maize and aeroponic-generated seed yam in Ghana, as well as CSA technologies for rehabilitation of degraded landscapes, the CSA small ruminant smart pack and bundled-packages for wheat and maize in Ethiopia.[36]

FRAMEWORK FOR BUNDLING CSA WITH CIS

Bundling CSA and CIS is an effective strategy to enhance the adoption of CSA practices and technologies and to increase the value of CIS to smallholder farmers. A bundling framework was developed by AICCRA to integrate tools, technologies, and services provided by different institutions and actors in Ethiopia. The framework was validated through stakeholder feedback and involves the following components:

- **Identify the issues to be addressed** – Identify climate-related challenges that need to be addressed using the CSA approach within a select boundary e.g. administrative unit, landscape, watershed, or community.
- **Develop an inventory of CSA interventions** – Develop an inventory of CSA technologies that can be used to address the challenges identified and that can be scaled up/out. This may require consulting the researchers who developed the technology, the extension system and/or a service provider involved in technology scaling.
- **Identify the scaling domain** – Assess the technologies in the inventory and assign them to a scaling domain using biophysical and socioeconomic criteria.
- **Engage with target users** – Meet with the target community, including local-level administrators, and share information on the CSA technology/ies to be scaled out. Identify interested households.
- **Communicate seasonal and intra-seasonal climate forecasts** – Work with forecast developers (e.g. the National Meteorology Agency) to provide farmers with seasonal and intra-seasonal climate forecasts downscaled to the appropriate spatial and temporal scale.
- **Provide farm-level agro-advisories** – Experts or automated systems (e.g. EDACaP) use the generated climate forecast information to provide climate agro-advisories for each CSA intervention.
- **Deliver agro-advisory services and gather feedback** – Disseminate the farm-level agro-advisories via a central server so that beneficiaries can access them through an Interactive Voice Response System and SMS in the local languages. For project beneficiaries that do not have access to a cell phone or are illiterate, the information should be delivered via development agents. The information can also be made available on a website or via mass media outlets (e.g. television and radio). Feedback on the weather conditions and usefulness of the advisory should be collected from the development agents through an established feedback mechanism.

Figure 8. Framework for bundling CIS and CSA[34]

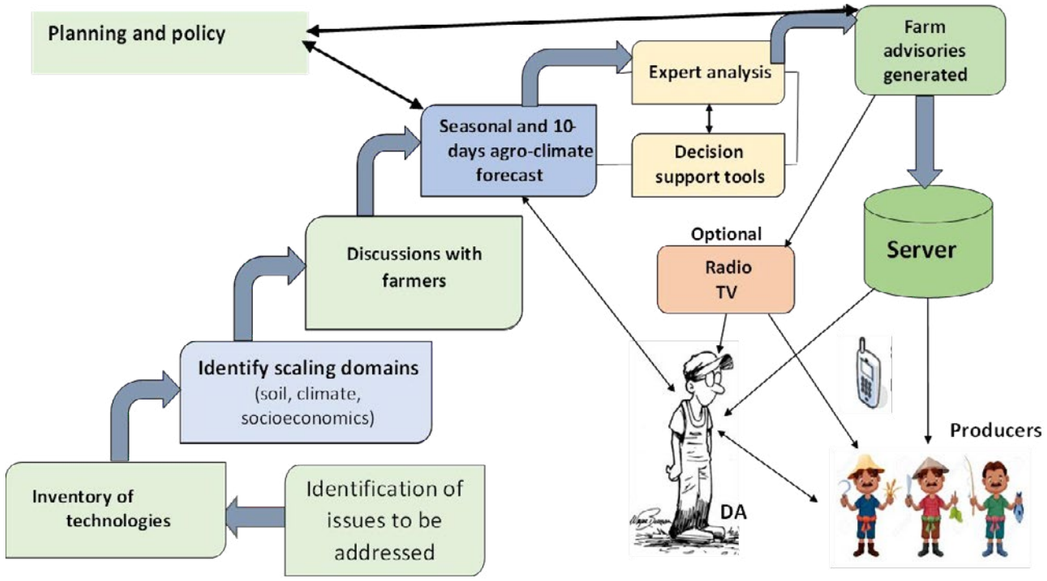


Table 12. Summary of recommendations for bundling CSA

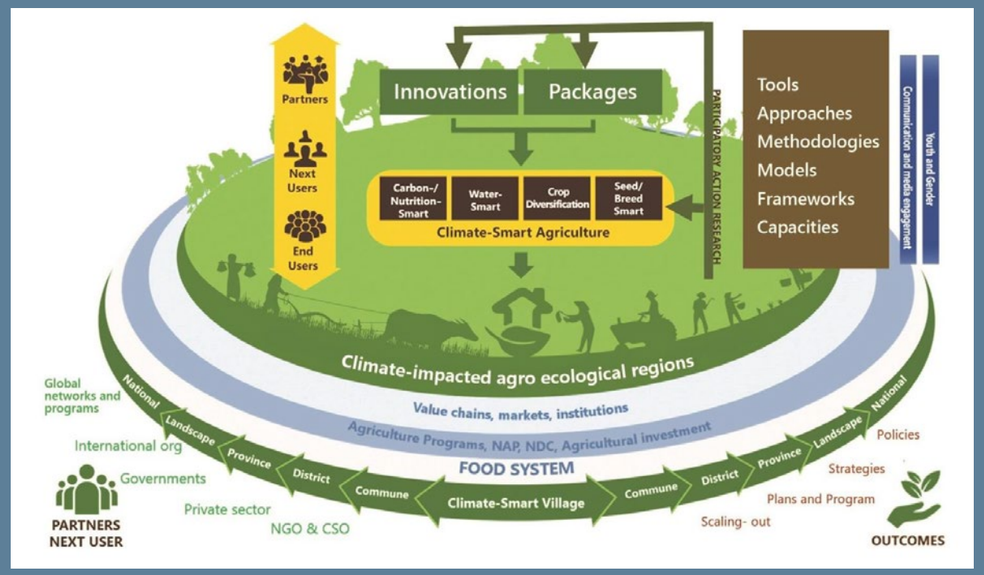
No.	Suggested actions
01	Engage with target users to identify opportunities for CSA bundling to optimise farm outcomes and manage trade-offs.
02	Identify and partner with relevant public institutions (e.g. research institutions, national meteorological agencies, extension services) and private sector players (e.g. ICT companies, agricultural input providers, financial institutions) for successful delivery of CSA bundles.
03	Establish a feedback mechanism to ensure the appropriateness of CSA bundles and continuously update to meet the needs of the farmers.
04	Create market incentives for innovation and participation and accelerating link formation between information and service providers and users.
05	Allocate public funds to reduce barriers to the implementation of CSA bundles (e.g. improve ease of doing business, reduce internet costs, capacity building).

Section 5

Scaling the adoption of CSA

The scaling of CSA takes place through various pathways and with a diverse range of actors across different scales.[v]

Figure 9. Scaling CSA in food systems[37]



Engagement, evidence and outreach are three important principles that need to be considered and included when scaling CSA:

1. ENGAGEMENT

- **Targeted and demand driven** – CSA approaches that focus on the farmer involving the co-development and prioritisation of innovations result in tangible benefits, the mitigation of risk, and meet their context-specific needs. Therefore, joint needs assessments with farmers and partners are key.
- **Participatory** – Stakeholders should be engaged in all processes from the outset. Involving farmers and partners from inception, co-designing the approach, and sharing the budget and decision making empowers stakeholders, enhances ownership, and creates robust scaling mechanisms.

[v] It must be noted that scaling up CSA is challenging due to the diversity of interventions and its context specificity. In addition, many other factors, such as enabling environment and economic, social, and cultural context, play a major role in successful scaling of CSA initiatives.

2. EVIDENCE

- **Scientific credibility** – Robust evidence is critical to innovation and scaling processes. Peer exchanges are also an important credibility source.
- **Opportunities and flexibility** – Integrate scaling efforts into existing systems and ensure they are adaptable to priority changes.

3. OUTREACH

- **Communication** – Communication should be tailored to the stakeholders, levels, and intended purpose.
- **Capacity building** – Requires a system-level approach to reduce dependency on external funding. Enhancing local skills for scaling is crucial, e.g. educating local scientists through university courses can accelerate and sustain scaling processes.

BOX 12: CSA Plan

AICCRA has developed a 'CSA Plan' to guide the scaling of CSA. The CSA Plan comprises of four components:

1. **Situation analysis** – Involves understanding the status of existing CSA initiatives, current and future climate vulnerabilities, and the effectiveness of the enabling environment. The agricultural, political, social, environmental, and economic context is assessed to determine the entry points for investing in priority CSA initiatives.
2. **Targeting and prioritising** – Identifies CSA intervention needs considering both stakeholder preferences and potential trade-offs. Advanced analytical techniques are combined with participatory processes to prioritise CSA practices, services, and policies to best-fit options that deliver economically, can be scaled out, and attract investment and funding.
3. **Programme support** – Requires the development of tangible co-generated and demand-driven products (e.g. extension materials, business models, implementation plans) to assist stakeholders in implementing CSA interventions on the ground.
4. **Monitoring, evaluation and learning** – Develops strategies and tools to track the progress of CSA implementation, to evaluate its impact, and to facilitate iterative learning to improve planning and implementation going forward.

Each CSA Plan comprises of various information, tools and techniques to enable action to facilitate scaling. The components of a CSA Plan can be applied independently or in a single package across multiple levels of decision making.

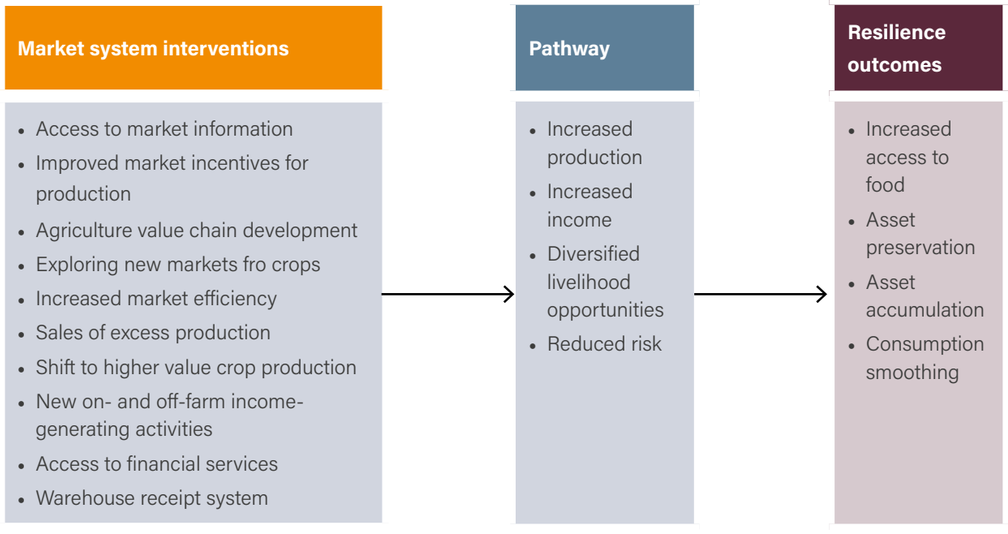
There are also numerous other approaches and elements to consider when scaling CSA such as strengthening market systems and value chains, increasing the adoption of ICTs for agro-advisory services, improving the communication and knowledge sharing of CSA practices and technologies, and incorporating local knowledge in CSA interventions.

MARKET SYSTEMS, VALUE CHAINS AND PRIVATE SECTOR

The market system approach strengthens agricultural value chains to build resilience through value addition, diversifying rural enterprises, and increasing household incomes. Value chains are useful mechanisms for connecting multiple actors through dialogue, knowledge exchange and capacity building, to achieve a common objective. Value chains also provide a useful delivery mechanism for extension services, credit, and subsidy programmes and can provide market-driven demand for the adoption of CSA technologies and practices. Furthermore, engaging private businesses in the development process is known to enhance sustainability. Thus, CSA adoption can be enhanced through scaling up value chains that are already climate smart or by introducing CSA practices and technologies into existing ones.

Current levels of investment in agricultural value chains are insufficient to achieve development goals, underscoring the need to attract private sector investment. This can be achieved through improving the policy and regulatory environment for private sector participation in value chains, promoting responsible investment, and using public financing to improve incentives, and reduce risks and transaction costs for private sector investment.

Figure 10. Relationship between market system interventions and resilience[8]



An effective approach to strengthening value chains requires:

- Ensuring that financing benefits smallholder producers and supports small and medium enterprises and job creation along the value chain;
- Managing transaction costs and risks; and
- Addressing the entire system, including the business environment and support services.

Table 13. Summary of recommendations for an effective market-system approach

No.	Suggested actions
01	Identify existing climate-smart value chains and scale them up.
02	Introduce CSA practices and technologies into existing value chains.
03	Attract private sector investment in value chains by improving the policy and regulatory environment.
04	Use public financing to improve incentives and reduce risks and transaction costs for private sector investment in value chains.
05	Ensure financing benefits smallholder producers and supports small and medium enterprises and job creation along the value chain.

INFORMATION AND COMMUNICATIONS TECHNOLOGY

ICTs and agro-advisory services are being incorporated in strategies to adapt to, mitigate, and monitor climate change within agricultural innovation systems. Digital agriculture can be applied by farmers for purposes such as yield mapping, GPS guidance systems, and variable rate application to improve productivity. It can also be used for sharing market and agro-weather information with smallholder farmers to enable them to make informed decisions and increase their awareness on climate change and CSA practices and technologies. Digital agriculture also encompasses e-extension services, and warehouse receipt and food traceability systems. The impact of ICT and digital agriculture has the potential to be far reaching, as in 2017 it was estimated that there were 960 million mobile subscriptions across Africa, implying an 80% penetration rate.[38]

To increase the adoption of ICT and digital technologies by smallholder farmers there is a need to improve rural network coverage and access to applications. Other limiting factors to uptake include inadequate skills and knowledge, a lack of trust, and unaffordability. These factors can be addressed through policy actions such as engaging with the private sector, improving the policy and regulatory environment, and using public financing to help crowd-in private sector investments.

Low digital literacy rates limit the use of ICT and associated agro-advisory services. Typically, women and minority producers are the worst affected by digital literacy barriers. Low digital literacy also has implications at the system level as decision-makers with little knowledge on digital innovations are unlikely to recommend them as solutions to agricultural challenges. Weak digital literacy can be addressed through the implementation of targeted capacity development programmes suited to the abilities and needs of stakeholders and with an emphasis on gender-responsiveness and inclusivity. Such programmes should target farmers as well as decision makers at local and national levels who have the power to bring digital innovations into solution development. Training national-level teams for the design, launch, and maintenance of service platforms is critical. Furthermore, incorporating digital literacy into school and tertiary education curricula will reduce digital literacy gaps and establish long-term national capacity for innovating digital solutions.

Figure 11. Benefits of digital agriculture[8]

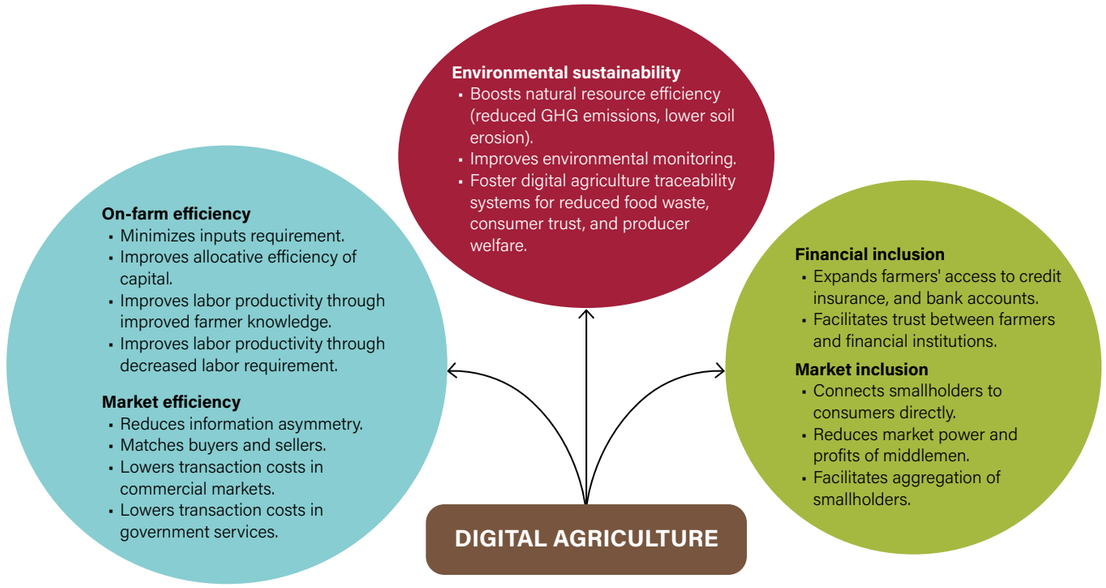


Table 14. Summary of recommendations for ICT and agro-advisory services

No.	Suggested actions
01	Improve rural network coverage and farmers' access to digital applications.
02	Encourage private sector investment by improving the policy and regulatory environment.
03	Use public financing to crowd-in private sector investment.
04	Roll out targeted ICT and digital agriculture capacity development programmes suited to the abilities and needs of stakeholders (e.g. farmers and decision-makers) and with an emphasis on gender-responsiveness and inclusivity.
05	Incorporate digital literacy in school and tertiary education curricula.

THE INCLUSION OF LOCAL KNOWLEDGE

Traditional agrarian knowledge, such as various forms of farm management, influence African smallholder farmers' social identities and farming culture. Thus, the transition of smallholder farmers to adopting CSA practices and technologies requires a level of trust in the new knowledge and related advisory support systems. Integrating the local knowledge of smallholder farmers in the design and implementation of CSA interventions can enhance trust and therefore rates of adoption. To improve upscaling and inclusion of local knowledge systems in CSA there is a need to improve the representation of smallholder farmers in agricultural policy and related decision-making processes.[39]

Table 15. Summary of recommendations for incorporating local knowledge in CSA

No.	Suggested actions
01	Improve the representation of smallholder farmers in agricultural policy and decision-making processes.
02	Establish communication channels and partnerships between farmers and research institutions to ensure the integration of local knowledge and scientific knowledge in the development of CSA interventions.

EFFECTIVE COMMUNICATION AND KNOWLEDGE SHARING

Communicating CSA information and sharing knowledge improves agricultural productivity by enhancing informed decision-making. Effective means of communication assist with identifying problems, raising awareness, encouraging dialogue, and influencing behavioural change. It can encourage the adoption of new technologies and practices and maximise outputs and profits. Effective communication is important not only for informing farmers of new and efficient means of farming but also for equipping them with the required skills for adoption. There are several modes for communicating CSA practices and technologies, including:

- **In-person contact** (e.g. stakeholder workshops, visits by extension agents and commercial representatives, and field days);
- **Print** (e.g. posters, pamphlets and newspaper and magazine articles);
- **Radio and television programmes**;
- **Theatre, videography and photography**; and
- **Digital technology** (e.g. social media and mobile and web-based platforms).

Effective communication of CSA requires:

- **Understanding the audience:** Communicate CSA information in a way that is appropriate to the audience's level of literacy and familiarity with climate change.
- **Considering the language of delivery:** CSA should be communicated in a language with which the audience is comfortable.
- **Encouraging feedback and two-way communication:** It is important to encourage feedback and to engage in two-way communication to ensure that the information is useful and relevant. This will help to build trust and establish long-term relationships.
- **Continuously updating information:** Ensure climate change and CSA intervention information is updated, evidence-based and relevant.
- **Ensuring inclusivity:** Women and youth should be included in communication channels and their feedback sought to ensure information meets their needs.

Scaling up CSA requires the communication of evidence on existing, successful CSA practices and technologies to encourage large-scale investment, institutional change and policy enhancement. Such communication can take place through targeted stakeholder engagement, amongst other means.

Table 16. Summary of recommendations for communicating CSA

No.	Suggested actions
01	Communicate CSA information in a way that is appropriate to the audience's level of literacy and familiarity with climate change.
02	Communicate CSA information in a language with which the audience is comfortable.
03	Encourage feedback to ensure that the information is useful and relevant.
04	Ensure climate change and CSA intervention information is updated, evidence-based and relevant.
05	Include women and youth in communication channels and seek their feedback to ensure the information meets their needs.
06	Engage with targeted stakeholders to communicate evidence on successful CSA practices and technologies to create awareness and foster buy-in.

BOX 13: AICCRA's innovative engagement approaches to scaling up CSA

AICCRA has utilised various innovative engagement approaches to communicate successful, evidence-based CSA technologies and practices and to foster buy-in and enhance CSA scaling in West and Central Africa.[40]

INNOVATION PITCHING

AICCRA's West Africa cluster, shared knowledge on feasible and effective CSA technologies and practices at the 2022 Symposium on the State of Agricultural Research in West and Central Africa organised by the West and Central African Council for Agricultural Research and Development (CORAF). The symposium assembled participants from 19 CORAF member countries, comprising mainly National Agricultural Research Institutes (43%), as well as universities and research laboratories, the private sector, civil society, CGIAR Centres, and intergovernmental agencies. Three pitches on proven CSA technologies and innovations for scaling were conducted with a panel discussion involving AGRHYMET, CORAF and West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL).

The innovation pitches had the following key outcomes:

- Participants gained knowledge and an improved understanding of existing CSA technologies and initiatives, the CSA concept, mechanisms for scaling-up CSA technologies, and CIS.
- Enhanced the interest and intentions of participants to scale up CSA technologies.

- Participants were willing to take the following actions to scale up CSA technologies:
  - Mainstream the knowledge gained into local/country adaptation initiatives (30.7% of participants);
  - Conduct CSA and CIS awareness campaigns (32.3% of participants);
  - Design and implement an extension education programme on CSA targeting end-users (20.0% of participants); and
  - Collaborate with AICCRA to receive support for scaling up CSA technologies within their institution and country (15.4% of participants).

BUSINESS TO BUSINESS MARKETING

At the Market of Agricultural Innovation and Technology event in 2022, AICCRA presented evidence on CSA technologies and innovations to increase buy-in through a 'business to business' (B2B) approach. This involved sensitisation and awareness creation on successful CSA technologies to enable potential buyers to select appropriate innovations to purchase. The B2B marketing approach led to the potential sale of three CSA innovations namely, the Climate-Smart Village approach, GEM Parboiler and improved cowpea varieties to four countries (The Gambia, Burkina Faso, Central African Republic, and Cameroon).

REGIONAL SCIENCE-POLICY DIALOGUE

In March 2022, CORAF hosted a regional consultation workshop to launch the 'Alliance for CSA in Central Africa,' a regional science-policy-dialogue platform, and to simultaneously revive the West Africa Alliance for CSA. The platforms are intended to build capacity and awareness of CSA and to mainstream evidence-based CSA knowledge into agricultural development programmes and policies. Through the workshop, AICCRA identified CSA technologies to be scaled up to meet the needs of the Central and West Africa regions.

The development of CSA profiles and investment plans

To strengthen the evidence base for CSA implementation, development partners, including CGIAR, FAO, USAID, and the World Bank, have supported countries in preparing CSA country profiles and CSA investment plans (CSAIPs). CSA profiles provide baseline information for identifying entry points for investing in CSA at scale. The profiles characterise the climate vulnerability of countries and identify promising CSA technologies, relevant institutions, and policies for implementation. CSAIPs use the baseline information from the profiles to identify investment opportunities that offer the greatest potential to transform a country's agriculture sector into a more productive, climate-resilient, and low-emission sector. CSAIPs also determine potential pathways for scaling up CSA, taking into consideration factors affecting adoption, and the required policy action.

CSAIPs are prepared using four steps involving participatory, bottom-up approaches in conjunction with quantitative modelling:

1. **Identification of a vision and goals** for the country's agricultural sector;
2. **Scenario development** to identify agricultural development pathways and key uncertainties that could hinder the achievement of sector goals;
3. **Modelling to assess the productivity and climate benefits of CSA** under a changing climate; and
4. **Prioritising technologies, evaluating strategies, and determining investment requirements**.

CSA profiles or CSAIPs have been developed for 23 African countries (by 2021), with investment project financing introduced in 17 of the countries.[41] It is recommended that all African countries continue to develop and revise their CSA profiles and investment plans as key drivers of CSA implementation and food system investments in Africa.

BOX 14: Mali's CSA Investment Plan

Mali's CSAIP (2019) describes the negative impact that climate change is likely to have on the country's agricultural production, trade and food security, and how the livelihoods of poor smallholder farmers will be the worst affected. The proposed CSAIP investments provide actionable solutions for reducing risk, enhancing resilience, adapting to identified climate impacts, as well as reducing greenhouse gas emissions.

The CSAIP was developed through a comprehensive stakeholder consultation process led by the Ministry of Agriculture. It is centred on the country's agriculture and climate change policies, strategies and plans, including its NDC and NAIP. The CSAIP defines 12 evidence-based priority areas for investment and provides a monitoring and evaluation framework that is aligned with other national programming processes.

Key outcomes of the CSAIP include:[42]

- The identification of four investments at the national level, six commodity-specific investments and two restoration projects, for a total value of between US$ 300 million and US$ 500 million. The investments are to assist 1.8 million beneficiaries to adapt to climate change, improve crop resilience and increase yields.
- The eight proposed climate-smart crop and livestock investments relate to specific crop, livestock, and forestry value chains along with land restoration.
- Most of the investments meet at least two of the three CSA pillars.
- National initiatives involve improving remote-sensing monitoring capabilities, including CSA in agricultural extension services, developing agroclimatic information systems, and monitoring soil fertility.
- The use of CSA investment to support national policies, of which a minimum of 13 address climate change adaptation.

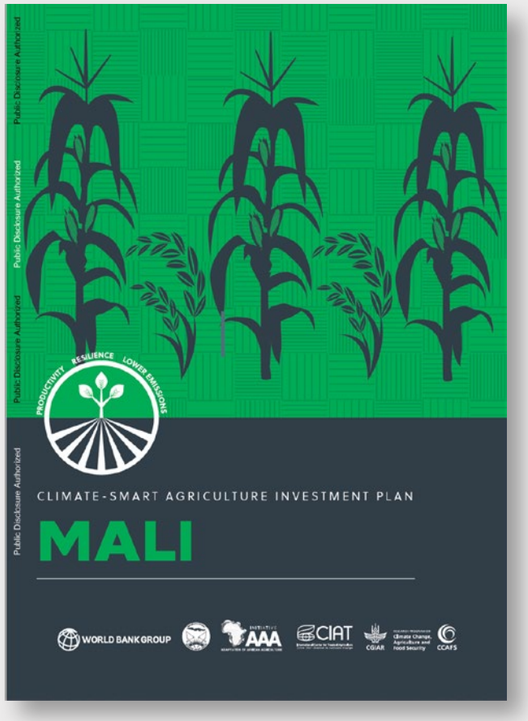


Figure 12. Mali's CSAIP

Conclusion

Africa is not effectively achieving the commitments it has laid out in the Malabo Declaration. However, CSA practices, services and technologies, if adopted and scaled effectively, can advance Africa's agricultural productivity, increase its climate change adaptation and mitigation potential, and ultimately enhance the resilience of Africa's food systems. This will in turn help to deliver on CAADP and Malabo Commitments and help Africa to obtain its agricultural transformation agenda.

This briefing paper provides recommendations to enhance the **planning, integration, ownership, implementation and scaling of CSA initiatives across the continent**. While CSA is context-specific and should be considered on a case-by-case basis, key actions are needed across the board to strengthen existing and new initiatives.

To enhance the adoption and implementation of CSA, national and regional efforts are still needed to encourage a supportive and enabling policy environment, as well as to ensure coordination amongst institutions at various levels. In addition, capacity development is needed to support CSA practices and innovations that are system-wide, integrated and inclusive, as well as knowledge generation and research that is based on farmer priorities and that is specifically tailored to support informed decision making.

Through innovative partnerships and functional MSPs countries can strengthen dialogue and knowledge sharing on CSA best practices, as well as initiatives that can better strengthen gender and youth inclusion. In addition, this paper recommends the development of diverse markets to enhance farmers' resilience to climate change impacts, as well as the need to increase innovative financial resources and farmer credit schemes to support the scaling of CSA implementation on the ground. In addition, to better respond to African countries developmental challenges, CSA practices should be bundled to maximise on-farm developmental benefits and to ensure the complementarity of practices.

Furthermore, for CSA to be scaled more effectively, countries need to deepen their engagement, integrate and share evidence, as well as use effective outreach tools. There are also other elements to consider such as markets, value chains, local knowledge and communication. Similarly, countries must continue to develop and revise their CSA profiles and investment plans as key frameworks for CSA implementation and food system investments in Africa. These profiles provide the entry points for investing in CSA at scale, characterising the climate vulnerability of countries and identify promising CSA technologies, relevant institutions, and policies for implementation.

Endnotes

[1] FAO. 2013. Climate-smart agriculture sourcebook. Food and Agriculture Organization of the United Nations. Rome.

[2] Westermann O., Förch W., Thornton P., Körner J., Cramer L., Campbell B. 2018. Scaling up agricultural interventions: case studies of climate-smart agriculture. Agricultural Systems.

[3] Makombe T. 2022. Has the Comprehensive Africa Agriculture Development Programme (CAADP) Biennial Review Triggered Policy Adjustments? Agrilinks.

[4] Gosling A, Chesterman S, Mutamba M. 2022. Key insights and perspectives from the Food Systems Summit Dialogues and the CAADP 3rd Biennial review process. AICCRA Report. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

[5] CGIAR. 2016. CSA Guide: The Basics. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

[6] GIZ and CIAT. 2022. Adaptation to climate change and NDCs. PowerPoint Presentation. Accelerating the Impact of CGIAR Climate Research for Africa (AICCRA) programme.

[7] London School of Economics. What is the difference between adaptation and resilience. September 2022. https://www.lse.ac.uk/granthaminstitute/explainers/what-is-the-difference-between-climate-change-adaptation-and-resilience/.

[8] World Bank Group. 2020. Climate-Smart Agriculture Implementation Brief: A Summary of Insights and Upscaling Opportunities through the Africa Climate Business Plan.

[9] FAO. 2013. Climate-smart agriculture sourcebook. Food and Agriculture Organization of the United Nations. Rome.

[10] Thornton P.K., Whitbread A., Baedeker T., Cairns J., Claessens L., Baethgen W., Bunn C., Friedmann M., Giller K.E., Herrero M., Howden M., Kilcline K., Nangia V., Ramirez- Villegas J., Kumar S., West P.C., Keatling B. 2018. A framework for priority-setting in climate smart agriculture research. Agricultural Systems. 167: 161-175.

[11] World Agroforestry. 2022. Explore. Evidence for Resilient Agriculture.

[12] Bhusal A., Khatri L., Bhandari B., Sherpa L., Neupane G. 2020. Climate-Smart Agriculture (CSA): Training Manual. Local Initiatives for Biodiversity, Research and Development (LI-BIRD) and Ministry of Land Management, Agriculture and Cooperative (MoLMAC), Gandaki Province, Pokhara, Nepal.

[13] Bioversity International & CIAT, CGIAR CCAFS, and GIZ. 2020. Adapting Green Innovation Centres to Climate Change: Analysis of value chain adaptation potential. Maize, Rice, Potato, and Cassava Value Chains in Oyo, Ogun, Benue, Nasarawa, Plateau, Kano, and Kaduna states, Nigeria.

[14] Ababio, K. The Africa Climate Smart Agriculture Alliance (ACSAA): A Strategic framework to catalyse "accelerated scaling-up of CSA in Africa". NEPAD Planning and Coordinating Agency.

[15] Chevallier R. 2022. Policy Coherence Analysis in Climate-Smart Agriculture in Africa. AICCRA Report. *Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA)*.

[16] Maka L., Ighodaro I.D., Ngcobo-Ngotho G.P.T. 2019. Capacity development for scaling up Climate-Smart Agriculture (CSA) innovations: agricultural extension's role in mitigating climate change effects in Gqumashe community, Eastern Cape, South Africa. *South African Journal of Agricultural Extension*. 47: 1.

[17] CTA. 2019. Innovative partnerships based on shared value accelerate the upscaling of CSA solutions. Blog. Technical Centre for Agricultural and Rural Cooperation.

[18] Kadzamira M.A.T.J., Ajayi, O.C. 2019. Chapter 25: Innovative Partnerships to Scale Up Climate-Smart Agriculture for Smallholder Farmers in Southern Africa. *The Climate-Smart Agriculture Papers*.

[19] Hartwich F, Tola J, Engler A, González C, Ghezan G, Vázquez-Alvarado JMP, Silva JA, Espinoza JJ, Gottret MV. 2007. Building Public–Private Partnerships for Agricultural Innovation. Food Security in Practice technical guide series. Washington, D.C.: International Food Policy Research Institute.

[20] Acosta M., Ampaire E.L., Muchunguzi P., Okiror, J.F., Rutting L., Mwongera C., Twyman J., Shikuku K.M., Winowiecki L.A., Läderach P., Mwungu C.M., Jassogne L. 2019. Chapter 23: The Role of Multi-Stakeholder Platforms for Creating an Enabling Climate Change Policy Environment in East Africa. *The Climate-Smart Agriculture Papers.*

[21] Winter S., Bijker M., Carson M. 2017. The role of Multi-stakeholder Initiatives in promoting the resilience of smallholder agriculture to climate change in Africa. Harvard Kennedy School, Corporate Responsibility Initiative.

[22] Van Nieuwkoop M., Van de Velde P., Huyer S., Freeman K.K. 2022. Gender-smart agriculture: The only way forward for women and climate. World Bank Group, Blog.

[23] Khoza S., Van Niekerk D., Nemakonde L.D. 2019. Understanding gender dimensions of climate-smart agriculture adoption in disaster-prone smallholder farming communities in Malawi and Zambia. *Disaster Prevention and Management, 28: 54.*

[24] FAO. 2018. Climate-smart agriculture training manual – A reference manual for agricultural extension agents. Food and Agriculture Organization of the United Nations, Rome.

[25] Nguru, M.K. 2021. Pathway to Ensure Gender Responsive Climate-Smart Agriculture (CSA) Policies at the Country level. Forum for Agricultural Research in Africa (FARA).

[26] Manfre, C. 2021. 3 Priorities for Improving the Resilience of Women Farmers and Entrepreneurs: Learning From COVID-19. TechnoServe.

[27] Bullock R., Huyer S., Shai T., Nyasimi M. 2020. The CCAFS Youth and Climate-Smart Agriculture (CSA) Strategy. CCAFS Working Paper no. 332. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

[28] Mungai C., Muchaba T., Szilagyi L., Radeny M., Atakos V., Ntiokam D. 2018. Youth engagement in climate-smart agriculture in Africa: Opportunities and challenges. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available online at: www.ccafs.cgiar.org.

[29] FARA. 2021. Policy Brief: Upscaling climate-smart agriculture (CSA) adoption in Africa. Forum for Agricultural Research in Africa (FARA).

[30] Nicholson CF. 2021. A synthesis of the work of CCAFS and partners on climate change and food and nutrition security. CCAFS Working Paper no. 369. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

[31] IFAD. 2020. Examining the climate finance gap for small-scale agriculture. International Fund for Agricultural Development (IFAD).

[32] Mungai E.M., Ndiritu S.W., da Silva I. 2021. Unlocking Climate Finance Potential for Climate Adaptation: Case of Climate Smart Agricultural Financing in Sub Saharan Africa. In: Oguge, N., Ayal, D., Adeleke, L., da Silva, I. (eds) *African Handbook of Climate Change Adaptation*. Springer, Cham.

[33] Gikonyo N.W., Busienei J.R., Gathiaka J.K., Karuku G.N. 2022. Analysis of household savings and adoption of climate smart agricultural technologies. Evidence from smallholder farmers in Nyando Basin, Kenya. Heliyon, 8.

[34] Tesfaye K, Desta LT, Demissie T, Seid J, Haile A, Mekonnen K, Solomon D. 2021. A Framework for Bundling Climate-Smart Agriculture (CSA) and Climate Information Services (CIS) in Ethiopia. AICCRA Technical Report. Addis Ababa, Ethiopia: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

[35] Prager S.D., Byandaga L., Kagabo D.M. 2021. Scaling and Sustaining CIS and CSA through Bundled Business Models. Info Note. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

[36] AICCRA.2023. Annual Report 2022: Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA). Internal Document. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

[37] Koerner J., Dinesh D., Loboguerrero A.M., Campbell B. 2020. Lessons learnt from CCAFS – 10 years scaling climate-smart agriculture. Info Note. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

[38] Business Africa Online. 2017. Mobile penetration in Africa reaches 80%.

[39] Ogunyiola A, Gardezi M and Vij S. 2022 Smallholder farmers' engagement with climate smart agriculture in Africa: role of local knowledge and upscaling, Climate Policy, 22:4, 411-426.

[40] Segnon A.C., Obossou E., Lamien N., Zougmore R.B. 2022. Scaling Climate-Smart Agriculture technologies and innovations in West and Central Africa through regional spillover mechanisms: Experiences from CORAF and way forward. Info Note. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

[41] Global Centre on Adaptation. 2021. State and trends in adaptation report 2021: How adaptation can make Africa safer, greener and more prosperous in a warming world.

[42] FAO. 2021. Climate-smart agriculture case studies 2021 – Projects from around the world. Rome.

AUDA-NEPAD
AFRICAN UNION DEVELOPMENT AGENCY

www.nepad.org