

REPORT



Mapping of Climate-Smart Agriculture Initiatives in Eastern & Central Africa



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Acronyms

ACCRA	Africa Climate Change Resilience Alliance
ACSAA	African Climate-Smart Agriculture Alliance
ACT	Agricultural Conservation Tillage Network
AGRA	Alliance for a Green Revolution in Africa
ARC	Agricultural Research Council- Sudan
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASDP	Agricultural Sector Development Support Programme
AUDA	African Union Development Agency
CBOs	Community Based Organizations
CCAFS	Climate Change and Food Security Program
CGIAR	Consultative Group on International Agricultural Research
CIAT	The International Centre for Tropical Agriculture
CMS	Content Management System
COMESA	Common Market for Eastern and Southern Africa
CoP	Communities of Practice
CRI	Climate Risk Index
CSA	Climate-Smart Agriculture
CSAYN	Climate-Smart Agriculture Youth Network
DRC	Democratic Republic of Congo
EAC	East African Community
ECA	Eastern and Central Africa
EIARI	Ethiopian Institute of Agricultural Research
EUR	Euro
DD	Decimal Degree
FAO	Food and Agricultural Organization
FOFIFA	The National Center for Applied Research on Rural Development- Madagascar
GBP	Great British Pound
GIS	Geographical Information System
GACSA	Global Alliance for Climate-Smart Agriculture
ICPAC	IGAD Climate Prediction and Application Centre
IGAD	Intergovernmental Authority on Development
INERA	Institut National pour l'Etude et la Recherche Agronomiques (The National Agricultural Study and Research Institute)- DRC
IPCC	Intergovernmental Panel on Climate Change
IRA	Institute de Recherche Agronomique

ISABU	Institut des Sciences Agronomiques du Burundi
KALRO	Kenya Agricultural Livestock and Research Organization
MAFGOSS	Ministry of Agriculture and Forestry, Government of South Sudan
NARI	National Agricultural Research Institute- Eritrea
NARO	National Agricultural Research Organization- Uganda
NDCs	Nationally Determined Contributions
NEPAD	The New Partnership for Africa's Development
NGOs	Non-Governmental Organizations
QGIS	Quantum GIS
RAB	Rwanda Agricultural Board
RICA	Rwanda Institute for Conservation Agriculture
SDGs	Sustainable Development Goals
TARI	Tanzania Agricultural Research Institute
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States Dollar
WB	World Bank
WY&VG	Women, Youth, and Vulnerable Groups

Executive Summary

Climate change is continuing to take a heavy toll on the agriculture sector in ASARECA member countries, putting years of economic progress at risk. The pathway to ensuring a climate-resilient agricultural sector must, therefore, be cemented with sound climate agricultural policies and interventions. Climate-Smart Agriculture is emerging as a promising pathway to address challenges imposed by the changing climate and ensure that agriculture becomes resilient. However, climate change efforts in Africa seem un-coordinated, hence making stewardship and strategic planning difficult. The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) commissioned a study to map out the existing CSA initiatives to take stock of the existing efforts and provide a platform for harmonizing the implementation of such similar initiatives by stakeholders in the region. The main objective of the study was to map out CSA initiatives being implemented in twelve (12) of the ASARECA 14 member countries. The 12 are Burundi, DRC, Eritrea, Ethiopia, Madagascar, Kenya, Republic of the Congo, Rwanda, South Sudan, Sudan, Tanzania and, Uganda. The CSA initiatives identified covered the period from 2015 to 2020.

Using a mixed-methods approach that entailed a desk review and stakeholder survey to collect both qualitative and quantitative data, a total of 489 CSA initiatives were identified. Evidence shows that ASARECA member countries are implementing a range of CSA initiatives to mitigate the impacts of climate change. These initiatives include policies, strategies/plans, programmes, projects, Communities of Practice (CoPs), hubs/platforms, and networks/partnerships. Half (50.7%) of initiatives identified were CSA projects. This was followed by programmes (15.5%), networks/partnerships (13.1%), strategies/plans (11.9%), CoP (4.9%), hubs/platforms (2.2%) and policies (1.6%). The number of policies directly targeting CSA are few, suggesting the need for the countries to enact CSA related policies to guide the implementation of CSA related initiatives in the region. Ultimately, increasing food production, improving resilience and reducing emissions from the agriculture sector will depend on how fast ASARECA member countries prioritize policy actions that address the challenges of the changing climate. ASARECA member countries such as Burundi, Uganda, Eritrea, Kenya and Rwanda are already seizing the opportunity of the climate crisis to accelerate the implementation of these policies.

Findings from the study revealed that Kenya had the highest (63) number of CSA initiatives in the region, followed by Uganda (38), Tanzania (37), South Sudan (11), Eritrea (9) and the Republic of Congo (1). The high number of CSA initiatives in Kenya, Tanzania and Uganda was attributed to the wide range of supportive policies, strategies, institutional and legislative frameworks that are addressing the declining agricultural productivity arising from environmental degradation and the negative impacts of climate change. Additionally, these three countries, have the highest number of NGOs registered that are involved in the implementation of CSA initiatives and support the national government to implement various climate change and agricultural strategies.

The study also revealed that all ASARECA member countries have drafted and submitted their Nationally Determined Contributions (NDCs) to the United Nations Framework Convention on Climate Change (UNFCCC), which contains a reference to agriculture as a priority sector. The NDCs are at the core of achieving the long-term goals of adaptation and mitigation in the agriculture sector. Countries that explicitly mention CSA in their NDCs are Burundi, Eritrea, Kenya, Madagascar, South Sudan, Tanzania and Uganda. On the other hand, only 3 countries (Ethiopia, Kenya and Sudan) submitted their NAPs to UNFCCC with Ethiopia and Kenya explicitly mentioning CSA as part of their adaptation strategies in the agriculture sector, while Sudan mentions several climate-smart technologies for the agriculture sector in their NAP.

The study also revealed that different groups of people were targeted by the CSA initiatives further highlighting the critical role of CSA in building resilience among diverse farming communities to ensure sustainable livelihoods.

The most common target group was smallholder mixed crop-livestock farmers operating under rain-fed and irrigated agricultural systems, followed by pastoralists and agro-pastoralists in arid and semi-arid lands; women and female-headed households; farmer associations and farmer groups; technical experts and extension agents; fishing communities, private sector, policymakers and decision-makers in relevant government ministries, departments and institutions, and the youth.

The study further provided useful insights into the various CSA technologies and practices being utilized and adopted within the ECA sub-region. Among the 489 CSA initiatives identified, six (6) common CSA practices and technologies aligned to the three pillars of CSA were defined. These include: (i) soil and sustainable land management; (ii) agroforestry, (iii) irrigation; (iv) disease and pest management for crops, (v) livestock and fisheries, and (vi) drought management for crops and livestock.

Findings on the financing mechanisms for the CSA within the ASARECA sub-region show that CSA initiatives are mainly being financed through multilateral and bilateral grants and loans, private philanthropy and foundations, banks and microfinance institutions. Estimated total funding of USD 23 million was made available by various development partners for the implementation of CSA projects, programmes and strategies between 2015 and 2020. Results of this study further show that CSA interventions that enhance opportunities to increase agricultural productivity had the highest funding estimated at USD 41,460 million. This was closely followed by interventions that improve resilience to climate change (USD 23,546 million) and interventions that contribute to long-term reductions in dangerous greenhouse gas emissions (USD 12,325 million). Financing for women and female-headed households, youth and Indigenous/marginalized people shows that women and female-headed households received more funding than the youth and indigenous/marginalized people. Women and female-headed households received more funding estimated at USD 55 million compared to the youth (USD 38 million) and Indigenous/marginalized people (USD 41 million).

The emerging challenges of climate change in the agriculture sector have led to increased investment in research and innovations aimed at transitioning farming communities towards sustainability and profitability. The study identified many research and innovation priorities including digitizing CSA products and services such as financial and insurance services, and weather agro-advisory services; mechanizing CSA farming operations; developing and scaling up business models for CSA; micro-insurance and index-based insurances schemes; public and private innovative financing and investments models for CSA; CSA multi-stakeholder platforms; and Public-Private Partnership (PPP) for technology innovation and transfer.

To transition towards a resilient and sustainable food system, ASARECA member countries require partnerships and innovation platforms for scaling up CSA Initiatives. Partnerships are deemed as critical for scaling up of CSA technologies and best practices as evidenced by findings from the study that show that multiple partnerships are supporting the implementation of various CSA initiatives. The study also showed that CSA has a strong business case and therefore private sector partnerships are critical in attracting financing and investments for scaling up CSA interventions. The study also showed that multi-stakeholder partnerships such as innovation platforms exist within member countries and provide stakeholders space to share and exchange research findings as well as learn about successful localized CSA interventions. Other CSA platforms and alliances such as Kenya Climate-Smart Agriculture Multi-Stakeholder Platform (CSA-MSP), Africa Climate Change Resilience Alliance (ACCRA) and Global Alliance for Climate-Smart Agriculture (GACSA) exist at national, regional and global level, respectively. Some of the partnerships identified to bridge the gap between governments (who develop policies), researchers and academia (who conduct research and provide data to support policymaking), NGOs and CBOs (who implement CSA actions) and donors (who provide financing). Other partnerships facilitate learning and capacity development through social media, webinars and conferences.

The study also revealed that various CSA interventions within the region are mainstreaming gender equality and social inclusion during implementation in an attempt to reduce the gender gap since this affects how men and women access and benefit from CSA initiatives. Out of 489 CSA initiatives, 358 have integrated a gender and social inclusion lens in their approach and implementation to reduce gender inequalities and social exclusion in agriculture. Out of 358 initiatives, 79.9% directly mention women and/or female-headed households as the target group. Similarly, 26.8% and 9.8% mention youth and indigenous/marginalized people respectively as the target population. Multiple dimensions of inequality also limit the adaptive capacity of women, youth and marginalized people. These groups comprise populations with the highest levels of vulnerability in ASARECA member countries. Women farmers, especially female-headed households, youth and marginalized indigenous people are more exposed to climate variability than men. This was attributed to limited access to natural and social resources required for engagement in CSA interventions.

Finally, ASARECA member countries are implementing various strategies to advance the contributions of CSA for increasing agricultural productivity, improving resilience to climate change, and contributing to long-term reductions in dangerous greenhouse gas emissions. These are being implemented through agricultural policies, strategies and plans, incorporating CSA into agricultural research, extension and development, institutional innovations, partnerships and networks. The study has identified many strategies that are being implemented to advance CSA in the ECA sub-region. These strategies include; (i) Increasing national ownership of CSA initiatives; (ii) Promoting strategic planning that supports the adoption and scaling up of CSA initiatives at all levels; (iii) Gender-responsive and socially inclusive CSA policies, strategies and plans; (iv) Inclusive and participatory research; (v) Capacity strengthening of smallholder farmers along value chains; (vi) Appropriate financial mechanisms that support the implementation of CSA initiatives; and (vii) Enhanced monitoring and evaluation on CSA interventions.



01

Introduction

1.1 Background

Climate change, persistent poverty especially in rural areas as well as disease pandemics such as COVID-19 are presenting big challenges in Africa. The region is experiencing extreme events of droughts, floods, and storms. In particular, droughts have increased in frequency and magnitude in recent decades and now impact areas that were unaffected historically. With increasing droughts and flood frequency, farming has been significantly affected thus negatively impacting millions of livelihoods, with adverse ripple effects to the economy (Connolly-Bouti and Smit, 2016; IPCC, 2014; Huho et al. 2010; FAO, 2018a; IFRC, 2011). According to projections by the Intergovernmental Panel on Climate Change (2014), crop yields in sub-Saharan Africa are set to drop by 22% by 2050 due to the effects of climate change. The yields of maize, one of the key staple crops in Africa are projected to fall by 18-22% (Serdeczny et al. 2017; Adhikari et al. 2015; Cairns et al., 2013). Various studies have also documented the negative impact of climate change on crops (Blümmel et al. 2020; Schrot et al. 2018; Ahmed et al. 2015; Ramirez-Villegas and Thornton, 2015; Thornton et al. 2015; Lobell et al. 2011). Livestock production has equally been affected by the changing climate (Rojas-Downing et al. 2017; Megersa et al. 2014). The agricultural production system has also experienced an increase in pests and diseases amongst crops, fisheries and livestock (Dinesh et al. 2015; Smith, 2015; Bett et al. 2017).

In Eastern and Central Africa (ECA), small-holder farmers dominate the agricultural landscape, deriving livelihoods from family farms as small as a quarter of an acre (Lowde et al. 2016; Murray et al. 2016). In ASARECA member countries, agriculture is central to adaptation and mitigation challenges posed by climate change. This is well recognized in the Paris Agreement, where many developing countries have prioritized agriculture as one of the critical sectors for the realization of their transformation agenda to a climate-resilient development pathway. This is because the changing climate is disrupting the farming practices by the smallholder farmers leading to high food insecurity and increased malnutrition especially among children, besides other challenges (Richardso et al. 2018; Vermeulen, 2014; Shisanya et al. 2016; Hall et al. 2011).

As part of the commitment to achieve food security and resilience in the agriculture sector, ASARECA member countries have embarked on developing various Climate-Smart Agriculture (CSA) initiatives to help define their longer-term agenda so as to guide near and long-term climate actions and planning in agriculture and other related sectors such as water and energy. It is important to point out that, traditionally, farming communities in ASARECA member countries have used traditional farming strategies (e.g. composting, mulching, reduced or no-till cultivation, fallowing and planting cover crops) to cope with the changing climate. These systems were practiced in creative ways, allowing small farming families to meet their subsistence needs amidst the unpredictable weather patterns. However, some of these practices have disappeared or are disappearing as more and more farmers shift to the use of inorganic soil amendments, monocrop and use of pesticides and herbicides. The ability of farmers and farming systems ecosystems to recover from climate shocks is thus compromised and/or limited in that farmers inevitably resort to overexploitation of natural resources using unsustainable methods. Furthermore, some of these methods are also financially draining to the smallholder farmers.

1.2 Climate-Smart Agriculture in the African Context

ASARECA member countries are highly affected by the current climate variability, uncertainty and extreme weather events. Available evidence indicates that climate in East and Central Africa sub-regions is already changing and the impacts are being felt across the countries (FAO, 2018; Adhikari et al., 2015; Niang et al., 2014; Shongwe et al., 2011; van de Steeg et al., 2009). A rise in average temperature, changes in rainfall patterns, increasing frequency of extreme weather events such as severe droughts and floods, and shifting agricultural seasons have been observed in different agro-ecological zones of eastern and central Africa (Kotir, 2011; Handmer et al., 2012). Climate change is particularly a threat to continued the economic growth and livelihoods of vulnerable populations and if left unchecked, it has the potential to create major impacts on the economy, society, culture and environment. The vulnerability of Eastern and Central African countries to climate change is compounded by heavy dependence on rain-fed agriculture (with 96% of agriculture estimated as rain-fed) and natural resources; gender inequalities, social exclusion, high poverty levels, low or non-existent levels of disaster preparedness to climate change effects, and poor infrastructure (Nitya et al. 2019; Ahmadalipour, 2019; Onyango et al. 2016). It is estimated that yields could fall by as much as 50% by 2050 (Onyutha, 2018; Tesfaye et al. 2015). Globally, it is estimated that climate change will lead to reductions in per capita consumption of 4-5% for Africa, the highest in the world (Stern, 2007).

To address these challenges posed by the changing climate and ensure that agriculture is more resilient, the climate-smart approach remains the most promising pathway for increasing the adaptive capacity of smallholder farmers and increasing resilience. It is important to point out that CSA is a combination of policy, technology, practices and finance that involves the direct incorporation of climate change adaptation and mitigation into agricultural development planning and implementation (FAO 2010).

The most commonly used definition is provided by the Food and Agriculture Organization of the United Nations (FAO) which defines Climate-Smart Agriculture (CSA) as ‘agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces or removes greenhouse gases (mitigation) where possible’ (FAO, 2013). This definition brings on board the “triple wins” that enhance opportunities to increase agricultural productivity, improve resilience to climate change, and contribute to long-term reductions in dangerous greenhouse gas emissions. CSA is considered an approach to help guide actions to transform and reorient agricultural systems to effectively and sustainably support the development and food security under a changing climate (FAO, 2010). CSA combines the improvement of social resilience with ecological resilience by promoting environmentally friendly intensification of farming systems, herding systems and efficient sustainable gathering systems. Therefore, CSA covers production systems and, policy and other enabling institutions that are best suited to respond to the challenges of climate change for a specific location.

Climate-smart agriculture initiatives are being undertaken at various levels including grassroots, sub-national, national and regional. These initiatives are being undertaken by national governments, various Community-Based Organizations (CBOs), private sector and Non-Government Organizations (NGOs) that are individually or jointly coming together to support transformative and scalable climate actions. CSA is very much context-specific since farming systems and farm typology are very diverse and thus require location-specific climate-smart interventions. An ideal CSA conceptual framework should integrate policies around adaptation, mitigation and food security including five (5) desirable outputs: a) increase productivity, b) increase income, c) increase resilience, d) improve input use efficiency, e) reduce emissions and, f) increase gender and social inclusions (Khatri-Chhetri



CSA as an innovative approach can sustainably increase productivity of crops, livestock, fisheries and forestry production systems and improve livelihoods and income for rural people, while at the same time contributing to the mitigation of the effects of climate change.

et al. 2017). CSA ideally is expected to improve farm productivity, increase resilience to weather extremes and decrease greenhouse gas emissions wherever possible (FAO, 2010).

1.3 Scope of Climate-Smart Agriculture Initiatives

Climate-Smart Agriculture (CSA) Initiatives were broadly defined to include different types of initiatives ranging from policies, plans, strategies, programs, projects, multi-stakeholder platforms, partnerships, communities of practices, networks, hubs among others. In the face of climate change, the fundamental changes for increasing agricultural production can occur through transformation across the individual farmer, practices and political scope. Advancing the policy, practice and research linkages between agriculture and climate change has made CSA a framework that is implementable across diverse actors and diverse areas (Scherr et al., 2012). Although the policy, practice and research nexus are critical for scaling up CSA, the absence of appropriate coordination and accountability, and the isolated implementation of CSA practices and technologies will result in a small-scale impact.

Under such circumstances, what is needed is extensive documentation of CSA initiatives to avoid duplication and increase coordination among the various CSA initiatives within the ECA region. Therefore, this study aimed at identifying and mapping CSA initiatives across ASARECA member countries, to avoid overlap and duplication, a process that could improve coordination of CSA actions across ASARECA member countries. As a prerequisite for effective coordination and scaling up, the study sought to map out CSA initiatives to identify areas for consolidation, address fragmentation and poor coordination at various levels (national and sub-regional level). It is expected that this will also contribute towards identifying comparative advantages for institutions involved in CSA and outline their respective roles in ensuring the successful design and implementation of CSA initiatives for the well-being of the whole society.

For this study, the scope of CSA initiatives included (i) Programs; (ii) Policies; (iii) Projects, (iv) Networks and partnerships; (v) Strategies/Plans, (vi) Communities of Practice and (vii) hubs/platforms that focus on CSA (Figure 1).

Figure 1: Framework for assessing CSA initiatives in ASARECA member countries



In terms of geographical scope, the study covered the Eastern and Central Africa (ECA) sub-region, with a focus on the ASARECA 12 member countries. These include Burundi, the Democratic Republic of Congo, Eritrea, Ethiopia, Madagascar, Kenya, Rwanda, Sudan, South Sudan, Republic of Congo, Tanzania and Uganda. A synopsis of climate change impacts on agriculture in each of the countries is highlighted in Appendix 1. The study covered the CSA initiatives that were either implemented (completed and ongoing) and those in the pipeline (planned but not yet started) for the period 2015 to 2020. However, CSA initiatives that started before 2015 and continued into the 2015-2020 period were also included in the study.

1.4 Objectives of the CSA Initiatives Study

The main objective of this study was to map CSA initiatives being implemented throughout ASARECA member countries

The specific objectives of the study were to:

- a. Establish and document the current state of CSA initiatives in ASARECA member countries and their preparedness in responding to climate change
- b. Identify existing collaborations/partnerships for scaling up CSA initiatives within ASARECA member countries
- c. Establish strategies for advancing contributions of the CSA sector in ASARECA member countries
- d. Develop recommendations for strengthening collaboration and coordination of the CSA sector in ASARECA member countries

02

Methodology

2.1 Research Methods

This study used a mixed-methods approach that entailed a desk review and stakeholder survey to collect both qualitative and quantitative data. A common understanding of glossary search terms that were used to identify CSA initiatives (policies, programs, projects, plans/strategies, CoP, Networks/partnerships, and Hubs/platform) was a prerequisite for mapping (Appendix II).

Desk review was undertaken to gather secondary data through online searches for CSA initiatives as well as a comprehensive document review of existing CSA initiatives to identify those that had been implemented in the last 5 years (2015-2020) within the ECA sub-region. The literature review covered government documents, scientific journals, reports, grey literature and other publications. Internet-based search was done for the following websites: Government websites especially Government Ministries, Directorates and Departments related to Climate Change, Agriculture, Natural Resource Management, Water, Environment, Forestry; Websites for International Agricultural Research Agencies such as CGIAR (CIAT-CCAFS); University websites; UN bodies websites such as FAO; CBOs and NGOs website; Donor websites such World Bank, USAID, Adaptation Fund; Journal papers; and News/blog articles.

A stakeholder survey was undertaken using a semi-structured questionnaire administered to key informants (Appendix III) to collect both qualitative and quantitative data. The key informants who participated in the survey were purposively sampled because of their past engagements and experiences concerning CSA, agriculture and climate change issues. The questionnaire was administered to different stakeholders including policymakers, Non-Governmental Organizations (NGOs), Community Based Organizations (CBOs), Academia, UN Bodies, and Donors using online platforms, email, and telephone calls.

Some of the organizations that were contacted include; Alliance for Green Revolution in Africa (AGRA), National Agricultural Research Institutes (NARIs) in ASARECA member countries (that included KALRO, NARO, TARI, RAB, ISABU, INERA-DRC, IRA, FOFIFA, NARI, MAFGOSS); Conservation Networks (ACT); the Consultative Group on International Agricultural Research (CIAT regional office, Climate Change Agriculture and Food Security regional office), United Nations Agencies (Food and Agriculture Organization, UNECA), African Union (New Partnership for Africa's Development); Regional Economic Communities (COMESA, EAC, and IGAD Climate Prediction and Application Center) among others. Government Ministries in charge of Agriculture, Livestock, Fisheries were also contacted. Farmer organizations that participated in the study included: East Africa Farmers Federation (EAFF); Uganda National Farmers Federation (UNFFE); Mtandao wa Vikundi vya Wakulima Tanzania (MVIWATA); and Kenya National Farmers' Federation (KENAFF) (Appendix IV).

To enable the respondents to complete the questionnaires appropriately and to ensure the validity and quality of the data, a glossary of terms is part of the questionnaire. Telephone interviews were structured differently from online and email surveys. It was brief (average about 10 minutes) and provided complementary information and their opinions on CSA initiatives in place to address agriculture and climate change in ASARECA target countries.

Data collected from online questionnaires, emails, and telephone interviews was entered into the database of CSA initiatives in ASARECA member countries.

2.2 CSA Initiatives Database

A database of CSA initiatives was developed using MS Excel. CSA information that was included in the database is shown in Table 1.

Table 1: Variables included in the database of CSA initiatives

a. Country/Region	i. Total target beneficiaries disaggregated by gender	l. Lead and type of implementing partner organizations
b. Type of CSA Initiative	j. Potential to enhance opportunities to increase agricultural productivity (Food Security), improve resilience to climate change (Adaptation) and contribute to long-term reductions in dangerous greenhouse gas emissions (Mitigation)	m. Financing and type donors
c. Title of the CSA initiative	k. Hectares of pastoral land and agricultural systems in which CSA practices have been adopted	n. Cost of implementation (Budget)
d. The 3 key words		o. Gender and social inclusion
e. Start/End year		p. Website/URL
f. Status (ongoing/completed / planned)		q. Location
g. Synopsis/Goal/Objective		r. Contact information and title of the key contact
h. CSA activities and intervention		

2.3 Data Analysis and Integration

Both secondary and primary data were entered into the database. The data was analyzed to provide an understanding of the current state of affairs of CSA initiatives in Eastern and Central Africa as well as countries' preparedness in responding to climate change. Descriptive statistics were generated to examine and show the current status and trends in CSA initiatives. The frequency and distribution of CSA initiatives in the data set were analyzed using summary statistics. Using content analysis, further analysis was done to assess the gender and social inclusiveness of the CSA initiatives. Search words such as women, youth, female-headed households, widows, maternal, children, elderly, marginalized communities/people were flagged out in the documents during the search. Some of the findings are presented in verbatim in this report.

2.4 Limitations of the CSA Mapping in ASARECA Member Countries

The study faced various challenges as a result of the COVID-2019 pandemic leading to restricted and limited physical engagements with the key informants and organizations. However, efforts were made to reach out to the key informants through email and telephone calls. Another limitation related to accessing the relevant documents. The accuracy and reliability of some data were ensured by triangulating information collected with published official government documents and peer-reviewed publications. Key informant interviews provided complementary information that was used to fill the data gaps.

03

Climate Risks and Vulnerabilities in Agricultural Sector in Eastern and Central Africa

3.1 Overview

Current predictions for Sub Saharan Africa indicate that the ECA sub-region and in particular ASARECA member countries will be the hardest hit by climate change. It's predicted that the impacts of climate change across ASARECA member countries will not be equally distributed with some countries and ethnic groups being hit harder than others (UNDP, 2019; Islam and Winkel, 2017; Niang et al. 2014). This has been attributed to several reasons including dependence on rain-fed agriculture, high poverty levels which leads to low adaptive capacity, and poor or inappropriate governance that fails to prioritize and act on climate change (Waithaka et al. 2013). The changing climate is increasing vulnerabilities among communities in Eastern and Central Africa, especially those living and deriving livelihoods from rural areas. This vulnerability will negatively impact peoples' livelihoods as well as the countries' economies. Further, if unchecked climate change will undoubtedly reverse progress made in improving the socio-economic well-being of the people within the ASARECA member countries.

The effects of climate change on agriculture and livelihoods have devastating consequences on food and nutrition security, the environment, and the economy. Many ASARECA member countries have had to declare national disasters due to droughts, mudslides, and floods (Froude and Petley, 2018; Mind'je et al. 2019). Climate projects have indicated an increase in the frequency and duration of droughts and a greater amount of annual precipitation during heavy rainfall events (Dosio et al. 2019). The impact of these extreme weather events is likely to increase the vulnerability of farming systems, thus weakening coping strategies and resilience in the agricultural sector (Sonwa et al. 2017). With the majority of the population (59.29%) in ASARECA member countries live in rural areas and most of these people lack the adaptive capacity to climatic shocks (Zanmassou et al. 2020; King et al. 2020; World Bank 2019). Innovative agricultural measures are therefore needed to help farmers and other actors along the agricultural value chain cope with the changes in emerging and projected climatic patterns.

The Climate Risk Index (CRI)¹ is an index that analyses the extent to which countries have been affected by impacts of weather-related loss events (flooding, cyclone, and drought). Table 2 shows that CRI is low for at least five (5) ASARECA member countries (Eckstein et al. 2020). The lower the CRI index, the highly vulnerable a country is to the direct consequences (deaths and economic losses) of extreme weather events (IBERDROLA, 2020). Madagascar with the CRI index of 15.83 is the most vulnerable to climate change with an estimated 72 deaths (0.27 per 100,000 inhabitants) and about USD 568 million in economic losses (IBERDROLA, 2020). Madagascar was hit by two cyclones leading to floods that destroyed buildings, killing 68 people, and displaced more than 70,000 (Eckstein et al. 2020).

¹ The Climate Risk Index (CRI) indicates a level of exposure and vulnerability to extreme events, which countries should understand as warnings in order to be prepared for more frequent and/or more severe events in the future.

Table 2: Climate Risk Index for ASARECA Member countries (2020)

Country	Climate Risk Index	Country	Climate Risk Index
Burundi	36.33	Madagascar	15.83
Congo	125.0	Rwanda	21.17
DRC	69.83	South Sudan	116.0
Eritrea	125.0	Sudan	49.33
Ethiopia	62.83	Tanzania	69.83
Kenya	19.67	Uganda	24.67

Source: Table 2018 (Eckstein et al. 2020)

Uganda, Rwanda, and Kenya each have a CRI of 24.67, 21.17 and 19.67 respectively, because they experience drought, famine, and flooding. For example, in 2018, heavy rains affected Kenya and Rwanda leading to floods and mudslides that ended in thousands of people being displaced (Eckstein et al. 2020). Specifically, the drought led to the death of 113 people and losses of more than USD 708 million (IBERDROLA, 2020). In Rwanda, extreme weather events led to 88 deaths and economic losses to the tune of USD 93.2 million in 2018 (IBERDROLA, 2020). The ND-GAIN Country Index² for ASARECA member countries is low indicating that the countries are extremely vulnerable to the impacts of climate change. The vulnerability score³ for each of the countries is very high while the readiness score⁴ is very low (Figure 2).

3.2 Climate Risks

Across the globe, predictions indicate that under a 3.5°C increase and a 20% precipitation change by 2030, production in high agricultural potential areas will only face a small decrease or even an increase of up to 1% (Parry et al., 2012). For example, there will be a 2 to 4 degrees increase in temperature in Ethiopia while the rest of ASARECA member countries will experience an increase in precipitation by 2,100 (Teshome and Zhang, 2019; Verburg et al 2010). However, a big decrease in food production of 21.5% is predicted to occur in medium and low agricultural potential areas such as Arid and Semi-Arid Lands (ASALs) (Diedhiou et al. 2018; Parry et al. 2012; Avnery et al. 2011).

In Eastern and Central Africa, climate change is expected to affect all four dimensions of food security: availability, access, utilization, and stability. The changing climate is projected to have significant impacts on agriculture through direct and indirect effects on crops, soils, livestock, and pests (Smale, et al. 2013). This will lead to a decline in the production of staple crops with changes in rainfall patterns and amounts as well as increasing temperatures (Adhikari et al. 2015; Scott et al. 2013).

The predicted decrease in production in ASAL areas that are mainly Livestock areas is considered to be a combination of reduced pasture/fodder as well as drug-resistant strains of livestock pests and diseases. In the Crop-farming regions, this risk is presented in a similar form of crop diseases and pests, as well as poor quality harvest. Overall, the associated climate risk is complicating economic planning by member countries and the predicted impact on production has a major impact on member country's GDPs.

2 The ND-GAIN Country Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. It aims to help governments, businesses and communities better prioritize investments for a more efficient response to the immediate global challenges ahead.

3 Vulnerability score measures a country's exposure, sensitivity and ability to adapt to the negative impact of climate change.

4 Readiness measures a country's ability to leverage investments and convert them to adaptation actions.

3.3 Green House Gas Emissions from the Agriculture Sector

GHG emissions reached a global total of almost 50 gigatonnes CO₂-equivalents per year (GtCO₂eq/yr) in 2016 (WRI, 2016). Of this, 73% of GHG emissions emanated from the energy sector and 18% from Agriculture. Other sources of emissions included Forestry and Other Land Use (6%), industrial processes (6%), and waste management activities (3%) (WRI, 2016). Historically, GHG emissions in Africa as a whole have been dominated by the Land-use Change and Forestry sector as a result of agricultural practices, deforestation, fires, and forest degradation.

In all the 12 ASARECA countries, agriculture is one of the largest sectors contributing to GHG emissions (Table 3). Findings from the study reveal that Ethiopia, Tanzania, and Sudan are the largest emitters of GHG from the agricultural sector while Rwanda, Burundi, the Republic of Congo, and Eritrea are the least emitters. To mitigate the GHG emission, Ethiopia's NDC pledged to reduce about 90 MtCO₂e from agriculture and 130 MtCO₂e from forestry in line with the country's Climate Resilient Green Economy (CRGE) strategy (FDR of Ethiopia, 2018). In Tanzania, GHGs emission from agriculture accounts for 5.68%. To mitigate this, the government has established the REDD+ readiness program and policy framework to address the adaptation and mitigation of climate change in agriculture (URT, 2013).

Table 3: Greenhouse Gas Emissions (GHG) in Agriculture, Land use change and forestry in ASARECA member countries (2016 Data)

S/n	Country	Sectors		Total Country emissions (mt)
		Agriculture	Land-use Change and Forestry	
1	Burundi	2.20 mt	3.81 mt	7.74
2	DR Congo	26.61	167.09 mt	224.81
3	Eritrea	4.57 mt	665.40 kt	7.96
4	Ethiopia	109.54 mt	23.07 mt	188.66
5	Kenya	45.80 mt	- 31.08 mt	47.77
6	Madagascar	23.91 mt	26.75 mt	58.88
7	Republic of Congo	3.09 mt	40.01 mt	49.77
8	Rwanda	3.10 mt	79.90 kt	5.28
9	South Sudan	52.86 mt	148.74 mt	201.60
10	Sudan	71.88 mt	46.22 mt	151.68
11	Tanzania	56.88 mt	214.69 mt	312.67
12	Uganda	29.40 mt	27.41 mt	81.07

Source: Climate Watch (2020)

3.4 Impact of Climate Change on Livestock Sub-sector

In ASARECA member countries, livestock is reared under different agricultural systems, that is, pastoral and mixed-crop farming. The pastoral system dominates the climate-sensitive arid, semi-arid, and arid rangelands of Tanzania, Ethiopia, Uganda, Kenya, Sudan, and South Sudan. The pastoral system is dependent on natural feed resources and water. Therefore, its productivity is highly affected by droughts and increasing temperatures. In western Uganda, pastoralists are vulnerable to climate variability, due to low adaptive capacity that has led to low milk yields and high livestock mortality (Nkuba et al., 2019).

In the Democratic Republic of Congo, weather changes have led to increases in the Rift Valley Fever Virus in cattle (Tshilenge et al. 2019). A mixed crop-livestock system is found in sub-humid and humid areas of ASARECA member countries and provides food security and livelihood options. The interactions between crops and livestock are managed under conditions of intensification, diversification, and risk management (Thornton and Herrero, 2015). Under the changing climate, the synergies between cropping and livestock husbandry offer various opportunities for raising productivity and increasing the efficiency of resource use in the Eastern and Central Africa region (Thornton and Herrero, 2015).

Livestock health and production are significantly vulnerable to the impacts of climate change with pastoralists who comprise a big population in ASARECA member countries being the most affected (Thornton and Herrero, 2015). Studies have shown that temperature increases are causing heat stress which negatively affects milk production, growth, reproduction and animal health, and welfare (Walter et al 2010) as well as changes in quantity and quality of pastures, water availability, severity and distribution of diseases and parasites (Figure 3) (Rojas-Downing et al. 2017; Baylis and Githeko, 2002).

The climate change challenge to the livestock sector is worsened by other factors such as low skills and knowledge of farmers/producers and pastoralists, low input/output production methods, and ineffective private and public animal health and laboratory services. Countries are developing livestock and feed management practices, early warning systems, improved veterinary services that aim at lowering the adverse effect of climate change, and building resilience of vulnerable livestock keepers. For instance, Kenya has developed the Climate-Smart Agriculture strategy that has livestock policy and technology interventions under different plausible agricultural development pathways that can assist farmers to mitigate against the effects of climate change (KCSAS, 2018). Meanwhile, in other ASARECA member countries, farmers are using and adopting forage-legume intercropping technologies to adapt to climate change impacts on mixed crop-livestock systems (Hassen et al. 2017).

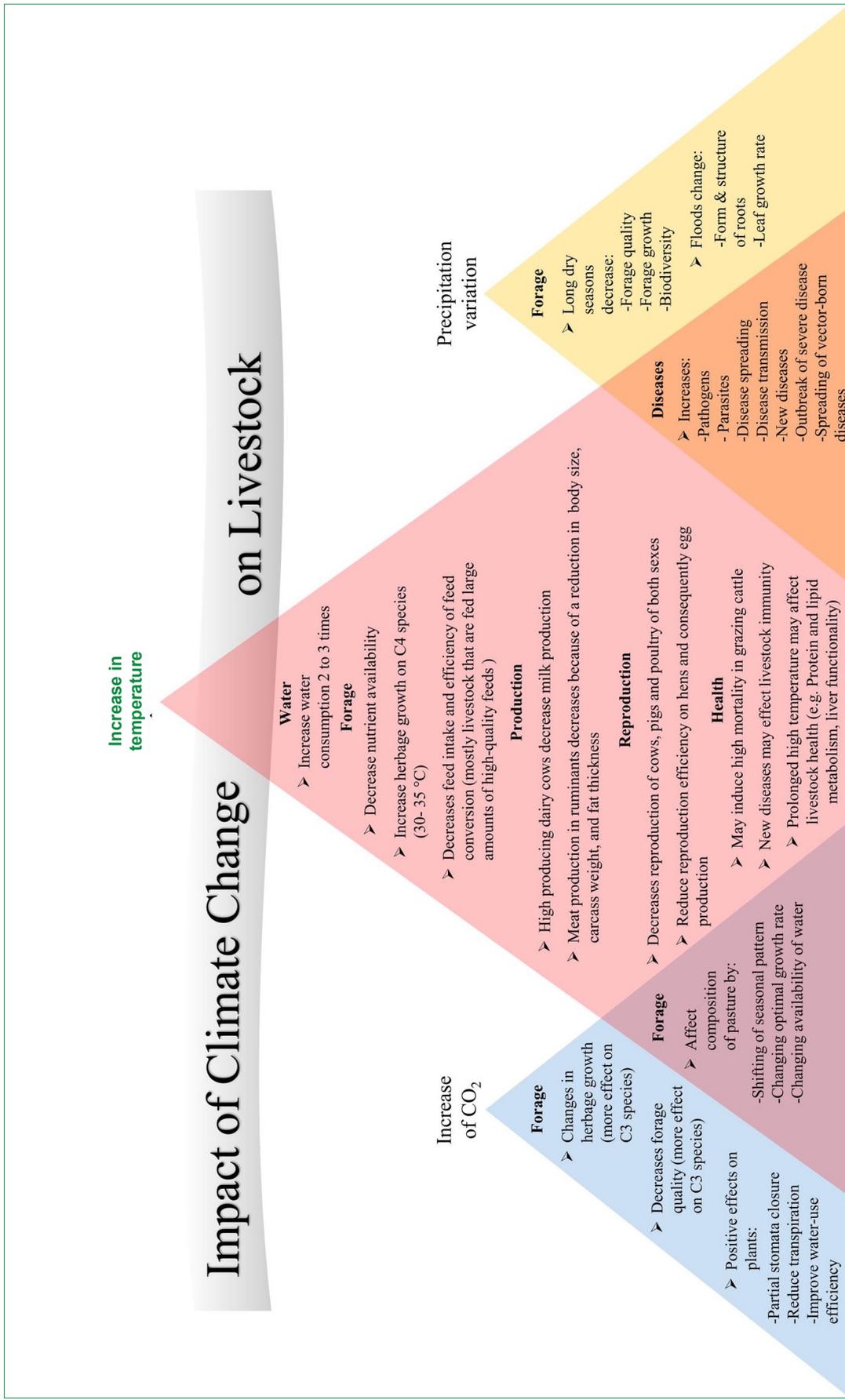
3.5 Impact of Climate Change on Crops Sub-sector

Globally, climate change is projected to increase the median temperature by 1.4–5.5°C and median precipitation by –2% to 20% by the end of the 21st century (Collins et al. 2013). This will negatively impact crop productivity in ASARECA member countries that are highly dependent on climate and weather under rain-fed agriculture. Climate change will affect crop yields disproportionately depending on the different agro-ecological zones and production systems (Descheemaeker et al. 2016). For example, in high altitude regions such as the highlands where low temperature is the limiting factor for plant growth, it is anticipated that a temperature rise will possibly increase crop yield, but in lowland areas, it will increase the risk of water stress (Thornton et al. 2009).

Increasing rainfall amounts especially in Ethiopia, Uganda, and Kenya will intensify the magnitude and frequency of floods affecting crop production and thus threatening the productivity of 95% of the rain-fed agricultural systems (Adhikari et al. 2015; IWMI, 2009) (Figure 4). In areas where water and heat stress will occur, studies indicate that climate change will decrease the length of the growing season (Kogo et al. 2020; Dunning et al. 2018; Challinor et al. 2016). Projections on the yields of staple crops such as maize indicate that there will be significant yield reductions in the Eastern and Central Africa region (Mumo et al. 2018; Adhikari et al. 2015; Tesfaye et al. 2015). Moreover, these projections show an overall reduction of 10% in maize production by 2055, which is equivalent to losses worth \$2 billion per year (Jones and Thornton, 2003).

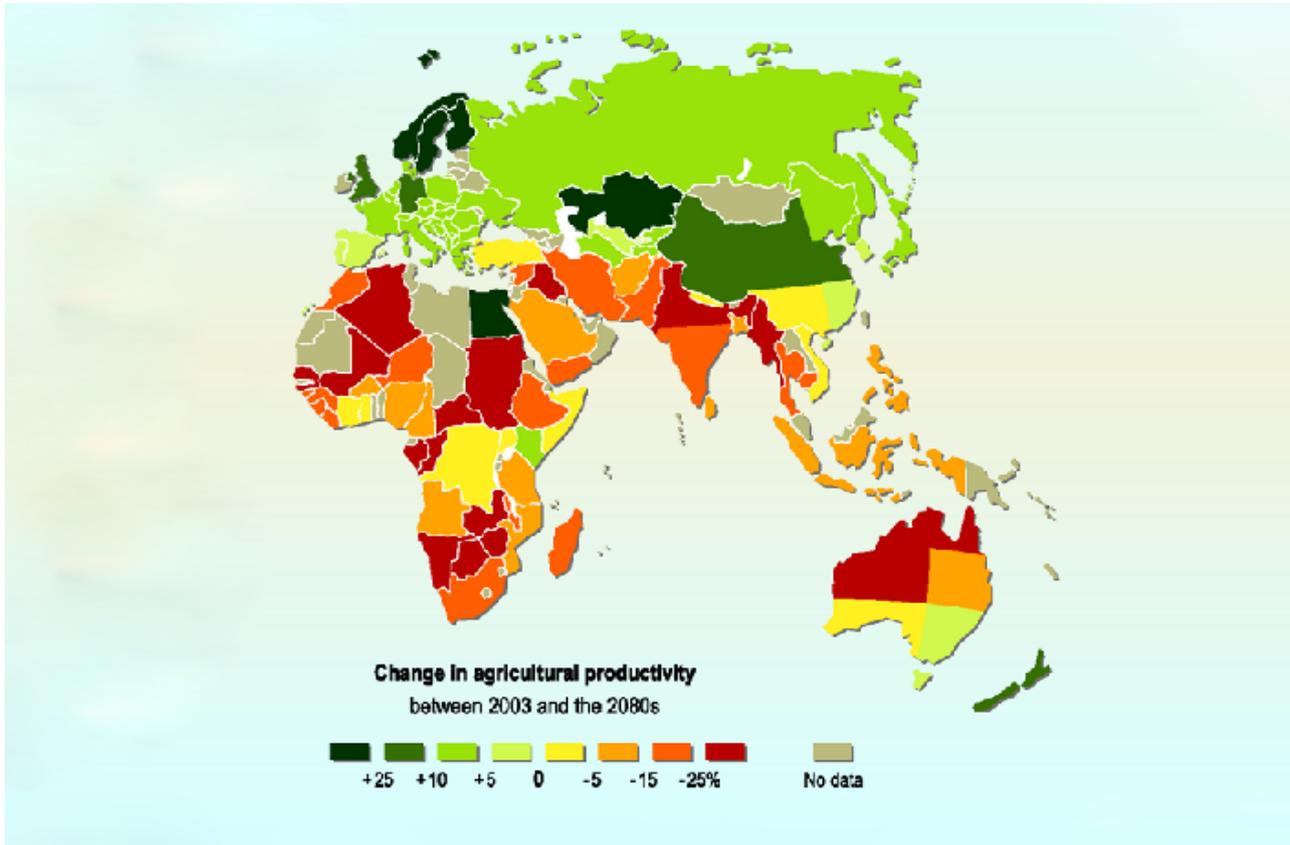
Similarly, wheat is also expected to experience low productivity (2t/ha) in the region due to an increase in intensity and frequency of abiotic (drought and heat) and biotic (yellow rust, stem rust, septoria, and fusarium) stresses which are associated with climate change (Tadesse et al. 2019).

Figure 3. Impacts of Climate Change on Livestock



Source: Borrowed from Rojas-Downing et al. (2017)

Figure 4: Projected impact of climate change on agricultural yields in Africa



Borrowed from Cline (2007)

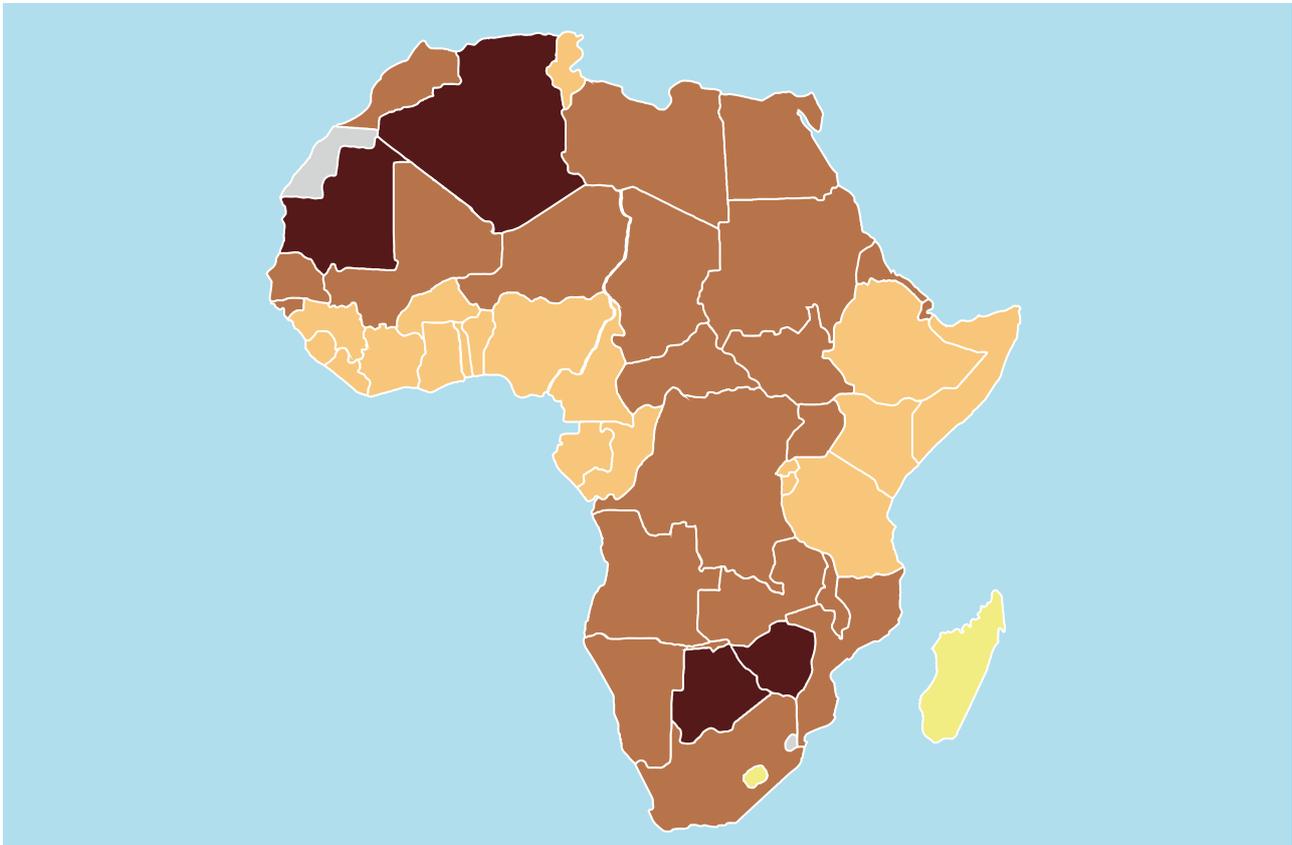
3.6 Impact of Climate Change on Fisheries Sub-sector

Fish is a major source of food and employment for the majority of communities in ASARECA member countries. The major aquatic habitats in ASARECA member countries include the natural lakes found in the Great rift valley basin, Indian and Atlantic Oceans, and man-made reservoirs. These water bodies support a diverse range of fishes that are affected differently by the changing climate (Hlohowskyj et al., 1996).

However, increasing temperatures in ASARECA member countries will negatively affect the fisheries sector through the reduction in breeding, species composition, and feeding behaviour of fish (Barange et al., 2018; Maina et al. 2013). Changing climate will also lead to fluctuations in fish stocks, negatively affecting vulnerable fishing communities that are heavily dependent on fisheries (Mohammed and Uraguchi, 2013; Brander, 2010).

The evidence available indicates that the fisheries sector in all ASARECA countries has a low vulnerability to climate change in different waters, such as freshwater, brackish and marine waters (Handisyde et al. 2017). Figure 5 shows the vulnerability of fisheries to climate change impacts in Africa (Allison et al. 2009). According to FAO (2013), increased variability in levels of precipitation and changes in air and water temperatures negatively affected the productivity of rivers, lakes, and floodplains in all the 12 countries.

Figure 5: Vulnerability of fisheries to climate change impacts in Africa



3.7 Challenges to Effective Climate Change Response in ASARECA Member Countries

National governments and other critical stakeholders in ASARECA member countries will have to respond by providing direct control measures against the effects of climate change, increasing the adaptive capacity of human and natural systems, and reducing GHG emission in the agricultural sector. Without appropriate adaptation responses, climate change is likely to constrain agricultural production and other related sectors such as water.

The agricultural system in ASARECA member countries, however, is facing a myriad of challenges in the wake of a changing climate. Some of the challenges include: (i) inadequate budgetary allocation; (ii) low deployment and diffusion of modern technology; (iii) frequent extreme weather events (droughts and floods); (iv) limited capital and access to affordable credit; (v) heavy livestock losses due to diseases; (vi) post-harvest crop losses; (vii) inadequate storage and processing facilities; and (viii) gender inequalities and social exclusion, among others.

More importantly, climate changes include fluctuating rainfall patterns, increases in drought frequency, and floods, which are expected to negatively affect crop yield, fisheries, and livestock production. To address these constraints and challenges, national governments and relevant stakeholders are working on interventions to reduce the vulnerability of resource-poor farmers. For example, farmers are adopting drought-resistant maize varieties and accessing weather and agro-advisory services through farmers' organizations in Ethiopia (Bedeke et al. 2019). Studies conducted in Sudan, Tanzania, and Kenya indicate that youth have adopted CSA. Some of the CSA practices include growing high-value vegetables using organic fertilizer under micro-irrigation schemes (Fadul et al. 2019; Amsler et al. 2019). Consequently, youth in DRC are engaging in intensive sustainable agriculture by adopting the use of high-yielding and drought-resistant crop varieties. The youths are marketing their products and earning high market prices (Arthur-Josué and Faustino, 2020). As a result of its ability to transform the agriculture

sector, Climate-Smart Agriculture (CSA) is therefore proving to be the most profitable and sustainable production option for ASARECA member countries (Kaptmyer et al. 2019; Tadesse, 2018; Taylor, 2018; Nowak et al. 2020; Karlsson et al. 2018; FAO 2013).

3.8 Country Preparedness in Responding to Climate Change

The above Sub-sections outline the impacts of climate change (Sect. 3.4-3.6) and challenges (Sect. 3.7) that national governments face as they attempt to deal with the negative consequences of climate change within the agricultural sector. This subsection then lays the various levels of preparedness by ASARECA member countries in light of the findings. Indeed, the socio-cultural and economic impact of climate change on ASARECA member countries is enormous. Various studies have shown that the economic costs of climate change impacts on the market and non-market sectors are about 3% of the total annual GDP for ASARECA member countries (Salih et al. 2020; Alam, 2017; Carleton and Hsiang, 2016). To forestall further impacts, ASARECA member countries have and continue to undertake a series of initiatives to adequately respond and mitigate against the impacts of climate change. To date, some of the initiatives that have been put in place by countries to enhance preparedness of the countries in responding to climate change effects include:

- a. **Research on impacts of climate change on the agriculture sector:** National Agriculture Research Institutes (NARIs) is leading research initiatives to analyze economic and socio-cultural impacts of climate change on agriculture and other related sectors such as water and energy. Examples of these initiatives include;
 - i. National vulnerability assessments
 - ii. Assessment of climate change impacts on various economic sectors especially the agriculture sector, and their associated economic costs and losses.
 - iii. Use of the data collected (which in some cases is gender disaggregated) to inform NDCs and NAPs and other climate change legislation.
 - iv. Assessments of GHG emissions from the agriculture sector
 - v. Build national capacity to implement climate change policies, plans, and strategies, and building and managing GHG inventory.

- b. **Developing climate change policies, plans, and strategies:** These are established by national governments to provide legislative and regulatory frameworks for an enhanced response to climate change. The various climate change strategies within ASARECA member countries provide an approach for integrating climate change considerations into the development agenda, planning, budgeting, and implementation.

- c. **Establishing institutions and governance frameworks to implement CSA:** ASARECA member countries have set up climate change coordination units and national coordination offices in various Government Ministries including the Ministries of Agriculture, Water, Forestry, etc., to facilitate effective and efficient implementation of climate actions within the countries.

- d. **Climate finance and investments:** Some ASARECA member countries are putting in place several climate financial mechanisms aimed at increasing food security, building resilience, and contributing to the reduction of emissions. Some of these financial mechanisms include:

Uganda's National Climate Green Fund (NCGF) is a semi-autonomous agency in Uganda's national climate financing mechanism. NCGF is administered by Uganda Development Bank Limited and is linked to other climate change funds such as East Africa Climate Change Fund.

- i. **National Climate Change Funds (NCCF):** These have been established under various legal frameworks to combat the impacts of climate change. For example, Rwanda, Uganda, and Kenya have established Climate Change Funds. Within Kenya, apart from the NCCF, County Governments of Garissa, Isiolo, Kitui, Makueni, and Wajir have established County Climate Change Funds (CCCFs) that are aligned to the NCCF, NDCs, NAPs, the Climate Change Act and NCCSR among others. These CCCFs prioritize and finance investments to reduce climate risk and achieve adaptation within the County. At the regional level, there is the East Africa Climate Change Fund.
- ii. **External Bilateral and Multilateral Funding:** All ASARECA member countries have access to external financial entities such as the Green Climate Fund (GCF); Adaptation Fund (AF); UN bodies e.g., FAO, UNDP; Global Environment Facility (GEF), World Bank; and Least Developed Countries Fund (LDCF). These countries have received grants and loans to finance various climate actions including CSA.

Given the extreme risks of floods, droughts and increasing temperatures some of the ASARECA member countries have planned for adaptation and mitigation activities in the agricultural sector (Table 4).

Table 4: Country Preparedness to Respond to Climate Change Impacts

Preparedness Strategies	List of Countries Implementing Strategies
Conducting predictions and evaluations of climate change and its impacts on agriculture and using the data to develop national strategies and plans (e.g., NDCs and NAPs)	Burundi, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Republic of the Congo, Rwanda, South Sudan, Sudan, Tanzania, Uganda
Integrating climate change into national and agricultural policies	Burundi, Eritrea, Kenya, Rwanda and Uganda
Integrating climate change into national and agricultural strategies and plans	Burundi, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Republic of the Congo, Rwanda, South Sudan, Sudan, Tanzania, Uganda
Improving understanding and sharing knowledge on science, policies, and best practices within the country and across the region	Burundi, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Republic of the Congo, Rwanda, South Sudan, Sudan, Tanzania, Uganda
Facilitating readiness for and access to various climate and green finances	Burundi, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Republic of the Congo, Rwanda, South Sudan, Sudan, Tanzania, Uganda
Assessing technology needs and facilitating technology transfer for adaptation and mitigation within agricultural sectors	Burundi, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Republic of the Congo, Rwanda, South Sudan, Sudan, Tanzania, Uganda
Improving community livelihoods and resilience, strengthening local institutions	Burundi, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Republic of the Congo, Rwanda, South Sudan, Sudan, Tanzania, Uganda
Capacity building national governments and other relevant stakeholders with critical knowledge for climate change and CSA	Burundi, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Republic of the Congo, Rwanda, South Sudan, Sudan, Tanzania, Uganda

04

Current State of CSA initiatives in ASARECA Member States

4.1 Overview

Climate change is causing intense devastating floods and droughts in the ASARECA member countries. It is destroying the livelihoods of the poorest and vulnerable populations, especially women who are dependent on agriculture and natural resources for their livelihoods. Hallegatte et al. (2017) estimate that the income of poor people will decline by more than 8% by 2030 due to the changing climate. This is likely to constrain their ability to respond to climate shocks. Therefore, there is an urgent need for agricultural systems in ASARECA member countries to adapt to climate change to achieve food security as well as lift people out of poverty. There is a plethora of approaches that promise to design resilient agricultural systems. These approaches can increase people's adaptive capacity as well as income thereby enhancing their wellbeing. One such approach is Climate-Smart Agriculture (CSA) that can reduce the negative impacts of climate change on agricultural productivity, livelihoods, and economies, and increase the adaptive capacity of farming communities (FAO, 2010). As an approach, CSA is not a single specific agricultural technology or practice. CSA is a combination of policy, strategy, technology, and finance that involves the direct incorporation of climate change adaptation and mitigation into agricultural development planning and implementation (FAO, 2010).

The economies of ASARECA member countries continue to rely on rain-fed agriculture, much to their detriment. In this region, farmers are not able to adequately plan due to the unpredictability of the rainy seasons. To mitigate this, the African Heads of State recognized the importance of CSA in the June 2014 Malabo Declaration which set a goal of 25 million farm households practicing CSA by 2025 (also referred to as Vision 25x25) (AU, 2014). This led to CSA being considered a priority of most African countries. Following the Malabo declaration, several regional CSA Alliances that seek to continually advance and refine approaches to food security were established. These alliances reflect the evolving policy context, latest research and innovations, appropriate and best CSA practices and technologies as well as the countries' development agenda and priorities.

In order to respond to the most pressing needs of farmers and deliver measurable change under the changing climate, agriculture in ASARECA member countries requires climate-smart technologies and innovations (KALRO Representative, Kenya)

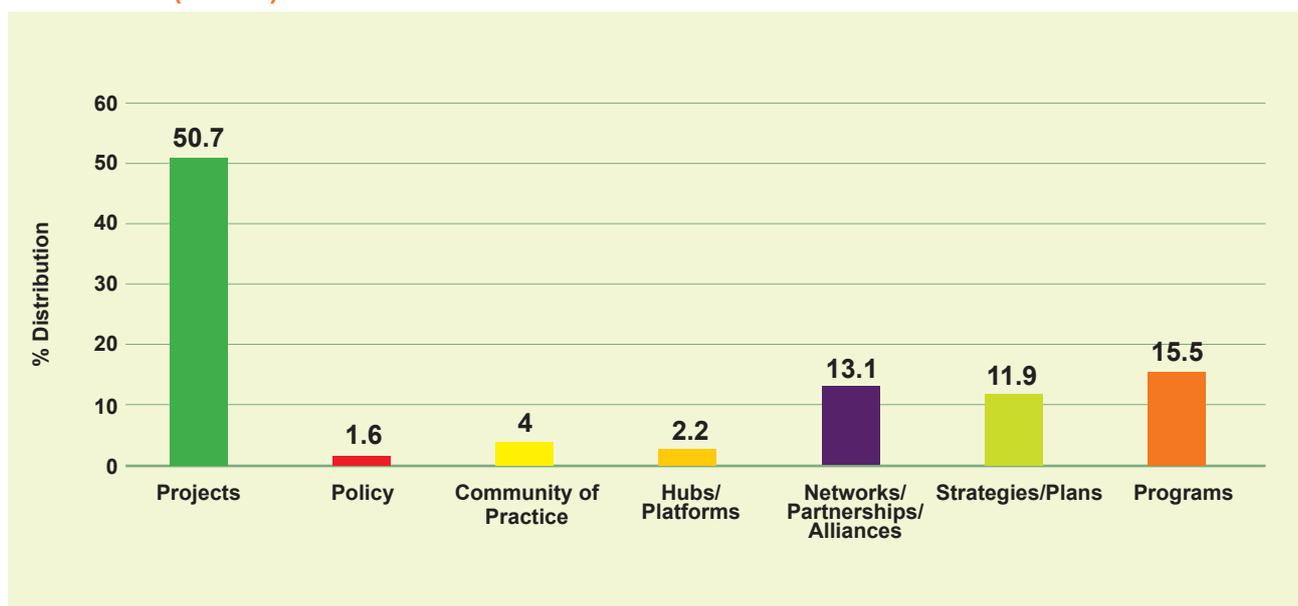
The changes in rainfall patterns in ASARECA member countries coupled with the increasing temperatures will require several climate-smart adaptation strategies to combat the resultant impacts such as drought, floods, pests and diseases, and loss of assets and livelihoods. As such, this section identifies the various CSA initiatives in twelve (12) ASARECA member countries and provides their current status of implementation. Studies have revealed that the onset of climate change impacts – particularly droughts, floods, and other alterations in rainfall patterns are already being felt in the agriculture sector within the ECA sub-region (Bhaga T.D, et al. 2020). On a positive note, all these countries have various ongoing, completed, and planned CSA initiatives including policies, plans/strategies, project programs, networks/partnerships, hubs/platforms, and Communities of Practice (CoP) aimed mitigating against the aforementioned impacts (ASARECA CSA Survey Data, 2020).

4.1.1 General Outlook on CSA initiatives in Eastern and Central Africa

Findings from the CSA mapping study indicate that ASARECA member countries are implementing various CSA initiatives as part of their climate change-related developmental agenda as well as contributing to the achievement of the United Nations Sustainable Development Goals (SDGs). These initiatives are implemented by different stakeholders including but not limited to: National Governments, Non-Governmental Organizations (NGOs), Community Based Organizations (CBOs), International and National Research institutions, Academia, and UN Agencies. This provides diverse contexts and ways in which each stakeholder is navigating and addressing the inevitable choices, synergies, and trade-offs that will characterize efforts to simultaneously achieve food security, adaptation, and mitigation in the agricultural sector in ASARECA member countries. The study found out that various CSA initiatives seek to build climate-resilient food and agricultural systems that are compatible with achieving the countries’ national development agenda and Sustainable Development Goals (SDGs).

For the period between 2015-2020, a total of 489 CSA initiatives were identified that are ongoing, completed, or planned (in the pipeline). Half of the CSA initiatives reported (50.7% - N=489) were projects. On the other hand, policies (1.6% - N=489) were the least reported initiative among the ASARECA member countries. (Figure 6). The other CSA initiatives included CoP (4.0%), platforms/hubs (2.2%), networks/partnerships (13.1%), strategies/plans (11.9%) and programs (15.5%). The low number of policies identified could be attributed to the fact that there are usually a few policies that are developed and used as national blueprints for several interventions that can be implemented as projects or programs. Therefore, under one policy or strategy, several standalone projects and programs emerge that can be implemented. For example, Ethiopia’s Climate-Resilient Green Economy (CRGE) strategy that aims to achieve middle-income status by 2025 while developing a green economy, has four pillars, one of which is improving crop and livestock production practices for higher food security and farmer income while reducing emissions. Under this pillar, there are eight priority areas, all of which are implemented as either projects or programs. Equally, Kenya’s CSA Strategy (KCSAS) outlines twelve strategic food security, adaptation, and mitigation issues that need to be addressed to enhance the adaptive capacity and resilience of farmers, pastoralists, and fisher-folk to avert the adverse impacts of climate change. All twelve issues are to be implemented as stand-alone projects or programs. In some cases, one issue can be addressed through two to three-stand-alone projects.

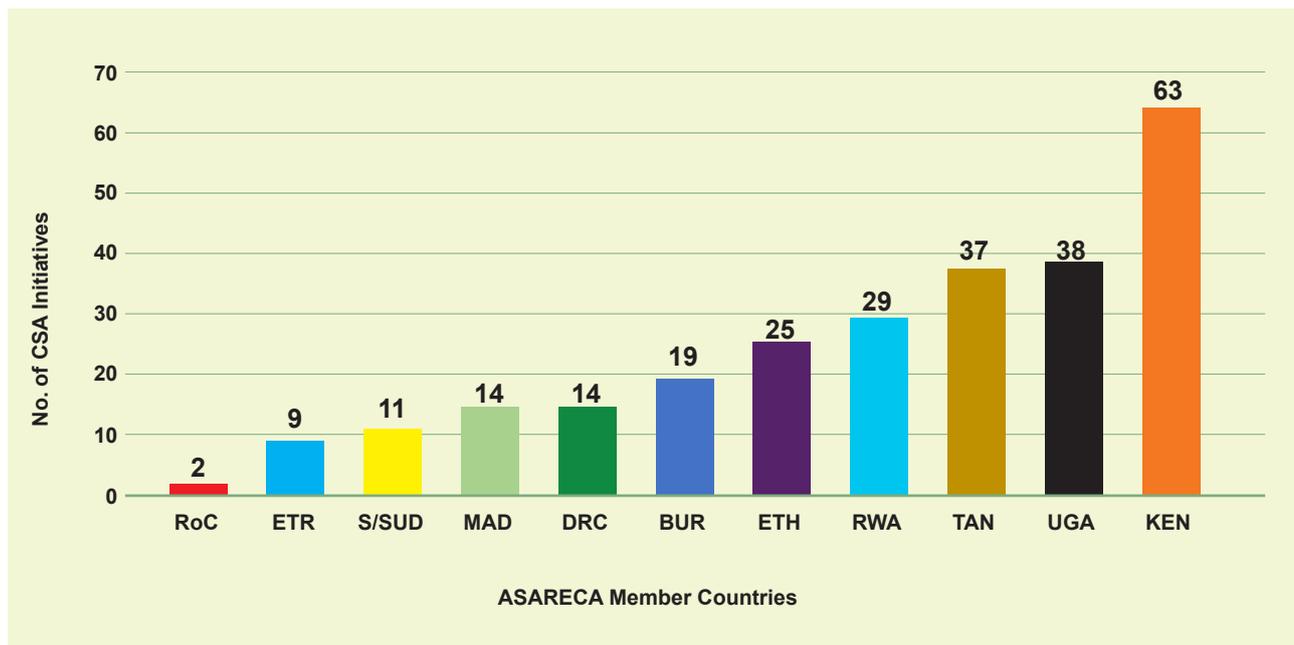
Figure 6: Percentage Distribution of CSA initiatives across ASARECA member countries 2015 - 2020 (N=489)



In terms of number of CSA initiatives within each country, the highest number of initiatives identified was in Kenya (63), followed by Tanzania (37) and Uganda (38). The lowest number of initiatives were in Republic of Congo (2), Eritrea (9) and South Sudan (11) (Figure 7). The high number of CSA initiatives in Kenya, Tanzania and Uganda could be attributed to a wide range of policies, strategies, institutional and legislative frameworks addressing the declining agricultural productivity emanating from environmental degradation and impacts of climate change in these countries. These policies and frameworks (e.g., Tanzania’s Climate-Smart Agriculture Program and NDC; Kenya’s development blueprint Vision 2030, NDCs and NAPs) support implementation of CSA projects and programs by creating an enabling environment.

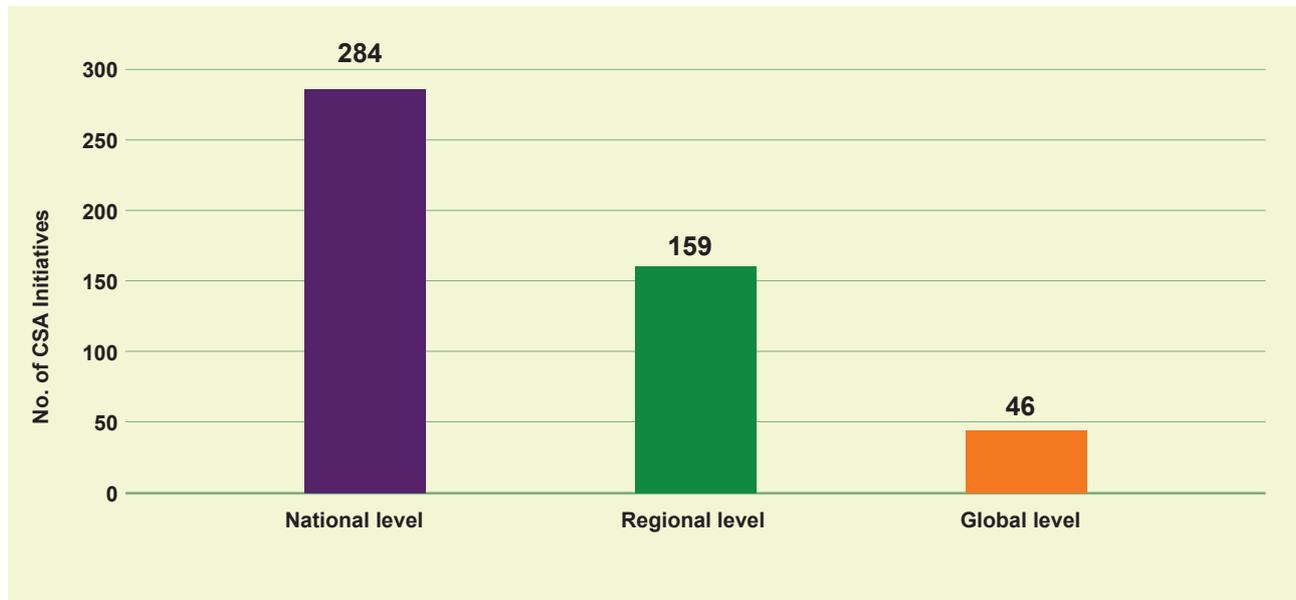
Several NGOs and CBOs are implementing CSA initiatives through international financing initiatives across ASARECA member states. Most of the NGOs and CBOs are funded by external donors and provide services in agriculture, education, healthcare, energy, and water among others. Their role in implementing CSA initiatives bolster government CSA initiatives. Kenya, Tanzania and Uganda have the highest number of NGOs registered that are involved in CSA initiatives. Kenya for instance has over 11,200 registered NGOs that received a total of Ksh166bn in 2018/19 (NGO Coordination Board, 2019). The NGOs support Kenya’s national development priorities and agendas including implementation of the various climate change and agricultural strategies, Sustainable Development Goals (SDGs) and the national ‘Big Four’ agenda.

Figure 7: Number of CSA initiatives in each ASARECA member country



Findings from this study show that a total of 284 CSA initiatives identified are implemented at the national level, while 159 and 46 are implemented at regional and global levels, respectively (Figure 8).

Figure 8: Number of CSA initiatives at national, regional and global levels



Beyond identification and mapping of CSA initiatives, this report provides an account of *why* different stakeholders in ASARECA member countries are pursuing certain CSA initiatives. Analysis revealed that different stakeholders have different visions and missions for ensuring increased agricultural production, building resilience amongst rural farming communities and reducing GHG. The shared value encourages them to leverage on one another, bringing their comparative advantage to the partnership to achieve project objectives. Content analysis of the objectives and goals of various initiatives revealed that each stakeholder is drawn to CSA for different reasons but have a shared value and intention of working towards improving adoption and sustainability of CSA within the region. The key focus areas of implementation of the CSA initiatives were summarized into four (4) major areas:

- a. Identification and dissemination of CSA innovations to help farmers achieve the triple wins of adaptation, productivity and reduced GHG emissions
- b. Multi-partnership models to support the adoption, scaling up and achieving sustainability of CSA.
- c. Sustainable networks, platforms and hubs to scale-up CSA and delivering mutual benefits for all partners.
- d. Investing financial and technological capital to harness and complement both public, private sector and donors to support in delivering climate-smart agricultural solutions.

It is quite clear that each stakeholder is critical in shaping the CSA design, implementation, knowledge and ultimately whose impacts will influence CSA practices amongst farmers. Results from this study further reveal that some of CSA initiatives especially projects, hubs/platforms, CoP and networks/partnerships that are undertaken by NGOs, CBOs and UN Bodies are not aligned to CSA country policies, strategies and development agenda. The lack of alignment to national policies and development agenda highlights the need to explore the sustainability and long-term contribution to reduction of emissions by CSA initiatives being implemented by these organizations, after projects wind up. Alignment with national interventions will provide an opportunity for such projects to create synergies with CSA policies and other national agendas that are government led and that are more sustainable in the long term.

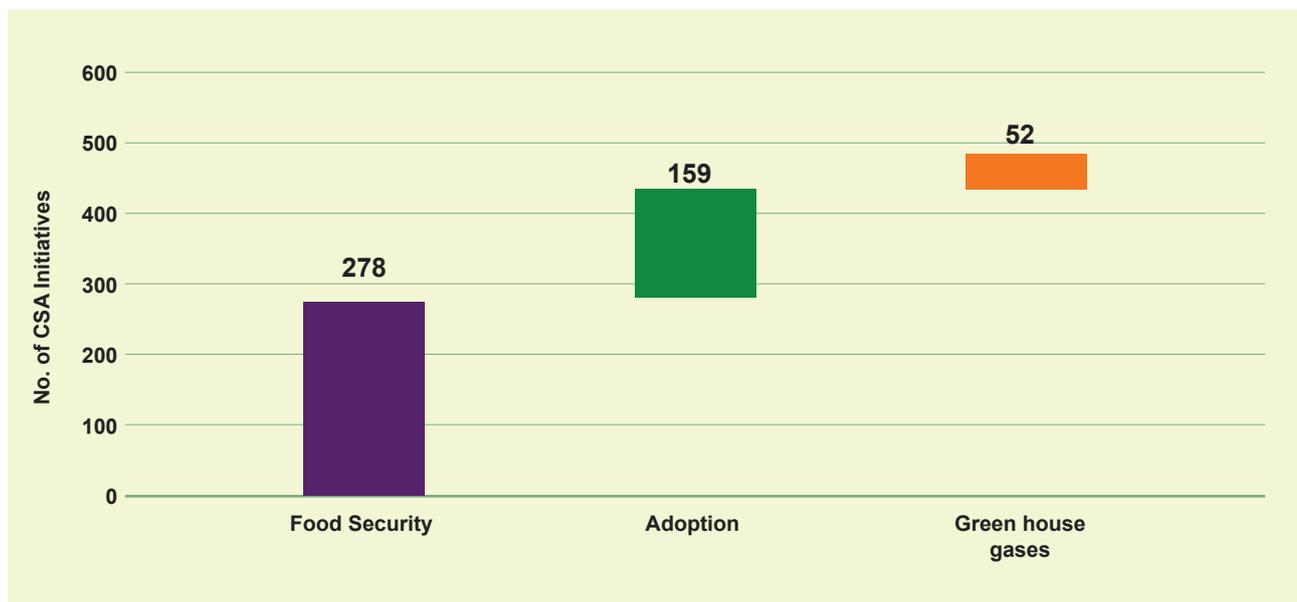
Mapping of CSA initiatives identified various CSA practices and technologies that are being implemented. Some of the CSA practices identified included: agroforestry, sustainable land management, use of drought resistant crop seeds, livestock and crop disease and pest management, irrigation and micro-irrigation, dairy production,

animal feed management, aquaculture, water conservation and management, livestock genetic improvement, risk management technologies, climate and weather information services, mechanization, credit and index-based insurance, agro-advisory services, and silvo-pastoralism. Most of the CSA initiatives focus at farm production level and to a lesser extent the other aspects of the agricultural value chains. Investing in CSA initiatives along the agricultural value chain to include climate-resilient infrastructure such as roads to access markets, post-harvest and storage facilities, cold chain storage for livestock vaccines, is just as critical as implementation of well-known CSA practices like agroforestry. It is therefore imperative that stakeholders (governments, NGOs, CBOs, donors etc.) designing and implementing CSA initiatives take into consideration the integration of CSA practices in other components of the agricultural value chain in order to build a food secure future in the face of climate change.

The various definitions of CSA indicate that there is no CSA silver bullet (FAO, 2013; World Bank, 2013). However, CSA is a promising approach that can sustainably contribute towards increased productivity, and resilience both at farm and landscape levels while reducing greenhouse gas emissions. Analysis of the various CSA initiatives shows that most of them are geared towards increasing agricultural productivity (food security). This CSA goal represented 56.9% of the CSA initiatives, compared to 32.5% and 10.5% in adaptation and mitigation goals respectively (Figure 9). This is supported by several studies that indicate CSA practices and technologies place more emphasis on food security than improving resilience and contributing to long term reduction in GHGs (Chandra et al. 2018; Martinez-Baron, 2018; Pereira, 2011).

I urge all stakeholders to get involved in CSA initiatives and commit to future efforts through partnerships and networks. Stakeholders should also invest time and funds in these partnerships and networks in order to advance CSA and achieve food security in ASARECA member countries. (Ministry of Agriculture Representative, Eritrea)

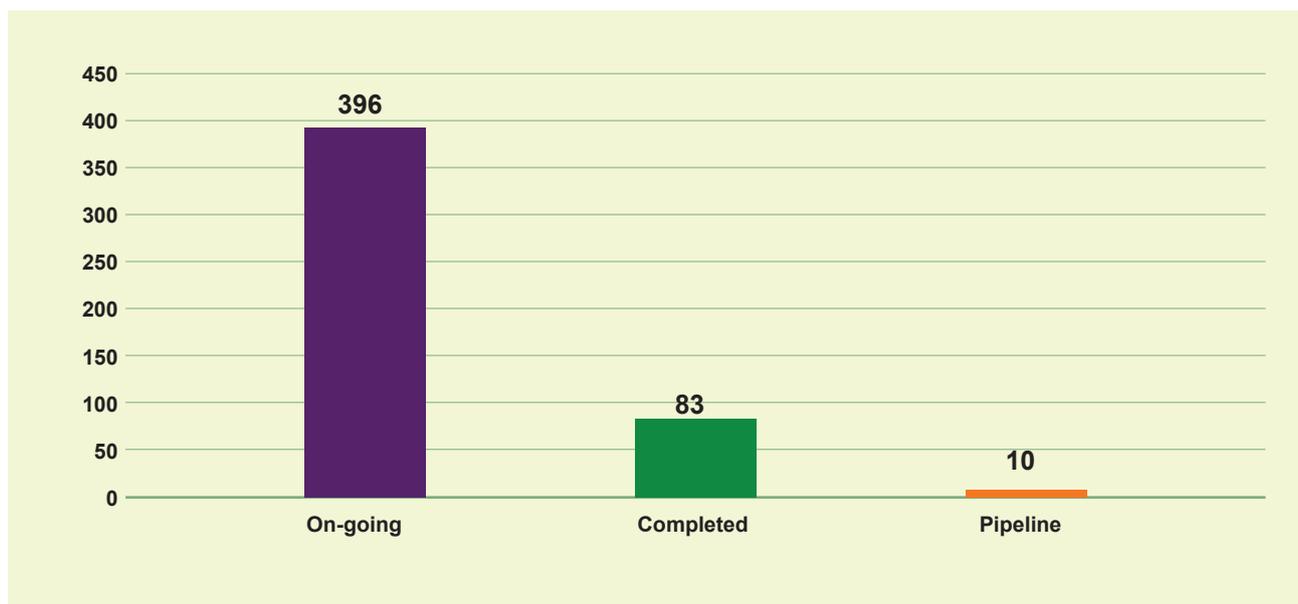
Figure 9: Categorization of CSA initiatives by Goals/Purpose of the initiative



Potential of CSA to contribute towards reducing mitigation is not considered as a priority goal for most of the CSA initiatives identified within ASARECA member countries. This implies that opportunities to reduce GHG emissions from agricultural systems remain largely untapped. According to WWF (2020), this may be due to CSA initiatives focusing mainly on the food production rather than looking at all the 3 CSA pillars. Nonetheless, the agricultural systems in ASARECA member countries have to improve and become more efficient in resource use (i.e. use less land, water and inputs to produce food more sustainably together with reducing food loss and waste) throughout the whole value chain (i.e. from the farm to consumption); if the CSA interventions have to address the mitigation goals (Wunderlich and Martinez, 2018; Brodt, 2011) as well. A good example of a CSA project with a mitigation goal is the completed Kenya Agricultural Carbon Project (KACP) that targeted 60,000 farmers on 45,000 hectares to adopt agroforestry and tree planting on woodlots and farm boundaries as well as composting and incorporation of crop residues into the soil (World Bank 2017).

Most of the CSA initiatives are currently ongoing. Out of the 489 CSA initiatives 81% (n=396), 17% (n=83) and 2% (n=10) are ongoing, completed and in the pipeline (not started yet) respectively (Figure 10). The CSA initiatives that are in the pipeline are all projects that are scheduled to begin between 2021 and 2022. These are in Ethiopia (2), Kenya (3), Rwanda (2) and Tanzania (3).

Figure 10: Categorization of CSA initiatives by implementation status



4.2.2 Policies Adopted and their State of Implementation

National governments have put in place various policies that support agricultural development and response to climate change effects. Policies include legislations and legal frameworks formulated for implementing CSA and adopted by national governments, or organizations to reach their CSA long-term goals of increasing productivity, adaptation and mitigation. Mapping of policies that directly address CSA shows that no ASARECA member country has so far developed any such policy or legislation. Policies that mention CSA are either agricultural, climate change or climate finance policies. These policies mention CSA as a priority sector, where it's mentioned under the objective and/or listed as one of the adaptation strategies. Findings from this study have indicated that there are eight(8) policies that directly or indirectly refer to CSA. The representation of these policies by country was as follows: Burundi (2), Kenya (3), Rwanda (1), Eritrea (1) and Uganda (1).

Development of CSA policies at national level demonstrates the commitment and ownership by national governments to address the effects of climate change in agriculture sector. Equally including CSA in climate change policies (e.g., Uganda’s National Climate Change Policy) is central to linking and achieving benefits of CSA to broader climate change goals. Policies to support climate finance are not common within ASARECA member countries. Results from the CSA mappings show that so far only Kenya and Rwanda have drafted policies for climate finance. At the national level, Kenya’s National Policy on Climate Finance (2016) aims to mobilize and effectively manage and track adequate climate change finance. At the sub-national level, five county governments in Kenya have developed their County Climate Change Funds (CCCFs). The Rwanda Green Fund is an investment fund for public and private projects that have the potential for transformative change and that align with Rwanda’s commitment to building a strong green economy.

Our agricultural policies and CSA strategies, projects, programs are missing a critical component and that is gender and social inclusion. We need to match gender equality commitments with CSA action and financing. If we did this, we can transform Africa’s agriculture (DRD Government representative, Tanzania).

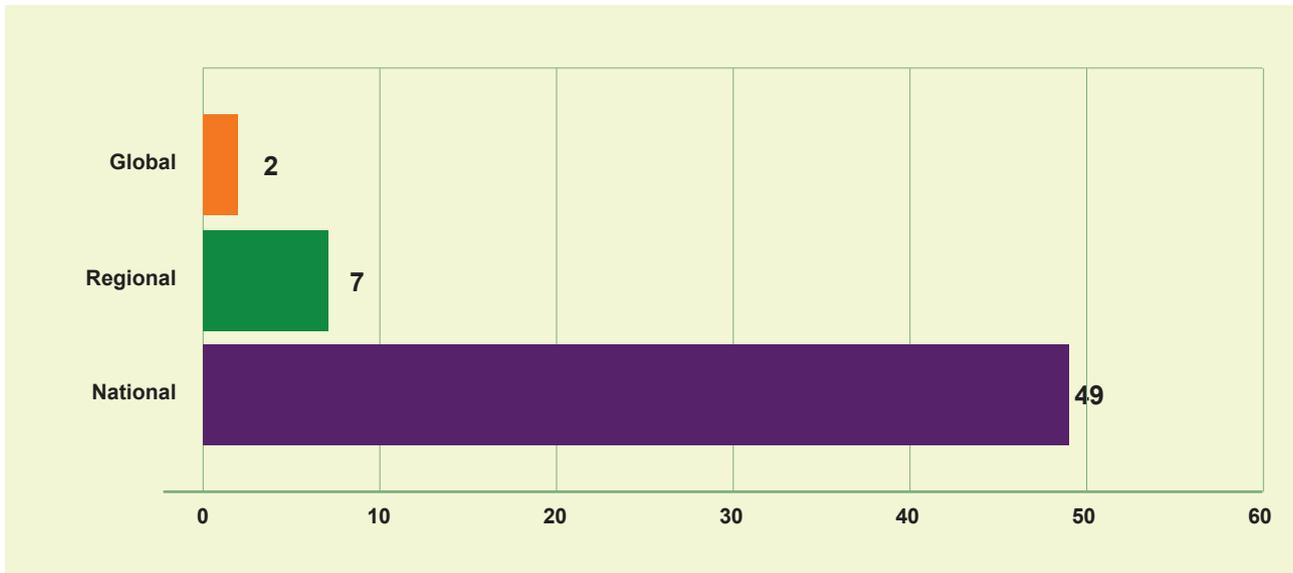
Burundi, Eritrea, Kenya, Rwanda, and Uganda have policies directly or indirectly related to CSA, suggesting that prioritizing adaptation to climate change in agriculture and other related sectors in the political agenda is an important consideration. It’s anticipated that countries will prioritize, integrate and mainstream CSA in their political agenda in the near future. It is important to point out that despite Ethiopia, Madagascar, South Sudan and Sudan not having policies directly or indirectly related to CSA, these countries have national strategies and plans that target CSA practices and interventions (see sub-section 4.2.1). Indeed, climate change is an issue that has an influence on many different spheres of policy making and consequently there are many different strategies to respond to climate change. Therefore, national governments investing in CSA is an opportunity to build a resilient agriculture sector across the region. However national governments need to create an enabling environment and provide financial incentives to mitigate risks especially for smallholder farmers. These will enable smallholder farmers better adapt CSA practices and technologies and access market opportunities.

4.2.2 Strategies and Plans Adopted and their State of Implementation

CSA strategies/plans are frameworks that are developed to support implementation to deliver on the CSA objectives of increasing food security, building resilience of communities and reducing GHG emissions within agricultural sector. CSA strategies/plans also represent categories of possible CSA actions or interventions. The mapping showed that the CSA plans/strategies in ASARECA member countries are developed to link and create synergies with broader national developmental goals, agricultural and/or climate change policies and programs. The synergies span incentive programs, research and technological developments that are CSA specific and arise from other simultaneous environmental and economic priorities. This clearly demonstrates that the national policy environment is evolving over time in an attempt to deal with the complexity of the agriculture-climate nexus.

A total of 58 CSA strategies/plans were identified in ASARECA member countries (Figure 11). Kenya had the highest number (13) of strategies, followed by Tanzania (7) and Rwanda (7). Burundi and Ethiopia had 4 each while 3 strategies/plans were found in Uganda. In Madagascar, South Sudan, Sudan, DRC and Eritrea, strategies/plans were found and only one was found in the Republic of Congo had the least number of strategies/plans (1), while each had 2 strategies/plans. Of the 58 CSA strategies and plans, 49 were implemented at national level, while 7 and 2 were implemented at the regional and global level, respectively.

Figure 11: Categorization of CSA initiatives by implementation status



CSA interventions being implemented within the strategies and plans include a wide range of practices and technologies that can contribute to increasing agricultural production under unfavorable climate regimes while building resilience and contributing to the reduction of GHG (De Pinto et al. 2020). However, as the climate continues to create challenges, there is dire need to develop tailor-made CSA interventions for each region as per the specific requirements considering that each region has its own unique issues. Consequently, it is inevitable for farmers to adopt new CSA interventions (Bhardwaj and Cahill, 2019). Analysis of 490 CSA initiatives revealed a whole range of interventions ranging from use of soil amendments, water management, agroforestry, to climate information services. Some of the interventions that are proposed within the CSA strategies and plans include:

- Integrated soil fertility management
- Promoting agroforestry practices and tree planting
- Promoting agro-ecological principles
- Restoration of degraded soils and lands
- Diversification along the agricultural value chain
- Reducing burning of crop residues and vegetation
- Capacity building of crop and livestock farmers and fisherman
- Improving access to markets, finance and inputs such drought tolerant seeds
- Strengthening governance and institutional capacity
- Promote access to improved livestock seeds and high-performance breeding lines through artificial insemination
- Setting up agricultural training centers
- Intensifying agricultural mechanization
- Development of fisheries and aquaculture



The main objective of Kenya Climate-Smart Agriculture Strategy (KCSAS) 2017-2026 and its implementation plan (Kenya Climate-Smart Agriculture Implementation Framework) is to adapt the sector to climate change, build resilience of agricultural systems while minimizing emissions for enhanced food and nutritional security and improved livelihoods. The KCSAS recognizes the vulnerability of pastoral communities, women and youth and the need for developing specific adaptation strategies that target these populations.

Two of the most important strategies/plans that ASARECA member countries have drafted are the Nationally Determined Contributions (NDCs) and the National Adaptation Plans (NAPs). ASARECA member countries have signed and ratified the Paris Agreement and submitted their NDCs to UNFCCC (UNFCCC, 2020). Each NDC reflects the country's ambition for reducing emissions, taking into account its domestic circumstances and capabilities. The ASARECA member countries are committed to building agricultural resilience as a priority to adaptation and mitigation. The countries have indicated in the NDCs their willingness to implement measures for reducing emissions within the agricultural sector, including implementing climate-smart agriculture. All the countries have made reference to either Agriculture; Land Use, Land Use Change and Forestry (LULUCF); or both in their mitigation contributions as well as reference to adaptation in the agricultural sectors (FAO, 2016). Countries that explicitly mention CSA in their NDCs are Burundi, Eritrea, Kenya, Madagascar, South Sudan, Tanzania and Uganda (Table 5).

Table 5: ASARECA member countries that have mainstreamed CSA within the NDCs and specific CSA interventions to be implemented

Country	CSA Intervention
Burundi	Promotion of climate-smart agriculture including agro-meteorology; Promotion of intensified water-efficient agriculture; Facilitate the genetic diversity of different animals; Enable the diversification of activities (breeding of multiple species of animals, combination of agriculture and livestock, sale of harvest transport services, fodder crops, etc.); Improve agricultural and livestock production activities (drainage, conservation, drying and cold chain) including the use of renewable energy sources (hydraulic, solar and wind); Promotion of research & development and technology transfers, especially for adaptation of agriculture to climate change
Eritrea	Enhance and promote Climate-Smart Agriculture; Maintenance and restoration of soil; Development and promotion of irrigation schemes
Kenya	Develop Climate-smart agriculture (CSA) in line with the National CSA Framework; Enhance the resilience of the agriculture, livestock and fisheries value chains by promoting climate-smart agriculture and livestock development; Enhance climate information services; Enhance the resilience of ecosystems to climate variability and change; Strengthen the adaptive capacity of the most vulnerable groups and communities through social safety nets and insurance schemes.
Madagascar	Dissemination of intensive/improved rice farming techniques; Implementation of conservation agriculture and climate-smart agriculture; Multi-hazard early warning systems; Application of Resilient Agriculture; Dissemination of arboriculture and agroforestry;
South Sudan	Promoting climate-smart agriculture; Livestock improvement; Enhancement of fisheries productivity; Soil erosion control; Promoting the harvesting and retention of water for different uses
Tanzania	Increasing yields through climate-smart agriculture; Protecting smallholder farmers against climate related shocks including through crop insurance; Strengthening knowledge, extension services and agricultural infrastructures to target climate actions; Promoting climate change resilient traditional and modern knowledge on sustainable pasture and range management systems; Enhancing development of livestock infrastructures and services; Promoting development of livestock insurance strategies.
Uganda	Expanding Climate-Smart Agriculture (CSA), extension services, climate information and early warning systems, diversification of crops and livestock, value addition, post-harvest handling and storage and access to markets, including micro-finances, rangeland management, small scale water infrastructure, agroforestry and research on climate-resilient crops and animal breeds; Extending electricity to the rural areas or expanding the use of off-grid solar system to support value addition and irrigation.

Ethiopia’s Growth and Transformation Plan II (2016-2020) as a green economy development strategy has aligned CSA through expansion of irrigation innovations and efficient agricultural marketing systems that will increase farmers’ income. Rwanda’s National Strategy for Transformation (2017-2024) targets irrigating 102,000 hectares of agricultural land with water conservation irrigation innovations.

National Adaptation Plans (NAPs) are medium- and long-term adaptation strategies that are developed through a gender-sensitive, participatory and fully transparent approach (UNFCCC, 2014). Status on implementation of the NAPs shows that Ethiopia, Kenya and Sudan submitted their NAPs to UNFCCC in 2019, 2017 and 2016, respectively. Both Ethiopia and Kenya explicitly mention CSA as part of their adaptation strategies in agricultural sector. On the other hand, the Sudan NAP, mentions several climate-smart technologies for the agricultural sector (Table 6).

Table 6: ASARECA member countries that have mainstreamed CSA within the NAPs and specific CSA interventions to be implemented

Country	CSA Intervention
Ethiopia	Enhancing food security through improving agricultural productivity through climate-smart agriculture; Strengthening sustainable natural resources management through safeguarding landscapes and watersheds; Improving soil water harvesting and water retention mechanisms; Developing efficient value chain and marketing systems; Strengthening drought, livestock and crop insurance mechanisms; Improving early warning systems.
Kenya	Promote and implement climate-smart agriculture practices in Kenya; Develop and up-scale specific adaptation actions - promotion and bulking of drought tolerant traditional high value crops, water harvesting for crop production, index-based weather insurance, conservation agriculture, agro-forestry, and integrated soil fertility management; Support adaptation of private sector agricultural value chain actors through capacity building efforts; Enhance the resilience of the livestock value chain; Enhance selection, breeding and management of animals to adapt to climate change; Promote livelihood diversification and market access (camels, indigenous poultry, beekeeping, rabbits, emerging livestock - quails, guinea fowls, ostriches etc.); Enhance the resilience of the agricultural value chain; Promote indigenous knowledge on crops; Coordinate and mainstream climate change adaptation into agricultural extension.
Sudan	Development and improvement of the agricultural production, farmers and pastoralists livelihoods; Conservation and development of the natural resources (rangelands and forestry); Modernization of the Agricultural Production Systems, Natural Resource Conservation and rehabilitation of the Livestock Sector Components.

4.1.4 Programmes

For purposes of this study, CSA Programmes are defined as a collection of projects that are implemented and managed at large scale and target a large number of beneficiaries in order to achieve efficiencies. A total of 76 CSA programmes were identified under different implementation status (ongoing, completed and in the pipeline) (Table 7). At country level, the highest number of programmes are being implemented in DRC (12); followed by Tanzania (8) and Kenya (7). Meanwhile a total of 21 programmes are being implemented at a regional level; No CSA programme was identified both in the Republic of Congo and South Sudan. Analysis of the CSA programmes shows that there are national programmes specifically targeting CSA such as Tanzania Climate-Smart Agriculture

Programme and Uganda Climate-Smart-Agriculture Country Programme. The CSA programmes, complemented with CSA policies, strategies and plans will ensure that ASARECA member countries are firmly rooted on an ambitious green growth trajectory for the future. It is important to note that successful implementation of CSA programmes will require multi-level partnerships between the national governments, NGOs, CBOs, financial institutions and the private sector. For Example, the CSA East Africa programme being implemented across Uganda, Tanzania and Kenya is a partnership between 5 organizations, including: (i) SNV Netherlands Development Organization; (ii) Wageningen University & Research; (iii) The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS); (iv) Agriterra and (v) Rabo Partnerships. This programme aims at undertaking risk analysis of major food value chains, identification of business opportunities in CSA, access to finance, policy influencing and knowledge sharing between countries and networks.

Table 7: Number of CSA programs in ASARECA member countries and their implementation status

S/n	Country/Region	Implementation status			Total (n=76)
		Ongoing	Completed	Planned	
1	Burundi	3	0		3
2	DR Congo	9	3		12
3	Eritrea	1	0		1
4	Ethiopia	4	1	1	5
5	Kenya	6	1	2	7
6	Madagascar	3	1	1	4
7	Republic of Congo	0	0		0
8	Rwanda	4	2	2	6
9	South Sudan	0	0		0
10	Sudan	2	0	1	2
11	Tanzania	5	3	1	8
12	Uganda	4	0	1	4
13	Regional	20	1	1	21
14	Global	3	0		3
Sub-Total		61	12	10	73

Findings from the study show that across the ASARECA countries, there are 20 programmes at regional level and only 3 at global level. On average, the regional programmes are implemented across 3 to 4 ASARECA member countries. For example, a programme funded by Green Climate Fund (GCF) titled, *Strengthening Climate Information Systems for Climate Change Adaptation in the Greater Horn of Africa through regional cooperation* is supporting the development of early warning systems across Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, Uganda and Djibouti. The program helps national governments to respond to both short-term climatic hazards (e.g., cyclones, floods and storms), as well as long-term hazards (e.g., drought). The study identified 10 CSA initiatives that were planned to start in the year 2020 and 2021 (Table 7 above).

The vision of Tanzania's Climate-Smart Agriculture Programme (TCSAP) (2015 – 2025) is in line with the National Development Vision 2025 and aims to have an Agricultural sector that sustainably increases productivity, enhances climate resilience and food security for the national economic development. TCSAP aims to build resilience of agricultural farming systems for enhanced food and nutrition security through six programmatic result areas namely: improved productivity and incomes; building resilience and sustaining agricultural advisory services; and improved institutional coordination.

4.1.5 Projects

We define CSA projects as those specific activities that are implemented and expected to be completed over a specific period of time. The projects are intended to achieve a particular outcome or purpose. In this case the purpose is to enhance opportunities for increasing agricultural productivity, improving resilience to climate change and contributing to long-term reductions in dangerous greenhouse gas emissions. Out of the 248 CSA projects identified, 72.58% (n=180) are currently ongoing, while 23.38% (n=58) have been completed. The results also show that only 4.03% (n=10) of the CSA projects have been planned. A majority of the ongoing projects (60.55%, n= 109) are being implemented at country level. A total of 69 (38.33%) and 9 (5%) projects are being implemented at regional and global level respectively. At national level, Kenya had the highest number of CSA projects (22), followed by Uganda (18), Ethiopia (12), Burundi (12) and Tanzania (11). The least number of CSA projects was reported in Eritrea (4), South Sudan (4), Sudan (5), and DRC (5). No projects were reported in the Republic of Congo (Table 8).

Between 2015 and 2020, the countries that had high numbers of CSA completed projects were: Uganda (10), Kenya (8), Tanzania (6) and Rwanda (5). As previously mentioned, Ethiopia, Kenya, Tanzania and Rwanda have projects in the pipeline that will be implemented between 2021 and 2022.

Table 8: Number of CSA projects in ASARECA member countries and their implementation status

S/n	Country/Region	Implementation status			
		Ongoing	Completed	Planned	Total (n=248)
1	Burundi	12	2	0	14
2	DR Congo	5	0	0	5
3	Eritrea	4	1	0	5
4	Ethiopia	12	3	2	17
5	Kenya	22	8	3	33
6	Madagascar	7	1	0	8
7	Republic of Congo	0	1	0	1
8	Rwanda	9	5	2	16
9	South Sudan	4	4	0	8

S/n	Country/Region	Implementation status			
		Ongoing	Completed	Planned	Total (n=248)
10	Sudan	5	2	0	7
11	Tanzania	11	6	3	20
12	Uganda	18	10	0	28
13	Regional	62	14	0	76
14	Global	9	1	0	10
Sub-Total		180	58	10	248

Most of the CSA projects identified focus on the following areas: (i) interventions that promote and facilitate the adoption of climate-resilient innovations, (ii) capacity building, (iii) innovate financing, technologies, management practices, (iv) appropriate tools and methods for estimation of the amount of carbon sequestration and emission of GHGs and (v) use of big data to achieve the CSA triple wins, as well as advancing CSA across ASARECA member countries. For example, the projects are supporting crop, livestock and aquaculture breeding activities; promoting private sector and community involvement in implementation; developing and strengthening sustainable delivery systems for drought resistant crop varieties; enhancing agro-weather and climate information services among others. The CSA projects also target appropriate tools and methods for estimation of the amount of carbon sequestration and emission of GHGs from agricultural sector. Such projects aim to contribute to the refinement of measurement and modelling methodologies associated with climate change mitigation and adaptation thus enabling policy makers to make informed decisions.

4.1.6 Networks, Partnerships and Alliances

The increasing information and knowledge on CSA in the ASARECA member countries and across the globe calls for identification, mobilization and convening of stakeholders that have relevant interests and resources to tackle the challenges of climate change (Acosta et al. 2019; Winter et al. 2017). Structured collective action through networks, partnerships and alliance can achieve greater scale and systemic impact than any one actor can deliver on its own (Acosta et al. 2019; Winter et al. 2017). Networks and partnership comprise of organizations, government institutions, researchers, practitioners and private sector that come together for a specific goal of building resilience of Africa’s agricultural systems. Networks, partnerships and alliances can

be formal or informal and work towards promoting collaboration amongst institutions and partners at different scales (i.e. national, regional and global). With the promises of CSA contributing to the triple wins of food security, adaptation and mitigation in agricultural sectors, several networks, partnerships and alliances have been established to support the rapid scaling-up of climate-smart agriculture at regional, continental and global level.



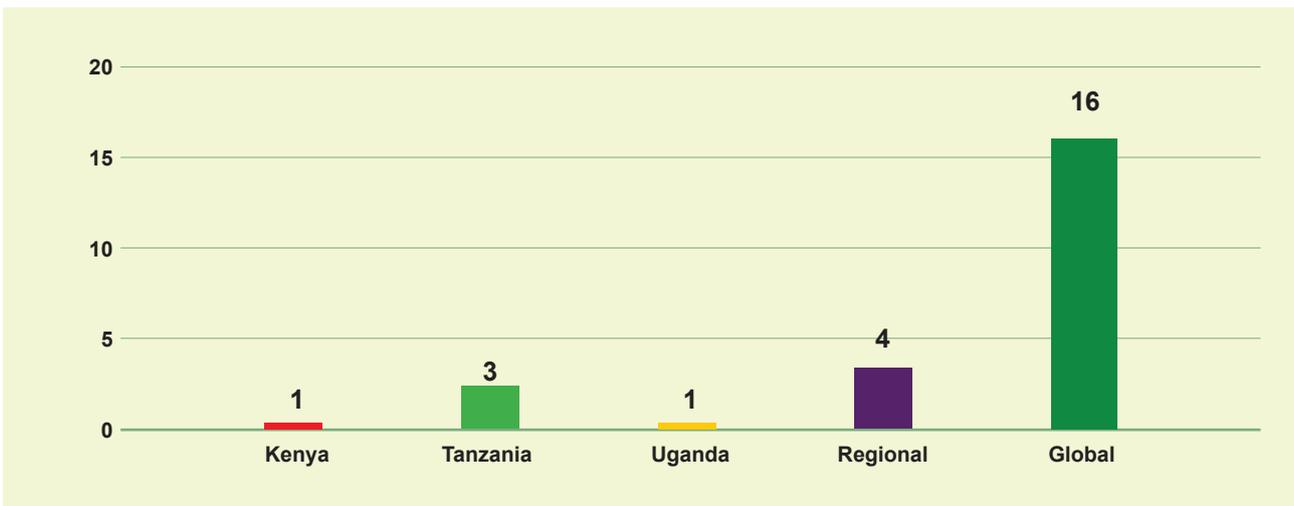
In 2016 Tanzania established a National Climate-Smart Agriculture Alliance (TCSAA) that aims at creating a national and broad-based forum on CSA that will be linked with key CSA initiatives at regional, continental and global levels.

The highest number of Networks, Partnerships and Alliances (20) are found at the regional (4) and global (16) level (Figure12). This report identified 3 networks, alliances and partnerships in Tanzania, only 1 in Kenya and another one in Uganda. One of the well-known global networks, alliances and partnerships is the Global Climate-Smart Agriculture Alliance (GACSA), which is a multi-stakeholder alliance that seeks to improve food nutrition, security and resilience in the context of a changing climate. At the regional level, CSA alliances have emerged from

GACSA, notably the Africa Climate-Smart Agriculture Alliance (ACSAA) that was formed to leverage policy, technical and financing support for grassroots national and regional level programmes and initiatives that can drive the widespread adoption of CSA practices and technologies across Africa. At national level, Tanzania has formed a national CSA alliance with the aim of bringing together diverse district CSA stakeholders ranging from local government agencies, NGOs, research institutions, universities, and farmer organizations to promote the adoption of CSA practices and technologies in the country.


 The Global Climate-Smart Agriculture Alliance (GACSA) in partnership with New Partnership for Africa's Development (NEPAD) and the Common Market for Eastern and Southern Africa (COMESA) has mobilized in-country partnerships in 8 African countries including Madagascar, Tanzania, Ethiopia, Uganda and Kenya to develop CSA programs within their National Agriculture Investment Plans (IFPRI, 2016).

Figure 12: Number of Networks, Partnerships and Alliances in ASARECA member countries



Mapping of networks and partnerships shows that the main goal is to share knowledge and exchange information on: (i) climate-smart agriculture practices and technologies, (ii) policies for adaptation, (iii) building resilience to climate change, (iv) low emissions development in agricultural sector, (v) financing climate adaptation, (vi) gender equality, equity and social inclusion, and (vii) the youth. On average each of the networks/partnerships reviewed focused on at least three of the above-mentioned goals.


 Except for Private Foundations that provide grants to NGOs and CBOs to implement CSA activities. Private Sector is not playing an active role in scaling up CSA. Governments and Partnerships with the Private Sector have a critical role to play in achieving a climate-resilient agriculture. By leveraging data and evidence, making concrete commitments, turning words into action, and embracing accountability, these two partners can drive real and meaningful change in agriculture under a changing climate (Office of the Vice-President Representative, Tanzania)

4.1.7 Community of Practice

CSA Communities of Practice (CoPs) are groups of people (individuals) and/or institutions who share similar interests and are willing to learn together and exchange information through regular communication (Nuutinen and Filho, 2018). Findings from the mapping exercise show that there are 24 CoPs across the ECA sub region occurring at various levels (national, sub-regional and global). Of these, the highest number of CoPs exist at regional (9) and global (8) levels. Kenya has 4 CoPs while, South Sudan, Uganda and Sudan each have one CoP. All the 24 CoPs are currently ongoing (Table 9).



There exists a lot of networks, fora and platforms for exchanging CSA information. However, scaling up CSA to the millions of farmers especially women in ECA is still an issue. What we need to do is drive coordinated action and change in CSA and climate change through a holistic, generational and equitable forum across the region. This forum should have a higher membership of farmers than governments, NGOs and CBOs (Youth Network Representative, DRC)

Table 9: Number of CSA Communities of Practices (CoPs) in ASARECA member countries

Country	Number (n=24)
Kenya	4
South Sudan	1
Uganda	1
Sudan	1
Regional	9
Global	8

The review revealed that the main goal for most Communities of Practices (CoPs) is knowledge-sharing of CSA practices, technologies as well as challenges that climate change poses on agricultural systems amongst the members. Typical members of a CoP included representatives from farmer organizations, government agencies, NGOs, CBOs, academia and UN bodies among others. These multiple actors coordinate and disseminate mitigation and adaptation measures that are appropriate for different agricultural systems across ASARECA member countries. However, some of the goals of the CoP are overlapping and can be reconciled.



Data-driven Agronomy CoP developed by the CGIAR Platform for Big Data in Agriculture uses digital technology to source, analyze and translate data into timely, practical and context-specific information to help communities, especially small and rural ones, to take advantage of new CSA practices and technologies and make the best choices for their farms. The CoP also shares information among national policy makers to enable them to make evidence-based policy-making that is crucial for an efficient, effective and inclusive CSA implementation.

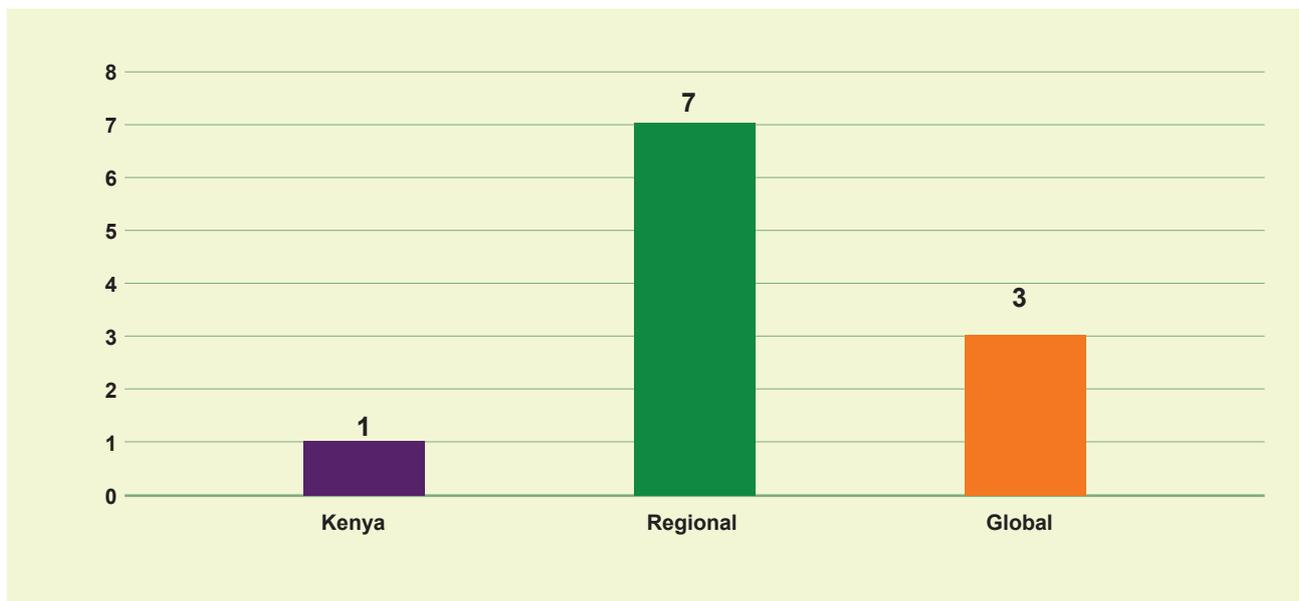
4.1.8 Hubs and Platforms

Successful upscaling of CSA technologies and practices requires the participation and engagement of multiple stakeholders, operating within the private and public sectors. This can be done through hubs and platforms that can be used to incubate and catalyze the adoption and scaling of innovative and sustainable CSA practices and technologies across ASARECA member countries. CSA hubs and platforms are online websites where users can access data and literature on CSA policies, technologies and practices. Some of the hubs and platforms are interactive and provide opportunities for users to access information in the form of interactive maps and/or other downloadable links where users can download CSA data. They are also innovations and frameworks for fostering collaborations pioneering the transition to climate-smart agriculture within the region, and indeed around the world.

A total of eleven CSA hubs and platforms were identified with most hubs and platforms existing at regional (3) and global (7) level (Figure 12). Among the ASARECA member countries, there was only 1 hub/platform which was reported in Kenya. The other member countries did not have country-based hubs/platforms but are members of the global and regional hubs and platforms. Some of the examples for hubs and platforms include: the weather data and information hubs such as the GASL's Livestock Environmental Assessment and Performance Partnership (LEAP) and National Frameworks for Climate Services (NFCS), both of which aim at accelerating access to climate data on livestock and weather, respectively. Data and information hubs/platforms also assist the countries to make informed decisions in the agricultural sector, as well as applying the data to develop programs and projects that address climate change issues in the respective countries.

Amidst growing impacts of climate change, a threat to food security and livelihoods, Kenya is using a policy platform to scale-up climate-smart strategies, practices and technologies that will help farmers to be resilient and productive in extreme weather events. The initiative called, Climate-Smart Agriculture Multi-Stakeholder Platform (CSA-MSP) was initiated by the climate change unit in Kenya's Ministry of Agriculture and Fisheries and aims to facilitate the application of Kenya's Climate-Smart Agriculture Implementation Framework (KCSAIF).

Figure 13: Number of CSA Hubs and Platforms



Analysis of CSA Hubs and platforms shows that stakeholders involved are mainly scientists, farmers and farmer organizations, input dealers, agro-advisory and extension providers, policy makers and youth. The hubs and platforms provide a digital space to demonstrate new CSA practices and technologies, and transfer those practices and technologies to stakeholders, thereby accelerating the implementation process of the CSA in agricultural systems in the member countries. Some of the hubs provide scientific data, tools, methods and set of protocols for onwards use by their members and general public. For example, the Tech Incubation Program has a hub for generating information, data and opportunities in Sudanese and Rwandese markets as well as development and promotion of technology use in agriculture.

4.2 Target Populations

The ASARECA member countries are dominated by subsistence small holder farmers practicing mixed crop-livestock systems under rain-fed system. These farmers operate under different climate systems and the various CSA initiatives are supporting them to transform their agricultural systems so that they become resilient and food secure in the face of changing climate. Institutions promoting CSA target women, youth and marginalized peoples within these countries with a range of CSA initiatives to increase their participation, access and control over productive agricultural assets and resources. The youth for example is targeted by various CSA initiatives in an attempt to encourage them to pursue CSA as a profitable and sustainable enterprise.

Content analysis of the CSA initiatives showed that different populations in the countries were targeted by the CSA initiatives (Table 10). The most common target group identified during the review was smallholder farmers and was mentioned in 65.6% (n=321) of the CSA initiatives identified. The group operates in mixed crop-livestock-agroforestry systems. Despite climate change posing challenges to agricultural sector, human population growth is fueling land fragmentation thus leading to declining land sizes. This has created a large number of smallholders who operate on less than two hectares of land. This situation is further aggravated by increasing temperatures and variable rainfall patterns (Wynants et al. 2019; Muyanga and Jayne, 2014; Simotwo et al 2018; Mubiru et al. 2018) which necessitates smallholder farmers to acquire a range of CSA interventions to meet their food and nutritional needs (Gbegbelegbe et al. 2018). It is estimated that 19,675,100 smallholder farmers are deriving their livelihoods from farms owned or managed by a single family or extended family in East Africa community (Ross and Mandler, 2019); while over 300 million farmers depend on agriculture for their livelihoods in the entire ECA region (ASARECA, 2014). Due to the huge and increasing numbers of smallholder farmers, national governments and organizations are addressing the climatic risks affecting the communities, through implementation of CSA initiatives. Examples of some of the CSA interventions identified targeting smallholder farmers include early warning systems, micro-irrigation, improved seeds and agricultural inputs, sustainable value chains, credit, soil and water management among others.

Table 10: Target populations under CSA initiatives

Different target populations in ASARECA member countries	Number of mentions (N=489)
Smallholder mixed crop-livestock farmers operating under rain-fed and irrigated agricultural systems	321
Farmer associations and farmer groups operating under rain-fed and irrigated agricultural systems	147
Pastoralist and Agro-pastoralists majorly operating in arid and semi-arid lands	238
Fishing communities operating in marine, freshwater and aquaculture waters	102

Different target populations in ASARECA member countries	Number of mentions (N=489)
Youth (both male and female)	96
Women and female headed households	286
Policy makers and decision makers at relevant Government Ministries, Departments and Institutions	109
Technical experts and extension agents	158
Private sector	192

Out of the 489 CSA initiatives reviewed, the second largest target population group was noted as women and female headed households (n=286). Women farmers, especially female heads of households in mixed crop-livestock system, pastoralism and fisheries are particularly exposed to climate risks in the member countries. These women contribute about 56%, 52%, 29% share of the agricultural labour in Uganda, Tanzania and Ethiopia respectively (Palacios-Lopez et al. 2017). They often lack secure land tenure, yet they rely directly on climate-affected natural resources for their livelihoods (Muchomba, 2017; Daley and Englert, 2010). Women also have less adaptive capacity due to less access to assets, information, technology, mobility and low decision-making power (Nyasimi and Huyer, 2017; Cohen et al. 2016). Due to their vulnerability as well as their roles and responsibilities, it is therefore not surprising that women comprise most of the target groups in ASARECA member countries. Furthermore, CSA has shown the potential to reduce women farmers' drudgery and increase productivity and income (Khatri-Chhetri, et al. 2020). Therefore, approaches (as outlined in CSA initiatives) are emerging to assist policy makers, decision makers, researchers, NGOs and CBOs in designing and implementing gender-responsive policies, frameworks, programs and projects across ASARECA member countries.

Pastoralist and agro-pastoralists majorly operate in arid and semi-arid lands, where rainfall is unpredictable and unevenly distributed (Herrero et al. 2016). Consequently, resources such as water, pasture and crops are critical for their livelihoods, hence the importance of CSA to this target group. Out of the 489 CSA initiatives, 238 target pastoralists and agro-pastoralist as the key stakeholders. These CSA initiatives focus on resilience and strengthening of the economic prospects for pastoral and agro-pastoral communities through provision of livestock breeds that can withstand high temperatures, feed management and access to markets for both livestock and crops.

4.3 Range of CSA Practices and Technologies

CSA is a wholesome basket of agricultural practices and technologies that not only aim at increasing food security and resilience for farmers in ASARECA member countries but also contributes towards improving the environment through reduction of greenhouse gases (GHG). CSA further contributes to improving farming input efficiency, soil and water quality and benefit-cost returns for farmers while limiting the negative effects of climate change on agriculture (Sova et al. 2018; FAO 2013). The study, therefore, identified a number of CSA practices. The most common CSA practices observed across the various CSA initiatives reviewed were: (i) soil and sustainable land management; (ii) agroforestry, (iii) irrigation; (iv) disease and pest management for crops, livestock and fisheries, (v) drought management for crops and livestock and (vi) access to markets and credit. Other CSA practices and technologies mentioned included:

- Climate-smart agribusiness along the agricultural value chains
- Information and communication technology (ICT) for dissemination of CSA practices and technologies (e.g. digital and mobile based applications)
- Integrated soil, water management and water and energy use efficiency (e.g., micro-irrigation)

- Reducing the impact on forest for agricultural development, particularly through the diversification along the agricultural value chain
- Promoting tree planting/growing practices
- Reducing burning of crop and vegetation
- Promoting agro-ecological principles
- Restoration of degraded soils and lands
- Capacity building of crop and livestock farmers and fisherman, policy makers and other stakeholders
- Improving access to markets and finance
- Strengthening governance and institutional capacity
- Promote access to improved livestock seeds and high-performance breeding lines through artificial insemination
- Setting up agricultural training centres
- Intensifying agricultural mechanization
- Development of fisheries and aquaculture
- Conservation tillage practices

Emerging threats, like the current COVID-19 pandemic are threatening to slow down progress made in implementation and scaling up of CSA initiatives. As policy makers, we must safeguard the progress made so far including hard-won gains in including CSA in NDCs, NAPs and national development policies and agenda (Government Representative, Burundi)

4.4 Current Research and Innovation Priorities

For decades' agriculture in Eastern and Central Africa has not been profitable especially for small holder farmers. The challenges of climate change in the agricultural sector have led to an emergence of several innovations and technologies aimed at transitioning farming communities towards achieving the triple wins of CSA. The study, therefore identified a number of innovations. These include:

- a. **Digitizing Climate-Smart Agriculture products and services:** Farmers in ASARECA member countries, are beginning to reap the benefits of CSA innovations through accessing emerging digitized CSA products and services. This has enabled promising CSA technologies and practices to *reach many more farmers* faster and at lower cost than traditional extension approaches (Mundy and Girvetz, 2020). Other CSA areas that are being digitized include;(i) *financial and insurance services* to reduce the finance barrier to CSA adoption and protect crops and livestock farmers from weather shocks, (ii) weather and agro-advisory services, and (iii) digitized platforms for multiple stakeholders to engage and exchange information across the CSA value chain. In Ethiopia and Rwanda, digital technological developments and innovations such as weather forecasts, satellites and soil sensors are enabling farmers to manage their crops easily (Ayehu et al. 2020; Bamurigire et al. 2020; Alemaw and Agegnehu, 2019). For example, a handheld digital mobile soil testing kit⁵ has been developed for monitoring pH, Nitrogen, Potassium, Phosphorus and soil organic matter as well as providing advice on the crop and production targets(AgroCares, 2020). Additionally, wireless pocket sensors are enabling farmers to access CSA agro-advisory information tailored to their local soil, weather and market conditions.

5 The gadget costs about €9,00 (AgroCares, 2020)

- b. Mechanizing Climate-Smart Agriculture farming operations:** Increasing agricultural productivity under the changing climate will need to be supported by mechanization of CSA that can reduce labour demands. Innovations for mechanizing CSA are addressing key sustainability issues including youth, gender, environmental conservation and ensuring that farming becomes profitable. Mechanization is envisaged to cut across the entire CSA crop value chain especially at production stage where seeders and planters (without complete ploughing of the land), are capable of penetrating soil surface vegetative cover to deposit seed and fertilizer at the required depth and spacing (Sims and Kienzle, 2017). In more recent mechanization efforts, there is an increasing focus of gender sensitive mechanization of farm operations.

In Ethiopia, CSA must embrace digital technologies to boost agriculture productivity against the backdrop of changing climate. As Africa continues to build and enhance greater access to mobile and internet technology, digital apps developers have the capabilities to develop apps for CSA that can easily help farmers to access knowledge and information on farming practices, seasonal and yearly rainfall patterns, diseases and pest control, and land management. CSA apps can also make agricultural markets, agro-advisory services, inputs and credits more accessible. Digital technologies can help boost the interest of youth in farming (EIARI Representative, Ethiopia)

- c. Developing and scaling up business models for CSA:** Commercialization of CSA is gaining momentum not only within ASARECA member countries but also across the entire globe. Research on innovative agribusiness models is being driven by research organizations in collaboration with private sectors and national governments. This research is expected to generate validated business models that can be deployed for scaling CSA within the region.
- d. Micro-insurance and Index based insurances schemes:** These are emerging as critical CSA innovation that insures farmers in the event of crop failure and animal losses. Examples include: (i) the schemes implemented by ACRE in Tanzania and Rwanda, (ii) Index-Based Livestock Insurance (IBLI) and (iii) the Kenya Livestock Insurance Program (KLIP) that provides insurance schemes aimed at compensating farmers to reduce the impacts of crop and livestock losses due to severe dry spells.
- e. Public and private innovative financing and investments models for CSA:** There is a strong business case for CSA in ASARECA member countries which is attracting public and private sector financing to stimulate adoption of CSA along value chains. There are various investment models being proposed and these are supported by policy and business incentives. These models are benefiting from the symbiotic relationship of public sector creating a stable environment and the private sector utilizing its skills in access to better markets.
- f. CSA Multi-stakeholder platforms:** At the national level, CSA platforms whose membership includes stakeholders with different interests are emerging. Examples of such platforms include the Tanzania Climate-Smart Agriculture Alliance (TCSAA) and the Kenya Climate-Smart Agriculture Multi-Stakeholder Platform (CSA-MSP). At the global level, the Global Alliance for Climate-Smart Agriculture (GACSA), which is cascaded into regional levels (Africa CSAA) is a partnership for different members including research institutions, farmers' organisations, governments, private sector, NGOs, academia and CBOs. GASCA is emerging as a great platform for knowledge exchange and inter-regional cooperation on CSA (Dinesh et al. 2017).



There exists a lot of networks, fora and platforms for exchanging CSA information. However, scaling up CSA to the millions of farmers especially women in ASARECA member countries is still an issue. What we need to do is drive coordinated action and change in CSA and climate change through a holistic, generational and equity fora across the region. These fora should have a higher membership of farmers than governments, NGOs and CBOs.

- g. **Public-Private-Partnership (PPP) for technology innovation and transfer:** Mapping of CSA initiatives shows that private sector is actively involved in delivery of CSA practices and technologies. Therefore, a strong partnership and collaboration between the public and private sectors can play a significant role in developing and scaling up of innovative CSA solutions. Where this PPP model has been demonstrated, higher financial resources, better technologies and skills as well as wider markets are access by the CSA initiative.



It is essential that African countries place a resilience and inclusive lens on their responses to threats that climate change imposes on agriculture. The database of CSA initiatives will provide a platform for ECA countries to see what CSA practices and technologies exist and are being implemented across the region (NGO Representative, DRC).



05

Partnerships for scaling up CSA initiatives in ASARECA member countries

5.1 Existing Collaborations on CSA

Partnerships are crucial for planning, implementation and successful scaling up of CSA technologies and management practices. Stronger partnerships amongst national governments, research and development organizations, farmer associations and groups and private sector is critical for facilitating enhanced use of CSA technologies and practices within the ECA region. In particular, scaling of CSA interventions will require building partnerships with the private sector (Sloan et al, 2019). Investments in agribusiness projects or enterprises are deemed as crucial for adoption of CSA. SMEs need to be supported to build both technical and organizational capacities to enable them operate. The *Farm to Market Alliance* integrates and engages with a diverse range of agricultural value chain actors, including private sector businesses, governments, farmer groups, market off-takers and aggregators, farm input supply companies, financial institutions, insurance providers and extension service practitioners in Tanzania, Kenya and Rwanda. These collaborations allow cross-country collaborators to align their interests and leverage resources around complex issues such as food security, resilience and reducing GHGs emissions. Findings from this study indicate that there a number of existing collaborations for scaling up of CSA initiatives in the ASARECA member countries. Some of these collaborations are shown below (Table 11).

Table 11: Examples of collaborative CSA initiatives within ASARECA member countries

S/n	Title of CSA Initiative	Focus Area	Partners	Countries
1	Africa CSA Alliance (ACSAA) and the NEPAD-iNGO Alliance on CSA (ongoing)	25 million farm households in practicing CSA by 2025	AU-NEPAD, AU, RECs of the African Union, Member states, Private Sector and Civil; Learning and research institutions; CARE International; Catholic Relief Service; Concern Worldwide, Oxfam, World Vision; FAO; CGIAR; FARA; FANRPAN	DRC, Ethiopia, Kenya, Madagascar, Rwanda, Tanzania, Uganda.
2	Climate-Smart Agriculture Youth Network (CSAYN) (ongoing)	CSA; CIS; Energy efficient farming;	IFAD; The World We Want; CTA; CONNECT4CLIMATE; GFAR; CIAT; Earth Charter International, CGIAR; IAAS; WAY; GYAN; ReRaC	DRC, Kenya, Madagascar, Rwanda, Tanzania, Uganda.
3	Global Agenda for Sustainable Livestock (GASL)(ongoing)	Livestock	AfDB; AU-IBAR; BMG; CIRAD; World Bank; Republics of ASARECA member countries; ILRI; Heifer International; FAO	Kenya, Rwanda

S/n	Title of CSA Initiative	Focus Area	Partners	Countries
4	Strengthening Climate Information Partnerships - East Africa (SCIPEA) (ongoing)	Climate information Services	Met Office-UK; International Research Institute for Climate and Society (IRI), the IGAD (Intergovernmental Authority on Development) Climate Prediction and Applications Centre (ICPAC), and the national meteorological and hydrological services (NMHSs) of Ethiopia, Kenya and Tanzania	Ethiopia, Kenya, Tanzania.
5	IGAD-FAO Partnership Programme (PP) on Building Resilience for (Agro-) Pastoralist Communities(ongoing)	Marketing and trade, transboundary animal diseases and natural resources management	IGAD and FAO	Ethiopia, Kenya.
6	Partnership for Inclusive Agricultural Transformation in Africa (PIATA)(ongoing)	Commercialization of CSA	Alliance for a Green Revolution in Africa; Bill & Melinda Gates Foundation; Rockefeller Foundation; United States Agency for International Development; UK Foreign, Commonwealth & Development Office; German Federal Ministry of Economic Cooperation and Development	Ethiopia, Kenya, Rwanda; Sudan, Tanzania,Uganda.

The main objective of these CSA collaborations is to address the current agricultural challenges, barriers and opportunities to success through collective action across the entire CSA value chain. Specifically, the collaborations aim at;

- Identifying and applying best practices in CSA that can dramatically improve agricultural performance in ASARECA member countries.
- Co-developing CSA products and services for farmers e.g., the IGAD Climate Prediction and Application Centre (ICPAC) that is delivering climate services to countries in Eastern Africa.
- Using digital technology to collect CSA data and thereafter to build evidence and to customize to the needs of farmers.
- Building resilience of farmers by empowering them to confidently grow climate resistant crops, and rear livestock and fisheries, as well as access markets to maximize productivity, profitability and resilience.
- Enabling organizations to exchange and share information and data on CSA practices and technologies.
- Financing joint CSA projects and programs to reduce costs and ensure sustainability.
- Translating scientific data into policy and communicating the knowledge to policy makers at national level.

Through these collaborations, organizations have been able to offer CSA related training, products and other tailor-made services. These collaborations enable integration and exchange of different types of CSA knowledge and skills. For example, the Climate Resilient Agribusiness for Tomorrow (CRAFT) funded by the Ministry of Foreign Affairs, Netherlands is a five-year collaborative project implemented by SNV, RaboBank, Wageningen University and Research (WUR) and the CGIAR's Research Program on Climate Change, Agriculture and

Food Security (CCAFS). The project aims at increasing the availability of climate-smart information and food for the growing populations in Kenya, Tanzania and Uganda. The project started in June 2018 and is expected to end in May 2023.



The Africa Climate-Smart Agriculture Alliance (ACSAA) is a great network for supporting national governments to develop country driven CSA strategies. For example, Kenya's CSA strategy and implementation framework, has a commitment to scaling up CSA practices and technologies to about two million smallholder farmers and fishermen. This will be done through the CSA multi-stakeholder platform whose overarching goal is to exchange information as well as discuss how the national CSA strategy is being implemented across the country.

5.2 Existing Innovation Platforms for Scaling up CSA Initiatives in ASARECA member countries

As previously mentioned, there are many existing CSA initiatives in ASARECA member countries, that are increasing productivity and improving farmer's resilience. However, these initiatives are unknown and hence posing a challenge in scaling up of CSA interventions. This section highlights the existing innovation platforms for scaling up CSA initiatives within the ASARECA member countries. Innovation Platforms are developed to share information and scale up adoption of technologies and innovations, supporting and enabling policy frameworks, and securing financial investment for CSA (Kadzamira and Ajayi, 2019). Homann-Kee Tui et al (2013) defines innovation platforms as spaces for learning and change and comprises of a group of individuals (from different organizations) with different backgrounds and interests (farmers, traders, food processors, researchers, government officials). Innovation platforms offer members opportunities to identify challenges, opportunities and solutions to achieve their goals for CSA. Platforms bring together resources and knowledge across different CSA initiatives, technologies and practices, and academic disciplines (including biophysical sciences, social sciences and the humanities). Innovation platforms can also be used to support bottom-up research and development initiatives amongst relevant CSA actors, which allows for prioritization, experimentation, and validation of solutions aimed at meeting the "triple" aims of CSA (mitigation, adaptation and food security).



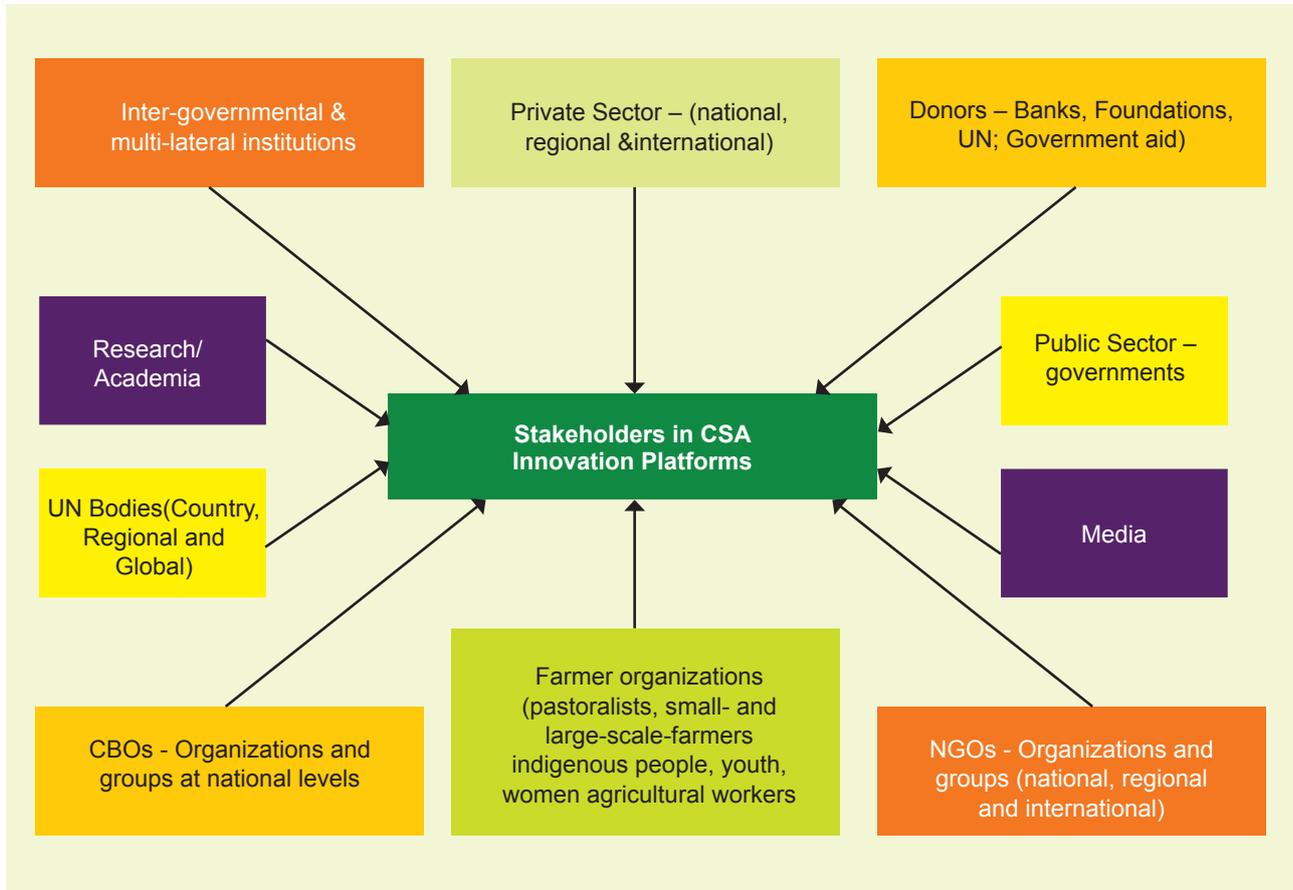
Private sector actors such as producers of climate-resilient seed, and input dealers join CSA innovations platforms because CSA is itself a business, and climate change affects that business.



There is no crowd funding platform that can significantly increase funds and public support for CSA initiatives and brings in new solutions to address the challenges imposed by droughts, erratic rainfall and increasing temperatures in the agriculture sector. A crowd funding platform has the potential to scale up CSA rapidly and play a key role in reshaping the global funding landscape (Youth Group Representative, Kenya).

A range of actors that are implementing and scaling up CSA initiatives were identified (Figure 14). The mapping exercise identified innovation platforms that are tackling the challenges and opportunities of agricultural productivity at various levels namely: country, regional and global level.

Figure 14: Representative actors of Innovation Platforms



Some of the platforms are targeting CSA value chains while others spread across several levels. The innovation platforms target the following users: national governments, NGOs, CBOs, research organizations, academia, farmers, private sector, policy makers, youth and UN bodies. The goals of the innovation platforms include;

- Facilitate information sharing and communication on CSA innovations, practices and technologies to improve productivity for farming and fishery communities.
- Facilitate dialogue on CSA initiatives and address the needs of each member.
- Increase access to CSA data (raw and synthesized data).
- Facilitate access to CSA publications and documentations.
- Facilitate learning and capacity development through social media, webinars and conferences.
- Undertake CSA activities such as proposal writing, research and dissemination.

Media is involved in disseminating CSA information and providing vital information during emergencies and disasters such as flooding and droughts emergency. In Kenya, media has incorporated climate change journalism as an adaptation strategy because the role of media in providing accurate, timely and relevant information is a critical component of resilience

At all levels (sub-national, national, sub-regional, continental and global), it is **now widely recognized that** agricultural extension and advisory services are not the sole remit of government anymore, and that there are other critical players such as farmer organizations, CBOs and NGOs that can disseminate **CSA practices and technologies. This is done through innovation platforms that scale up the adoption of CSA practices and technologies. National governments are now becoming champions in implementation of innovations platforms for scaling up CSA. For example, the Kenya CSA multi-stakeholder platform (CSA-MSP) led by the Climate Change Unit in the** Ministry of Agriculture, Livestock and Fisheries (MALF) provides a platform for bridging the gap between national policies and implementation of CSA by various actors. The **CSA-MSP platform also provides an opportunity for coherence and** coordination of CSA activities between different stakeholders in Kenya. Kilimo Salama service is another innovative platform that also provides micro-insurance. This IP concept is currently being implemented by Syngenta in Rwanda and Kenya. In event of crop failure and livestock loss, Kilimo Salama service uses the M-Pesa platform to make pay-outs to farmers.

Climate Watch is an innovative online platform that offers raw and open data, visualizations and analysis for GHG emissions from agriculture sector and tracks a country's commitment to post-2020 climate actions (e.g., NDCs). The aim of Climate Watch is to help policymakers, researchers and other stakeholders gather insights on a country's climate progress.

There is a risk of Covid 19 pandemic reversing potential gains made in scaling up CSA amongst farmers, especially women. However, we should invest more in online CSA platforms and make them more interactive. This will enable a farmer to talk and/or chat directly with CSA experts such as a weather and agro-advisory expert. Private sector should actively invest in internet connectivity in rural areas and with affordable broadband costs so that farmers can afford to access the online CSA platforms. Furthermore, the youth who are currently using these platforms more than the older farmers, do not have enough income to invest in internet (NGO representative, Ethiopia).



06

Gender Responsiveness and Social Inclusiveness of the CSA Initiatives

Climate change is closely linked to Gender Equality and Social Inclusion (GESI), affecting women, men, youth, the elderly, the poor, and the rich differently. Women, youth, and the elderly are severely affected compared to men due to the rigid and restrictive social and cultural roles, as well as responsibilities (Slavchevska, 2015). These rigid restrictions give rise to the difference in vulnerabilities and abilities to adapt to climate change. Achieving gender equality and social inclusion is paramount in most of the ASARECA member countries. In particular, addressing gender inequality and social exclusion is essential to achieving sustainability in agriculture. High levels of inequality and exclusion make it harder to increase productivity, enhance resilience, and mitigate against the impacts of climate change.

Gender and social inclusion are pertinent to CSA initiatives and therefore there is a need to emphasize on the importance and ultimate goal of integrating GESI in CSA technologies and practices. Taking a gender-responsive and socially inclusive approach to CSA, means that the particular needs, priorities, and realities of men and women are recognized and adequately addressed in the design and application of CSA.

The 2014 Malabo Declaration includes specific targets on gender and social inclusion such as women and youth engagement in agriculture, job creation in the agriculture value chains, support and facilitation of preferential entry as well as participation in gainful and attractive agribusiness opportunities (AU, 2014). This declaration recognizes the importance that the agricultural sector plays in the economic development of Africa, especially for the youth who are expected to play a critical role in food production in the near future.

Given the norms and traditions concerning the roles of women, youth, and other vulnerable groups in agricultural production as well as land tenure system within ASARECA member countries, implementation and eventual adoption of CSA Initiatives face great limitation when gender and social inclusion lens are not taken into consideration. The inadequate access by women and other socially excluded groups to CSA practices and technologies is bound to exacerbate inequalities and place an extra burden on the entire agriculture sector. In ASARECA member countries, women are involved in the agricultural labour force either as producers, unremunerated family workers, or agricultural wage workers. Evidence shows that over 50% of all employed women in Sub-Saharan Africa work in agriculture (FAO, 2019). Despite their contribution to the agricultural sector, more women than men face barriers and constraints in accessing new agricultural practices and technologies, and agro-advisory services (FAO, 2019). This creates a knowledge gap in agriculture and the resulting insecurity affects the way women farm and adapt to climate change.

▲ A gender inclusive CSA that is healthier and wealthier is possible in ECA. We need researchers to identify CSA practices and technologies that are suitable for women, youth and marginalized communities and then policy makers to enact gender responsive agricultural and CSA policies and strategies to scale up these practices (Respondent from Government, Rwanda).

Capacity building on mainstreaming gender into CSA projects is urgently needed in Sudan. While Sudan is reporting on gender equality at national level, it will be useful to collect and analyze gender disaggregated data at micro-level in relation to CSA. This will unmask the significant differences and inequalities of girls and women who experience multiple and intersecting forms of unfairness in agricultural sector. Women from rural areas religious and ethnic minorities; and those that are disabled, refugees, migrants, and internally displaced, face significantly higher rates of inequality with respect to access to resources required to adopt CSA (NGO representative, Sudan).

6.1 Women and Female-Headed Households

Content analysis of the CSA initiatives shows that out of the 489 CSA initiatives, 77.6% (n=358) have integrated GESI in the approach and implementation modalities to reduce gender inequalities and social exclusion in agriculture. The target population is women, female-headed households, youth, and indigenous/marginalized people. Out of the 358 initiatives, a majority (79.9%) of them directly mention women and/or female-headed households as the target population. About 26.8% and 9.8% mention the youth and indigenous/marginalized people respectively as the target populations (Table 12).

This is a great achievement particularly for women given their critical roles in agriculture and food security in the ECA sub-region. The countries with the highest number of CSA initiatives that target women and female-headed households, youth, and indigenous/marginalized people were identified as Kenya (54), Uganda (40), Tanzania (36), Rwanda (35), and Ethiopia (32). On the other hand, Eritrea (4) and the Republic of Congo (2) had comparatively fewer CSA initiatives being reported.

The high number of CSA initiatives that are gender and socially inclusive in some ASARECA countries has been attributed to the enactment of legislation that aims to achieve gender equality within the country. Rwanda for instance has embraced pro-women and gender policies. The country has been ranked among the top 5 for gender equality globally. Additionally, Rwanda also leads the world in terms of the share of women in the national legislature. This ensures that policies adopted tend to have a gender and social inclusion lens. Findings from the CSA study show that gender equality principles are also embraced in Rwanda, Ethiopia, Kenya, Tanzania, and Uganda.

These principles have been integrated into national developmental agenda and strategies. These countries' political will to promote gender equality and social inclusion is strong and has been achieved through commitments to regional and international conventions, protocols and declarations on gender equality and women's empowerment such as, the Maputo Protocol and the Solemn Declaration on Gender Equality in Africa (SDGEA) (2004), the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW), the Beijing Declaration and Platform of Action (1995) and Sustainable Development Goals.

Promoting gender equality in CSA isn't just the right thing to do, it's the smart thing to do. There are many women and marginalized people who are dependent on agriculture and feeding their families. The current climatic impacts such as drought is causing havoc on their crop yields and livestock. Therefore, supporting the participation of women and marginalized people in CSA will create a positive ripple effect for all families in my country, (CBO Representative, South Sudan).

Table 12: Number of CSA initiatives in ASARECA member countries targeting women, youth, and marginalized people

S/n	Country	Target population			Total (n=417)
		Women and female-headed households	Youth	Indigenous/ marginalized people	
1	Burundi	8	3	0	11
2	DR Congo	9	4	5	18
3	Eritrea	3	1	0	4
4	Ethiopia	19	10	4	33
5	Kenya	41	5	6	52
6	Madagascar	9	7	0	16
7	Republic of Congo	1	1	0	2
8	Rwanda	23	14	0	37
9	South Sudan	7	6	1	14
10	Sudan	8	7	4	19
11	Tanzania	23	8	5	36
12	Uganda	25	9	7	41
13	Regional	95	12	3	110
14	Global	15	9	0	24
Total		286	96	35	417

6.2 Youth

The majority of youth (male and female) are not interested in agriculture and consider it as inefficient, socially immobile, and technically uninteresting (White, 2015; Irungu et al. 2015; Anyidoho, 2012). This phenomenon is experienced across all enterprises in crop farming, livestock rearing, and fisheries (Ansah, 2018; Swarts and Aliber, 2013). This has left only the elderly farmers (around 60 years despite the median population age being 19 years) being actively engaged in agriculture within the region (FAO, 2014). Therefore, agriculture must not only be adaptable to the changing climate, but it should also be a profitable, rewarding, and technologically attractive enterprise to attract technologically savvy young farmers.

Involving more young people in CSA is crucial but major shifts in technology and agribusinesses are needed to ensure that Africa's next generation embraces agriculture. Youth can play an important role in a range of activities in climate-smart production and supply chains. This can be achieved by providing the youth with continuous training and support to enable them to develop skills and vital CSA knowledge such as the use of digital services for weather and agro-advisory, and market information. Digital services will provide the youth with real-time information enabling them to make better business decisions and improve crop yields and gain access to market and finance.

CSA Youth Network (CSAYN) is one of the largest networks and comprises of volunteers that have a strong interest in the climate-smart agriculture and the environment. The network links volunteers across the world and enables them to learn and exchange information, research findings and seek advice from other volunteers. Within ASARECA member countries, CSAYN is present in Ethiopia, Madagascar, DR Congo, Kenya, Rwanda and Uganda.

Content analysis of the CSA initiatives shows that of the 358 initiatives that are gender and socially inclusive, a total of 96 (26.8%) CSA initiatives mention targeting the youth (Table 13). The CSA initiatives target both male and female youth and do not differentiate between male and female youth. Table 12 shows that Rwanda had the highest number of CSA initiatives (14) while the Republic of Congo had the least youth CSA initiatives (1). The most popular CSA initiatives are projects (28) and networks/partnerships (25) (Table 13).

Communities of Practice and Hubs/Platforms are also common where youth members come together for peer-to-peer knowledge sharing, training, and mentorship. The CSA Youth Network (CSAYN) present in Ethiopia, Madagascar, DR Congo, Kenya, Rwanda, and Uganda is a good example of a network that is currently providing CSA services to the youth in the ECA region.

Within DRC, there are thousands of talented young farmers, who given the opportunity, could be passionate advocates for CSA issues. These young farmers need training in innovative CSA practices and technologies that can help them shape the future of agriculture in their countries. There are CSA platforms and tools that build knowledge and capacity that young farmers can tap into (NGO Representative, DRC).

Table 13: Distribution of CSA initiatives in ASARECA Member Countries Targeting Youth

S/N	Country	CSA initiatives							Total (n=96)
		Community of Practice	Hubs/ Platforms	Networks/ Partnerships	Plans/ Strategies	Policy	Programmes	Projects	
1	Burundi	1	0	1	0	0	0	1	3
2	DR Congo	0	1	1	0	0	0	2	4
3	Eritrea	0	0	1	0	0	0	0	1
4	Ethiopia	1	1	1	2	0	1	4	10
5	Kenya	0	0	1	2	1	0	1	5
6	Madagascar	1	2	1	1	0	0	2	7
7	Republic of Congo	0	0	0	0	0	0	1	1
8	Rwanda	1	1	2	3	0	4	3	14
9	South Sudan	0	0	0	0	0	3	3	6
10	Sudan	1	0	2	0	0	2	2	7
11	Tanzania	1	0	1	2	0	1	3	8
12	Uganda	1	0	1	1	0	2	4	9
13	Regional	1	2	7	0	0	0	2	12
14	Global	1	2	6	0	0	0	0	9
	Sub-Total	9	9	25	11	1	13	28	96

6.3 Indigenous and Marginalized People

Studies show that indigenous⁶ and marginalized⁷ people are more susceptible to climate change impacts because they are often ignored by their national governments (Maharjan and Maharjan, 2017). This category of people has the smallest ecological footprints and contributes the least amount of greenhouse gas emissions (Maharjan and Maharjan, 2017; Casey et al. 2018). Yet they suffer the worst impacts of climate change, as well as exclusion from participation in policy formulation and implementation (Bryan, 2020). This has been attributed to various factors including the vulnerability of the indigenous and marginalized people who mostly live in marginal and fragile areas (Maharjan and Maharjan, 2017). Their high dependence on nature and stable ecological systems increases their overall vulnerability to climate risk.

A review of the CSA initiatives in ASARECA member countries shows that only 9.8% (n=35) of the gender sensitive and socially inclusive CSA initiatives reported are targeting indigenous and marginalized people. Table 14 below shows the distribution of CSA initiatives that target indigenous and marginalized people.

Table 14: Distribution of CSA initiatives in ASARECA member countries targeting indigenous and marginalized people

Country	Plans/Strategies	Policy	Programmes	Projects	Total (n=35)
DR Congo	0	0	2	3	5
Ethiopia	2	0	2	2	4
Kenya	0	1	1	2	6
South Sudan	0	0	0	1	1
Sudan	1	0	2	2	4
Tanzania	1	0	1	3	5
Uganda	0	0	3	3	7
Regional	0	0	1	2	3
Sub-Total	4	1	12	18	35

The highest number of these initiatives were reported in Uganda (7) while South Sudan had the least number of initiatives (1). Burundi, Eritrea, Madagascar, Republic of Congo, and Rwanda did not have any CSA initiatives targeting indigenous and marginalized people. The livelihoods of indigenous and marginalized people are dependent on natural resources, yet their habitats are undergoing rapid environmental degradation. This category of people is also experiencing a disproportionate burden of morbidity. This shows that organizations, including national governments, have overlooked the impact of climate change on indigenous and marginalized people and are not focusing on them as a target group.

On the other hand, studies have shown that targeting marginalized people with development initiatives is not cost-effective, and agricultural and environmental outcomes are less tangible (Eadson and Foden, 2020; Jagtap, 2020). This perhaps explains why organizations shy away from implementing CSA initiatives amongst these communities. Among the CSA initiatives, the findings show that CSA programs and projects are the ones that target indigenous and marginalized people the most (Table 14).

⁶ Indigenous peoples are defined as practitioners of unique cultures and ways of relating to people and the environment. They have retained social, cultural, economic and political characteristics that are distinct from those of the dominant societies in which they live (UN Department of Economic and Social Affairs Indigenous Peoples, 2007)

⁷ Marginalized populations are groups and communities that experience discrimination and exclusion (social, political and economic) because of unequal power relationships across economic, political, social and cultural dimensions (UN Human Rights-Office of the High Commissioner for Human Rights, 2014)

6.4 Range of CSA Interventions Targeting Women, Youth and Marginalized People in Eastern and Central Africa

The CSA initiatives have emphasized that women, youth, vulnerable and marginalized people are vulnerable to food insecurity under a changing climate. The commonly mentioned intervention is the strengthening of the adaptive capacity of women, youth, marginalized, pastoralists, vulnerable groups, and communities by facilitating access to CSA practices, markets, credit, social safety nets, and insurance schemes. Specifically, the CSA initiatives in ASARECA member countries target the following GESI issues:

- a. Increasing the number of women participating and benefiting from CSA practices and technologies. For the CSA initiatives that provided the percentage of target groups, the mapping exercise showed that on average the initiatives targeted 25% women and female-headed households as beneficiaries in the various CSA initiatives.
- b. Creating employment for Women, Youth, and Vulnerable Groups (WY&VG) at different implementation stages of CSA initiatives.
- c. Access and inclusion at the post-harvest value-chain e.g., providing climate-resilient post-harvest storage solutions.
- d. Access to markets.
- e. Reducing rural women’s agricultural and domestic workload through labor-saving CSA practices and technologies.
- f. Access to credit and financing mechanisms.
- g. Specifically targeting woman-headed households as the primary stakeholder of the targeted CSA intervention.
- h. Improving the capacity of national governments, NGOs, private sectors, CBOs, and local institutions to formulate and promote gender-responsive CSA interventions, risk reduction strategies and plans, set up and/or improve mechanisms to deliver integrated and timely agro-weather/early warning messages.
- i. Capacity building of women and youth along the CSA value chains.
- j. Climate-smart and energy-saving technologies that can help women and the youth in adaptation and improving livelihoods within the agricultural sector.
- k. Diversification of income sources for women and youth.
- l. Participatory and action-oriented research to provide support for policies that help women, poor farmers and the youth improve their lives and produce sufficient food under the changing climate.
- m. Inclusion of women and vulnerable groups throughout the iterative cycle of project and program planning, implementation, and monitoring and evaluation.
- n. Consideration of gender issues as a cross-cutting dimension, including institutional arrangements, capacity development, financing, and information sharing related to the NDCs and NAP processes.
- o. Disaggregating research data by gender and social inclusion lens to allow for social inclusivity principle in CSA interventions.
- p. Strengthening the adaptive capacity of the WY&VG through social safety nets and insurance schemes.
- q. Fair and equitable distribution of burdens and benefits in CSA among WY&VG.
- r. Address social and cultural norms that could hinder or limit WY&VG access to productive CSA resources, advisory services, participation, and adoption.

Government research institutions should prioritize and invest in gender-responsive data collection and analysis so that technocrats and policy makers can use it to make informed CSA policies. Additionally, NGOs and CBOs that implement CSA projects and programs can also use the data collected to mainstream gender throughout the project and program cycle (NGO representative, Congo)

07

Finance Investments in Climate-Smart Agriculture Initiatives

Agriculture plays an important role in the economies of ASARECA member countries, contributing on average between 24 and 44% of their Gross Domestic Product (GDP) to the national economies (FAOSTAT, 2020). Despite the contribution of agriculture to the economies, the annual national budget appropriations for agriculture in ASARECA member countries is dismal. For instance, Rwanda and Kenya allocated only 4.4% and 3.2% of their budget, respectively for the FY2019/2020 (FAOSTAT, 2020). These budgets are well below the recommendations set by the Comprehensive Africa Agriculture Development Programme (CAADP), which requires investing a minimum of 10% of national budgets into agriculture, to raise agricultural productivity by at least 6% (AU, 2014). Additionally, there is a low level of financial lending to agriculture compared to the other sectors which poses a significant challenge to the broader agricultural development agenda (Kenya Bankers Association, 2018). Both public and private sector investments in agriculture are not enough to sustain the desired outcomes in terms of food production and security. Hence, farmers in ASARECA member countries continue to experience low productivity and have poor access to productive assets characterized by minimal use of climate-resilient technologies.

Financing investment for CSA initiatives is critical for the development and transformation of the agricultural sector under a changing climate. Financing for climate change actions especially in agriculture is now available for developing countries, including ASARECA member countries. According to the World Bank Discussion Paper, Making Climate Finance Work in Agriculture (2020), Climate Finance plays a strategic role in building resilience of smallholder farmers to mitigate against impacts of climate change by accelerating climate smart investments in the agricultural sector. Agriculture has been identified as one of the major emitters of GHG, and therefore, there is potential for agriculture to receive much-needed investment from a variety of sources (WRI CAIT, 2017) (see Table 1).

The CSA mapping study revealed that the highest amount of financing for CSA initiatives was reported in Ethiopia’s CRGE project (2011-2025) with committed funding of USD 150 billion⁸. On average Ethiopia has the highest amount of funding for CSA initiatives at USD 194 million, while the Republic of Congo has the lowest at USD 10 million (Table 15).

Table 15: Average amount of financing for CSA in ASARECA member countries (n=284)

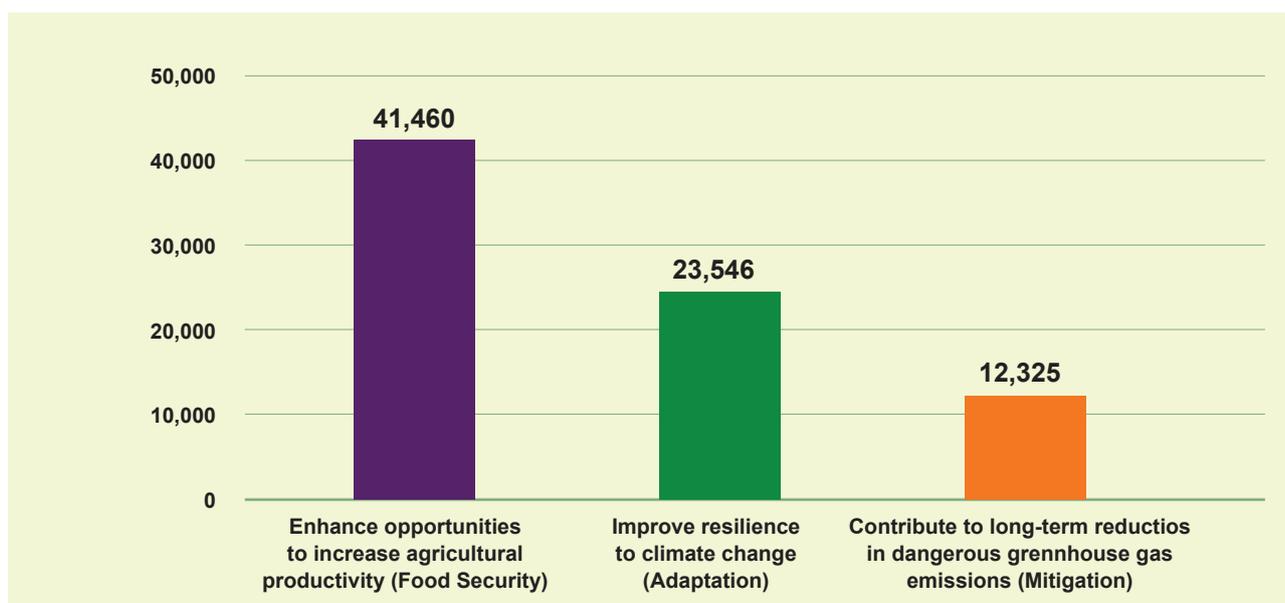
Country	Average (millions USD)	Range (USD)
Burundi	57 Million	4.2-149 Million
DR Congo	25 million	802K-73 Million
Eritrea	17 million	14-37 Million
Ethiopia	194 million	8.6-365 Million
Kenya	94 million	117K-279 Million
Madagascar	87 million	920K-254 Million
Republic of Congo	10 million	120K-20 Million

⁸ Since this figure is so large compared to financing for other CSA initiatives, it was treated as an outlier and excluded from the analysis

Country	Average (millions USD)	Range (USD)
Uganda	28 Million	450K- 248 Million
Rwanda	65 Million	99K-186 Million
South Sudan	23 Million	1.8-37 Million
Sudan	73 Million	3.4-357 Million
Tanzania	25 Million	1.2-180 Million

The funding for most of the CSA initiatives is to enhance opportunities to increase agricultural productivity (food security). From 284 CSA initiatives, analysis shows that on average funding for food security initiatives is about USD 41,460 million, while adaptation is USD 23,546 millions. The least amount of funding estimated at USD 12,325 million was committed for mitigation of GHGs (Figure 15). This indicates that the priority goal for financing organizations is to meet the demand for food security in a changing climate. Additionally, targeting financial investments towards achieving the CSA pillar of increasing agricultural productivity to ensure food security implies that ASARECA member countries consider the agricultural sector as an important investment. Financial investments aimed at increasing food security are complemented with a cross-cutting efforts such as enhancing women and youth empowerment, and energy and water access, especially for irrigation. Amounts of funding for policies, CoP, Networks/partnerships, and hubs/platforms were not identified mainly because funding for these initiatives is usually included in CSA strategies/plans, projects, and programs. In other cases, CoPs, Networks/partnerships, and hubs/platforms are on an individual and institutional voluntary basis.

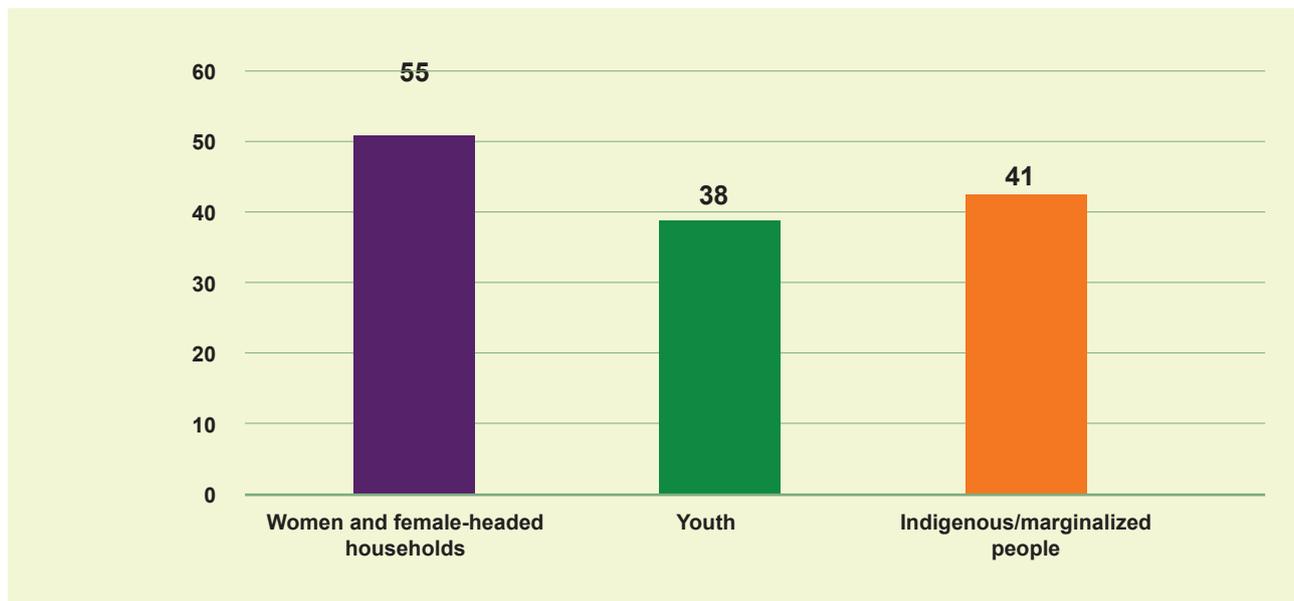
Figure 15: Average cost of Financing CSA (projects, strategies/plans, and Programs) in ASARECA Member Countries



NGOs, CBOs, national governments, research institutions, women groups, youth groups, farmer associations, donors and the private sector are key partners in realizing an equitable climate-smart agricultural future. Together and independently, these stakeholders can drive bigger and bolder financial and technical commitments for CSA. Through new and existing CSA networks and platforms, these stakeholders can contribute towards increasing agricultural productivity in ASARECA member countries (NGO Representative, Rwanda)

Results of the mapping exercise on financing for women and female headed households, youth, and indigenous/marginalized people shows that women and female headed households receive more funding than the youth and indigenous/marginalized people. Out of the 358 initiatives that targeted women and female-headed households, youth, and indigenous/marginalized people, 295 (76%) were funded. Analysis show that women and female-headed households received more funding (USD 55 million) than youth (USD 38 million) and indigenous/marginalized people (USD 41 million) (Figure 16).

Figure 16: Average cost of Financing CSA (Projects, strategies/plans, and Programs) in ASARECA Member Countries (Millions USD)



Mapping of the financing landscape for CSA initiatives shows that it is highly fragmented with financing coming from different sources to support increased productivity, building resilience, and reducing GHG from multiple sources. This has led to a thin spread of financial resources which has increased the challenges associated with accessing finance for CSA and ultimately reducing overall efficiencies. On average, USD 23 millions of funds were available for CSA projects, programmes, and strategies. The different sources of public and private finance identified included:

- a. Multilateral grants and loans
- b. Bilateral grants and loans
- c. Private philanthropy and Foundations
- d. Banks and microfinance institutions

The largest source of financing is multilateral and bilateral grants and loans for agriculture and climate change (UNFCCC, 2016). Recent years have seen a rise in the complexity of CSA initiatives, practices, and technologies which negatively affects access to financing due to the challenge of categorizing the initiatives in the already set traditional financing guidelines. With donors funding, specific sectors, CSA practices, and technologies cover several sectors such as energy, agriculture, forestry, water, infrastructure, and manufacturing that need to be included. Therefore, this leads to a conundrum for funding agencies. Accompanying this challenge is the complexity of donors and aid delivery channels from old known bilateral and multilateral donors such as USAID, UK Aid among others. The emergence of new donor portfolios such as private philanthropy, non-government

organizations, and the private sector is opening up a new funding window for development projects including CSA initiatives (OECD, 2018). This is good news for the promotion of CSA initiatives across the ECA sub region as financing aid becomes more diversified.

At the national level, CSA policies, strategies, and plans are mostly financed through public financing mechanisms as the primary source of financing. ASARECA member countries have provided for annual CSA national budgets since CSA is a priority in national development agendas as well as agriculture and climate change policies, strategies, and plans. ASARECA member countries have equally mainstreamed CSA into national strategic investment plans to ensure that funds are available for implementation of CSA (e.g., Tanzania's ASDP). External donors are also financing policies and strategies and other CSA initiatives.

Diverse donors are supporting the implementation of CSA across ASARECA member countries. Such donors include: the Global Environment Facility (GEF), the Green Climate Fund (GCF), the Adaptation Fund (AF), Climate Investment Funds from Multilateral Development Banks (MDBs) such as the African Development Bank (AfDB), United Kingdom's Department for International Development (DFID), French Development Agency (AFD), Danish International Development Agency (DANIDA), German International Development Agency (GIZ), Japan International Cooperation Agency (JICA), European Union, Belgian Development Agency; Irish Aid, Swedish International Development Cooperation Agency (SIDA), Germany's International Climate Initiative and the German government-owned development bank (KfW). Private philanthropy and Foundations have also supported the implementation of CSA both at national and regional levels. Notable examples include; Rockefeller Foundation, Bill and Melinda Gates Foundation, McKnight Foundation among others. Through public financing, national governments are also funding CSA initiatives, especially strategies and plans.



In Kenya, we ensure that CSA investments and finances meet the needs of beneficiaries and equally benefit everyone, more so women and youth farmers. We are witnessing an increase in youth farmers rearing heat resistant and faster growing goats. Through our program, we provide credit to their groups to purchase these goats
(NGO Representative, Kenya)

08

Strategies for Advancing the Contributions of the CSA Sector in Eastern and Central Africa

The significance of the agricultural sector in the economies of the ASARECA member countries provides a strong impetus to strengthen CSA as the key driver for achieving food security, building resilience, reducing poverty levels and GHGs emissions. It is important to point out that, there is a need to undertake continuous research to generate novel CSA technologies and innovations to address climate related challenges with the increasing prevalence of extreme weather events and unpredictability of weather patterns. Failure to come up with new innovative technologies will lead to diminished agricultural production and its contribution to the national economies resulting in food insecurities, significant lowering of incomes, and increased poverty levels especially amongst women, youth, and vulnerable groups. Indeed, in the changing climate, CSA can contribute towards revitalizing impoverished rural farming communities and turning them into fertile grounds of economic prosperity.

To empower farmers with CSA practices and technologies, a solid financial investment, reliable infrastructure and markets, cost and labour reduction, mechanized equipment and weather information are essential. Additionally, an understanding of local social and cultural practices is imperative if women, youth, and marginalized people such as pastoralists are to benefit from these CSA technologies (Government Representative, South Sudan)

Consultative discussions with the stakeholders during the CSA mapping exercise identified strategic areas that will play a key role in advancing the contributions of the CSA sector in the near future. These focus areas include; governance, research, adaptation, mitigation, finance, partnerships, value chains, and tools for monitoring CSA and agriculture-based adaptation. Details of these focus areas are highlighted below:

- a. **Increasing national ownership of CSA initiatives.** Most ASARECA member countries have developed NDCs and NAPs and they are in the process of revising their NDCs. This provides a great opportunity for mainstreaming CSA as a priority within NDCs and NAPs implementation and financial support. Such CSA initiatives will be of special interest and relevance because they will be designed and prioritized by the countries themselves.
- b. **Scaling up CSA through partnerships with the private sector.** The private sector is a key driver of economic growth and job creation. Any climatic risks that will affect the private sector will consequently negatively affect food security. The private sector can invest in helping smallholder farmers to access markets, increase productivity, engage in value additions, improve quality of the product, reduce production costs and transfer risk

One thing that national governments are failing to do is to aggressively remove barriers to women's leadership, meaningful participation, and decision making in CSA. Despite being the year 2020 and research demonstrating that the role of women in agriculture and agriculture value chains in ECA region is important, very little is being done to remove barriers and provide incentives in such areas as access to land, inputs and credit (NGO representative, Madagascar).

under the changing climate (Tyagi and Joshi, 2019; Fuglie, 2016; Demeke et al. 2016; Arias et al. 2013). The private sector can also engage in the development and review of CSA policies and strategies; legislations and investment ventures as well as offer direct financing and investments through public-private partnerships (PPPs) (KCSAS, 2017). Such investments will in the long run help the private sector boost businesses, through stabilizing supply, increasing trade volumes, and accessing better quality products (Odeke, 2020).

- c. **Promote strategic planning that supports the adoption and scaling up of CSA initiatives at all levels.** Promoting pro-CSA governance and strategic planning in terms of the development of regional CSA strategies and plans that strengthen the engagement of farmer associations, national governments, NGOs, CBOs, the private sector is critical for scaling up CSA activities.
- d. **Gender-responsive and socially inclusive policies, strategies, and plans.** Developing evidence-based, gender-responsive, and socially inclusive CSA policies, strategies, and plans on farming systems preparedness and resilience to shocks, extreme events, and current and future disease pandemics (e.g. Covid 19).
- e. **Inclusive and participatory research.** Research should be undertaken to; identify and promote (i) inclusive profitable and sustainable CSA supply chains to help guarantee resilience at farm and landscape level and across the value chains; and (ii) quality CSA inputs and outputs, which should be resilient to weather changes and extreme events (drought and floods) to ensure high productivity and contribute in mitigating climate change through reduced GHGs emissions.
- f. **Capacity strengthening of smallholder farmers.** Increasing the capacity of farmers and other actors along the CSA value chains in adopting and adapting CSA practices. This is critical for reducing the risk of reversal on the achieved progress.
- g. **Strengthening CSA networks and platforms.** Strengthening and/or establishing strategic CSA networks and knowledge platforms (horizontal and vertical networks) between and amongst different stakeholders, more so with national governments. This will expedite the adoption and scaling up of CSA practices and technologies.
- h. **Promoting climate-smart agenda.** Harnessing multiple gains of climate change adaptation in agriculture by national governments through instituting appropriate incentive mechanisms to encourage the transition of farming systems towards the climate-smart agriculture agenda.
- i. **Promote the adoption of CSA best practices.** Compilation of CSA best practices at different levels (national and sub-regional levels), farming systems (mixed-crop, pastoralism, fisheries, etc.), and along CSA value chains. This can be included in a knowledge database that can be regularly updated and information will be readily accessible digitally to users. National and international research institutions and academia across the sub-region can contribute towards providing high-quality knowledge resources that can be included in the knowledge database.
- j. **Appropriate financial mechanisms that support the implementation of CSA initiatives.** Development of appropriate financial mechanisms and investments for CSA including micro-grants and impact investments on CSA and agriculture in general is critical for enhancing contributions from the sector.
- k. **Enhanced monitoring and evaluation of CSA interventions.** Improved monitoring and data collection on CSA interventions, would facilitate cross-learning among stakeholders on the effectiveness of CSA practices.

Overall, all the key stakeholders consulted underlined how crucial supporting the entire CSA value chain is critical for building resilient and sustainable agricultural systems in ASARECA member countries.

09

Conclusion

This study was designed to map out CSA interventions within ASARECA member countries. A total of 489 CSA initiatives were identified and reviewed. It is expected that more interventions will be identified and documented through regular updates of the database that will be available on the ASARECA website. Overall, the findings from this study have indicated that CSA is being recognized and implemented in ASARECA member countries through various initiatives including policies, programs, strategies, and projects. In particular, the development of national policies and strategies at the national level demonstrates the commitment and ownership by national governments to address the effects of climate change in the agriculture sector. Additionally, the inclusion of CSA in climate change policies and strategies is central to linking and achieving the benefits of CSA to broader climate change goals and national developmental agenda such as Sustainable Development Goals.

Stakeholders involved in the implementation of CSA are also forming CoPs, networks, alliances, platforms, and partnerships designed to provide collaboration, cooperation, and scaling up of CSA practices and technologies amongst the stakeholders within the member countries. Hubs for CSA are used to facilitate knowledge exchange between various stakeholders including scientists, farmers, industry, advisory services, and policymakers. Through the hubs, stakeholders especially scientists can incubate and catalyze the use, adoption, and scaling of innovative and sustainable CSA solutions across ASARECA member countries.

Gender equality and social inclusion within some of the CSA initiatives focused on increasing women and youth participation and benefits from CSA practices and technologies, value addition and market access, and other enablers such as weather and agro-advisory, capacity building, and credit. However, there is a need for all CSA initiatives to integrate gender equality and social inclusion approach to ensure that the needs, priorities, and realities of the elderly men, women, youth, are recognized and adequately addressed for sustainability purposes. In particular, the involvement of more young people in CSA initiatives is crucial but major shifts in technology and agribusinesses are needed to ensure that Africa's next generation embraces agriculture.

Finally, ASARECA member countries are tapping into various financing sources including national, bilateral, multilateral, and private philanthropy. Most of the CSA initiatives supported by these financing sources are biased towards food security, building resilience, and adaptation, with limited support to mitigation.



10

Recommendations

This study identified many CSA initiatives being implemented across ASARECA member countries. The CSA initiatives included programs, policies, strategies/plans, projects, communities of practice, networks/partnerships, and hubs/platforms. Several recommendations are emerging from the study that is critical for improving coordination and avoiding overlap and duplication in the implementation of the initiatives in ASARECA member countries. This sub-section, therefore, highlights recommendations for strengthening collaboration and coordination for CSA initiatives within the ECA as well as enable member countries to prepare for the projected future climate change and variability. Some of the key proposed recommendations include:

- a. The climate of Eastern and Central Africa countries is changing and will negatively affect the agriculture and related climate-sensitive sectors. Therefore, ASARECA Secretariat needs to convene member countries and sensitize them on the need to integrate the CSA approach to build resilient agricultural systems need to design and implement CSA initiatives to increase food security, enhance resilience and contribute towards reducing greenhouse gas emissions.
- b. ASARECA Secretariat needs to support member countries in developing climate-resilient agricultural policies, or CSA specific policies or integrate CSA as a priority in the agricultural sector, and/or mainstream CSA into existing and future climate change-related policies and strategies.
- c. ASARECA Secretariat needs to support member countries to mainstream gender-responsive and socially inclusive climate-smart agriculture into core government policy, expenditure, and planning frameworks.
- d. ASARECA Secretariat needs to convene member countries to develop climate-resilient calls/concept notes/proposals as part of joint resource mobilization to increase access to CSA financing
- e. ASARECA Secretariat needs to support countries in convening a donor's conference on CSA collaborative resource mobilization to enable member countries to achieve the impact and outcomes of increased food security, resilience, and mitigation in the agricultural sector
- f. ASARECA Secretariat needs to mobilize multi-stakeholders to establish an effective CSA Community of Practice that can facilitate sharing of resources to build a common CSA evidence pool, to facilitate information exchange and communication across member countries, and for identifying and communicating CSA 'best practices' to scale up to a wider audience including politicians and policymakers.
- g. ASARECA member countries need to establish a policy enabling environment for CSA that spans regulatory measures, incentive programs, research, and technological development. Currently, there are no specific policies that support the implementation of CSA in ASARECA member countries.

- h. To prepare for and address the impacts of climate change, ASARECA Secretariat needs to work with and support national research institutions to conduct research on impacts of climate change on the agricultural sector, identify context and location-specific CSA practices and technologies, and draft policy briefs to inform CSA policy-making processes
- i. ASARECA Secretariat needs to collaborate and support research institutions to develop an online compendium of CSA 'best practices' for easy access and sharing by the different stakeholders including national governments.
- j. ASARECA Secretariat needs to work with national governments to engage with the private sector through Public-Private Partnership (PPP) for CSA technology innovation and transfer, marketing, financing, and risk management.
- k. ASARECA Secretariat can establish a crowdfunding platform that can significantly increase financing and public support for CSA initiatives as well as rapidly scale up CSA within the member countries.
- l. ASARECA Secretariat should create a partnership with Media platforms to disseminate CSA information and provide vital information during emergencies and disasters such as flooding and droughts emergency.
- m. ASARECA Secretariat should enhance the skills and knowledge through capacity building of stakeholders including policymakers and politicians on mainstreaming gender and social inclusion lens into CSA initiatives
- n. ASARECA Secretariat should create awareness and build the capacity of multi-stakeholders with skills to enable them to access the various financing sources available for CSA initiatives such as Green Climate Fund, Global Environment Facility and Adaptation Funds and Multilateral Development Banks.
- o. ASARECA Secretariat should engage with member countries and other stakeholders to increase allocations to implement CSA initiatives

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Appendixes

Appendix 1: Overview of Eastern and Central Africa (ECA) Countries

a. Madagascar

Madagascar is experiencing high levels of poverty with 81% of the population living below poverty line, severe natural resources degradation (Republic of Madagascar, 2015). Low agricultural productivity coupled with political instability has negatively impacted families leading to food insecurity (25 % of rural population are food insecure) and reduced the adaptive capacity. Increased incidences of cyclones and variability of rains, and soil erosion and degradation threaten agricultural production particularly for production of staple rain fed crops such as rice, cassava and maize (Republic of Madagascar, 2015; World Bank, 2016, IFPRI, 2012). Madagascar is considered one of the countries with the lowest adaptive capacity to cope with the impacts of climate change (FAO, 2018c).

b. Sudan

Sudan is considered extremely vulnerable to climate variability and change. Climate projections increase in temperature, increased unpredictability of seasonal rains, increased incidence of drought, rising sea levels and higher storm surges (Khalifa et al. 2017; World Bank 2016b). The changing climate is causing food insecurities and inequities. Average annual rainfall has reportedly declined from about 425 mm/year to about 360 mm/year leading to intense rainfall variability and frequent drought occurrences affecting over 80% of the population who reside in rural areas and depend on agriculture and livestock production (Khalifa et al. 2017). The most affected populations are the very poor people, women, and children whose options to adapt to drought and climate change are still impeded by limited capacity. Agriculture is among the sectors that are most vulnerable to droughts whereby the productivity of crops and natural pastures has tremendously reduced in the last thirty years due to recurring droughts (Khalifa et al. 2017).

c. Tanzania

Prolonged dry episodes and unpredictable rainfall are affecting agricultural productivity in Tanzania. The weather changes are causing uncertainty in cropping patterns, increased weed competition with crops for critical resources and ecological changes for crop and livestock pests and diseases (USAID. 2017). These changes are affecting more than 90 % of the population that is dependent on agriculture or agricultural related activities. The yields of crops such as maize, beans, sorghum and rice, are projected to decrease in coming decades, endangering livelihoods and food security (Rowhani et al. 2011; Arce and Caballero, 2015). Livelihoods of fishing communities are also threatened as Indian ocean and inland lakes warm up and increased storm surge, especially in the island of Zanzibar (World Bank, 2018). Agriculture is a key sector of Tanzania's economy, as it accounts for 24.1 percent of GDP and is the source of livelihoods for more than three-quarters of the population who live in rural areas. Tanzania's Agriculture Climate Resilience Plan (2014-2019) identifies and responds to the most urgent impacts posed by climate variability and climate change to the crop sub-sector, while the National Climate-smart Agriculture Program (2015 – 2025) aims to accelerate uptake of CSA in the country to increase productivity and climate resilience in the agriculture sector (crop, livestock and fisheries), but also to reduce greenhouse gases emissions. This demonstrates that Tanzania is ready for implementing CSA practices and approaches and the development of the CSA guidelines is a step toward achieving the global and national goals of sustainable agriculture production in a changing climate.

d. Burundi

Burundi is vulnerable ranking 168 out of 181 countries in the ND-GAIN index for climate vulnerability, and 175th out of 191 countries in the readiness index. This implies that Burundi is extremely vulnerable, yet not ready to deal with the climate change effects. Despite having one of the lowest agricultural productivity, rain-fed agriculture employs more than 90% of the citizens (Nsombo et al. 2013). Burundi has experienced cycles of excess or deficit rainfall nearly every decade and an overall increase in mean temperature and climate models show a tendency towards more extreme weather cycles that will result in extreme floods and drought. Due to the hilliness of the country, increased rainfall will lead to mudslides and soil erosion, thus worsening the status of soil fertility (Nsombo et al. 2013).

e. Uganda

Agriculture is the most vulnerable and severely affected sector in Uganda. The sector employs about 65.6% of the population. Frequent occurrences of drought and high rainfall variability is negatively impacting pastoralism and crop production, the main livelihood and income generating activities for most of the rural residents (Republic of Uganda, 2015). It is estimated that an annual loss and damage of about of USD 47 million to crops, this increasing food insecurity and instability (Republic of Uganda, 2015).

f. Kenya

Agricultural sector in Kenya accounts for 75% of its total agricultural output and 70% of the marketed agricultural produce. The sector is facing risks of climate variability and change with droughts reported to be recurrent (KNAP, 2016). Climate variabilities such as droughts and floods are resulting in reduced productivity and insecure livelihoods for both pastoralist and mixed crop-livestock farming communities. Kenya has also reported conflicts over water and grazing fields between nomadic and sedentary communities during drought periods.

g. Democratic Republic of the Congo (DRC)

70% of the population in DRC depends on agriculture (Nsombo et al. 2012). The country is experiencing increasing dry spells during the rainy season negatively impacting agricultural production and causing detriment to food and income security. DRC has significant freshwater reserves, but irrigation is not sufficiently developed to deal with drought. The dominant contribution of Agricultural sector to DRC's economy implies that changes in climate patterns are likely to have a major impact on country's GDP and economic growth (USAID, 2017). Climate change is expected to increase current vulnerabilities within DRC affecting food security due to crop losses and failures, increased livestock mortality and negative impacts on fisheries. Therefore, strategies for food systems adaptation to climate change such as CSA are relevant for the DRC (Beyene et al. 2013).

h. Eritrea

65% of Eritrea's population reside in rural areas relying rain-fed agriculture and artisanal fisheries. Eritrea is vulnerable to climate change and both the marine and terrestrial ecosystems have been negatively affected. Over the past 60 years temperature has risen by approximately 1.7°C with tremendous impact on biodiversity losses, sea level rise and coral bleaching due to increase in sea water temperature, decline in food production, loss of biodiversity and overall loss of resilience of the ecosystem. Hence, the country plans to adapt climate-smart technologies to counteract the adverse impacts of climate change, so as to improve the health and social wellbeing of the population.

i. Republic of the Congo

The economy of the Republic of Congo is dominated by the oil sector and contributes 67.2% to the GDP (CSC, 2013). However, most of the Congolese are engaged in the informal sector, with agriculture and forestry as the main livelihoods (CSC, 2013). Climate change is already affecting the food security in the Republic of the Congo. Over the past 25 years, surface water flows have been very low impacting biodiversity, fisheries, agriculture, and navigation (Haensler et al. 2013). Climate changes have already affected crop suitability, resulting in changes in the production levels of main agricultural crops (CSC, 2013).

j. Rwanda

Rwanda experiences a moderate climate and relatively high rainfall. Climate change is expected to result in increased temperatures, intensified rainfall, and prolonged dry seasons (Government of Rwanda, 2011) that tends to lead to severe floods and drought periods. Analysis of rainfall trends has shown an increasing occurrence of extremes over time, rainy seasons are becoming shorter and more intense increasing the risks of erosion and mudslides, displacement and health problems (REMA 2011). Other climate impacts include lowering level of lakes and water flows and forest degradation. Rwanda is highly vulnerable to climate change because of its dependence on agriculture, accounting for 33% of GDP in 2013 and employing 90% of the country's inhabitants (directly or indirectly) (Mundi, 2013).

k. Ethiopia

Ethiopia is one of the world's most drought-prone countries and climate change is exacerbating the problem. Ethiopia is facing unpredictable rains, and in some years the complete failure of seasonal rains (USAID, 2013). Being a large country there is variability in vulnerability between the lowland and highlands. The lowlands are vulnerable to increased temperatures and prolonged droughts that may affect livestock rearing. The highlands suffer from more intense and irregular rainfall, leading to erosion, which together with higher temperatures may result in lower agricultural production. Climate change projections for Ethiopia include increases in temperature, erratic rainfall and unpredictability of seasonal rain, and increased incidences of drought and other extreme events (USAID, 2016) and will negatively impact agriculture, livestock, water and human and animal health (WHO, 2015). Agriculture is dominated by small-scale subsistence farmers who remain heavily dependent on rain, who employ low-intensive technologies and lack access to weather and agro-advisory services. Many farmers grow slow-maturing, high-yield "long cycle" crops that depend on two rainy seasons to reach harvest and are thus highly vulnerable to changes in seasonal rainfall. Ethiopia's livestock sector relies heavily on climate-sensitive resources and higher temperatures directly impact livestock's health and productivity, and indirectly can magnify existing tensions over land and water (Gashaw et al.2014).

l. South Sudan

Already a fragile country, the changing climate is expected to aggravate South Sudan the situation and may contribute to existing tensions and conflict (IFPRI, 2013). With about 87% of the South Sudanese population depends on agriculture, livestock, and forestry, this makes the livelihoods very vulnerable (South Sudan, 2015). Since 1980, decreasing rainfall has been accompanied by rapid increases in temperature on the order of more than 1°C (USAID and USGS, 2011). Livestock production dominates and provide livelihoods for about 80 percent of the population. Livestock are raised in a variety of production systems, including pastoralism, which depends on access to grazing land and watering points (IFPRI, 2013). Climate change can exacerbate existing tensions over land use among and between farmers and pastoralists as they compete for increasingly scarce resources (IFPRI, 2013).

Appendix II: Glossary search terms that were used to identify CSA initiatives

CSA Initiatives	Terminologies	
Policies, strategies and plans	<ul style="list-style-type: none"> ■ Policy ■ Strategy/plan ■ Act ■ Bills ■ Agricultural related policies that mention CSA, adaptation and mitigation in agricultural systems ■ Natural resource management policies/strategies that mention CSA, adaptation and mitigation in agricultural systems ■ Water related policies/strategies that mention CSA, adaptation and mitigation in agricultural systems 	
Programmes and Projects	<ul style="list-style-type: none"> ■ Resilience in agriculture/CSA ■ Climate-smart villages ■ Index based insurance ■ Improved livestock ■ Conservation agriculture ■ Irrigation systems ■ Capacity building for CSA ■ Carbon sequestration and CSA ■ Soil carbon ■ Efficient dairy systems ■ CSA value chain ■ Drought tolerance for crops and livestock ■ Agroforestry ■ Farm forestry and CSA ■ Flood tolerant crops ■ Credit for CSA ■ Agro-climatic advisories ■ Water stress ■ Weather index ■ Agriculture Forestry and Other Land Uses (AFOLU) 	<ul style="list-style-type: none"> ■ Aquaculture ■ Climate Services ■ Disease Resistance ■ Early Warning Systems ■ Ecosystem Services ■ Food Security ■ Greenhouse Gas ■ Heat Stress ■ Improved Feeding ■ Organic Fertilizer ■ Livestock Insurance ■ Manure Management ■ Adaptation ■ Mitigation ■ NAMA ■ NAPs ■ NDCs ■ REDD+ projects ■ Sustainable intensification ■ Climate Finance
Networks	Alliances Network Partnerships	
Communities of Practice	Communities of Practice	
Hubs and Platforms	Data Hubs Information hubs Platforms	

Appendix III: Semi-structured questionnaire administered to key stakeholders in ASARECA member countries

Climate-Smart Agriculture (CSA) Initiatives Being Implemented in ASARECA Member Countries

Introduction and Informed consent by respondent

Dear Participant:

My name is Mary Nyasimi. I am Consultant working with the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA). I am conducting a survey on **Climate-Smart Agriculture (CSA) Initiatives** being implemented in your country at **National** and **Regional** levels. The data collected will provide useful information regarding the various CSA initiatives in your country.

Climate-Smart Agriculture (CSA) is an innovative approach to sustainably increase productivity of crops, livestock, fisheries and forestry production systems and improve livelihoods and income for rural people, while at the same time contributing to the mitigation of the effects of Climate Change. CSA combines the improvement of social resilience with the improvement of ecological resilience and promotes environmentally friendly intensification of farming systems, herding systems and the efficiency of sustainable gathering systems. CSA is driven through adequate combination of technologies, policies, financing mechanisms, risk management schemes and institutional development. It is embedded into identified development pathways, transforming food systems, landscapes, farming systems and practices adapted to communities. CSA brings “triple wins” that enhance opportunities to increase agricultural productivity, improve resilience to climate change, and contribute to long-term reductions in dangerous greenhouse gas emissions.

CSA Initiatives will encompass the following:

■ Policies/Legislations	■ Projects
■ Strategies/Plans	■ Networks/Partnerships/Alliances
■ Programmes	■ Community of Practice

The following questionnaire will require approximately 20 Minutes to complete. There is no compensation for responding nor is there any known risk. Please note that the information collected will be confidential. Participation is strictly voluntary.

Thank you for taking the time to assist with the survey of CSA Initiatives. Please note that a **Report** and **CSA initiatives interactive map** will be developed and shared with you. If you require additional information or have questions, please call or WhatsApp me and my colleague via the numbers listed below.

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Email: e.warinda@asareca.org

Thank you

1. Participant Information

1.1	Name	
1.2	Country	
1.3	Phone Number	
1.4	Email	

2. CSA Policies (This will include legislations and legal frameworks formulated for CSA and adopted by national governments, or organizations to reach its CSA long-term goals of increasing productivity, adaptation and mitigation).

2.1 Are you aware of the NATIONAL policies in your COUNTRY that address climate-smart agriculture (CSA) in the Last 5 years (2015-2020)?

YES/NO

2.2 If Yes, please list the name of the NATIONAL policy and state whether it is gender and socially inclusive

Name of National policy	Website URL Link	Is it Gender and Socially inclusive (YES/NO)	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

2.3 Are you aware of the REGIONAL policies that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES/NO

2.4 If Yes, please list ALL Regional policies and state whether it is gender and socially inclusive

Name of Regional CSA policy	Website URL Link	Is it Gender and Socially inclusive (YES/NO)	Countries participating	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

2.5 Are you aware of the **NATIONAL** Agricultural/natural resource, environmental policies that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES/NO

2.6 If Yes, please list ALL policies and state whether it is gender and socially inclusive.

Name of National Agricultural/natural resource, environmental policies	Website URL Link	Is it Gender and Socially inclusive (YES/NO)	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

2.7 Are you aware of the **REGIONAL** Agricultural/natural resource, environmental policies that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES NO

2.8 If Yes, please list the **REGIONAL** Agricultural/natural resource, environmental policies? State whether it is gender and socially inclusive and List the countries involved in the Regional CSA Policies?

Name of Regional Agricultural/natural resource, environmental policies	Website URL Link	Is it Gender and Socially inclusive (YES/NO)	Countries participating	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

3. CSA Strategies and Plans (This includes Country CSA development strategy or plan and outlines CSA goals and sets out which sectors or Ministries will be suitable to achieve the goals)

3.1 Are you aware of the **NATIONAL** CSA Strategies and Plans in your **COUNTRY** that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES/NO

3.2 If Yes, please list the name of the **NATIONAL** CSA Strategies and Plans and state whether it is gender and socially inclusive.

Name of National CSA Strategies and Plans	Website URL Link	Is it Gender and Socially inclusive (YES/NO)	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

3.3 Are you aware of the **REGIONAL** CSA Strategies and Plans that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES/NO

3.4 If Yes, please list ALL Regional policies and state whether it is gender and socially inclusive.

Name of Regional CSA Strategies and Plans	Website URL Link	Is it Gender and Socially inclusive (YES/NO)	Countries participating	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

4. CSA Programmes (This will entail CSA plan of action to accomplish a specified goal. Programmes are usually followed by a schedule of activities and implemented at large scale)

4.1 Are you aware of the CSA programmes in your **COUNTRY** that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES/NO

4.2 If Yes, please list the name of the CSA programme and the CSA interventions that the program is promoting.

Name of National CSA programme	Website URL Link	CSA Interventions	Is it Gender and Socially inclusive (YES/NO)	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

4.3 Are you aware of the **REGIONAL** CSA programme in that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES NO

4.4 If Yes, please list the **REGIONAL** CSA programme and the CSA interventions that the program is promoting and countries involved.

Name of Regional CSA programme	Website URL Link	CSA Interventions	Is it Gender and Socially inclusive (YES/NO)	Countries participating	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

5. CSA Projects (This will entail CSA activities that will be completed over a specific period of time and intended to achieve a particular purpose)

5.1 Are you aware of the CSA projects in your **COUNTRY** that address climate-smart agriculture (CSA)?

YES/NO

5.2 If Yes, please list the name of CSA projects and the CSA interventions that the project is promoting.

Name of National CSA projects	Website URL Link	CSA Interventions	Is it Gender and Socially inclusive (YES/NO)	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

5.3 Are you aware of the **REGIONAL** CSA Projects that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES/NO

5.4 If Yes, please list the **REGIONAL** CSA Projects and the CSA interventions that the project is promoting and countries involved.

Name of Regional CSA Projects	Website URL Link	CSA Interventions	Is it Gender and Socially inclusive (YES/NO)	Countries participating	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

6. CSA Networks and Partnerships (These are Networks and partnership comprising of organizations that come together for a specific goal. The organizations can be governments, NGOs, CBOs and donors, e.t.c, which might form a formal or informal network/partnership. For example, the Climate-Smart Agriculture Youth Network (CSAYN)

6.1 Are you aware of the CSA Networks and Partnerships in your **Country** that address climate-smart agriculture (CSA)?

YES/NO

6.2 If Yes, please list the **National** CSA Networks and Partnerships and the CSA interventions that the network/partnership is promoting and state whether there is Gender and social inclusion.

Name of CSA National Networks/partnerships	Website URL Link	CSA Interventions	Is it Gender and Socially inclusive (YES/NO)	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

6.3 Are you aware of the **Regional** CSA Networks and Partnerships that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?

YES/NO

6.4 If Yes, please list the name of **Regional** CSA Networks and Partnerships the CSA interventions that the networks/partnership is promoting and countries involved.

Name of Regional CSA Networks	Website URL Link	CSA Interventions	Is it Gender and Socially inclusive (YES/NO)	Countries participating	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

7. CSA Community of Practice (These are groups of people (individuals) who share a concern or a passion CSA. CoP members engage in joint CSA activities, discussions and share information e.g., via google groups, Dgroups)

7.1 Are you aware of the National CSA CoP in your Country that address climate-smart agriculture (CSA)?
YES/NO

7.2 If Yes, please list the name of the **NATIONAL** CSA CoP and the CSA interventions that the CoP is promoting.

Name of National Community of practices	Website URL Link	CSA Interventions	Is it Gender and Socially inclusive (YES/NO)	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

7.3 Are you aware of the **Regional** community of practices that address climate-smart agriculture (CSA) in ***the Last 5 years*** (2015-2020)?
YES/NO

7.4 If Yes, please list the **Regional** community of practices the CSA interventions that the CoP is promoting and countries involved.

Name of Regional community of Practice	Website URL Link	CSA Interventions	Is it Gender and Socially inclusive (YES/NO)	Countries participating	Potential to contribution to Food Security, Adaptation, Mitigation or ALL	Amount of Funding (USD)	Number of Beneficiaries (Women & Men)

8. Identification of Persons with additional CSA information. We would appreciate if you can provide additional names of people who can provide the above information. This will enable us to contact the person directly.

8.1	Name of Person	
8.2	Country	
8.3	Phone number	
8.4	Email	

Appendix IV: List of Government Ministries and organizations contacted

Category	Stakeholder
National Government Ministries	<ul style="list-style-type: none"> ■ Rwanda Agriculture and Animal Resources Development Board ■ Ministry of Agriculture, Livestock and Fisheries-Kenya ■ Ministry of Agriculture– Tanzania ■ Ministry of Agriculture, Animal Industry and Fisheries – Uganda ■ Ministry of Agriculture – Ethiopia ■ Ministry of Agriculture and Animal Resources – Rwnada ■ Ministry of the Environment, Agriculture and Livestock – Burundi ■ The Ministry of Agriculture -Eritrea ■ Ministry of Agriculture and Forestry – Sudan ■ Ministry of Agriculture and Forestry – South Sudan ■ Ministry of Agriculture– DRC ■ Ministry of Agriculture, Livestock and Fisheries- Madagascar
Alliances	<ul style="list-style-type: none"> ■ Alliance for Green Revolution in Africa (AGRA)
National Research Institutes / Organizations	<ul style="list-style-type: none"> ■ Forestry Research Institute ■ Kenya Agriculture and Livestock Research Organization (KALRO) ■ National Agricultural Study and Research Institute (INERA)- DRC ■ National Agricultural Research Organization (NARO)-Uganda ■ National Center for Applied Research on Rural Development (FOFIFA)-Madagascar ■ Tanzania Agricultural Research Institute (TARI) ■ Institut National pour l’Etude Agronomique au Congo ■ Institut National pour l’Etude et la Recherche Agronomiques ■ Institut des Sciences Agronomiques du Burundi (ISABU) ■ Institut des Sciences Agronomiques du Rwanda (ISAR) ■ Agricultural Research Council- Sudan ■ Rwanda Institute for Conservation Agriculture
International Research Organizations	<ul style="list-style-type: none"> ■ International Center for Tropical Agriculture (CIAT) ■ CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) ■ International Development Research Center (IDRC) ■ BioVision
United Nations Agencies	<ul style="list-style-type: none"> ■ Food and Agriculture Organization (FAO) ■ UNECA
Regional Economic Communities	<ul style="list-style-type: none"> ■ East Africa Community ■ Common Market for Eastern and Southern Africa (COMESA) ■ IGAD Climate Prediction and Application Center(ICPAC)
Farmer organizations	<ul style="list-style-type: none"> ■ Uganda National Farmers Federation ■ Mtandao wa Vikundi vya Wakulima Tanzania (MVIWATA) ■ East Africa Farmers Federation (EAFF) ■ Kenya National Farmers’ Federation (KENAFF)
Youth Organizations	<ul style="list-style-type: none"> ■ Climate-Smart Agriculture Youth Network (CSAYN) ■ Agri-Profocus



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