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Situational Analysis of Climate Adaptation in Africa: Opportunities for Capacity Development



An ACBF Report Based on the Scoping and Mapping of Institutions Involved in Climate Change Adaptation in the African Agricultural Sector

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Acronyms

AAA	Adaptation for African Agriculture
AAI	African Adaptation Initiative
ACBF	African Capacity Building Foundation
ACPC	Africa Climate Policy Centre
AGRA	Alliance for a Green Revolution in Africa
BMGF	Bill & Melinda Gates Foundation
CAADP	Comprehensive Africa Agriculture Development Programme
CANI	Climate Action Network International
CBO	Community-based organization
CCAFS	Climate Change, Agriculture and Food Security
COP	Conference of the Parties
CSO	Civil society organization
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EWS	Early warning systems
FAO	Food and Agriculture Organization of the United Nations
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GHG	Greenhouse gas
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
IGAD	Intergovernmental Authority on Development
lied	International Institute for Environment and Development
lisd	International Institute for Sustainable development
IPCC	Intergovernmental Panel on Climate Change
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NGO	Nongovernment organization
REC	Regional Economic Community of the African Union
SDG	Sustainable Development Goal
SADC	Southern African Development Community
SSFs	Small-scale fisheries
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNECA	United Nations Economic Commission for Africa
UNIDO	United Nations Industrial Development Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund
USAID	U.S. Agency for International Development
WFP	World Health Organization
WMO	World Meteorological Organization
WRI	World Resources Institute

Glossary

Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities through changes in processes, practices, and structures. In some natural systems, human intervention may facilitate adjustment to the expected climate and its effects (FAO, 2020a: 3).

Adaptation in agriculture: Signifies modifying land use, agricultural production, socio-economic and institutional systems and policymaking in response to and in preparation for actual or expected climate variability and change and their impacts, to moderate harmful effects and exploit beneficial opportunities (FAO, 2020a: 3).

Adaptation co-benefit: A socially, economically, and/or environmentally desirable outcome generated from the implementation of a climate adaptation policy or measure.

Africa-based versus Africa-led organizations: Africa-led refers to organizations that are led by Africans, have head offices in Africa, and have much of the staff complement as Africans. Africa-based refers to organizations that are not necessarily controlled by Africa but are driving an African climate adaptation agenda in the agricultural sector, may have non-African leadership, and have much of the staff complement as non-Africans: head offices could be either on the African continent or outside.

Agricultural sector: Broadly cover the following main subsectors: Fisheries and Aquaculture, Forestry, Animal Production and Health, Land and Water (cross-cutting), as well as Plant Production and Protection (FAO, 2020a). These

subsectors cut across economic and social development dimensions that include inclusive rural transformation and gender equality, food and nutrition, food systems and food safety, agrifood economics, as well as markets and trade. This structure then directs one to the concept of the value chain, which remains critical in mapping organizations involved in climate change adaptation activities in the agricultural sector.

Ecosystem: Refers to the existing landscape of different actors (civil society, public sector, private sector, donors, and the like) that participate in climate adaptation and resilience in the agricultural sector. These state and nonstate actors have mandates that may overlap, and they also have interrelations between them.

Resilience: From the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (IPCC, 2007), defined as the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

Target sector: The agricultural sector and its main subsectors, with a limited focus on the forestry sector as this is treated as a separate sector in climate action priority sectors. Where necessary, the subsector is considered.

Value chain: The set of actors and activities that bring a basic agricultural product from obtaining inputs and production in the field to final consumer, through stages such as processing, packaging and distribution.



Executive summary

Climate change is already impacting Africa disproportionately, and will continue to do so, primarily by affecting the sectors that are key to the livelihoods of vulnerable communities, such as agriculture, forestry, and fisheries. In addition to bearing the brunt of climate change and other environmental degradation challenges, Africa is often underrepresented in global climate change mitigation and adaptation efforts across multiple dimensions, from research and development to policy and advocacy to on-theground implementation. Valuable leadership, expertise, and context-specific knowledge are missing at the decision-making table, leading to uninformed and ineffective solutions. Institutional capacity strengthening is therefore seen as one of the drivers of climate-resilient development by enabling the development of transformative solutions to deal with climate challenges.

The main objective of this study was to conduct a "Scoping and Mapping of Climate Change Adaptation Institutions in Africa". The analysis was commissioned as part of a five-year project on "Strengthening African Leadership for Climate Adaptation (SALCA)" by the African Capacity Building Foundation (ACBF). The study mapped and profiled key climate adaptation and resilience actors and their roles in sub-Saharan Africa, including identifying actors in climate adaptation in the agricultural sector. It also reviewed existing global and African climate adaptation frameworks and agendas, including policies and initiatives being implemented to promote climate adaptation on the continent. This work lays the foundation for the subsequent component of SALCA covering capacity needs assessment and the delivery of customized organizational improvement plans to build leadership in climate adaptation in target organizations. This component will enable the organizations to engage more effectively with, and represent the voice of, vulnerable and poor African communities impacted by the adverse effects of climate change, in both national and international climate decisionmaking processes. It also aligns with, and contributes to, the African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032) that identifies effective institutional capacities as a key results area for effective response to climate change in Africa, as well as the Comprehensive Africa Agriculture Development Programme (CAADP) Commitment 6 on "Enhancing resilience to climate variability and change".

The scope of the study was limited to mapping entities working on climate adaptation in the agricultural sector in 11 focus countries in Africa: Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Tanzania, Rwanda, and Uganda. These are also the focus countries where the Alliance for a Green Revolution in Africa (AGRA) is supporting the transformation of agriculture to improve the livelihoods of the continent's farming communities. The project will leverage on the already established AGRA consortia model that provides the necessary linkages across the agricultural system as an impact pathway to effective capacity strengthening.

Secondary and primary information from desk research and an online survey with stakeholders was used. The desk review was the major source of data and information on institutions working on climate adaptation in the agricultural sector in the 11 countries. The online survey gathered further information from the institutions identified through the desk research. These included years of operation, staffing levels, gender and social inclusion considerations, climate adaptation activities implemented, funding, and partnerships. Also considered were opportunities and challenges related to Covid-19 and the digital technology revolution. The online platform (QuestionPro)based survey questionnaire was circulated to respondents via email. The questionnaire was translated into French and Portuguese. A virtual consultative and validation workshop was held on 27 April 2022 to receive feedback from key stakeholders on the initial findings of the analysis.

This report presents the key findings from the study and a set of recommendations to accelerate climate adaptation in Africa's agricultural sector. The situational analysis of the climate adaptation ecosystem found that there is a growing climate intervention gap in Africa, with the continent continuing to lag behind all other regions of the world in climate adaptation, despite various initiatives' efforts. The widening gap is caused, among other factors, by the ever-increasing reliance on external support for climate actions, persistent poverty and socioeconomic inequality, low levels of development, limited economic capacity, and poor governance. In addition, the disproportionate impacts of climate change on youth and women remain a challenge needing urgent redress. Adaptation and resilience building remain a priority as the continent prioritizes adaptation over mitigation, but there are huge potential gains if the continent pushes adaptation and unlocks mitigation potential in general.

In addition, preparation of National Adaptation Plans (NAPs) per the Paris Agreement is slow. Only 12 African countries had uploaded their NAPs to the United Nations Framework Convention on Climate Change (UNFCCC) platform by the time of this analysis: Burkina Faso, Cameroon, Central African Republic, Chad, Ethiopia, Kenya, Liberia, Sierra Leone, South Africa, Sudan, South Sudan, and Togo.

The need for capacity building in climate adaptation and resilience remains huge, as noted in the February 2020 African Union meeting that reviewed the implementation of the Malabo Declaration. Such capacity gaps are evident at national, regional, and continental levels. With the African population expected to reach 2.4 billion by 2050 and relying on a predominantly rain-fed agricultural system, critical work has to be undertaken to ensure that the continent can be food secure. The African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032) has identified capacity building as one of the key priorities under Strategic Intervention Axis 3. The strategy prioritizes institutional, technical, relational, and strategic capacity development for delivering climate adaptation and low-emission, climateresilient development on the continent.

With regard to the framework for climate and resilience in the African adaptation agricultural sector. capacity building and remain embedded in resilience building existing and future frameworks that include the 2014 Malabo Declaration, the African Union's Agenda 2063, its Climate Change and Resilient Development Strategy and Action Plan (2022-2032), and the United Nations 2030 Agenda for Sustainable Development, especially Sustainable Development Goals 2 and 13, which focus on ending hunger and climate action. The climate adaptation and resilience framework should also respond to programming by the African Regional Economic Communities (RECs). The RECs have claimed space in climate adaptation and resilience in agriculture, including disaster risk reduction

and management (although at varying degrees and strengths). The broad categories of climate adaptation actors and their roles include the nongovernment organizations (NGOs) and funding agencies that dominate the climate adaptation and resilience space.

Other players in this space include the UN agencies and local NGOs and communitybased organizations (CBOs) that have spread their wings across Africa. Local NGOs remain, however, financially challenged for sustainable programming and projects. Government entities are still key players in facilitation and policy development, interpretation, and implementation at national and subnational levels.

According to the findings from the online survey, up to 60% of responding organizations have been operating for the past 15 years and more. The majority of the organizations (51%) had $1\neg\neg-19$ employees, while 25% had more than 100 employees. As for the share of African staff in the organizations, 82% had 75% or more. On funding, there was a roughly equal split among those predominantly foreign funded (30%), predominantly local funded (26%), and with an equal division (33%). A total of 35% of the organizations surveyed supported women and marginalized groups through specific interventions and employment, and the targeting of certain value-chain points (22%).

climate adaptation services, For several organizations surveyed were involved in research, hands-on implementation of projects, capacity building, policy, and advocacy, as well as extension work. In agricultural subsectors, the largest share of the organizations was involved in the promotion of mixed farming (28%), followed by forestry (23%), plant production and protection (21%), animal production (14%), and fisheries and aquaculture (13%). As for the value chain, the bulk of the organizations was involved in direct work with farmers (40%),

followed by inputs (23%), processing (13%), traders and consumers (9% each), and retailers (5%). Most of the organizations also indicated that they had in the past 10 years completed 1–4 projects (54%), followed by those that had completed 5–9 projects (28%). The pattern had some similarity with ongoing projects.

Digital transformation remains critical to climate adaptation and resilience not only in the focus countries but throughout the African continent. Tracing digital challenges along the agriculture value chain reveals that Interactive Voice Response (IVR)/Short Message Service (SMS) could be used for advisory services and solutions at the agricultural input point. Digitized farm records help to establish credit lines, while satellites and drones could be used to enhance remote sensing and land or crop monitoring, with the Internet of Things adopted for efficient resource use at the production stage. Database technologies may be used to optimize postharvest losses and retain product quality in distribution, while IVR/SMS remain viable in promoting nutritional advisory information.

An estimated 64% of responding organizations indicated that Covid-19 had influenced innovation in climate change adaptation and resilience strategies, such as online training of staff. While 33% of organizations revealed that funding had completely dried up owing to Covid-19related impacts, 47% said that funding had partially dried up, but they still managed to operate. Only 15% indicated that funding had remained uninterrupted. An estimated 20% had their capacity reduced to about 25%, while 27% indicated that capacity had gone back to prepandemic levels, with 28% operating at about 75% capacity. Project implementation was moderately reduced in 54% of organizations, with only 7% indicating that they had continued operating normally.

Based on the findings, this report makes the following recommendations to advance capacity strengthening for climate adaptation in the agricultural sector:

- Determine the extent to which the Africabased and Africa-led organizations mapped delivery of climate adaptation services in agriculture to provide solid decisionmaking information in selecting institutions that have stronger potential to deliver climate adaptation services in agriculture before capacity needs assessment. Such assessment is vital to further identify capacity gaps for effective delivery of climate adaptation interventions in agriculture and to determine what capacity intervention measures will be needed.
- Establish the nature and extent to which RECs support climate adaptation, because they have several departments or specialized institutions dealing with disaster risk reduction and management, and with climate change adaptation and resilience in the agricultural sector. There is no information on how the different departments or institutions under the RECs coordinate their interventions on climate adaptation. Further research is needed to establish the nature and extent of this work, including funding mechanisms, partners involved, and good-practice cases for learning and capacity-building purposes.
- Address programme and project continuity challenges stemming from short funding cycles, because many activities in climate change adaptation and resilience are financed on a programme or project basis, which brings discontinuity and loss of institutional memory. Research is needed on sustainable funding mechanisms for

African climate change adaptation and resilience in agriculture.

- Investigate and identify quick and big wins for women in adaptation and resilience building in agriculture, because women dominate small-scale farming in sub-Saharan Africa. Such interventions could also identify hot-spot areas in the 11 focus countries, and others.
- Determine the potential long-term impacts of the Covid-19 pandemic on adaptation in agriculture. While Covid-19 had clear short- to medium-term severe negative impacts on the capacity of many national departments and NGOs working in climate adaptation and resilience, potential longterm impacts remain undocumented. Further investigation is needed to identify and develop the institutional capacities required to implement transformative solutions for responding to potential future Covid-19–related impacts.
- Promote mapping and upscaling of use-cases of digital technologies for adaptation. Given the growing uptake of digital technology under the "Fourth Industrial Revolution", the full potential of digital technology should be tapped to accelerate climate adaptation and resilience in agriculture through mapping pilot applications cases, consolidating lessons and good practices, and upscaling and disseminating



1. Introduction and background

Human-induced climate change has become an indisputable phenomenon worldwide (IPCC, 2022). The Paris Agreement (UNFCCC, 2015) acknowledged climate change as "an urgent and potentially irreversible threat to human societies and the planet". Without urgent global action, its impacts will be catastrophic. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (IPCC, 2021) reinforces this prognosis by providing unprecedented clarity on how human influence has warmed the oceans, land, and atmosphere, with rapid and widespread changes.

Climate change presents risks to economic sectors including agriculture and food production. The changes can evolve gradually, such as sea-level rise leading to saltwater intrusion in groundwater, making land unsuitable for farming; or can evolve rapidly, such as droughts and floods. These events have cumulative effects: for instance, a drought may lead to poor harvests and food shortages. The reduced supply can cause market prices to spike and render food unaffordable for most of the population, leading to malnutrition and potentially irreversible impacts on children's development, including educational attainment.

While the agricultural sector is often the most important sector for employment in Africa, its contribution to gross domestic product (GDP) is highly variable (African Union, 2022). The sector is vulnerable to climate change because its systems are mainly rain-fed and underdeveloped, in turn because most farmers are still small scale, with limited financial resources and access to infrastructure (Tamiru and Fekadu, 2019). The combination of climatic and other socio-economic drivers and stressors will therefore increase the vulnerability of the continent's agricultural systems to climate change. Such systems will be impacted in different ways and adapting to these changes will require context specificity. The continent is also experiencing recurring risks to food production, and without adequate capacity to adapt and to enhance resilience, the risks may be more intense in future climatic conditions. Women remain the most vulnerable to the impacts of the changing climate as they carry the responsibility for subsistence agriculture.

Addressing climate change impacts requires local, national, and international actions. While mitigation efforts are necessary to slow the rate of greenhouse gas (GHG) emissions, impacts from climate change are already being felt and the capacity to cope with them must be built, especially as they escalate in the future. Thus, adaptation that addresses processes, practices, and structures to moderate potential damage associated with the changing climate is a priority for African countries (Worker, 2017).



2. Situational analysis of the climate adaptation ecosystem in Africa

2.1 Climate change impact on agriculture in Africa

Under the IPCC's "business-as-usual" warming scenario (IPCC, 2021), there will be significant changes in rainfall patterns by the end of this century. With these changes, Africa's wet regions along the equator will witness a 30% rise in rainfall, while its already dry regions will see a 20% reduction in rainfall (Nicholson et al., 2018). Prolonged periods of flooding and drought, depending on the region, will be experienced as these changes intensify. According to IPCC AR6 (2021, 2022), key agricultural subsectors are among the most vulnerable, and require urgent attention.

Rising temperatures will have a severe impact on crops such as wheat, maize, sorghum, and millet, which are foundational to the African diet. For example, crop yields across sub-Saharan Africa will fall by 10% under the 2°C warming scenario (UNEP, 2021). The projected rise in days experiencing extreme heat stress annually over the coming decades will lead to the extension of areas unsuitable for livestock production by the end of the century.

Because most of the continent's farmers rely entirely on rainfall, farmers in these dry regions will battle for adequate water to keep crops and livestock alive. The Horn of Africa is known as a dry spot and, at the time this report was finalized, was experiencing its third consecutive failed rainy season resulting in widespread food insecurity and hunger. In 2021, about 1.14 million people in southern Madagascar experienced acute food insecurity after a catastrophic drought (FAO, 2021). In the coastal regions, floods and storms are destroying agriculture. In 2019, cyclone Idai destroyed crops in Mozambique, leaving more than 1 million people seeking food handouts.

Given this scenario, measures are needed to enhanceclimatechangeadaptationandresilience building on the continent. Such interventions will include research and development to produce stress-tolerant crops and livestock breeds. They will also include modernizing Africa's agricultural sector through investments in irrigation systems and improved infrastructure. Wider access to finance, including crop and livestock insurance, is key. Other measures could include policy changes enhancing food security by integrating international markets and connecting farmers from around the world, and by creating incentives to attract and engage youth back to, or retain them in, rural areas to take up sustainable farming and food production.

2.2 Challenges and opportunities for climate adaptation and resilience

The determinants of climate change adaptation and resilience are summarized in figure 1. It provides insights for identifying gaps and designing interventions to equip farmers with the necessary risk management options and skills to adapt to the challenges—and opportunities-associated with climate change (Ogunleye et al., 2021). For example, many resource-poor households have no financial capacity to adopt new technologies to improve their yields or to purchase new seed varieties that are drought resistant (Alam et al., 2017). Social, economic, and environmental factors present adaptation challenges to communities, including those in coastal areas (Rakib et al., 2019). However, technological innovations, exclusion of informal communities, cultural orientation, and a breakdown of cooperation with institutional communities generate challenges to adaptation and resilience-building strategies. Institutional challenges and natural barriers increase vulnerabilities and impede adaptation (Chowdhury et al., 2021).

Some challenges are related to identifying gaps and improving adaptation plans (Uittenbroek et al., 2013). At the problem-identification stage, adaptation barriers include lack of political will, lack of participation of key stakeholders such as farmers, insufficient budget and resources, lack of knowledge of climate change impacts, and paucity of proper implementation of policies. In addition, overlapping planning obstacles, increasing frequency of climate-related phenomena, and uncertainty of scientific findings have emerged as barriers to adaptation and resilience building. Challenges at institutional and policy levels may occur in a cyclical fashion with one barrier leading to another, creating a chain of obstacles that hinder the achievement of climate change adaptive and resilient agriculture systems.



Figure 1: Determinants of climate change adaptation and resilience

Source: Modified from Acevedo et al. 2020.

Institutions with responsibility for facilitating adaptation may be the stumbling block to farmers' adaptation to climate change (Rogé et al., 2014) owing to ineffective implementation of institutional processes stemming from weak organizational capabilities (Luo et al., 2017). Weak institutions also face issues in developing credible and effective assessment frameworks for resilience (Combes, 2019). One institutional weakness or challenge leads to another (figure 2), creating a web of problems that hinders implementation of adaptation options in farming communities. There is also a web of interactions between institutional challenges and farmercentric obstacles, such as lack of awareness reinforced by spiritual norms and traditional systems (Kamal et al., 2018). The belief system of a region and its gender norms may bear on climate change adaptation practices negatively (Mersha and Van Laerhoven, 2018).

Figure 2: Climate change adaptation challenges at the policy/institutional level



Source: Modified from Chowdhury et al. 2021.





3. Global and African climate adaptation frameworks and agendas

3.1 Frameworks that support climate adaptation and resilience in the agricultural sector

African countries have ratified various treaties, protocols, and multilateral agreements, including the 1992 United Nations Framework Convention on Climate Change (UNFCCC), which is the flagship international treaty in fighting climate change; the Kyoto Protocol, which seeks mainly to reduce GHG emissions globally and that entered into force in 2005; and the Paris Agreement, which was ratified in 2015 with a focus to address equally the climate change mitigation and adaptation agenda (UNFCCC, 2015). Enshrined in the Paris Agreement are two implementation frameworks: the Nationally Determined Contributions (NDCs) in which countries prioritize actions on GHG emission reductions, and the National Adaptation Plans (NAPs) that provide a domestic planning platform

for enhancing adaptation and building resilience. In Africa, agriculture emerges as the priority sector (AfDB, 2019). In addition, the African Union's Agenda 2063 and the Comprehensive Africa Agriculture Development Programme (CAADP) are frameworks prioritizing adaptation and agricultural transformation action. CAADP seeks to achieve annual agricultural growth rates of more than 6%, and it is hoped that achieving these rates will support the promotion of food security and economic development.

To smooth implementation of international treaties and agreements, some countries have reshaped their existing domestic policies and legislation. Other countries have developed new national institutions and frameworks for action. Table 1 summarizes provisions for climate adaptation and resilience of other global and continental frameworks.

Policy/development framework	Summary of adaptation and resilience in the agricultural sector
The Adaptation Fund (UNFCCC, 2001)	This fund is financed through the proceeds from the Kyoto Protocol's clean development mechanism and supports activities in agriculture. Farmers benefit through testing climate-resilient technologies and practices that include drought-tolerant seeds, improved irrigation systems, and sustainable land management practices.
Bali 2007 (UNFCCC, 2007)	The Bali Roadmap provided an opportunity for agriculture to be considered more specifically under the UNFCCC Conference of the Parties (COP) Decision 2/ CP.7.
Durban COP 17 (UNF- CCC, 2011)	The "No, No Deal" campaign was one of the notable campaigns to forcefully put agriculture and climate adaptation and resilience on the global climate agenda, with a proposal to focus on "adaptation of agriculture to climate change impacts while promoting rural development, sustainable development and productivity of agricultural systems and food security in all countries, particularly in developing countries".

Table 1: Global frameworks that support climate adaptation and resilience in agriculture

Bonn COP23 (UNFC- CC, 2017)	At the 23rd UNFCCC COP23, countries agreed on a new work plan for agri- culture—the Koronivia Joint Work on Agriculture—through decision 4/CP.23, which focused on methods and approaches for assessing adaptation, adaptation co-benefits, and resilience in agriculture.
Paris Agreement (UNF- CCC, 2015)	Article 7.1 of the Paris Agreement establishes the global goal on adaptation with the aim of driving collective action. The article also seeks to strengthen resilience and reduce vulnerability to climate change. It further looks at ensuring adequate adaptation responses across all economic sectors, including agriculture.
2030 Agenda for Sus- tainable Development (United Nations, 2015)	Sustainable Development Goal (SDG) 2 aims to "End hunger, achieve food se- curity and improved nutrition and promote sustainable agriculture"; SDG 13 aims to "Take urgent action to combat climate change and its impacts".
Sendai Framework (United Nations Office for Disaster Risk Re- duction—UNDRR)	The Sendai Framework on Disaster Risk Reduction identifies agriculture as one of the sectors demanding global collaboration in climate adaptation.
Agenda 2063 (Afri- can Union, 2014) and CAADP	Agenda 2063 (Item 15) states that Africa shall "address the global challenge of climate change by prioritizing adaptation in all actions to ensure the survival of the most vulnerable populations for sustainable development and shared prosperity". Climate-resilient agricultural development programmes, such as CAADP, are identified to address climate change.

Source: Survey.

Given the limited scope of this study, national climate adaptation and resilience policies are not considered in much depth—only a highlight of the progress in the submission of NAPs per the UNFCCC Paris Agreement is provided. Of the 11 focus countries, only three—Burkina Faso, Ethiopia, and Kenya—had submitted their NAPs to the UNFCCC secretariat by the time this report was written (table 2).

	Table 2: Key provisions from	the three submitted N	APs-Burkina Faso,	Ethiopia, and Kenya
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Country (year NAP finalized)	Key adaptation and resilience provisions from the NAP for agriculture
Burkina Faso (2015)	 Seeks to restore degraded land, improve access for farmers to high-quality agricultural production factors, and improve resilience of stakeholders to climate change. Seeks to develop early warning systems (EWS) ensuring efficient management of climate vulnerability and variability for at-risk communities. Looks at improving pastoral activities through better dissemination and use of information. Focuses on increasing productivity and resilience of ecosystems and improving biodiversity conservation and ecological monitoring.
Ethiopia (2019)	 Seeks to enhance food security through climate-smart agriculture and access to potable water. Focuses on strengthening sustainable natural resource management through safeguarding landscapes and watersheds, improved soil management, and water harvesting. Enhances sustainable forest management practices. Strengthens drought, livestock, and crop-insurance mechanisms, and aims to improve EWS. Seeks to develop and use adaptation technologies and to reinforce adaptation research.

Kenya (2015)	 Promotes local and indigenous knowledge of crop production. Seeks to raise awareness of climate change impacts on agricultural value chains. Focuses on coordinating and mainstreaming climate change adaptation into agricultural extension.
Kenya (2015)	 Seeks to strengthen land use management systems including rangeland management, fodder banks, and strategic reserves. Focuses on conducting capacity building in indigenous knowledge, as well as in livestock insurance schemes, EWS, and livestock management and breeding.

3.2 Climate change and the African Union Development Agenda

Four key strategies loom large in the African Union Development Agenda. Climate change is embedded in the African Union's Agenda 2063 (African Union, 2014), which acknowledges the need to address climate change and to prioritize adaptation over mitigation. The first "Aspiration" calls for "A prosperous Africa, based on inclusive growth and sustainable development" and recognizes the increasing climate shocks resulting from climate variability and change, migration, and other economic uncertainties that increase vulnerability.

The African Union Climate Change and Resilient Development Strategy and Action Plan (2022– 2032) has the overall objective of achieving the vision of Agenda 2063 through "building resilience to the impacts of climate change." Five key results areas are effective institutional capacities to implement climate change actions; harmonized climate change strategies; Africa speaks with one voice; increased resilience and reduced vulnerability; and increased access to finance.

The African Union 2020 Framework for Irrigation Development and Agricultural Water Management highlights climate adaptation and resilience as one of the seven cross-cutting development issues and key interventions needed, including climate-smart agriculture. Key interventions proposed are promotion of practices building climate diversification of farming systems, introduction of water-efficient and low-cost small-scale irrigation, and soil and water conservation practices including those for agro-forestry, micro- and macro-level water harvesting, mulching, composting, and intercropping.

The African Regional Nutrition Strategy (2015-2025) identifies climate change as one of its key risks, leading to an accelerated negative impact on food production, and recommends intensified implementation of the CAADP framework to address risks. On government progress, only 11 of the 49 Member States are on track to meet the Malabo resilience-building targets. Among these 11 are five that are part of this study-Ethiopia, Ghana, Mali, Rwanda, and Uganda. The African Union organs advancing the African Common Position on Climate Change at global fora and negotiations include the Committee of African Heads of State and Government on Climate Change, the African Ministerial Conference on the Environment, and the African Group of Negotiators on Climate Change.

3.3 Climate change agenda and African Regional Economic Communities

At the subcontinental level, the Regional Economic Communities (RECs) and other regional institutions are addressing climate adaptation and resilience in the agricultural sector through regional policy frameworks and initiatives. For example, the East African Community (EAC), Economic Community of Central African States (ECCAS), and Southern African Development Community (SADC) have addressed the need to build climate resilience at regional level through establishing and operationalizing Disaster Preparedness and Response Funds, while the Economic Community of West African States (ECOWAS) is establishing regional food reserves to manage food crises in the region (African Union, 2020).

3.4 Milestones in climate adaptation approaches in agricultural subsectors

3.4.1 Fisheries and aquaculture

Small-scale fisheries (SSFs) are crucial to regional food systems around the world, providing much-needed nutrients, income, and food along the value chain. Climate change is, however, threatening to disrupt SSFs through impacts that affect productivity and sustainability via drastic and harsh changes in coastal and marine resources, undermining productivity of aquatic systems (Froehlich et al., 2022; Macusi et al., 2021). Adaptation and the building of resilience of aquaculture systems and SSFs along the value chain are key to entrenching the industry's productivity and sustainability. Still, barriers include governance structures, inequality, marginalization, as well as scarcity of financial resources, of human resources,

and of access to information, technology, and infrastructure (Piggott-McKellar et al., 2019). Prospects for successful adaptation and resilience building in SSF thus require a deep understanding of climate change dynamics among disadvantaged communities on how they are affected and how they respond to it along the value chain (Conway et al., 2019).

In addition, the framework for climate change adaptation must take geographical issues into context. For example, indigenous coastal communities depend much more heavily on the aquatic food and fishing business than noncoastal and non-indigenous communities. Hence the need to appreciate fishing communities' perspectives, how the different communities respond, and the degree to which they take adaptation seriously (Salvadeo et al., 2021).

Galappaththi et al. (2021) developed a placespecific framework for assessing fishing communities' adaptations, which conceptualizes resilience as a function of the adaptive, coping, and transformative abilities of a community (table 3).

Characteristic	Definition
Place	Social and physical space that has attachments to people and social pro- cesses. Attachment to place is understood as the bonding that occurs be- tween people and their meaningful environments (for example, livelihoods, culture, and wellbeing).
Human agency	Human (individual or collective) capacity to act independently in making their own decisions as part of the process of their way of life.
Collective action	Action taken together (or shared) by a group of two or more people to meet a common desired objective.
Institutions	Local organizations that facilitate collective action meeting a local goal (for example, co-managed institutions).
Indigenous and local knowl- edge systems	A co-evolving cumulative body of knowledge (including observations, experience, lessons, and skills) belonging to a specific group of people and their resource management systems (or a place) and handed down through generations by cultural transmission. It reflects the cultural identity.
Learning	Social learning, which itself refers to collective action and reflection that occur among a specific group of people as they work to improve the management of human–environment interactions.

Table 3: Determining adaptation strategies in fishing communities

Source: Galappaththi et al. (2021).

The framework can be used to develop community adaptation strategies anywhere in the world, taking local circumstances into consideration. It adopts the socio-ecological systems approach and considers the integration of human and environment systems to comprehend the complexities and uncertainties within SSF systems. Community adaptation and resilience develop over time as enabling opportunities or factors work together at every phase of the value chain from resource mobilization to marketing and delivery.

Each component of the system should also evolve to meet the demands of the changing environment. For example, institutions should evolve their coordination capacities, skills, and knowledge to enable their ability to facilitate collective action in meeting local goals. Indigenous and local knowledge systems should also evolve and develop capacity to comprehend social dynamics as they relate to climate change. What is crucial is to identify the challenges along the value chain, drawing lessons from current actions and mapping ways to overcome them or turn them into opportunities.

3.4.2 Forestry

Climate change is one of the main drivers of shifts in forests' species diversity, phenological composition, structure, and fragmentation (Chapungu et al., 2014; Yadav et al., 2019). Forest and forest-dependent communities are exposed to climate change-related impacts that threaten livelihoods, economic activities, and the socio-ecological integrity of communities (MacDicken, 2015). A combination of climate change disturbances such as floods, droughts, wildfires, and insects works with other drivers of forest change such as land use change, pollution, and over-exploitation of forest resources to compromise the sustainability of communities and their forest resources (World Agroforestry Centre and Unique Forestry and

Land Use, 2019; Gurung et al., 2021). Forests are prone to different climate change–related variables such as temperature increase, changes in precipitation, changes in seasonal pattern, increases in carbon dioxide, a greater number of and more intense storms, and sealevel rise, as well as others at the local level including land use change.

3.4.3 Animal production and health

Livestock production contributes greatly to the global economy through the provision of millions of jobs, food and nutrition security, and income to millions of households (Henry et al., 2018; Feng et al., 2021). In many developing countries, livestock provides much of a family's income and is an important source (and marker) of wealth (Faisal et al., 2021). But climate change impacts animal production value chains (Mutimukuru-Maravanyika et al., 2022), making it harder for small-scale livestock farmers to make a living out of it. The future supply of animal products could be compromised by the increasing temperatures, precipitation changes, and extreme weather events associated with climate change: fibre, meat, milk, and a range of animal products will be affected (Rojas-Downing et al., 2017; Faisal et al., 2021).

Livestock is produced at different scales under different systems, including silo-pastoralism, poultry farming, dairying, agro-pastoralism, and transhumance pastoralism. The Horn of Africa, for example, has borne the brunt of climate change as heat stress has affected animals and herders, presenting a raft of challenges affecting productivity (Faisal et al., 2021). An increase in temperatures beyond 400C, for instance, is estimated to cause a reduction in meat production, interrupt breeding cycles, and affect animals' feeding habits. An increase in drought severity and frequency has also been associated with livestock mortality and an increase in livestock diseases (Mutimukuru-Maravanyika et al., 2022).

Adaptation mechanisms that can be adopted include adjusting herd size and composition with a bias towards small livestock such as goats and sheep, which require less feed and water. Migrating to more favourable areas is a possible adaptation measure. Developing alternative feed sources, providing livestock with medical facilities, and keeping resilient breeds are other alternatives.

Muchuru and Nhamo (2017) evaluated adaptation measures in the African livestock sector from UNFCCC national communications from 21 African countries including Ghana, Kenya, Malawi, Nigeria, Rwanda, and Uganda. They found eight main adaptation measures undertaken: carrying capacity and policies; integrated pasture management; capacity building, extension, training, awareness, and information sharing; livestock breeding, diversification, and intensification; management of diseases, vectors, and parasites; technology, innovation, and research and development; alternative livelihoods; and irrigated water supply.

3.4.4 Crop and plant production and protection

Because climate change affects crop and plant

production, farmers need to cushion themselves against climate change by investing in appropriate adaptation measures (Muchuru and Nhamo, 2019). Crop production is fundamental for reducing poverty and ensuring food and nutrition security across the world (Kaini, 2020). Achieving some of the SDGs, specifically 1, 2, and 3, is based on food availability due to crop production and protection (Pérez-Escamilla, 2017). Climate change has deep impacts on crop yields and is causing ecological shifts in cropland suitability for crop production (Sloat et al., 2020; Aghapour Sabbaghi et al., 2020; Mutimukuru-Maravanyika et al., 2022). The changes in agro-ecological zones have severe consequences for land-use patterns, biodiversity, socio-economics, and agricultural productivity (Masud et al., 2017; Aghapour Sabbaghi et al., 2020), although future temperature increases may conversely open up new areas for crop production (Ray et al., 2019; Sloat et al., 2020).

Shongwe et al. (2014) developed a framework that can be used to understand the links between climate change and adaptation strategies and how institutional or policy factors influence adaptation (figure 3).



Figure 3: Linking climate change and adaptation strategies in crop production

Source: Adapted from Shongwe et al. 2014.

The success of the adaptation strategies decides the community's crop production systems as well as crop yield, which will therefore determine the food security situation of a place. Weak strategies are likely to compromise crop production systems and crop yields and thus food security.

Management adaptation options focus on lifting production through multiple approaches, including modifying crop varieties to suit existing and predicted thermal conditions and to resist heat stress and droughts; developing varieties resistant to climate change-induced pests and diseases (Mekonnen et al., 2021; El-Sayed and Kamel 2020); and using irrigation to sustain soil moisture. Beyond these and the measures described by Muchuru and Nhamo (2019) above are understanding local weather trends and adjusting the timing and location of cropping activities to maximize productivity (Wang et al., 2022), modifying crop calendars, and weather-based index insurance. All these adaptation strategies have the potential to offset the negative impacts of climate change and to leverage on the positive effects.

Still, a litany of issues inhibits effective adaptation among farmers, especially smallholders in developing countries (Kalele et al., 2021; Mnguu and Masanyiwa 2021), related to personal attributes, environmental conditions, and the policy environment (Mugiya and Hofisi, 2017). Lack of resources has been cited as the major stumbling block (Mugiya and Hofisi, 2017; Mnguu and Masanyiwa, 2021). Frequent and intense droughts have shrunk farm livestock numbers among smallholder farmers in several developing countries (Faisal et al., 2021), which has affected their adaptation capacity in terms of draught power to use in their plough tillage system (Mugiya and Hofisi, 2017). Lack of draught power delays land preparation for early and dry planting, in a constraint for adaptation using small grains that perform better when planted with the first rains or during the dry season (Mugiya and Hofisi, 2017). Thus, most smallholder farmers miss the opportunity to grow the small grains effectively.

Farmers may have no access to adaptation strategies, such as new seed varieties, irrigation equipment, pesticides and fertilizers that require substantial financial resources, owing to lack of access to credit facilities and other financial instruments or programmes to build their capacity (Pill, 2022). Poor programme strategies and priorities (Mugiya and Hofisi, 2017; Klemun et al., 2020), and lack of active participation and involvement in planning and interventions present adaptation challenges in multiple communities (Bardosh et al., 2017), creating a disconnect between adaptation strategies and community priorities.

Mugiya and Hofisi (2017) noted that market failure. cultural factors. and politicized interventions in Africa remain some of the key challenges to climate change adaptation and resilience building. Small-scale rural farmers grow cash crops to get finance to fund other agricultural activities, but fluctuations and uncertainties in prices of cash crops have suppressed incomes for farmers, resulting in their increased vulnerability. Finally, cultural and religious beliefs with regard to some crop and livestock varieties have forestalled adaptation strategies.



4. Methodology

4.1 Objectives of the scoping and mapping exercise

The broad goal of this study was to understand the climate adaptation organizational landscape in Africa and to establish a database of the organizations operating in the climate adaptation space on the continent. The objectives were:

4.1.1 Mapping and profiling key climate adaptation and resilience actors and their roles—that is, donors, governments, international nongovernment organizations (NGOs), private sector organizations, and civil society organizations (CSOs) on the continent, including those involved in climate adaptation and resilience strategies and initiatives in agriculture on the continent.

4.1.2 Reviewing existing global and African climate adaptation frameworks/agendas, including existing policy and programmes being implemented.

4.1.3 Exploring the opportunities and challenges of global phenomena such as the digital revolution and the Covid-19 pandemic on the service delivery capacities of the organizations and institutions involved in African climate adaptation and resilience in agriculture.

4.2 Focus countries

entities working on climate adaptation in the agricultural sector in 11 focus countries in Africa (figure 4): Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Rwanda, Tanzania, and Uganda. These are also the focus countries where the Alliance for a Green Revolution in Africa (AGRA) is supporting the transformation of agriculture to improve the livelihoods of the continent's farming communities. The project will leverage on the already established AGRA consortia model that provides the necessary linkages across the agricultural system as an impact pathway to effective capacity strengthening.

4.3 Data collection

4.3.1 Desk review

A desk review was the main source of data and information on institutions working on climate adaptation in the agricultural sector in the 11 countries; on the existing climate adaptation frameworks, policies, and initiatives to accelerate climate adaptation action on the continent; and on the challenges and opportunities for climate adaptation and resilience. It paid special attention to climate resilience in agricultural subsectors—fisheries and aquaculture, forestry, animal production and health, and crop and plant production and protection.

The scope of the study was limited to mapping



Figure 4: Focus countries of the scoping and mapping exercise

4.3.2 Online questionnaire

Data was collected through an online survey questionnaire uploaded to the QuestionPro platform, with a link sent to identified organizations. As there were two Frenchspeaking countries and one Portuguesespeaking country, the questionnaire was translated into those languages. The survey was structured into three main parts focusing on an organization's general information; core business; and the impact of the digital revolution and Covid-19.

Questionnaire administration included "snowballing", in which organizations that received the survey either forwarded it to other entities they partner with or indicated other potential institutions.

The survey platform was opened on 8 April

and closed on 25 April 2022. A total of 398 organizations operating in the 11 focus countries were reached. From these, 103 organizations responded to the survey, with 57 (55.3%) successfully completing the survey questionnaire and the remaining 45 (43.7%) dropping out. More than 280 organizations were identified in the 11 focus countries, with some profiled in more depth from both the online survey and desk review. Spatially, beyond organizations operating at national level, others operating at regional, continental, and international levels, as well as UN agencies, were identified. Information from the online survey was used to refine and further validate the information from the desk review for some organizations. Summaries of the spatial spread of responding organizations and the countries of the organizations' headquarters are displayed in figures 5 and 6.



Figure 5: Spatial operational scale of organization

Figure 6: In which country is your organization headquartered?



In addition, a virtual consultative and validation workshop was held on 27 April 2022. The main purpose was to gather feedback of draft outcomes and check if the study had indeed included key organizations addressing climate change adaptation and resilience in agriculture in the selected countries.



5. Climate adaptation actors and their roles

5.1 Climate adaptation and resilience work by international organizations

Multiple international organizations operating in the climate change adaptation and resilience space globally and in Africa were identified (annex 1). The work of some of them is now summarized.

5.1.1 ActionAid International

ActionAidoperates innine of the 11 focus countries (not Burkina Faso and Mali). ActionAid's work falls into four broad programme areas: women, politics and economics, land and climate, and emergencies (ActionAid, 2022a). Women's rights are a special focus and are embedded across ActionAid work streams. The land and climate programme area ensures that ActionAid addresses matters of climate adaptation and resilience in agriculture (ActionAid, 2022b). Matters addressed by ActionAid include drought in Ethiopia and Kenya, and food security challenges owing to floods and tropical cyclones in Mozambique.

5.1.2 Bill & Melinda Gates Foundation (BMGF)

BMGF work focuses on supporting small-scale farmers in climate adaptation and on enhancing resilience. The Foundation links to many international partners in ensuring that farmers have access to climate-smart innovations, leading to improved adaptive capacity. The work is integral to the Foundation's broader agenda, which supports resilient food systems that enhance income for rural farming families. BMGF also provides consumers with access to healthy, affordable diets, and empowers women.

5.1.3 Care International

Care international works in 104 countries globally to tackle the root causes of poverty and social injustice, including building adaptive capacity and community resilience to the impacts of climate change. It builds alliances and partnerships around the world with organizations offering complementary services to strengthen the resilience and adaptive capacity of vulnerable groups to the impacts of climate change. Care International's climate agenda is delivered through the CARE Climate Justice Centre (CARE International, 2022). The six intervention areas are: locally led adaptation and resilience to climate change; advocacy; sustainable livelihoods; ecosystems and naturebased solutions; gender equity; and disaster risk and humanitarian action. CARE is working in 10 of the focus countries (not Nigeria).

5.1.4 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

GIZ is an international development agency that provides advisory services and international competency development. In climate change adaptation and resilience, GIZ facilitates the implementation of the UNFCCC through partnerships with development banks and multilateral organizations to implement the Paris Agreement. Three such initiatives with both direct and indirect benefits for the agricultural sector are the global NDC Partnership to promote coordinated implementation of NDCs; the National Adaptation Plan (NAP) Global Network, which promotes national adaptation planning through consultation, exchange, and coordination of donor programmes; and the InsuResilience initiative, which aims to have 500 million poor people accessing insurance against the consequences of extreme weather conditions by 2025 (GIZ, 2022a).

GIZ also focuses on fishing by promoting measures for sustainable and climate-friendly fisheries and advocating for the promotion of the entire value chain, including environmental and consumer protection as well as social standards, while considering adaptation to climate change. Under its rural development programme, GIZ has a Farming 4 Future (F4F) initiative implemented in four focus countries-Burkina Faso, Ghana, Nigeria, and Tanzania (GIZ, 2022b). The initiative supports small farmers in boosting their rice harvest, improving product quality, and raising their incomes; and promotes climate-friendly cultivation techniques, especially those that conserve water, even from irrigation.

5.1.5 Food and Agriculture Organization of the United Nations (FAO)

FAO supports several countries in developing monitoring and evaluation (M&E) frameworks and systems for adaptation in agriculture (FAO, 2018). In Kenya, for example, it has developed an M&E system for implementing the Climate Smart Agriculture Framework Programme, and in Uganda, the Performance Monitoring Framework for the National Adaptation Plan for agriculture. FAO's M&E programme also supports refining country-based NDCs enshrined in the Paris Agreement (UNFCCC, 2015) and SDGs 2 and 13.

5.1.6 FHI360

While the FHI360's work is associated mainly

with health, in Uganda, the organization has moved into addressing other interrelated issues affecting people's lives, including the promotion of women leading households using advanced technology in improving agricultural practices and diversifying household food intake. Three notable projects on climate change adaptation and resilience are Climate Change Adaptation and ICT; USAID/ Uganda Education and Research to Improve Climate Change Adaptation; and USAID/Uganda Community Connector Project.

5.1.7 Intergovernmental Authority on Development (IGAD) in Eastern Africa

IGAD is a REC in Eastern Africa that aims to achieve peace and sustainable development. Of the nine members of IGAD, Ethiopia, Kenya, and Uganda are among the focus countries. IGAD has five specialized institutions, of which the following three address climate change adaptation and resilience in agriculture (IGAD, 2022): Climate Prediction and Application Centre; Centre for Pastoral Areas and Livestock Development; and Sheikh Technical Veterinary School.

The IGAD Climate Prediction and Applications Centre (ICPAC) covers perspectives on agriculture and food security, climate focusing, disaster risk management, water resources management, environmental monitoring, capacity development, climate information dissemination, and climate change. The IGAD Centre for Pastoral Areas and Livestock Development (ICPALD) has the mandate to promote, facilitate, and advocate for peoplecentred. gender-responsive sustainable development in arid and semi-arid areas in the IGAD region.

5.1.8 Oxfam International

Oxfam International has several key programmes and projects of which some focus on food, climate, and natural resources (Oxfam International, 2022). Oxfam's goal is for women and communities vulnerable to climate change to fight hunger. The programmes further focus on enhancing vulnerable communities' resilience to the changing climate to secure access to land and natural resources. Oxfam also works to ensure that small farms are productive, through assisting local producers to form cooperatives and producer organizations and advocating for government assistance with implements. Oxfam further campaigns for the right to dignified work in food value chains. On climate change, Oxfam supports small-scale farmers to become more resilient, enabling them to voice their concerns and strengthen their capacity to cope.

5.1.9 U.S. Agency for International Development (USAID)

USAID is an international organization leading a variety of international development programmes and humanitarian initiatives to save lives, reduce poverty, strengthen democratic governance, and assist people to develop beyond assistance. It plays a seminal role in climate change mitigation and adaptation. Partnering with about 45 countries, UASID implements emission reduction measures, protects critical ecosystems, promotes transitions to renewable energy, builds resilience against the impacts of climate change, and promotes the flow of capital to climate-positive investments. USAID endeavours to strengthen global food and nutrition security by advancing climate-smart agriculture and increasing resilience to climate change. One of its flagship climate adaptation programmes is Feed the Future, which provides a comprehensive and multisectoral approach to poverty, food insecurity, and undernutrition.

5.1.10 Other international organizations

Other international organizations active in climate change adaptation and resilience in Africa include CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS); Climate Action Network International (CANI); Eat Forum (EA); International Development Research Centre (IDRC); International Food Policy Research Institute (IFPRI); International Institute for Environment and Development (IIED); International Institute for Sustainable Development (IISD); United Nations Economic Commission for Africa (UNECA)/ Africa Climate Policy Centre (ACPC); United Nations Development Programme (UNDP); UN Environment; World Food Programme (WFP); and World Resources Institute (WRI). The websites for these organizations are in annex A.

5.2 Highlights of broad capacity challenges

Several capacity challenges emerged from the desk review of climate adaptation and resilience in African agriculture, including those associated with lack or scarcity of the following:

- Continuity in high-level political and top management buy-ins;
- Harmonized and effective policy frameworks (to include legislation, regulations, strategies, and action plans);
- Funding mobilization;
- · Institutional and individual effectiveness;
- · Research and development;
- Collaboration between state and non-state actors;
- Climate adaptation and resilience agenda in the agricultural sector; and
- Delivery of climate adaptation services by national NGOs in general, and limited human resources in particular.

Potential future funding to build climate adaptation and resilience in selected national NGOs could focus on amalgamating some of them into effective entities addressing a cluster of adaptation needs. This approach may also assist in raising awareness and developing and refining policies.

5.3 An overview of the online survey

A detailed list of international organizations (UN agencies and international NGOs), national departments and agencies, and national NGOs/ CBOs/CSOs is presented as a separate Excel document as a supplement to this report. Here we present regional and national NGOs/ CBOs/CSOs that the ACBF and partners will further evaluate to seek partnerships for the programme at hand. Although some regional and national NGOs/CBOs/CSOs may have been missed in the scoping and mapping exercise, this is not an exclusion criterion as ACBF, and its partners are at liberty to have another look at them if they are brought to their attention. Given that the international organizations were scoped and mapped under the desk review section, they are not the focus here.

5.3.1 Information on organizations

The online survey asked questions on the number of years the organizations were in operation, number of employees, share of African staff, and sources of funding. The findings are displayed in figures 7-10.

Figure 7: How many years has the organization been operating? (n = 57)



Figure 8: Please indicate the number of employees in your organization





Figure 9: Please indicate the percentage share of African staff members

Figure 10: Where are the sources of funding for your organization?



Up to 60% of the organizations responding have been operating for 15 years and more (figure 7). The majority of the organizations (51%) had 1–19 employees (figure 8). A total of 25% of organizations had more than 100 employees. An estimated 82% of organizations had 75% or more African staff (figure 9). There was a roughly equal split among organizations predominantly foreign funded (30%), predominantly local funded (26%), and with an equal division (33%) (figure 10). Only 11% of the responding organizations did not wish to disclose sources of funding.

5.3.2 Organizations' core business

The online survey also posed questions on the organizations' core business, among them: adaptation activities being implemented, main areas of engagement in agricultural subsectors, areas of operation in the value chain, number of projects completed in the past 10 years, and number of current projects. Several organizations addressed more than one mandate across the key mandates identified, although most of them were involved in research, hands-on implementation of climate adaptation interventions, capacity building, policy, advocacy, and extension work (figure 11).





On the main areas of engagement in agricultural subsectors (figure 12), the largest share of the organizations was involved in mixed farming (28%), followed by forestry (23%),

plant production and protection (21%), animal production (14%), and fisheries and aquaculture (13%).



Figure 12: Main areas of engagement in agricultural subsectors

For key areas of operation in the agricultural value chain, the biggest share of organizations was involved with farmers (40%), followed by

inputs (23%), processing (13%), traders and consumers (9% each), and retailers (5%) (figure 13).

Figure 13: Organizations' key areas of operation in the agriculture and food value chain



Most organizations indicated that they had completed $1\neg-4$ projects in the past 10 years (54%), followed by those that had completed 5–9 projects (28%) (figure 14). The pattern had

some similarity with ongoing projects (figure 15). The patterns could be tied to organizations' limited capacity.



Figure 14: Number of projects completed in the agricultural sector in the past 10 years

Figure 15: Number of current/ongoing climate adaptation and resilience projects



5.3.3 Gender and social inclusion

On questions on the presence of gender and social policy, and on inclusion of marginalized groups in climate change adaptation and resilience projects, an estimated 93% of responding organizations indicated that they had a gender and social inclusion policy in place. Other results are shown in figure 16.

Most of the organizations support women and marginalized groups through specific interventions. This is followed by the establishment of specific targets for employment and targeting certain value chain points (22%).







6. Opportunities and challenges of the Covid-19 pandemic and the digital revolution for organizations' service delivery capacities

6.1 Covid-19 pandemic

One of the sectors severely affected by the Covid-19 pandemic is agriculture. Both state and non-state actors were not spared as climate change adaptation and resilience work was either stopped or downsized because of the pandemic. A 2021 report on the impact of Covid-19 drawn from a survey of 1,039 CSOs from 46 countries by EPIC-Africa and @ AfricanNGOs (2021) indicates that operations in 98% of CSOs were disrupted. Impacts included loss of funding (68.1%), one or more staff testing positive (37%), and restricted movement of staff (70%).

An assessment of the impact of the Covid-19 crisis on access to seed for farmers, commissioned by the African Union Commission in 2021, found that it reduced mobility, increased costs of transactions, delayed distribution, and reduced exports and imports. To address the impacts, several medium-term recommendations were made to the African Ministers of Agriculture by the Commission, which included strengthening the capacity of public research institutions.

The key finding from our online survey regarding the impact of Covid-19 on the organizations' operations and capacity are presented in figures 17–19. An estimated 64% of the responding organizations indicated that Covid-19 had influenced innovation in climate change adaptation and resilience strategies. Although 33% of the organizations revealed that funding had completely dried out, almost half of respondents (47%) said that funding had partially dried up, but they still managed to survive. Only 15% indicated that funding remained uninterrupted. An estimated 20% of responding organizations had their capacity reduced to about 25%, while 27% indicated that capacity had gone back to pre-pandemic levels and 28% said they were now operating at about 75% capacity. Project implementation was also moderately reduced among 54% of respondents, while 7% indicated that they had stopped completely, with another 7% indicating that they had continued as normal.





Figure 18: Current capacity to deliver climate adaptation and resilience services



One of the key innovations mentioned by several organizations was that meetings and other engagements went virtual through Teams, Zoom, and other platforms. As one respondent indicated:

We have been able to leverage on our network structure to implement project irrespective of travel restrictions. We have now embraced digital platforms and virtual meetings. We have also developed an Interactive Collaborative Environment which we have deployed for various purposes including stakeholder engagements, knowledge dissemination and partnership building.



Another highlighted the following:

At the onset of Covid-19, as movement restrictions and other safety measures took hold across Kenya, the Kenya National Farmers' Federation (KENAFF) created a mobile phonebased information service as a way to respond to the crisis and keep farmers better informed. The KENAFF Unstructured Supplementary Service Data (USSD) Code Platform delivers USSDbased messages containing information on a wide range of topics, from Covid-19 mitigation measures to technical advisory, to suggestions for adaptation and resilience building, to the latest information on market conditions and weather patterns. To ensure the necessary level of accuracy for weather predictions and market fluctuations, all information is localized to the subcounty level.

As for the challenges, one respondent wrote:

There was limited financing that reduced financing of projects. Lockdown slowed down, and in some cases stopped activities and movement to contact sites and data collection and interaction. High cost of data affected communication with project implementors. Change in government priorities to address Covid-19–related challenges reduced funding to research and innovation. There were also closures of universities over long periods of time affecting innovation by staff, lay off, loss of some to Covid-19 and loss of income to others as projects stalled or were discontinued altogether.

6.2 Digital transformation

Digital services in agriculture keep expanding in developing countries (Phatty-Jobe, 2020)-and Africa is no exception. Such services come in various forms including digital advisory, access to services, agricultural e-commerce, digital procurement, and smart farming. Integrated digital services have been shown to make substantial contributions to climate resilience and adaptive capacity of smallholder farmers, increasing their income. Examples of how solutions have been taken up by agriculture, reflecting high levels of mobile phone use and connectivity in some focus countries, include: solution providers such as WeFarm, iCow, and Pula providing climate risk reduction advisory solutions to hundreds of thousands of farmers

in Kenya (Tsan et al., 2019); the 8028 Farmer Hotline service that provides agronomic advice via video, IVR, radio, and mobile phone to over 440,000 farming households in Ethiopia; and the Esoko helpline in Ghana, a digital platform model providing market price information, weather forecasts, agronomic advice, and access to over 300,000 farmers (Partey and Kotey Nikoi, 2019). Some countries like Rwanda have developed a National ICT [information and communications technology for Agriculture Strategy. This strategy is aimed at improving productivity and expanding job creation capacity in agriculture through digital lending, input supplies, subsidies, and advisory services (Republic of Rwanda, 2016).

What is clear from digital services in agriculture is their in-built early warning systems in climate adaptation. However, as revealed by the desk review, there are challenges such as the cost of data, digital illiteracy, and digital divides based on gender that need to be overcome. For example, in Rwanda, an estimated 60% of men but only 38% of women own a mobile phone (FAO, 2022).

The online survey asked organizations to respond to the key challenges of the digital revolution in addressing climate adaptation and resilience in agriculture at community level (figure 20). All the presented key challenges ranked highly and closely, with the lack of individual capacity to interface with digital platforms coming in ranked slightly higher at 18%, followed by limited network coverage (17%), and availability of mobile phones and other applicable devices (16%). Only the regulatory environment restricting wide use of digital platforms was ranked low at 3%, implying that it is not a real challenge.







7. Conclusions and recommendations

This section presents some conclusions and recommendations from the scoping and mapping exercise in the 11 focus countries.

7.1 Conclusions

7.1.1 Key climate adaptation and resilient actors in Africa

This study scoped and mapped organizations working in climate change adaptation and resilience in agriculture. Of those identified in the desk review, 57 completed the survey, but only five of these were international organizations.

The broad categories of climate adaptation actors (donors, NGOs, government, private sector, CSOs) include the NGOs such as AGRA, CARE International, Oxfam, and ActionAid that dominate the climate adaptation and resilience space. The space also features a heavy presence of funding agencies such as USAID and GIZ. UN agencies also have a strong presence in the space. Other players are local NGOs/CBOs that have spread their wings across Africa to claim space but remain financially challenged to have sustainable programmes and projects. These local NGOs require capacity building. Government entities remain key players in facilitation and policy development, interpretation, and implementation.

A full list of the actors in the climate adaptation in agricultural space is provided in annex B, with organizations that responded to the online survey denoted by *. All the organizations profiled as working at the continental and REC levels, and those operating at national level with headquarters in the focus countries, are in the Africa-led category.

7.1.2 Climate adaptation frameworks and existing adaptation strategies and initiatives

A raft of international treaties, protocols, and multilateral agreements ratified by African countries seeks to address climate change mitigation and adaptation, as with the two implementation frameworks under the Paris Agreement—the NDCs and NAPs. In Africa, agriculture emerges as the topmost priority sector for climate adaptation. Yet Africa is behind in submitting NAPs per the UNFCCC Paris Agreement. Of the 11 focus countries, only three—Burkina Faso, Ethiopia, and Kenya—had submitted their NAPs to the UNFCCC secretariat by the time this report was written.

Climate change is embedded in Agenda 2063, which acknowledges the need to address climate change and to prioritize adaptation over mitigation. In addition, the CAADP framework prioritizes adaptation and action to transform agriculture. CAADP seeks to achieve annual agricultural growth rates of more than 6% to support food security and economic development.

The African Union Climate Change and Resilient Development Strategy and Action Plan (2022– 2032) has the overall objective of achieving the vision of Agenda 2063 through building resilience to the impacts of climate change. Effective institutional capacities to implement actions is one of its five priority areas. The African Union organs advancing the African Common Position on Climate Change at global fora and negotiations include the Committee of African Heads of State and Government on Climate Change, African Ministerial Conference on the Environment, and African Group of Negotiators on Climate Change.

At subcontinental level, the RECs and other regional institutions are addressing climate adaptation and resilience in the agricultural sector through regional policy frameworks and initiatives.

7.1.3 Opportunities and challenges presented by digital technology and Covid-19 on delivery of climate adaptation services

Digital agricultural services keep expanding in developing countries, including those in Africa. They include digital advisory, access to services, agricultural e-commerce, digital procurement, and smart farming, with integrated digital services making substantial contributions to climate resilience and adaptive capacity of smallholder farmers. The increase in many of these services has been prompted by high rates of mobile phone use.

Challenges such as the cost of data, digital literacy, and digital divides based on gender still need to be addressed, however. Others include lack of individual capacity to interface with digital platforms, patchy network coverage, and limited access to mobile phones and other devices.

Agriculture was also severely affected by the Covid-19 pandemic. For state and non-state actors, climate change adaptation and resilience work was either stopped or downsized. Operations were disrupted in several ways, including loss of funding, one or more staff testing positive, and restricted movement of staff. Covid-19 also led to increased costs of transactions, delays in distributing seeds, and reduced exports and imports.

7.1.4 Importance of collaboration among organizations

Collaboration among national, regional, and international organizations and UN agencies remains critical. Community-led organizations, including women and youth-led organizations, are central in enhancing climate adaptation and resilience. UN organizations like UNDP, FAO, UNECA, and WFP, as well as international organizations like AGRA, CARE International, and GIZ, are key stakeholders in building climate adaptation and resilience capacity.

7.2 Recommendations

Given the revealed need to strengthen institutional capacity so as to accelerate climate adaptation on the continent, the following recommendations are proposed.

7.2.1 Assess delivery and conduct a capacity needs assessment

The extent of climate adaptation delivery and capacity needs must be assessed to determine how much the mapped Africa-based and Africaled organizations deliver climate adaptation services in agriculture. This analysis will provide the basis for solid decision-making information in selecting institutions that have stronger potential for delivering climate adaptation in agriculture before a capacity needs assessment. Such assessment will subsequently be vital to identify capacity gaps and determine what capacity interventions are needed.

7.2.2 Continue analysis of how much RECs support climate adaptation

The African Union RECs have claimed space in climate adaptation and resilience in agriculture, including disaster risk reduction and management. They have several departments or specialized institutions dealing with these challenges, but information is lacking on how these departments and institutions coordinate their interventions. Further research is needed to establish the nature and extent of the work, including funding mechanisms, partners involved, and good-practice cases for learning and capacity-building purposes.

7.2.3 Conduct research on sustainable funding mechanisms

Many projects on climate change adaptation and resilience are financed on a programme or project basis, implying discontinuity and loss of institutional memory. Research on sustainable funding mechanisms is therefore needed.

7.2.4 Investigate quick and big wins for women

As women dominate small-scale farming, it is crucial to investigate quick and big wins for them. Such interventions could also identify hot-spot areas in the 11 focus countries, and others, and consider specific challenges unique to women and disadvantaged groups in framing solutions.

7.2.5 Promote mapping and upscaling of use-cases of digital technologies

Given the growing uptake of digital technology in the "Fourth Industrial Revolution", the full potential of digital technology should be tapped for mapping pilot applications cases, consolidating lessons and good practices, and upscaling and disseminating technology solutions.

7.2.6 Investigate further the potential longterm impacts of the pandemic

Covid-19 had clear short- to medium-term severe negative impacts on the capacity of many national departments and NGOs working in climate adaptation and resilience, but potential long-term impacts remain undocumented. These need to assessed for adaptation in agriculture, in turn requiring further investigation to identify and develop institutional capacities so as to implement transformative solutions to respond to potential future Covid-19–related impacts.

References

AAI (Africa Adaptation Initiative). 2022. "About AAI."<u>https://africaadaptationinitiative.org/.</u> Accessed 11 April 2022.

Acevedo, M., K. Pixley, N. Zinyengere, S. Meng, H. Tufan, K. Cichy, L. Bizikova, K. Isaacs, K. Ghezzi-Kopel, and J. Porciello. 2020. "A Scoping Review of Adoption of Climate-resilient Crops by Small-scale Producers in Low- and Middleincome Countries." Nature Plants 6: 1231–1241. https://doi.org/10.1038/s41477-020-00783-z.

Acharjee, T. K., G. van Halsema, F. Ludwig, P. Hellegers, and I. Supit. 2019. "Shifting Planting Date of Boro Rice as a Climate Change Adaptation Strategy to Reduce Water Use." Agricultural Systems 168: 131–143. <u>https://doi.org/10.1016/j.agsy.2018.11.006.</u>

ActionAid. 2022a. "Who We Are."<u>https://actionaid.</u> org/who-we-are. Accessed 13 April 2022.

ActionAid. 2022b. "Land and Climate." <u>https://actionaid.org/land-and-climate</u>. Accessed 13 April 2022.

AfDB (African Development Bank). 2019. Climate Change Impacts on Africa's Economic Growth. Abidjan, Côte d'Ivoire: AfDB. <u>https://</u> www.afdb.org/sites/default/files/documents/ publications/afdb-economics_of_climate_ change_in_africa.pdf._

African Union. 2014. "Agenda 2063." <u>https://au.int/en/agenda2063/goals.</u> Accessed 5 December 2022.

African Union. 2020. "Framework for Irrigation and Agricultural Water Development." <u>https://</u> <u>au.int/sites/default/files/documents/38632-</u> <u>doc-framework_for_irrigation_development_</u> <u>english.pdf._</u> African Union. 2021. "White Paperon the Covid-19 Crisis and the Seed Sector in Africa: Impact, Options for Actions and Recommendations." https://au.int/en/documents/20201111/whitepaper-covid-19-crisis-and-seed-sector-africaimpact-options-actions-and.

African Union. 2022. "African Union Climate Change and Resilient Development Strategy and Action Plan (2022–2032)."

Aghapour Sabbaghi, M., M. Nazari, S. and S. Soufizadeh. Araghinejad, 2020. "Economic Impacts of Climate Change on Water Resources and Agriculture in Zayandehroud River Basin in Iran." Agricultural Water 241. Management https://doi.org/10.1016/j. agwat.2020.106323.

Alam, G. M. M., K. Alam, and S. Mushtaq. 2017 "Climate Change Perceptions and Local Adaptation Strategies of Hazardprone Rural Households in Bangladesh." Climate Risk Management 17: 52–63. <u>https://</u> www.sciencedirect.com/science/article/pii/ S221209631730013X.

Ashardiono, F., and M. Cassim. 2014. "Climate Change Adaptation for Agro-Forestry Industries: Sustainability Challenges in Uji Tea Cultivation." Procedia Environmental Sciences 20: 823–831. https://doi.org/10.1016/j.proenv.2014.03.100.

Bardosh, K. L., S. Ryan, K. Ebi, S. Welburn, and B. Singer. 2017. "Addressing Vulnerability, Building Resilience: Community-based Adaptation to Vector-borne Diseases in the Context of Global Change." Infectious Diseases of Poverty 6: 1–21. <u>https://doi.org/10.1186/</u> <u>s40249-017-0375-2.</u>

Cai, B., W. Li, S. Dhakal, and J. Wang. 2018. "Source Data Supported High Resolution Carbon Emissions Inventory for Urban Areas of the Beijing-Tianjin-Hebei Region: Spatial Patterns, Decomposition and Policy Implications." Journal of Environmental Management 206: 786–799. https://doi.org/10.1016/j.jenvman.2017.11.038.

CARE International. 2022. "CARE Climate Justice Centre." <u>https://careclimatechange.org/.</u> Accessed 12 April 2022.

Chapungu, L., N. Takuba, and H. Zinhiva. 2014. "A Multi-method Analysis of Forest Fragmentation and Loss: The Case of Ward 11, Chiredzi District of Zimbabwe." African Journal of Environmental Science and Technology 8: 121–128. <u>https://doi.</u> org/10.5897/ajest2013.1556.

Chowdhury, M. A., M. K. Hasan, and S. L. U. Islam. 2021. "Climate Change Adaptation in Bangladesh: Current Practices, Challenges and Way Forward." Journal of Climate Change and Health 6: 100108. <u>https://doi.org/10.1016/j.joclim.2021.100108.</u>

Chowdhury, M. A., and M. A. Hossen. 2017 "Challenges of Governance for Addressing Climatic Concerns in Bangladesh." <u>https://www. researchgate.net/publication/325285575.</u>

Combes, J. D., A. Siga, L. A. Buliruarua, and T. Rabuatoka. 2019. "Recognition of Prior Learning (RPL) in Resilience (Climate Change Adaptation and Disaster Risk Reduction) in the Pacific: Opportunities and Challenges in Climate Change Education." Climate Change and the Role of Education, 363–370.

Conway, D., R. J. Nicholls, S. Brown, M. G. L. Tebboth, W. N. Adger, B. Ahmad, H. Biemans, F. Crick, A. F. Lutz, R. S. De Campos, M. Said, C. Singh, M. A. H. Zaroug, E. Ludi, M. New, and P. Wester. 2019. "The Need for Bottom-up Assessments of Climate Risks and Adaptation in Climate-sensitive Regions." Nature Climate Change 9: 503–511. <u>https://doi.org/10.1038/</u>

<u>s41558-019-0502-0.</u>

ECA (United Nations Economic Commission for Africa). 2009. "Challenges to Agricultural Development in Africa." In Economic Report on Africa 2009: Developing African Agriculture through Regional Value Chains, 117–142. Nairobi: ECA.

El-Sayed, A., and M. Kamel. 2020. "Climatic Changes and Their Role in Emergence and Re-emergence of Diseases." Environmental Science and Pollution Research 27: 22336– 22352. <u>https://doi.org/10.1007/s11356-020-08896-w.</u>

EPIC-Africa and @AfricanNGOs. 2021. "The Impact of COVID-19 on African Civil Society Organizations: On-going Uncertainty and a Glimmer of Optimism." <u>https:// globalfundcommunityfoundations.org/</u> wp-content/uploads/2021/11/EPIC-Africa_ TheImpactOfCOVID-19.pdf._

Faisal, M., A. Abbas, C. Xia, M. Haseeb, S. Akhtar, M. Arslan, Z. Mushtaq, and Y. Cai. 2021. "Assessing Small Livestock Herders' Adaptation to Climate Variability and Its Impact on Livestock Losses and Poverty." Climate Risk Management 34: 100358. <u>https://doi.org/10.1016/j.crm.2021.100358.</u>

FAO (Food and Agriculture Organization of the United Nations). 2018. Advancing on Monitoring and Evaluation for Adaptation in the Agriculture Sectors. Rome: FAO Secretariat.

FAO (Food and Agriculture Organization of the United Nations). 2020a. Adaptation in the Agriculture Sectors: Leveraging Co-benefits for Mitigation and Sustainable Development. Rome: FAO Secretariat.

FAO (Food and Agriculture Organization of the United Nations). 2020b. The State of World

Fisheries and Aquaculture 2020: Sustainability in Action. Rome: FAO Secretariat. <u>https://doi.org/10.4060/ca9229en.</u>

FAO (Food and Agriculture Organization of the United Nations). 2021. "Southern Madagascar: Government and UN Sound the Alarm on Famine Risk, Urge Action." Press Release, 11 May. <u>http://www.fao.org/news/story/en/item/1398455/icode/.</u>

FAO (Food and Agriculture Organization of the United Nations). 2022. "Digital Agriculture Profile: Rwanda." https://www.fao.org/3/cb2507en/ cb2507en.pdf. Accessed 17 April 2022.

Farm Radio International. 2013. "An Introduction to Agricultural Value Chains." Baltimore, MD: Farm Radio International.

Feng, X., H. Qiu, J. Pan, and J. Tang. 2021. "The Impact of Climate Change on Livestock Production in Pastoral Areas of China." Science of the Total Environment 770: 144838. <u>https://</u> doi.org/10.1016/j.scitotenv.2020.144838.

Froehlich, H. E., J. Z. Koehn, K. K. Holsman, and B. S. Halpern. 2022. "Emerging Trends in Science and News of Climate Change Threats to and Adaptation of Aquaculture." Aquaculture 549: 737812. <u>https://doi.org/10.1016/j.</u> aquaculture.2021.737812.

Galappaththi, E. K., J. D. Ford, and E. M. Bennett. 2019. "A Framework for Assessing Community Adaptation to Climate Change in a Fisheries Context." Environmental Science and Policy 92: 17–26. <u>https://doi.org/10.1016/j.envsci.2018.11.005.</u>

Galappaththi, E. K., J. D. Ford, E. M. Bennett, and F. Berkes. 2021. "Adapting to Climate Change in Small-scale Fisheries: Insights from Indigenous Communities in the Global North and South." Environmental Science and Policy 116: 160–170. <u>https://doi.org/10.1016/j.</u> envsci.2020.11.009.

GIZ (Germany Agency for International Cooperation). 2022a. "Adapting to Climate Change." <u>https://www.giz.de/expertise/</u> <u>html/60102.html. Accessed 11 April 2022.</u>

GIZ (German Agency for International Cooperation). 2022b. "Fishing." <u>https://www.giz.de/expertise/</u> <u>html/60097.html Accessed 11 April 2022.</u>

GIZ (German Agency for International Cooperation). 2022c. "Sustainable Forest Management and International Forest Policy." <u>https://www.giz.de/expertise/html/60096.html.</u> <u>Accessed 11 April 2022.</u>

GIZ (German Agency for International Cooperation). 2022d. "Farming 4 Future: Sustainable Rice Cultivation in Africa." <u>https://</u> www.giz.de/en/workingwithgiz/55196.html. Accessed 11 April 2022.

Gurung, L. J., K. K. Miller, S. Venn, and B. A. Bryan. 2021. "Climate Change Adaptation for Managing Non-timber Forest Products in the Nepalese Himalaya." Science of the Total Environment 796: 148853. <u>https://doi.</u> org/10.1016/j.scitotenv.2021.148853.

Henry, B. K., R. J. Eckard, and K. A. Beauchemin. 2018. "Review: Adaptation of Ruminant Livestock Production Systems to Climate Changes." Animal 12 (Suppl. 2): s445–s456. https://doi.org/10.1017/S1751731118001301.

IGAD (Intergovernmental Authority on Development). 2022. "About IGAD." <u>https://</u> igad.int/about/. Accessed 11 April 2022.

Ingutia, R. 2021. "The Impacts of Covid-19 and Climate Change on Smallholders through the Lens of SDGs; and Ways to Keep Smallholders on 2030 Agenda." International Journal of Sustainable Development and World Ecology 28: 693–708. <u>https://doi.org/10.1080/13504509</u>.2021.1905100.

IPCC (Intergovernmental Panel on Climate Change). 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva: IPCC.

IPCC (Intergovernmental Panel on Climate Change). 2015. "Agriculture, Forestry and Other Land Use (AFOLU)." Climate Change 2014: Mitigation of Climate Change, 811–922. <u>https://doi.org/10.1017/cbo9781107415416.017</u>.

IPCC (Intergovernmental Panel on Climate Change). 2021. Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK and New York: Cambridge University Press. doi:10.1017/9781009157896.

IPCC (Intergovernmental Panel on Climate Change). 2022. Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK and New York: Cambridge University Press. doi:10.1017/9781009325844.

Kaini, M. 2020. "Role of Agriculture in Ensuring Food Security." International Journal of Humanities and Applied Social Science 1–5. https://doi.org/10.33642/ijhass.v5n1p1.

Kalele, D. N., W. O. Ogara, C. Oludhe, and J. O. Onono. 2021. "Climate Change Impacts and Relevance of Smallholder Farmers' Response in Arid and Semi-arid Lands in Kenya." Scientific African 12: e00814. <u>https://doi.org/10.1016/j.sciaf.2021.e00814.</u>

Kamal, A. S. M. M., M. Shamsudduha, B. Ahmed, S. M. K. Hassan, S. Islam, I. Kelman, and M. Fordham. 2018. "Resilience to Flash Floods in Wetland Communities of Northeastern Bangladesh." International Journal of Disaster Risk Reduction 31: 478–488. <u>https://doi.org/10.1016/j.ijdrr.2018.06.011.</u>

Luo, X. S., D. Muleta, Z. Hu, H. Tang, Z. Zhao, S. Shen, and B. L. Lee. 2017. "Inclusive Development and Agricultural Adaptation to Climate Change." Current Opinion in Environmental Sustainability 24: 78–83. <u>https://doi.org/10.1016/j.cosust.2017.02.004.</u>

MacDicken, K. G. 2015. "Global Forest Resources Assessment 2015: What, Why and How?" Forest Ecology and Management 352: 3–8. <u>https://doi.</u> org/10.1016/j.foreco.2015.02.006.

Macusi, E. D., R. C. Geronimo, and M. D. Santos. 2021. "Vulnerability Drivers for Small Pelagics and Milkfish Aquaculture Value Chain Determined through Online Participatory Approach." Marine Policy 133: 104710. <u>https://doi.org/10.1016/j.marpol.2021.104710.</u>

Masud, M. M., M. N. Azam, M. Mohiuddin, H. Banna, R. Akhtar, A. S. A. F. Alam, and H. Begum. 2017. "Adaptation Barriers and Strategies towards Climate Change: Challenges in the Agricultural Sector." Journal of Cleaner Production 156: 698–706. <u>https://doi.</u> org/10.1016/j.jclepro.2017.04.060.

Mekonnen, A., A. Tessema, Z. Ganewo, and A. Haile. 2021. "Climate Change Impacts on Household Food Security and Farmers Adaptation Strategies." Journal of Agriculture and Food Research 6: 100197. <u>https://doi.</u> org/10.1016/j.jafr.2021.100197.

Mersha, A. A., and F. van Laerhoven. 2018. "The Interplay between Planned and Autonomous Adaptation in Response to Climate Change: Insights from Rural Ethiopia." World Development 107 (C): 87–97.

Muchuru, S., and G. Nhamo. 2017. "Climate Change and the African Livestock Sector: Emerging Adaptation Measures from UNFCCC National Communications." International Journal of Climate Change Strategies and Management 9 (2): 241–260.

Muchuru, S., and G. Nhamo. 2019. "A Review of Climate Change Adaptation Measures in the African Crop Sector." Climate and Development 11 (10): 873–885. <u>https://doi.org/10.1080/17565</u> 529.2019.1585319

Mnguu, Y., and Z. Masanyiwa. 2021. "Smallholder Farmers' Adaptation Strategies to Climate Change in Semi-arid Areas of Chamwino District, Tanzania."

Mugiya, D., and C. Hofisi. 2017. "Climate Change Adaptation Challenges Confronting Small-scale Farmers." Environmental Economics 8: 57–65. https://doi.org/10.21511/ee.08(1).2017.06.

Mutimukuru-Maravanyika, T., L. Chapungu, and F. Majeke. 2022. "Food Systems in Dryland Communities: Challenges and Opportunities in Gutu District, Masvingo Province, Zimbabwe." In Climate Change Adaptations in Dryland Agriculture in Semi-Arid Areas, edited by X. Poshiwa and G. Ravindra Chary, 157–172. Singapore: Springer.

Niang, I., O. Ruppel, M. Abdrabo, A. Essel, C. Lennard, J. Padgham, and P. Urquhart. 2014. "Africa." In Impacts, Adaptation, and Vulnerability. Part B: Regional aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, edited by V. R. Barros et al., 1199–1265. Cambridge, UK: Cambridge University Press. Nicholson, S. E., C. Funk, and A. H. Fink. 2018. "Rainfall over the African Continent from the 19th through the 21st Century." Global and Planetary Change 165: 114–127.

Ogunleye, A., A. Kehinde, A. Mishra, and A. Ogundeji. 2021. "Impacts of Farmers' Participation in Social Capital Networks on Climate Change Adaptation Strategies Adoption in Nigeria." Heliyon 7: e08624. <u>https://doi.</u> org/10.1016/j.heliyon.2021.e08624.

Oxfam International. 2022. "Food, Climate and Natural Resources." <u>https://www.oxfam.org/en/</u> <u>what-we-do/issues/food-climate-and-natural-</u> <u>resources</u>Accessed 12 April 2022.

Pakmehr, S., M. Yazdanpanah, and M. Baradaran. 2020. "How Collective Efficacy Makes a Difference in Responses to Water Shortage Due to Climate Change in Southwest Iran." Land Use Policy 99: 104798. <u>https://doi.org/10.1016/j.landusepol.2020.104798.</u>

Partey, S., and G. Kotey Nikoi. 2019. "A CCAFS-Informed Public-Private Partnership Reaches 300,000 Farmers with Climate Information." Press Release, CGIAR, 20 March. <u>https://ccafs.</u> cgiar.org/news/ccafs-informed-public-privatepartnership-reaches-300000-farmers-climateinformation.

Pearson, P. J. G., A. Jorgenson, S. Fiske, K. Hubacek, J. Li, T. McGovern, T. Rick, J. Schor, W. Solecki, R. York, and A. Zycherman. 2018. "Social Science Perspectives on Drivers of and Responses to Global Climate Change." Energy Policy 50: e554. https://doi.org/10.1002/wcc.554.

Pérez-Escamilla, R. 2017. "Food Security and the 2015–2030 Sustainable Development Goals: From Human to Planetary Health." Current Developments in Nutrition 1: 1–8. <u>https://doi.org/10.3945/cdn.117.000513.</u>

Phatty-Jobe, A. 2020. Digital Agriculture Maps 2020: State of the Sector in Low and Middle-Income Countries. London.

Piggott-McKellar, A., K. E. McNamara, P. D. Nunn, and S. Sekinini. 2019. "Moving People in a Changing Climate: Lessons from Two Case Studies in Fiji." Social Sciences 8: 133.

Rakib, M. A., J. Sasaki, S. Pal, Md. A. Newaz, Md. Bodrud-Doza, and M. A. H.

Bhuiyan. 2019. "An Investigation of Coastal Vulnerability and Internal Consistency of Local Perceptions under Climate Change Risk in the Southwest Part of Bangladesh." Journal of Environmental Management 231: 419–428. https://doi.org/10.1016/j.jenvman.2018.10.054.

Ray, D. K., P. C. West, M. Clark, J. S. Gerber, A. V. Prishchepov, and S. Chatterjee. 2019. "Climate Change Has Likely Already Affected Global Food Production." PLoS One 14: 1–18. https://doi.org/10.1371/journal.pone.0217148.

Republic of Rwanda. 2016. "National ICT4 Ag Strategy (2016–2020)." Scribd. <u>https://www.</u> scribd.com/document/324213359/ICT-for-Agriculture-policy-and-Strategic-Plan-2016-2020-Rwanda.

Rogé, P., A. R. Friedman, M. Astier, and M. A. Altieri. 2014. "Farmer Strategies for Dealing with Climatic Variability: A Case Study from the Mixteca Alta Region of Oaxaca, Mexico." Agroecology and Sustainable Food Systems 38: 786–811. <u>https://doi.org/10.1080/21683565</u>.2014.900842.

Rojas-Downing, M. M., A. P. Nejadhashemi, T. Harrigan, and S. A. Woznicki. 2017. "Climate Change and Livestock: Impacts, Adaptation, and Mitigation." Climate Risk Management 16: 145–163. <u>https://doi.org/10.1016/j.crm.2017.02.001.</u>

Salvadeo, C., H. N. Morzaria-Luna, H. Reyes-

Bonilla, A. Ivanova-Bonchera, D. P. Ramírez, and E. Juárez-León. 2021. "Fisher's Perceptions Inform Adaptation Measures to Reduce Vulnerability to Climate Change in a Mexican Natural Protected Area." Marine Policy 134. https://doi.org/10.1016/j.marpol.2021.104793.

Schoene, D. H. F., and P. Y. Bernier. 2012. "Adapting Forestry and Forests to Climate Change: A Challenge to Change the Paradigm." Forest Policy and Economics 24: 12–19. <u>https://</u> doi.org/10.1016/j.forpol.2011.04.007.

Shongwe, P., M. B. Masuku, and A. M. Manyatsi. 2014. "Factors Influencing the Choice of Climate Change Adaptation Strategies by Households: A Case of Mpolonjeni Area Development Programme (ADP) in Swaziland." Journal of Agricultural Studies 2 (1): 86–98.

Sloat, L. L., S. J. Davis, J. S. Gerber, F. C. Moore, D. K. Ray, P. C. West, and N. D. Mueller. 2020. "Climate Adaptation by Crop Migration." Nature Communications 11: 1–9. <u>https://doi.org/10.1038/s41467-020-15076-4.</u>

Tamiru, L., and H. Fekadu. 2019. "Effects of Climate Change Variability on Agricultural Productivity." International Journal of Environmental Sciences and Natural Resources 17 (1): 555953. DOI:10.19080/ IJESNR.2019.17.555953.

Tsan, M., S. Totapally, M. Hailu, and B. K. Addom. 2019. The Digitalisation of African Agriculture Report 2018–2019. Wageningen, Netherlands: CTA/Dalberg Advisers. <u>https://cgspace.cgiar.org/</u> handle/10568/101498

Uittenbroek, C. J., L. B. Janssen-Jansen, and H. A. C. Runhaar. 2013 "Mainstreaming Climate Adaptation into Urban Planning: Overcoming Barriers, Seizing Opportunities and Evaluating the Results in Two Dutch Case Studies." Regional Environmental Change 13 (2): 399–

411. doi:10.1007/s10113-012-0348-8.

United Nations. 2015. "The 2030 Agenda for Sustainable Development." UN General Assembly Resolution, 21 October 2015, A/RES/70/1. New York. <u>https://www.refworld.org/docid/57b6e3e44.</u> <u>html.</u> Accessed 28 November 2022.

UNEP (United Nations Environment Programme). 2021. Adaptation Gap Report 2021: The Gathering Storm—Adapting to Climate Change in a Postpandemic World. Nairobi.

UNFCCC (United Nations Framework Convention on Climate Change). 2001. "Report of the Conference of the Parties on Its Seventh Session (COP7), Held at Marrakesh from 29 October to 10 November 2001." FCCC/ CP/2001/13/Add.1.

UNFCCC (United Nations Framework Convention on Climate Change). 2007. "Report of the Conference of the Parties on Its Thirteenth Session, Held in Bali from 3 to 15 December 2007." FCCC/CP/2007/6/Add.1.

UNFCCC (United Nations Framework Convention on Climate Change). 2011. "Report of the Conference of the Parties on Its Seventeenth Session, Held in Durban from 28 November to 11 December 2011." FCCC/CP/2011/9.

UNFCCC (United Nations Framework Convention on Climate Change). 2015. "Paris Agreement to the United Nations Framework Convention on Climate Change." <u>https://unfccc.</u> <u>int/process/conferences/pastconferences/parisclimate-change-conference-november-2015/ paris-agreement.</u> UNFCCC (United Nations Framework Convention on Climate Change). 2017. "Report of the Conference of the Parties on Its Twentythird Session, Held in Bonn from 6 to 18 November 2017." FCCC/CP/2017/11/Add.1.

Wang, X., C. Folberth, R. Skalsky, S. Wang, B. Chen, Y. Liu, J. Chen, and J. Balkovic. 2022. "Crop Calendar Optimization for Climate Change Adaptation in Rice-based Multiple Cropping Systems of India and Bangladesh." Agricultural and Forest Meteorology 315: 108830. <u>https://</u> doi.org/10.1016/j.agrformet.2022.108830.

Worker, J. 2017. "National Climate Change Governance: Topic Guide." Birmingham, UK: GSDRC, University of Birmingham.

World Agroforestry Centre and Unique Forestry and Land Use. 2019. "Climate-smart Agriculture Measurement, Reporting and Verification in the Republic of Zimbabwe." 5–10. <u>https://cgspace.</u> cgiar.org/handle/10568/99462.

World Bank. 2019. "World Bank Group Action Plan on Climate Change Adaptation and Resilience." Washington, DC: World Bank.

World Bank. 2020. State and Trends of Carbon Pricing 2020. Washington, DC: World Bank.

Yadav R. P., B. Gupta, P. L. Bhutia, J. K. Bisht, and A. Pattanayak. 2019. "Biomass and Carbon Budgeting of Land Use Types along Elevation Gradient in Central Himalayas." Journal of Cleaner Production 211: 1284–1298. <u>https://doi.</u> org/10.1016/j.jclepro.2018.11.278.

Annexes

Annex A: Some international organizations of interest

Organization	Website
Accelerating Impacts of CGIAR Climate Research	https://ccafs.cgiar.org/events/AICCRA_Launch_
for Africa (AICCRA)	<u>Event</u>
Adaptation for African Agriculture (AAG)	https://vito.be/en/about-vito
ActionAid International	https://actionaid.org
United Nations Economic Cimmission for Africa	https://www.uneca.org/acpc
(UNECA) African Climate Policy Center (ACPC)	
African Adaptation Initiative (AAI)	https://africaadaptationinitiative.org/
Alliance for a Green Revolution in Africa (AGRA)	www.agra.org
African Development Bank	https://www.afdb.org/
Bill & Melinda Gates Foundation	https://gatesfoundation.org
Building Systemic Resilience Against Climate Vari-	https://www.cgiar.org/initiative/23-climber-build-
ability and Extremes (ClimBeR)	ing-systemic-resilience-against-climate-variabili-
	ty-and-extremes/
CARE International	https://careclimatechange.org/
Climate and Development Knowledge Network	https://cdkn.org/
Consultative Group on International Agricultural Research (CGIAR) Centers	https://www.cgiar.org/research/research-centers/
CGIAR Research Program on Climate Change,	https://ccafs.cgiar.org/index.php/regions/east-africa/
Agriculture and Food Security (CCAFS)	<u>kenya</u>
International Maize and Wheat Improvement Center (CIMMYT)	https://www.cimmyt.org/location/africa/kenya/
ClimDev Africa	https://www.climdev-africa.org/
Clim-Eat	https://clim-eat.org/
Climate Action Network (CAN)	https://climatenetwork.org/
Climate Policy Initiative	https://www.climatepolicyinitiative.org/
Deutsche Gesellschaft für Internationale Zusam- menarbeit (GIZ)	https://www.giz.de/en/html/index.html
Eastern Africa Grain Council	https://eagc.org/
Food and Agriculture Organization of United Na- tions (FAO)	https://www.fao.org/
Family Health International (FHI360)	https://www.fhi360.org/
Green Climate Fund	https://www.greenclimate.fund/
Heifer International	https://www.heifer.org
Climate Prediction and Applications Centre (https://www.icpac.net
International Crops Research Institute for the	https://www.icrisat.org/
Semi-Arid Tropics	
Intergovernmental Authority on Development (IGAD)	https://igad.int/
International Fund for Agricultural Development (IFAD)	https://www.ifad.org/en/

International Food Policy Research Institute I (FPRI)	https://www.ifpri.org/
International Livestock Research Institute (ILRI)	https://www.ilri.org/
International Institute for Environment and Develop- ment (IIED)	https://www.iied.org/
Institute of Environment and Water Management (IEWM)	https://iewm.org/
International Development Research Center (IDRC)	https://www.irdc.ca
Oxfam International	https://www.oxfam.org/en
Netherlands Development Organization (SNV)	https://snv.org/
Tanager Ignite	https://tanagerintl.org/portfolio/ignite/
The Adaptation Fund (AF)	https://www.adaptation-fund.org/
United Nations Development Program (UNDP)	https://www.undp.org/
UN Women	https://www.unwomen.org/en
U.S. Agency for International Development (USAID)	https://www.usaid.gov/
World Food Programme (WFP)	https://wfp.org
World Agroforestry Centre	https://www.worldagroforestry.org/
World Resources Institute (WRI)	https://www.wri.org/
The World Bank	https://www.worldbank.org/
World Meteorological Organization (WMO)	https://public.wmo.int/en
World Wildlife Fund (WWF)	https://www.worldwildlife.org/



Annex B: Mapped and scoped organizations involved in climate adaptation and resilience in the agricultural sector in focus countries (* denotes organizations that responded to the survey online)

	Spatial and Operation Level and Boundaries				
Country	National NGOs, CBOs and other organiza- tions (Africa-Led)	National Depart- ments and Agen- cies (Africa-Led)	Africa-wide (including re- gional focus) (Africa-Led)	International Organizations (Africa-based)	UN Agencies (Africa-based)
Burkina Faso	Profiled		Profiled	Profiled	Profiled
	 A2N (Association Nodde Nooto) Dori, Burkina Faso AGED (Association Pour La Gestion De L'environnement Et Le Développent) Amassa Afrique Verte APIL (Action Pour La Promotion Des Initia- tives Locales) FENOP (Federation National Des Organisa- tions Paysannes) Green Sahel Secrétariat Perma- nent du Conseil Nation- al pour l'Environnement et le Développent Dura- ble (SP-CONEDD) Terre verte 	 Direction Géner- ale des Production Végétales Institut de l'Environnement et de Recherches Agricoles (INERA) Ministry of Ag- riculture, Water & Fisheries Resourc- es 	ProfiledProfiled1. African Adap- tation Initiative1. Action(AAI)Adapta2. African UnionAfrican3. Econewsture (A.Africa*2. Adve4. Food, Agri- culture and Nat- ural ResourcesDeveloand ResourcesPolicy AnalysisPolicy Analysis(ADRA)Network (FAN- RPAN)*3. Alliat5. East Africanlution inCommunity(AGRA)(EAC)4. Bill &6. Economicda GateCommunity of Central African5. Care7. EconomicResearCommunity of West AfricanFood S8. Horn of Center and(CCAF)Africa Regional Environment7. ClimNetwork(CANI)9. Intergovern- mental Author- ity on Develop- ment (IGAD)*8. Deut10. LEADbeit (GSouthern and Eastern Africa*0. Eat P11. Innovations for Poverty10. FH11. Innovations for Poverty10. FH12. Southern African Develo- ment (SADC)Resear13. Regional UniversitiesInternaUniversities Forum for Ca- pacity Building in Agriculture (RUFORUM)Resear	ProfiledProfiled1. African Adaptation Initiative1. ActionAid1. Food(AAI)Adaptation forOrganiza2. African UnionAfrican Agricul-(FAO)3. Econewsture (AAG)2. UNECAfrica*2. AdventistAfrica CI4. Food, Agri-DevelopmentPolicy Cculture and Nat-and Care Re-(ACPC)ural Resourcessources Agency3. UnitedPolicy Analysis(ADRA)NationsNetwork (FAN-3. Alliance for aDevelopRPAN)*Green Revo-Program5. East AfricanIution in Africa(UNDP)*(AGRA)4. UN En6. Economicda Gates Foun-5. UnitedCommunity of5. Care Interna-States (EC-CAS)6. CGIARClimate7. EconomicResearch(UNFCC)	 Food and Agriculture Organization (FAO) UNECA/ Africa Climate Policy Centre (ACPC) United Nations Development Programme (UNDP)* UN Environment United Nations Framework Convention on Climate Change (UNFCCC) World Food
Ethiopia	Profiled1. Action for Development (AFD)*2. Action For IntegratedSustainable Development Association(AISDA)3. ADHENO IntegratedRural DevelopmentAssociation4. Enhanced Rural Self-Help Association5. Gurmuu Developmentopment Association6. Institute for Sustainable Development7. Lem, the Environment & DevelopmentSociety of Ethiopia (LemEthiopia)8. Mission for communityy development forEcological Learningand Community Action(MELCA) Mahiber	 Environment, Forest and Climate Change Commis- sion Disaster Risk Management Com- mission Ethiopian Agri- culture Research Institute Ethiopian Agri- cultural Transfor- mation Agency Ethiopian Biodi- versity Institute Environmental Protection Authority Ethiopian Environment and Forestry Research Institute Ministry of Agri- culture* Ministry of Fi- nance 		mate Change, Agriculture and Food Security (CCAFS) 7. Climate Action Network International (CANI) 8. Deutsche Gesellschaft für Internationale Zusammenar- beit (GIZ) 9. Eat Forum (EA) 10. FHI360 11. International Development Research Cen- tre (IDRC) 12. Internation- al Food Policy Research Insti- tute (IFPRI)	Programme (WFP) <u>Not Profiled</u> 1. European Union 2. United Na- tions Children's Fund (UNICEF) 3. UN Office for Disaster Risk Reduction (UNDRR) 4. UN Women 5. UN Water 6. World Meteorological Organization (WMO)

Country	Spatial and Operation Level and Boundaries			
	National NGOs, CBOs and other organizations (Africa-Led)	National Departments and Agencies (Africa-Led)	International Organizations (Africa-based)	
Ethiopia	 10. Sustainable Environment and Development Action (SEDA) 11. Tena Kebena Ginfle Cleaned Association (TKGCA) <u>Not Profiled</u> 1. Dan Church Aid 2. Union of Ethiopian Women and Children Association 	 10. Ministry of Irrigation and Lowland Development 11. Ministry of Water and Energy 12. National Meteorology Agency (NMA)* 13. Water Development Commission 	 13. International Institute for Environment and Development (IIED) 14. International Institute for Sustainable development (IISD) 15. International Institute of Tropical Agriculture (IITA)* 16. The Lutheran World Fed- eration 17. Oxfam International 18. U.S. Agency for Internation- al Development (USAID) 19. Vi Agroforestry* 20. World Resources Institute (WRI) Not Profiled 21. Africa Harvest Biotech Foundation International 22. African Centre for Technolo- gy Studies 23. Anglican Development Service 24. Cargill Pty Ltd 25. Canadian Feed the Chil- dren 26. Caritas 27. Catholic Relief Services 28. Centre for Agriculture and Bioscience International (CABI) 29. Christian Aid 	
Ghana	Profiled1. Abrono Organaic Farming Project (ABOFAP)2. Cradle of Hope for Relief and Development (CHRAD)3. CSIR Climate Change Agricul- ture and Food Security Platform*4. DERA Foundation5. Green Africa Youth Organization6. GreenGlobe7. Institute for Energy and Environ- mental Solutions (ISEES)8. PALS of the Earth9. Presbyterian Agricultural Services (PAS)Not ProfiledProduce Buying Company (PBC)	 Centre for Climate Change and Sustainability Studies Environmental Protection Agency Forestry Commission Ghana Agricultural Sector Investment Programme* Ghana Meteorological Agency Ministry of Food and Agricul- ture* Ministry of Environment Ministry of Finance 		
Kenya	Profiled 1. African Conservation Tillage Network (ACT)* 2. African Technology Policy Stud- ies Network (ATPS)* 3. Climate Change Network of Kenya* 4. Grassroots Organizations Operating Together in Sisterhood (GROOTS Kenya) 5. Inclusive Climate Change Adaptation for a Sustainable Africa (ICCASA)* 6. Kamaso Milimani Women Group* 7. Kenya Climate Innovation Cen- tre (KCIC) 8. Kenya Forest Working Group	 Agriculture Sector Development Support Programme II (ASDSP II)* Kenya Agricultural and Livestock Research Organization (KALRO) Kenya Industrial Research and Development Institute (KIRDI) Department of Earth and Climate Sciences - Institute of Climate Change Adaptation (ICCA), University of Nairobi* 	 30. Climate Change, Agriculture and Food Security (CCAFS)/ International Livestock Re- search Institute (ILRI) 31. Concern Worldwide 32. Development Fund Norway 33. Famine Early Warning Sys- tems Network 34. Global Climate and Health Alliance 35. GOAL 36. Green Climate Fund (GCF) 37. Hand in Hand International 38. Humanitarian International 39. KFW Bank 40. ICRISAT-CGIAR 41. IKEA Foundation 42. International Climate Initia- tive (IKI) 43. International Fund for Agri- cultural Development (IFAD) 44. International Water Man- agement Institute (IWMI) 	

Country	Spatial and Operation Level and Boundaries			
	National NGOs, CBOs and other organizations (Africa-Led)	National Departments and Agen- cies (Africa-Led)	International Organiza- tions (Africa-based)	
Kenya	 9. Kenya National Farmers' Federation (KENAFF)* 10. NutriProduce Limited* 11. Pragmatic Social Action* 12. Providence Whole Care International* 13. Reseed Kenya* 14. The Polly Foundation* 15. Union For Poverty Alleviation and Management Organization* Not Profiled 1. Andreas Hermes Akademie (AHA) 2. Biovision Foundation 3. Climate Action Voices 4. Consumer Grassroots Association 5. Echamiaito 6. Extinction Rebellion Kenya 7. Legal Resources Foundation Trust 8. Ndume Manufacturers Ltd 9. The Institute of Climate Change and Adaptation, University of Nairobi 10. The Nature Conservancy 11. Ujamaa Centre 	 5. Ministry of Agriculture, Livestock, Fisheries, and Cooperatives 6. Ministry of Environment and Forestry 7. Ministry of Water and Irrigation 8. National Commission for Science Technology & Innovation* 9. National Drought 10. National Environment Manage- ment Authority 11. National Water Resources Authority (WRA) 	 46. Mercy corps 47. Netherlands Development Organization (SNV) 48. Norwegian Church Aid 49. One Acre Fund 50. Sand dams Worldwide 51. Self Help Africa 52. Stockholm Environment Institute (SEI) 53. International Committee of the Red Cross 54. Vi Agroforestry 55. Welthungerhilfe 56. World Bank 57. World Vision* 	
Malawi	Profiled1. Centre for Environmental Policy and Advocacy2. Civil Society Agriculture Network*3. Civil Society Network on Climate Change*4. Co-ordination Unit for the Rehabili- tation of the Environment5. Development Initiative Network6. Farmers Union of Malawi7. Foundation for Community and Capacity Development (FOCCAD)8. Kusamala Institute of Agriculture and Ecology9. LEAD Southern and Eastern Africa 10. National Smallholder Farmers' Association of Malawi11. Small Scale Livestock and Liveli- hoods Program*12. The Centre for Climate Change and Environment Management (CCCEM)Not Profiled1. GiveDirectly2. Lilongwe University of Agriculture and Natural Resources (LUANAR) 3. National Smallholder Farmers Association of Malawi	 Department of Climate Change and Meteorological Services* Department of Forestry Ministry of Agriculture, Irrigation and Water Development 		

Country	Spatial and Operation Level and Boundaries			
	National NGOs, CBOs and other organiza-	National Departments and Agencies (Africa-Led)		
	(Africa-Led)			
Mali	Profiled			
	 Agence de l'Environnement et du Développement Durable (AEDD) AMASSA AFRIQUE VERTE* Ass Consommateurs du Mali (ASCOMA) Association des Consommateurs du Mali (ASCOMA) Association Malienne d'Éveil au Développement Durable (AMEDD) Association Malienne Pour Le Development, La Protection De L'environnement Et La Lutte Contre La Desertification (AMADE –PELCODE) Centre d'actions et de Realisations Internationales o(CARI) GCOZA Mali : Groupe de Coordination des Zones Arides Plan de Développement Economique, Social et Culturel (PDESC) Réseau climat et developpement (RESO CLIMAT) Sahel Eco 	 Banque Nationale de Dévéloppement Agricole (BNDA) Direction Nationale d l'Agriculture (DNA) Ministry of Agriculture 		
Mozam- bique	Profiled 1. ADPP Mozambique 2. Associação do Meio Ambiente (AMA) 3. BioFund 4. Center for Policy Analysis- Eduardo Mondlane Universitt* 5. KULIMA 6. National Union of Peasants (UNAC) 7. The Foundation for Community Development (FDC)	 Agrarian Development Fund (FDA) Institute of Agricultural Research of Mozambique Institute of Cotton and Oilseed of Mozambique (IAOM) Ministry of Agriculture and Food Security (MASA) Ministry of Agriculture and Rural Development (MADER) Ministry of Coordination of Environmental Affairs (MICOA) Ministry of Economy and Finance (MEF) Mozambique Almond Institute (IAM) Mozambique National Institute of Disaster Management (INGC) National Fund for Sustainable Development National Institute of Irrigation (INIR) National Metrological Institute (INAM) Technical Secretariat for Food and Nutrition Security (SETSAN) 		
Nigeria	 Profiled 1. Community Action for Food Security (CAFS) Initiative* 2. Farm Awareness for Food Preservation Initia- tive – FAFPI 3. Gbolekekro Women Empowerment and De- velopment Organization (GWEDO)* 4. Green Environment and Climate Change Initiative* 5. HEDA Resource Centre* 6. Integrated Rural Development Foundation 	Nigeria Meteorological Agency		

Country	Spatial and Operation Level and Boundaries			
	National NGOs, CBOs and other organizations (Africa-Led)	National Departments and Agencies (Afri- ca-Led)		
	 7. Rad Environmental and Climatic Protection (RE-NACLIP) Foundation* 8. Sustainable Environment Food and Agriculture Initiative 9. Women Farmers Advancement Network (WO-FAN) 10. Youth in Agroecology and Restoration Network* 			
	 Not Profiled Association of Small-scale Agro Producers in Nigeria Eco Clean Active Initiative (ECA) Edo Dynasty United Worldwide Eleven Twelve Foundation (EETF) Health of Mother Earth Foundation Kebetkache Women Development Resource Center Nigeria Conservation Foundation (NCF) Nigerian Youth Climate Network Nourish Scotland Owonikoko Community Farmers Group The Voice Foundation Youth for Our Planet 			
Rwanda	Profiled1. Action for Environment Protection and Promotion of Agricultural Sector2. Biodiversity Conservation Organization3. Rise and Farming Solutions Ltd.4. Rural Environment and Development Organiza- tion (REDO)*5. Rwanda Development Organization 6. Rwanda Environment Awareness Organization (REAO)7. Rwanda Village Community Promoters 8. The Rwandan Ecologists' Association -ARECO 9. We Do GREEN OrganizationNot Profiled ARECO Rwanda Nziza	 Ministry of Agriculture and Animal Resources Rwanda Agricultural Board Rwanda Development Board The National Fund for Environment – FONER-WA* 		
Tanzania	Profiled1. Advancing Agricultural Agenda for SmallholderProducers2. Aqua-Farms Organization3. Climate Action Network Tanzania4. Green Kilimo Tanzania5. Loliondo Actions for Green Earth6. Research, Community and Organizational Devel-opment Associates (RECODA)*7. Sustainability in Action (SiA)8. Tanzania Organiz Agriculture Alliance9. Tanzania Organiz Agriculture Movement (TOAM)10. Tanzania Organization for Agricultural Develop-ment (TOfAD)*11. Tanzania Organization for Agricultural Develop-ment	 African Seed & Plant Health Centre Sokoine University of Agriculture Department of Crop Science and Horticulture Sokoine University of Agriculture Institute of Resource Assessment- University of Dar es Salaam Kizimbani Agricultural Research Institute Ministry of agriculture food security and coop- eratives Partner with us - Directorate of Postgraduate Studies, Research, Technology Transfer and Con- sultancy (sua.ac.tz) The Southern Agriculture Growth Corridor of Tanzania 		

National NGOs, CBOs and other organizations (Africa-Led) National Departments and Agencies (Afri- ca-Led) 12. Tanzania Traditional Energy Development Organization (TaTEDO)* 13. Tanzanian Olivil Society Forum on Olimate Change 14. Tobacco Research Institute of Tanzania Not Profiled Image: Change 14. Tobacco Research Institute of Tanzania Not Profiled 1. FORUMCC - Civil Society Organizations (CSOs) network on Olimate Change 2. Tanzania Forest Conservation Group 3. Tanzania Natural Resource Forum (TNRF) 1. Climate Change Department 2. Makerser University Centre for Climate Re- search and Innovation 3. Environment Governance Institute 4. Gordon's Apricultural Organization - Uganda (GAO-UG)* 1. Climate Change Department 2. Makerser University Centre for Climate Re- search and Innovation 3. Ministry of Agricultura, Presente Corganization 9. Umoja Conservation Trust 10. UWEPO Tree and Plant Nursery Not Profiled 1. Climate Change Department 2. Ministry of Valer and Environment (Including Climate Change Directorate) 1. Advocates Coalition for Development and Environmental Management Authority 10. UWEPO Tree and Plant Nursery Not Profiled 1. Advocates Coalition for Development and Environmental Management Authority* 1. Advocates Coalition for Development and Environmental Alert 3. The Network for Chivil Society Organizations in Environmental Alert 5. The Network for Chivil Society Organizations in Environmental Alert 5. Transforming Africa Agricultural Development (TAGdew 1. Using Africa Agricultural Development (TAGdew 1. Using Coffee Development Authority 8. Uganda National Farmers Federation 1. Using Coffee Development Authority 8. Uganda National Farmere Federation	Country	Spatial and Operation Level and Boundaries			
12. Tanzania Traditional Energy Development Organization (TaTEDO)* 13. Tanzania Towil Society Forum on Climate Change 14. Tobacco Research Institute of Tanzania Not Profiled 1. FORUMCC - Civil Society Organizations (CSOs) network on Climate Change 2. Tanzania Forest Conservation Group 3. Tanzania Forest Conservation Group 3. Tanzania Forest Conservation Group 3. Tanzania Rorest Conservation Group 3. Environment Governance Institute 4. Gordon's Agricultural Organization 5. Greenwatch* 6. Kilimo Trust* 7. Rural Enterprise Development Solutions 8. Tropical Ecosystems and Land Management Organization 9. Umoja Conservation Trust 10. UWEPO Tree and Plant Nursery Not Profiled 1. Advocates Coajition for Development and Environmental Management Authority* Network for Civil Society Organizations in Environment and Natural Resources sector (ENR- CSO Network) 6. Transforming Africa Agricultural Development (TAGdew 7. Uganda Coffee Development Authority 8. Uganda National Farme		National NGOs, CBOs and other organizations (Africa-Led)	National Departments and Agencies (Afri- ca-Led)		
UgandaProfiled1. African Initiative on Food Security and Environment1. Climate Change Department2. Ecological Christian Organization3. Environment Governance Institute4. Gordon's Agricultural Organization - Uganda (GAO-UG)*3. Ministry of Agriculture, Animal industry and Fish- eries (including Department of Disaster Prepared- ness)5. Greenwatch*6. Kilimo Trust*7. Rural Enterprise Development Solutions8. Tropical Ecosystems and Land Management Organization9. Umoja Conservation Trust 10. UWEPO Tree and Plant Nursery1. Advocates Coalition for Development and Envi- ronment (ACODE)2. Environmental Alert 3. Environmental Alert 3. Environment and Natural Resources sector (ENR- CSO Network)National Environment and National Farmers Federation0. Uganda National Farmers Federation9. Uganda National Farmers Federation		 Tanzania Traditional Energy Development Organization (TaTEDO)* Tanzanian Civil Society Forum on Climate Change Tobacco Research Institute of Tanzania <u>Not Profiled</u> FORUMCC - Civil Society Organizations (CSOs) network on Climate Change Tanzania Forest Conservation Group Tanzania Natural Resource Forum (TNRF) 			
	Uganda	 Profiled 1. African Initiative on Food Security and Environment 2. Ecological Christian Organization 3. Environment Governance Institute 4. Gordon's Agricultural Organization - Uganda (GAO-UG)* 5. Greenwatch* 6. Kilimo Trust* 7. Rural Enterprise Development Solutions 8. Tropical Ecosystems and Land Management Organization 9. Umoja Conservation Trust 10. UWEPO Tree and Plant Nursery Not Profiled 1. Advocates Coalition for Development and Environment (ACODE) 2. Environmental Alert 3. Environmental Conservation Trust of Uganda 4. Sugar Corporation of Uganda Limited 5. The Network for Civil Society Organizations in Environment and Natural Resources sector (ENR-CSO Network) 6. Transforming Africa Agricultural Development (TAGdev 7. Uganda Coffee Development Authority 8. Uganda National Farmers Federation 	 Climate Change Department Makerere University Centre for Climate Research and Innovation Ministry of Agriculture, Animal industry and Fisheries (including Department of Disaster Preparedness) Ministry of Water and Environment (including Climate Change Directorate) Ministry of Local Government (District Production Offices) National Agricultural Research Organization National Environmental Management Authority Uganda National Meteorological Authority* 		



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