Climate Smart Agriculture Framework

2018 - 2028

Government of Zimbabwe

Ministry of Lands, Agriculture, Water, Climate, and Rural Resettlement

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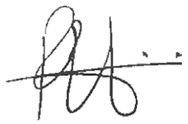
Foreword

Agricultural production and productivity in Zimbabwe has remained low due to several factors, including climate change-induced weather patterns, poor soil fertility and unsustainable management practices among others. This is more so in the smallholder farming sector where farming is predominantly rain-fed. The resultant loss in profitability impacts negatively on both the farming communities and the economy of the country which is largely agro-based.

The Climate Smart Agriculture (CSA) concept centres on the three pillars of (i) sustainably increasing productivity and incomes; (ii) increasing the resilience of ecosystems and livelihoods (adaptation) and (iii) reducing greenhouse gas emissions (mitigation). The CSA concept facilitates the integration of technologies to increase the resilience of ecosystems and farming communities.

The CSA framework was developed using lessons from the Conservation Agriculture (CA) Strategy (2010-2015) and was guided by Regional and National policies on Agriculture and Climate Change. The Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIM ASSET); National Agricultural Policy Framework; National Climate Change Response Strategy; National Climate Policy; Comprehensive African Agriculture Development Programme (CAADP) and the 23rd Ordinary African Union Assembly's 2013 Malabo Declaration on Climate Change and Agriculture are reflected in the objectives and implementation of the framework. The CSA Framework also contributes to the operationalization of Zimbabwe's Nationally Determined Contributions (NDCs) document, which clearly identifies CSA as one of the key response measures to climate change in the agriculture sector. The recently launched CSA manual for agricultural colleges directly contributes to achieving the CSA framework's objectives 4 and 5 on CSA knowledge management and institutionalization.

It is my hope that the CSA framework will provide guidance for both implementation and resource mobilization for CSA. The Government sincerely appreciates and acknowledges the support from different organisations and stakeholders who contributed to the production of this CSA framework.



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Honourable Air Chief Marshal (Retired) Perrance Shiri

Minister of Lands, Agriculture, Water, Climate and Rural Resettlement

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Acronyms

Acronym	Long Form
ACSAA	Africa Climate Smart Alliance
AI	Artificial Insemination
CA	Conservation Agriculture
CAADP	Comprehensive African Agriculture Development Program
CGIAR	Consultative Group on International Agricultural Research
CCSAP	Climate Change Strategy and Action Plan 2015-2030
CRM	Climate Risk Management
CSA	Climate Smart Agriculture
CSOs	Civil Society Organisations
DFID	Department for International Development
ENSO	El Niño – Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
FOs	Farmers Organisations
GACSA	The Global Alliance for Climate Smart Agriculture
ICTs	Information Communication Technology
INDCs	Intended Nationally Determined Contributions
INGOs	International Non-Governmental Organisations
IPCC	Intergovernmental Panel on Climate Change
ISFM	Integrated soil fertility management
MLARR	Ministry of Lands, Agriculture and Rural Resettlement
ME&L	Monitoring, evaluation and learning
MEWC	Ministry of Environment, Water and Climate
MRV	Monitoring, Reporting and Verification
NCSASC	National CSA Steering Committee
NDC	Nationally Determined Contributions
NGOs	Non-Governmental Organisations
NAPs	National Adaptation Plans
PSB	Phosphate Solubilising Bacteria
RAP	SADC Regional Agriculture Policy
RAIP	Regional Agricultural Investment Plan
R&D	Research and Development
RISDP	Regional Indicative Strategic Development Plan
SADC	Southern African Development Community
SDGs	Sustainable Development Goals
SOC	Soil organic carbon
SOM	Soil organic matter
TAMD	Tracking Adaptation and Measuring Development
TWG	Technical Working Group
ZIM-ASSET	Zimbabwe's Agenda for Socio-Economic Transformation

Glossary of Key Terms

Climate Smart Agriculture (CSA)
Climate Smart Agriculture is an integrative approach to addressing the interlinked challenges of food security and climate change, that explicitly aims for three objectives: (i) sustainably increasing agricultural productivity to support equitable increases in farm incomes, food security and development; (ii) adapting and building resilience of agricultural and food systems to climate change at multiple levels; and, (iii) reducing and/or removing greenhouse gases emissions, where possible. It is an integrated approach to managing landscapes- cropland, livestock, forests and fisheries that addresses the interlinked challenges of food security and climate change. The perspective on CSA is sustainable agriculture, based upon integrated management of water, land and ecosystems at landscape scale. Some of the approaches to CSA include: conservation agriculture; integrated soil fertility management (ISFM); manure management; improved livestock enterprises; intercropping; soil and water conservation structures; integration of perennial and annual crops; and diversification of enterprises, among others.

Conservation agriculture (CA)
Conservation agriculture is an agronomic practice that applies three main principles: reduced soil disturbance through zero or minimum tillage, maintaining a permanent soil cover through mulching or cover cropping, and crop diversification through rotations or intercropping. The practice improves the soil's physical, chemical and biological properties and reduces soil erosion while increasing water infiltration and moisture retention.

Resilience
Resilience is the capacity of individuals, households, communities, organisations or systems to anticipate, prevent (where possible), prepare for, withstand, survive, revitalise, learn, and transform when faced with acute shocks or chronic stresses such as those resulting from climate change.

Shock(s)
An acute, short to medium-term episode or event that has substantial, negative effects on people's current state of well-being, level of assets, livelihoods, or their ability to withstand future shocks. A shock's onset may be slow or rapid and may affect select households (idiosyncratic shocks) or a large number or class of households (co-variate shocks) at the same time.

Stress(es)
This is a longer-term pressure that worsens current or future vulnerability and undermines well-being, including - but not limited to - climate variability and change, population pressure, and environmental degradation.

Start of season
The start of the season is any day after the 10th of November when an area receives 20 millimetres of rains or more in 3 days or less provided there is no dry spell of 10 days or more in the next 20 days". The end of the season is any last day before end of April when an area receives 15 millimetres of rain provided there are no rains of 2.95 millimetres or above in the next 20 days (AGRITEX, 2013).

Dry spell
A dry spell is a period of days with little or no precipitation and is therefore a collection of dry days, where each day will have received less than 2.95 millimetres or 5 millimetres, depending on the threshold adopted for record-keeping and analysis or as used for National Crop and Livestock Assessment survey period of at least 10 days with no precipitation.

Wet Spell
A wet spell is when 100 millimetres is received within five consecutive days.

Drought
Drought is defined as a period in which a region has a deficit in its water supply. The definition of drought is region-specific and can be categorized into three main types: meteorological, hydrological, and agricultural. Meteorological droughts take into account deficiencies in measured precipitation in comparison to what is determined as normal. For hydrologists, droughts are monitored by checking stream flow and lake, reservoir, aquifer water levels, which is important in recommending appropriate soil and water management. Agricultural droughts occur as a result of water deficits that impact negatively on crop production and are normally declared after indicators of the impact on agriculture are confirmed to governments.

Executive Summary

A 10-year climate change response strategy for the agricultural sector: The Climate Smart Agriculture (CSA) Framework is a 10-year strategy to guide, facilitate and coordinate large-scale adoption of CSA as a national response to climate change in the agriculture sector. Climate change is inducing changes in rainfall patterns, and more severe and frequent extreme weather events such as droughts and flooding that are worsening the challenges already being faced by millions of farming households across the country. These changing patterns are projected to result in a 20-25% shortening of the growing season, resulting in up to 50% reduction in yields in some parts of the country. Unless urgent action is taken to address the threat posed by climate change, Zimbabwe's commitment to ending hunger, malnutrition and poverty will be undermined. The CSA Framework comes at a time of unprecedented global attention and cooperation on tackling climate change. In 2015, Zimbabwe joined the global community in signing the Paris Agreement, committing to a set of ambitious adaptation and mitigation actions that seek to avoid the worst impacts of climate change. Climate Smart Agriculture has emerged as the most promising approach to tackling climate change in the agricultural sector.

Building on the success of Conservation Agriculture (CA): Following more than a decade of research and testing, there is growing consensus in Zimbabwe and globally that conservation agriculture has significant positive impacts on food security and incomes of farmers in the face of a changing climate. Although CA is just one of the many practices that fit the definition of CSA, its implementation has generated many lessons for driving a broader transition to CSA. This CSA Framework draws on these lessons to tackle the most pressing constraints and harness the potential of key drivers that are expected to catalyse sustainable and large scale adoption of CSA.

The strategic vision: The vision of the CSA Framework inspired by that of the current Comprehensive Agriculture Policy Framework (2012-2032), which strives for 'a prosperous, diverse and competitive agriculture sector, ensuring food and nutrition security significantly contributing to sustainable development'. Its intended outcome is 'sustainable, large-scale adoption of CSA' that will result in a 'climate resilient and rewarding agricultural sector that guarantees national food and nutrition security, and drives socio-economic development'.

The objectives: To drive sustainable, large-scale adoption of CSA in Zimbabwe, the CSA Framework has outlined five specific objectives as follows: (i) Improve access to, and sustainable use of CSA inputs, tools and technologies; (ii) Increase the use of climate smart farm practices; (iii) Improve participation in vibrant markets for farm produce; (iv) Strengthen coordination, knowledge management and capacity for implementation; and, (v) Mainstream CSA into policy, regulatory and disaster risk management frameworks. These five objectives have been outlined in detail to identify priority areas of investment, including actions to improve the institutional, policy, and regulatory environment, as well as ensure better coordination and capacity for implementation from national to local levels.

The key drivers: The Framework highlights six 'key drivers', those critical catalysts, game-changing actions and investments that will be required across a number of objective areas to support adoption of CSA at scale. These are: (i) Targeted research; (ii) Information and communication technology (ICT); (iii) Engaging the private sector; (iv) Harnessing the youth; (v) Innovative finance; and, (vii) High quality extension.

Implementation plan: The Framework has outlined an implementation plan that lays out the following:

(i) The institutional structure that will drive implementation and coordination: The implementation of the CSA Framework will be driven and coordinated by three main bodies – an inter-ministerial, multi-stakeholder National CSA Steering Committee, a Technical Working Group, and a CSA Unit to be housed within The Ministry of Lands, Agriculture and Rural Resettlement (MLARR).

(ii) Provincial and District CSA Committees will also ensure local level coordination.

(iii) The roles and responsibilities of key stakeholders: Key stakeholders are segmented into three tiers to emphasise the level of their involvement, responsibility, and accountability for delivering the objectives of the CSA Framework.

(iv) The plan of action: This presents a plan for implementation of the Framework, it also informs a better understanding of Monitoring Evaluation and Learning (ME&L) frameworks for specific CSA investments that are expected to be developed on a case by case basis as part of program designs.

The Plan of Action for implementing the Framework has been organised into five Phases that include: (i) Phase 1: Inception; (ii) Phase 2: Institutional Setup; (iii) Phase 3: Planning and Program Conception; (iv) Phase 4: Resource Mobilisation; and, (v) Phase 5: Program Implementation.

"Climate change is inducing changes in rainfall patterns, and more severe and frequent extreme weather events such as droughts and flooding that are worsening the challenges already being faced by millions of farming households across the country.

Unless urgent action is taken to address the threat posed by climate change, Zimbabwe's commitment to ending hunger, malnutrition and poverty will be undermined.

1 Introduction

1.1 Background

Agriculture contributes more than 15% of Zimbabwe's GDP and 40% of export earnings. The sector has strong linkages with agro-based industries and service sectors that supply inputs and utilise its output as raw materials. More than 70% of the national population live in rural areas where crop and livestock farming are the dominant economic activities. The sector is characterised by low inputs - low output, climate sensitive rain-fed systems, particularly among the smallholder farmers. Climate change is already inducing changes in rainfall patterns, and more severe and frequent extreme weather events such as droughts and flooding that threaten to deepen the challenges already being faced by millions of farming households across the country. Unless decisive action is taken to build resilience of the agricultural sector, food insecurity and poverty are set to worsen.

Supporting a transition of current farming systems towards climate resilience is a key priority. Effective response measures are urgently required to sustainably increase productivity, food security and incomes, while building the adaptive capacity and resilience of farming systems. Climate Smart Agriculture (CSA) is foremost among the approaches to tackle the threats from a changing climate in the agricultural sector.

The CSA Framework is a 10-year national strategy intended to guide, coordinate, and facilitate climate smart investments in the agricultural sector. It highlights the climate risks, vulnerabilities and associated impacts on agro-ecosystems, as well as promising options for climate smart investments to counter the effects of climate change. The Framework draws from the experiences and lessons emerging from more than two decades of researching, piloting and promoting Conservation Agriculture (CA) in Zimbabwe and other countries in the region. To set the scene, a detailed Situation Analysis (Section 2) is presented situating CSA within the national and global developments around agriculture and climate change, as well as summarising key lessons for the way forward. The alignment of the Framework with the Regional Agricultural Policy and the continental Comprehensive African Agriculture Development Program (CAADP) processes is contained in Section 3 while the Scope, including the definitional aspects of CSA is presented in Section 4, with the Strategic Vision and Objectives of the Framework outlined in Section 5. The priority areas of CSA investment under each objective and result area are outlined in detail in Section 6. Key Drivers for the Framework are presented in Section 7 while the Implementation Plan and a Monitoring and Evaluation Framework are presented in Sections 8 and 9 respectively.

1.2 Alignment with national and regional policies and priorities

Key requirements for an enabling policy environment to promote climate-smart smallholder agricultural transformations is greater coherence, coordination and integration between climate change, agricultural development and food security policy processes. Climate smart agriculture in Zimbabwe will be driven through the climate change policies at the national level as expressed through the National Adaptation Plans (NAPs) and the Nationally Appropriate Mitigation Actions (NAMAs) as well as the national or regional climate change policies and strategies. The CSA Framework is aligned to the national economic blue print – Zimbabwe's Agenda for Socio-Economic Transformation (ZIM-ASSET) and the National Climate Change Response Strategy and the recently completed National Climate Policy. Within the agricultural sector, the CSA Framework is informed by the Comprehensive Agriculture Policy Framework (2012-2032), which outlines the sectoral policy thrust. The Framework also complements and operationalises Zimbabwe's Nationally Determined Contributions (NDCs) submitted to the UNFCCC under the Paris agreement which clearly identifies CSA as one of the key response measures. Regionally the CSA Framework also gives traction to key elements of the CAADP and the 23rd Ordinary African Union Assembly's 2013 Malabo Declaration on Climate Change and Agriculture.

1.3 The process of preparing the CSA Framework

After more than two decades of research, testing and promotion of CA, the need to embrace CSA as a broader approach to improving climate resilience in agriculture systems was clear. The CSA Framework builds on the success of the five-year CA upscaling Framework (2010-2015) and is informed by lessons from both national and regional initiatives. The drafting of the CSA Framework was spearheaded by The Ministry of Lands, Agriculture and Rural Resettlement (MLARR) in close consultation with the Ministry of Environment, Water and Climate (MEWC). The scope and content of the Framework was guided by extensive multi-stakeholder consultations, field engagements with farmers and practitioners as well as experiences from similar programs in the region.

2 Situation Analysis

2.1 The Global and local context

Unprecedented global cooperation on climate change

The CSA Framework coincides with a time of unprecedented global attention and cooperation on climate change. The Paris Agreement signed in 2015 commits the global community to a shared set of ambitious actions to tackle climate change. This long awaited binding global agreement commits to a common goal of limiting global warming to "well below 2 degrees Celcius compared to pre-industrial levels" and outlines mechanisms to avoid the worst impacts of climate change. One of its three objectives is "to pursue a transformation towards sustainable development that fosters climate resilient and low greenhouse gas emission societies and economies, and that does not threaten food production and distribution". Importantly, the agreement includes clauses that "recognize the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change". Zimbabwe's NDCs submitted as part of the commitments to the Paris Agreement strongly highlight both the vulnerability of the agricultural sector as well as its central role in both climate change adaptation and mitigation (see Box 1). Coordinated efforts at the national levels, through alignment of supportive legislative structures will contribute towards the regional targets as outlined in the SADC Regional Agricultural Policies.

Box 1: Highlights of Zimbabwe's NDCs

Zimbabwe commits to promoting adapted crop and livestock development and CSA practices through the following interventions:
- Strengthening capacities to generate new forms of empirical knowledge, technologies (including CA) and agricultural support services that meet climate challenges.
- Promoting the use of indigenous and scientific knowledge on drought tolerant crop types and varieties and indigenous livestock that are resilient to changes in temperatures and rainfall.
- Developing frameworks for sustainable intensification and commercialization of agriculture at different scales across agro ecologies.

Building resilience in managing climate related disaster risks such as droughts by:
- Strengthening early warning systems on climate related agricultural risks.
- Developing and sustaining an integrated approach in all sectors of the economy to reduce impacts of climate extreme events.
- Promoting climate indexed insurance solutions and enabling market frameworks.

Strengthening management of water resources and irrigation in the face of climate change by:
- Promoting and supporting water harvesting as a climate change adaptation strategy.
- Developing, rehabilitating and maintaining surface and groundwater resources.
- Strengthening and intensifying monitoring systems for hydro-meteorological parameters.
- Promoting efficient water use practices in the economy.
- Strengthening institutional capacity, research and extension for integrated water resources management.
- Strengthening biodiversity conservation management and integrity of natural ecosystems to adapt to climate change.
- Strengthening water and moisture conservation initiatives.

Promoting practices that reduce risk of losses in crops, livestock, and agricultural incomes by:
- Building capacity to conduct comprehensive vulnerability assessments and develop appropriate response models.
- Strengthening the capacity of the national meteorological and hydrological services to provide climate data timely.

Cross sectoral adaptation efforts such as:
- Promoting capacity building through research and development, education and awareness, and training in climate change related issues.
- Mainstreaming gender responsive climate policies and emphasise special efforts to support vulnerable groups (women, youth, and children) in climate change adaptation efforts within all sectors of the economy.

Building the capacities and support communities towards a diversification of livelihoods and shifts from agriculture into other sectors, where needed.

Renewed attention on ending hunger and poverty

The challenge of ending hunger, malnutrition and poverty is firmly on the local and global agenda. Achieving these targets as set out in the Sustainable Development Goals (SDGs) and ZIM-ASSET is a top priority of the Government of the Republic of Zimbabwe. The SDGs has set an agenda for achieving global food security and to eliminate hunger, malnutrition and poverty in all their forms everywhere by 2030. Similarly, achieving food security and nutrition is a key priority of ZIM-ASSET. As expressed in the Comprehensive Agriculture Policy Framework (2012-2032), Zimbabwe's vision for agriculture is "a prosperous, diverse and competitive agriculture sector, ensuring food and nutrition security significantly contributing to national development". Among the key challenges, the policy framework cites low productivity and incomes associated with the low level of skills among farmers, limited access to high quality inputs, irrigation infrastructure, equipment and machinery, poor linkages with suitable financial and product markets, recurring droughts, wildfires and insufficient regulatory frameworks for managing imports and lack of transparency in contract farming.

Box 2: SDGs related to agriculture and climate change

Goal 1: No Poverty - End poverty in all its forms everywhere;
Goal 2: Zero Hunger - End hunger, achieve food security and improved nutrition and promote sustainable agriculture;
Goal 13: Climate Action - Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.

Increasing threat from climate change

Agriculture is the most climate-sensitive sector given its direct dependency on climate variables. There is ample evidence that climate change is already having a significant impact on Zimbabwe's agricultural sector, as is the case in many other parts of Southern Africa where rain-fed production systems dominate (see Annex 2). Climate change mostly affects agriculture through three main drivers: (i) temperature increases; (ii) changes in the rainfall patterns, particularly in terms of total rainfall amount and its distribution, and season length; and, (iii) increasing frequency and intensity of extreme events such as droughts and flooding. Across much of Zimbabwe, increases in average temperatures of 0.5 - 1 degrees Celcius have been recorded over the last century. A further increase of 2 to 3 degrees Celcius is projected by the turn of the century[1]. Zimbabwe's NDCs (2015) highlight the modest downward trends in total and mean summer rainfall (see Box 3). Changes in intra-seasonal rainfall characteristics such as onset, duration, dry spell frequencies, and rainfall intensity are also noted. The country has experienced an increase in hot days, hot nights, and hottest days and a decrease in extreme cold days and cold nights in recent decades. Projections of mean monthly temperature show an average warming of around 2 degrees Celcius by 2080. Significant decrease in annual precipitation of between 50 and 200 millimetres is also expected in many parts of the country within the next two decades. These changing patterns are projected to result in a 20-25% shortening of the growing season in the low-lying areas of Southern Zimbabwe, making maize production virtually impossible. Generally, yield losses as high as 50% are expected in the Western and Southern regions. Unfortunately these areas are already characterised by marginal growing conditions.

[1] International Food Policy Research Institute (2010)

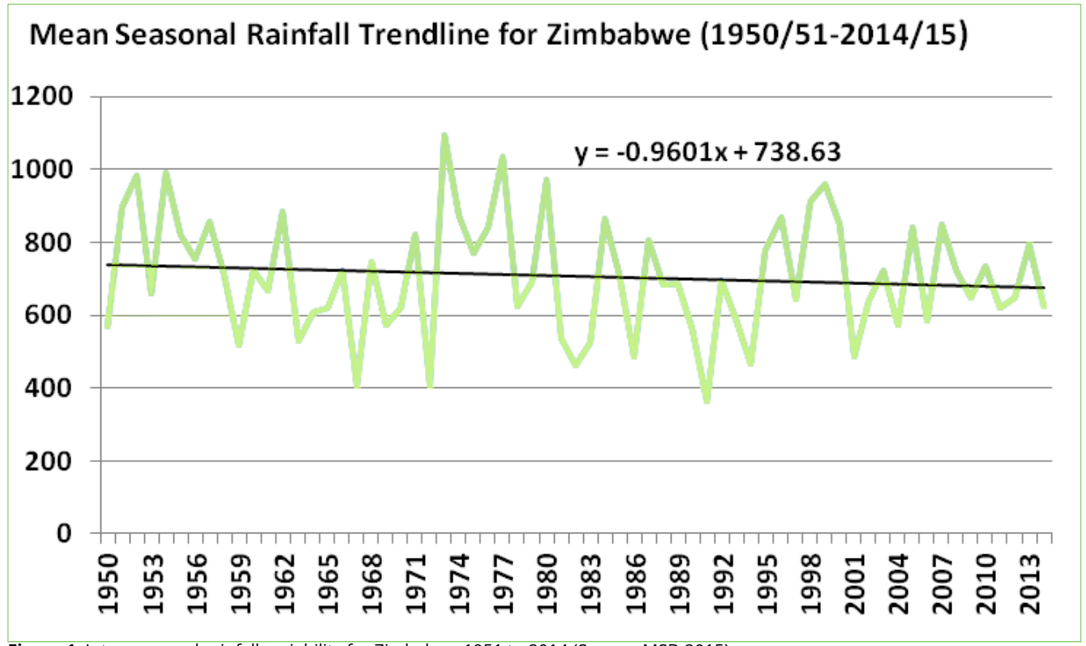


Figure 1: Inter seasonal rainfall variability for Zimbabwe 1951 to 2014 (Source: MSD 2015)

Climate change is also linked to the increasing frequency and intensity of extreme weather events such as droughts, heat waves, heavy precipitation and associated flooding. Of all the climate-related hazards, drought tends to be the most common hazard in Zimbabwe, especially in the Western and Southern regions. In its Fourth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) concluded that there is a 90% probability that the extent of drought-affected areas will increase. Although the relationship between climate change and the El Niño – Southern Oscillation (ENSO)[2] phenomenon is still not conclusive, there is ample evidence to suggest that the intensity and frequency of the El Niño is worsening as the climate changes. Zimbabwe has been struck by five major droughts in recent decades: in 1991-1992, 1994-1995, 2000-2001, 2005-2006 and 2015-2016; all linked to the occurrence of El Niño. Community participatory climate risk analysis conducted for Chiredzi district revealed that drought is the most important climatic hazard and five types of drought are normally experienced in the district: early season-characterized by delayed or slow onset of the rains; mid-season-rains break for weeks on end about January/February; terminal-rains terminate from about January/February); seasonal-rains are light and patchy throughout the season; and extreme drought-in this case rains fail for two or more consecutive seasons[3].

Floods have become more frequent in recent decades. These are caused by several factors, such as high rainfall intensity falling over generally flat terrain, rivers bursting their banks, dam breaks and back flow. Tropical cyclones have also become one of the major concerns in many parts of the country and the rest of Southern African region due to their devastating winds and flooding.

Farmers face the worst impacts of climate change

The majority of Zimbabwean farmers depend on climate sensitive rain-fed agriculture. Low asset endowments, poor access to finance, inconsistent linkages with markets for produce and weak public extension support severely limit their capacity for adaptation, placing them at disproportionately high risk from a changing climate. A combination of erratic rainfall, rising temperatures and more intense and more frequent extreme events are worsening the food security and poverty status of millions of farmers, threatening to reverse the gains that have been achieved over many decades. The acknowledgement of the magnitude of the challenge, the required pace and scale of response measures, coupled with honest introspection on past performance, has prompted the need for a radical shift in approaches for delivering climate smart solutions.

[2] The ENSO cycle refers to the coherent and sometimes very strong year-to-year variations in sea- surface temperatures, convective rainfall, surface air pressure, and atmospheric circulation that occur across the equatorial Pacific Ocean. El Nino and La Nina represent opposite extremes in the ENSO cycle. El Nino refers to the above-average sea-surface temperatures that periodically develop across the east-central equatorial Pacific, bringing drier conditions to southern Africa but higher rainfall and floods to the Horn of Africa. It represents the warm phase of the ENSO cycle, and is sometimes referred to as a Pacific warm episode. La Nina refers to the periodic cooling of sea-surface temperatures across the east-central equatorial Pacific. It represents the cold phase of the ENSO cycle, and is sometimes referred to as a Pacific cold episode.

[3] Unganai et al., 2015

Global consensus on Climate Smart Agriculture

Climate smart agriculture is foremost among the approaches to tackle the threats from a changing climate in the agricultural sector. This term has been formally defined by the Food and Agriculture Organization of the United Nations (FAO) as consisting of three components: (1) sustainably increasing agricultural productivity and incomes; (2) adapting and building resilience to climate change; (3) reducing and/or removing greenhouse gases emissions, where possible (FAO, 2013; p.ix). The Global Alliance for Climate Smart Agriculture (GACSA) is a multi-stakeholder coalition promoting the incorporation of CSA approaches within food and agricultural systems (United Nations, 2014). Its African affiliate, the Africa Climate Smart Alliance (ACSAA), has committed to up-scale the adoption of CSA approaches, targeting 25 million smallholder farmers in Sub-Saharan Africa by 2025 (ACSAA, 2014). There is also a general regional consensus on CSA practices and technologies as outlined in the SADC Regional Agricultural Policy. In Zimbabwe many governmental and non-governmental entities have now adopted CSA as their main approach to tackling climate change in agriculture.

Climate smart agriculture is an approach to doing agriculture differently. While it shares the objectives and guiding principles of well-known approaches to agriculture-such as sustainable intensification, integrated land use management, ecosystem based management, landscape management, conservation agriculture, agro-ecology, eco-efficiency, and green growth-CSA includes processes of transforming the support environment to deliver desired objectives. Climate smart agriculture addresses wider challenges with a clearer focus on climate risks and food security. Climate-smart approaches entail a greater investment in managing climate risks and understanding and planning for adaptive change. As such, CSA is a holistic concept that brings together a number of agricultural development objectives, as well as other global development objectives, covering environmental, social and economic issues. It informs decisions and practices both on-farm and beyond the farm-in research, technology, policy-making and finance. Climate smart agriculture therefore focuses on those practices, technologies, tools, policies, partnerships and support services required by farmers to sustainably increase productivity, build the resilience of their production systems, and reduce emissions where possible.

Acknowledging the importance of CA, the GoZ launched a CA Implementation Framework in 2012, aiming to reach 500,000 farmers on at least 250,000 hectares and a target yield of 1.5 tonnes per hectare. Increased interest by the Zimbabwean government has seen budget allocations for CA for the first time during the 2010/2011 agricultural season and these allocations are on-going. The governments' extension department (AGRITEX) has supported CA demonstrations across the country and CA issues have been included in the annual National Crop and Livestock Assessment. A CA module for colleges delivering the Diploma in Agriculture was launched in October 2010.

CA Strategic targets: To have at least 500 000 farmers using CA practices on 250 000 ha of land with average yield 1.5 t/ha by 2015

Priority areas:
- Harmonization of CA promotion
- Promotion of different CA options to accommodate farmers in different farming sectors
- Resource mobilization
- Training of extension staff in mechanized CA
- Mainstreaming CA in curricula of learning institutions

Figure 2: Conservation Agriculture Upscaling Framework (2010 – 2015). Source: MLARR, 2010. Conservation Agriculture Upscaling Framework 2010-2015. Harare

Building on the successes of Conservation Agriculture

Conservation agriculture has emerged as one of the most promising and widely adopted CSA practice in the country. Although CA is just one of the many available CSA practises, there is growing consensus in Zimbabwe and in the region that CA has significant positive impacts on food security and incomes of farmers in the face of a changing climate (see Annex 3; p. 65). Through the application of the three main principles of reducing soil disturbance, maintaining a permanent soil cover, and practising crop rotations; CA improves the soil's physical, chemical and biological properties and reduces soil erosion while increasing water infiltration and moisture retention. As such the practice has major advantages in dealing with the common challenge of moisture stress caused by dry spells during the growing season. CA has been shown to improve drought tolerance for crops, increasing yields and encouraging diversified cropping systems that increase overall resilience of the farming system. Reduced tillage in CA systems also cuts costs and labour requirements associated with ploughing and enables more timely planting, a key advantage given the shorter growing seasons now experienced in most parts of the country.

Estimates from 2015/2016 suggest that more than 300,000 households are currently practicing CA (Figure 3), which is close to a third of the communal farmers, but the area under CA is under 150,000 hectares constituting about 5% of total area under cultivation. A number of studies have confirmed significant increases in maize yields under CA (see Annex 3: p. 65).

Despite the progress in promoting uptake of CA by governmental and non-governmental entities across the country, many challenges remain. Key among the factors undermining the adoption of CA is the limited access to finance for purchase of complementary implements and inputs, a lack of adequate extension support, and marketing bottlenecks that discourage meaningful investment. Many of the lessons from implementing CA in different settings are vital in shaping the strategy for the transition to CSA in the coming years.

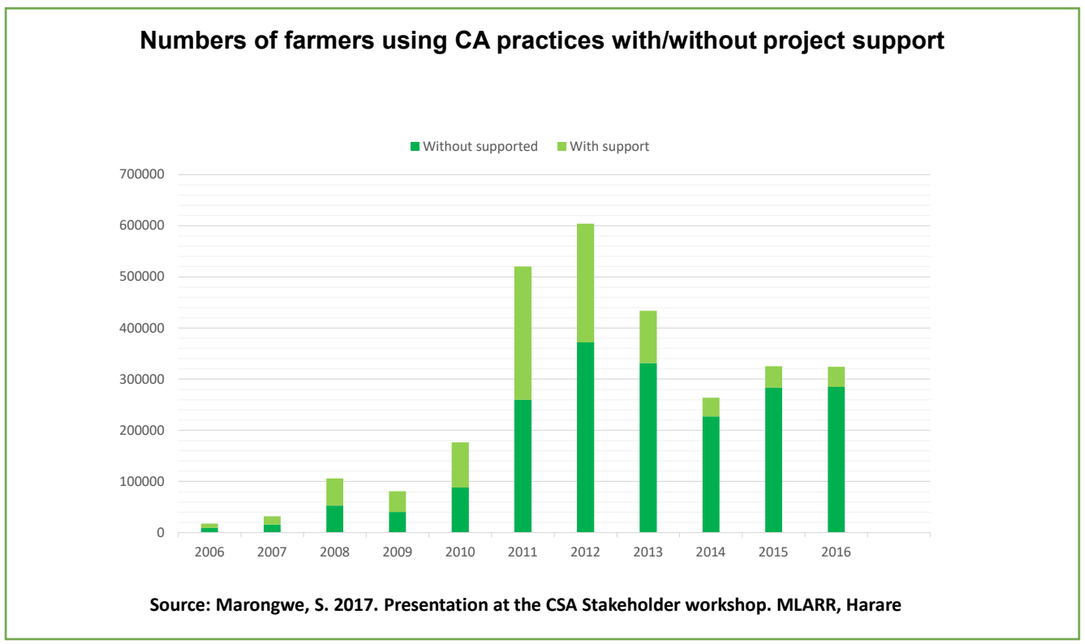


Figure 3: Trends in the CA adoption

2.2 Some Lessons for the way forward

Complex systems, diverse contexts, multiple pathways

The complexity of rural development in Zimbabwe (and other developing countries), particularly agricultural transformation is now widely appreciated and well documented. Many practitioners have realised that there are no 'silver bullets' such that multiple pathways pursued together with multiple stakeholders and partnerships at various scales are often required to drive sustainable change. The transition to CSA will have to embrace the same complexities that necessitate a systems approach. The diverse contents also mean that what is climate smart in one part of the country is not climate smart everywhere. These specificities call for a better understanding of climate risks at the micro scale, and a targeted approach to developing and prioritising CSA investments.

Achieving sustainable results at scale is the single biggest challenge

Experiences from development interventions in Zimbabwe and other countries, during the past few decades, point to the difficulty of achieving sustainable positive results at scale. Similarly, lessons from recent CSA interventions, including CA, suggest that going beyond pilot stages or isolated success stories is perhaps the single biggest challenge facing proponents of agricultural transformation. If CSA is to be successful, the design and delivery of promising technologies and practices needs to be rooted in innovative models that facilitate sustainable uptake across large numbers of farmers.

Scope for achieving CSA 'triple objectives' in agriculture - raising productivity, building resilience while reducing emissions

Many of the CSA practices have been found to offer triple benefits-they raise productivity while improving resilience of the farming system and contribute to reducing emissions. For example, soil management under CA systems aim to create carbon-rich, productive soils that retain moisture and improves overall microbial activity and overall soil health. The practice also reduces soil erosion and improves efficiency in the use of nutrients, especially nitrogen and potassium through greater precision in fertilizer application resulting in higher yields, reduced cost and lower emissions. Better soil, nutrient and water management improves yields and the resilience of the production system, while lowering cost, and many cases, also lowering levels of emissions (see Annex 3; p.65).

Box 3: Managing for 'triple wins' in CSA

Soil management practices in CSA aim to increase soil organic matter (SOM) and soil organic carbon (SOC) content, which increase the resilience of the agro-ecosystem and bring the following triple benefits: richness in carbon, lower need for chemical inputs, and sustenance of vital ecosystem functions-such as moisture and nutrient cycles. The management regimes generally require improved management of organic matter (crop residues, mulch, manure, and compost) to maintain productive soils. Exact approaches vary but many use residues such as organic mulch in combination with no-till farming and integrated and precision nutrient management (i.e. a needs based application of both synthetic and organic fertiliser). There is a diverse typology of husbandry practices that satisfy "good management" criteria, some types being-CA; integrated soil fertility management (ISFM); organic agriculture; planting basins and tied ridges; improved grazing management on pastures or rangelands; and, mixed farming, i.e. combining crop and livestock systems.

Labour demand for practices strongly linked to adoption rates

There is growing evidence that the labour demand of different CSA practises are important determinants of sustainable adoption. Mechanisation is key to reducing drudgery and labour requirements. Innovative ways of improving access to affordable and appropriate mechanisation such as equipment pooling and service provider models have been shown to enhance adoption.

Climate change is not gender neutral

Prevailing gendered divisions of labour often result in more women represented in agricultural sectors. Coupled with their disadvantaged position with respect to accessing productive resources and information needed to cope with climate risks, women often face greater difficulty in coping with climate change and variability. Women are also at particularly high risk of the negative impacts from climate change, due to the resulting intensification of their workloads. They often have to walk further to collect water and fuelwood, while also taking on additional agricultural work responsibilities when men migrate in search of off-farm work. Women's responsibilities and vulnerabilities are thus often amplified by climate change. This magnifies existing inequalities, reinforcing the disparity between women and men in their vulnerability to and ability to cope with climate change. Given these gender disparities CSA investments should be designed to prioritise the development of those agricultural value chains where gender groups such as women and youth undertake significant roles in the value chain and are direct beneficiaries. Affordable, women friendly technologies that reduce the drudgery of agricultural operations should also be a priority among climate smart solutions.

Harness the youth to drive CSA

Africa's large youthful population is both a challenge and an opportunity. Zimbabwe is similarly faced with the paradox of staggering youth unemployment and an aging farming population. Creating accessible and rewarding opportunities for youths to enter the agricultural sector is a key part of the solution to both agricultural transformation and solving widespread unemployment.

The technology and information driven nature of CSA means that the required transition will have to be built on a relatively youthful generation of farmers with higher literacy and capacity for rapidly gaining the necessary technical and business acumen.

Inclusive business models build resilience across value chains

Climate change presents both farmers and agribusinesses with risks (and opportunities) that affect their operations, their competitiveness, and their profitability. Many of the risks and opportunities are shared. Increasingly, proactive agribusinesses now acknowledge these as 'shared imperatives' which can only be tackled jointly with those who also face them. They are investing in innovative, mutually beneficial and commercially sustainable solutions for addressing shared climate risks in ways that unlock value for all involved, while building the resilience of key players such as farmers who otherwise have limited resources for such investments. There are examples of win-win outcomes from private sector investments that unlock access to technology (e.g. drought tolerant seed varieties and livestock breeds), finance, off-take markets, information, insurance and other risk management tools that build resilience of smallholder farmers. By helping farmers increase productivity, stabilize yields, improve quality of products, reduce production costs, and transfer risk (through insurance), such investments are concurrently helping businesses stabilize supply (or demand in the case of input suppliers), increase trade volumes and capacity utilisation, access better quality products, lower transaction costs, and minimise contractual defaults while building trust and a better understanding of the smallholder context. Benefits go beyond farmers and businesses. Governments and aid agencies are benefiting from reduced need for safety nets and disaster recovery costs. New commercial opportunities have also emerged for service providers involved in supporting implementation. This approach is built on the rational self-interest of both businesses and farmers, and this is proving to be the game changer in addressing the challenge of scaling-up and sustaining climate change response measures.

Mobile and digital technology driven solutions

The last decade has witnessed an exponential growth of mobile and digital technologies that are fuelling innovation, new market dynamics and improving efficiency of delivering financial, communication and risk management solutions to farmers. These innovations are redefining development models and empowering smallholder farmers with new, powerful communication tools, and facilitating more productive interactions and financial transactions among actors across agricultural value chains. With the rapid growth of digital payments, including mobile money, Zimbabwe is ahead of most African countries in embracing the tools for a new financial infrastructure that fits the needs of rural households, providing them with the financial tools necessary to manage climate risks and seize economic opportunity.

Catalyse systemic change to sustain impact through private sector engagement

This Framework seeks to promote a shift away from previous project based approaches that have focused (at significant cost) on very localised and isolated solutions that benefit only small numbers of farmers and do not go to scale. Engaging private sector players is one promising model that provides scope for scale-up if/when those partners realise the commercial opportunity of more CSA innovations. The private sector offers 'scale agency' where project and/or government-led initiatives have struggled. Skilful coordination across ministries, different levels from national to local, with agribusiness and service providers, farmers and NGOs.

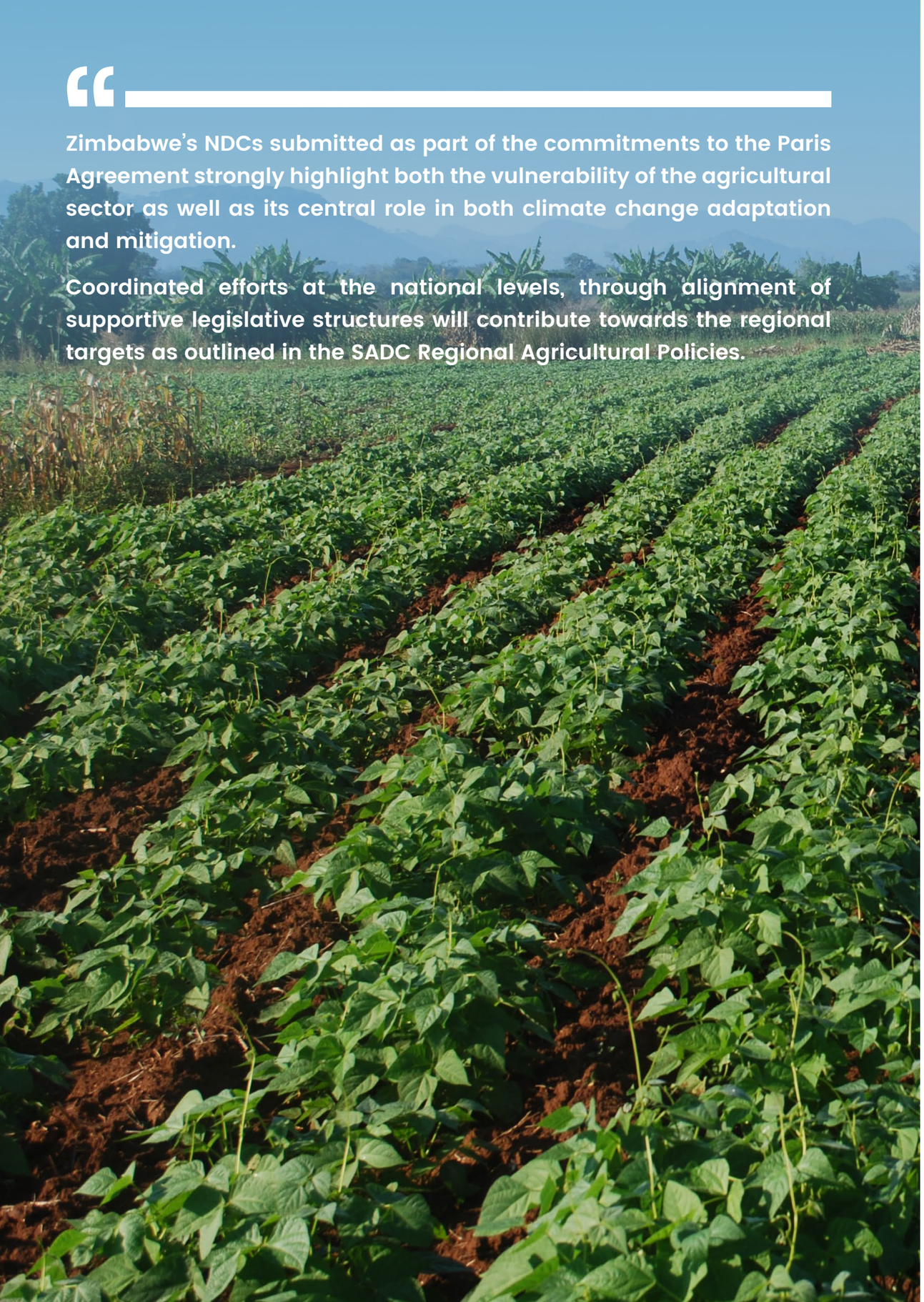
Start with managing current climate risk

This CSA Framework is founded on the principle of managing current climate variability as the best indicator of the ability to manage future variability. Many of the technologies to implement that already exist.

Prioritise no-regret options[4]

No-regret interventions that address current climate risk while building resilience regardless of how future climate trend turn out is equally a key principle underpinning adaptation program design.

[4] No regret options are adaptation investments which are beneficial to farmers regardless of how the climate turns out in the future. Examples include a shift to renewable energy, water-efficient irrigation systems, improved soil and water management etc



> **Zimbabwe's NDCs submitted as part of the commitments to the Paris Agreement strongly highlight both the vulnerability of the agricultural sector as well as its central role in both climate change adaptation and mitigation.**
>
> **Coordinated efforts at the national levels, through alignment of supportive legislative structures will contribute towards the regional targets as outlined in the SADC Regional Agricultural Policies.**

3 Alignment of the Zimbabwe CSA Framework with the Regional Agricultural Policy and SADC regional policy frameworks

3.1 Introduction

The formulation of the Zimbabwe CSA Framework as set up, offers an excellent opportunity for the country to harmonise and contribute to the policy priority areas within the provisions of the SADC Regional Agricultural Policy Framework. The Zimbabwe CSA Framework is intended to operate within the SADC regional policy context, specifically the SADC Regional Agricultural Policy, its climate change-related elements and how it is aligned to SADC Regional Agricultural Policy and contributing to the overall SADC regional goals and objectives.

3.2 Relevant regional policy frameworks

The implementation of CSA framework will directly contribute to and be aligned to the SADC Regional Agricultural policy, which is one of the regional frameworks most important to agriculture, all under the revised Regional Indicative Strategic Development Plan (RISDP) (SADC 2015a), which is the guiding SADC policy framework outlining the regional integration agenda. Others being the Regional Agricultural Investment Plan (RAIP) (SADC 2014a, 2014b, 2016), as well as the Climate Change Strategy and Action Plan 2015-2030 (CCSAP) (SADC 2015b), Regional Green Economy Strategy and Action Plan for Sustainable Development (2014c) and Food and Nutrition Security Strategy 2015-2025 (SADC 2014d. The RISDP provides strategic direction to all SADC activities with its priority areas including environment and sustainable development, research and development, private sector promotion and sustainable food security.

The framework will similarly contribute to the CAADP, Africa's policy framework for agricultural transformation, where Zimbabwe as one of the countries, is expected to pledge to allocate at least 10 % of public resources to agriculture. The SADC Regional Agricultural Policy (RAP) is the basis for the Regional CAADP Compact, implemented in five-year cycles, the RAIP operationalises the first phase of SADC RAP.

As the Zimbabwe CSA Framework aligns itself to the SADC RAP, it also contributes to the realisation of this SADC policy, which provides a framework for harmonisation of agricultural policies with four specific objectives: (i) Enhance sustainable agricultural production, productivity and competitiveness; (ii) Improve regional and international trade and access to markets of agricultural products; (iii) Improve private and public sector engagement, investment in agricultural value chains; (iv) Reduce social and economic vulnerability of the region's population in the context of food and nutrition security and changing economic and climatic environment. The RAIP prioritises investment areas and promotes regional collaboration that stimulates agricultural production, trade, and sustainable natural resource use.

3.3 Domestication of regional policies in national policy frameworks

The CSA Framework creates an opportunity for the realization and fulfilment of the mandates of member states' role in the development of national policies or strategies with SADC taking the role of harmonisation of national policies, strategies and programmes as a cornerstone of the SADC goal of regional integration and development. Policy coordination aims to support the alignment of national policies, strategies and programmes with regional frameworks. This forms part contribution to Zimbabwe's commitment to harmonisation[5] and standardisation of policy processes. The domestication of regional policy instruments aims to ensure a harmonised approach to regional economic development and integration. The SADC RAP creates an enabling environment for member states to explore harmonisation and domestication. The alignment of national agriculture policies and strategies to the SADC RAP in general and the climate change related elements in particular is key to ensuring sustainable agriculture development in the SADC Region in light of the challenges posed by the impacts of climate change. Thus, the development of the Zimbabwe CSA Framework offers an opportunity for the country to harmonise the policy priority area within the provisions of the RAP. The framework interfaces with the climate-change related content of the RAP in significant ways, offering the potential for synergies. In this regard, promoting alignment and cooperation between the Zimbabwe CSA Framework and the SADC RAP is essentially maximising synergies.

[5] Harmonisation refers to an agreement on the manner in which each member state designs and implements particular national policy instruments in support of the regional agenda.

3.4 The climate change related elements of the SADC Regional Agricultural Policy, the RAP Results Framework and the Regional Agricultural Investment Plan

1. Regional Agricultural Policy (RAP)

The RAP prioritizes climate change impacts in agriculture in two policy statements operationalised in the RAP results framework (next section) based on the need to focus on interventions strengthening the resilience of smallholder producers' livelihoods, strengthening national systems to major food security shocks/disasters, adaptation and mitigation to climate change and variability as well as fostering a unified regional response to climate change, and a coordinated mechanism to benefit from the carbon markets for environmental services, sequestering carbon in forests and land and preserving biodiversity.

These are: (i) SADC support Member States to enhance and adapt, where relevant, their respective national vulnerability reduction strategies and plans including contingency plans and associated instruments, with proposed interventions including; Complementing national initiatives and focusing on cross-border threats that require a coordinated regional response; Enhancing adaptive capacities of all relevant sub-sectors of the agriculture sector; Supporting and coordinating decision making and strategic development processes at regional and national levels to strengthen the related regional information, monitoring and analysis package/systems and network of national systems; (ii) SADC support measures to improve the region's capacity to adapt to and mitigate climate change and variability, with proposed interventions including; Strengthening regional research in developing appropriate adaptation strategies for climate variability and change in the agriculture sector; Developing capacity for carbon stock inventory and analysis with a view to enabling the agriculture sector to benefit from carbon trading; Promoting R&D on climate change and variability data and information generation and dissemination for the provision of early warning information to farmers; Promoting the adoption and incorporation of sound environmental impact mitigation measures in national and regional agricultural policies and programmes; Ensuring the effective engagement and participation of the agriculture sector in the international dialogue on climate change; and Supporting SADC Member States to achieve their own climate change policies, strategies and programmes.

2. RAP Results Framework

As mentioned above, the RAP Results Framework operationalises the RAP policy statements with immediate outcomes and targeted outputs formulated in the RAP Results Framework, with those directly relevant to climate change within agriculture being:

- 4A.2 Improved environmental management and sustainable use of natural resources
- 4A.2.4 Clean and low carbon agriculture production promoted
- 4A.2.5 Policy guidelines on production of bioenergy and other clean energy technologies developed and implemented
- 4A.2.7 Conservation of biological diversity both on farm and off-farm promoted
- 4A.3 Improved capacities on climate change adaptation and mitigation
- 4A.3.1 Regional climate change response strategies and programmes developed and implemented
- 4A.3.2 A mechanism for financing demand driven research on CC adaptation and mitigation established
- 4A.3.3 Capacity development programmes in CC adaptation and mitigation targeted at regional and national public and private institutions supported
- 4A.3.4 Mechanisms for accessing Carbon Trade Finance developed and promoted
- 4A.3.5 Knowledge of regional and national policy makers and stakeholders on CC mitigation and adaptation increased.

3. Reporting

The objectives of the CSA framework contribute to the regional agricultural policy priorities and fall within the RISDP outcome indicator of Increased production, productivity and competitiveness of crops, livestock, forestry, fisheries and wildlife to support trade, industry and food security in the region within the Strategic objective; Improved human capacities for socio-economic development as part of member states' commitment to domesticate RAP and other harmonized policies and programmes on agricultural development.

4. Regional Agricultural Investment Plan (RAIP)

Both the CSA Framework and the RAIP elaborate on the SADC Regional CAADP Compact. The RAIP provides priority programmes until 2022 with climate change relevance, including specifically:

Programme 1: Increase Agricultural Production, Productivity and Competitiveness

Programme 4: Reduce Social and Economic Vulnerability.

"The Zimbabwe CSA Framework is intended to operate within the SADC regional policy context, specifically the SADC Regional Agricultural Policy, its climate change-related elements and how it is aligned to SADC Regional Agricultural Policy and contributing to the overall SADC regional goals and objectives.

4 Scope of the CSA Framework

The CSA Framework guides a national response to the challenges brought by climate change on the agricultural sector and aligns this to the regional response as outlined within the RAP. The Framework describes the current situation and constraints, gives the broad goals and objectives and detailed response measures and an implementation plan for driving a transition to CSA for the country. The Framework guides interventions at two levels; the institutional level to create an enabling environment for Climate Risk Management (CRM) in the agricultural sector; and the practical level to promote, facilitate, and support investments that drive a transition to CSA.

4.1 Definition of climate smart agriculture

This Framework document defines CSA as an integrative approach to addressing the interlinked challenges of food security and climate change, that explicitly aims for three objectives: (i) sustainably increasing agricultural productivity to support equitable increases in farm incomes, food security and development; (ii) adapting and building resilience of agricultural and food systems to climate change at multiple levels; and, (iii) reducing and/or removing greenhouse gases emissions, where possible. This is in line with leading agricultural development agencies such as the FAO[6] and the Consultative Group on International Agricultural Research (CGIAR).

CSA is understood as an approach to doing agriculture differently. While it shares the objectives and guiding principles of many well-known approaches to agriculture-such as sustainable intensification, integrated land use management, ecosystem based management, landscape management, CA, agro-ecology, eco-efficiency, and green growth-CSA includes processes of transforming the support environment to deliver desired objectives. In addition, CSA addresses wider challenges with a clear focus on climate risks and food security. Climate-smart approaches entail a greater investment in managing climate risks and understanding and planning for adaptive change. As such, CSA is a holistic concept that brings together a number of agricultural development objectives, as well as other global development objectives, covering environmental, social and economic issues. It informs decisions and practices both on-farm and beyond the farm - in research, technology, policy-making and finance. CSA therefore focuses on those practices, technologies, tools, policies, institutions, partnerships and support services required by farmers to anticipate, prevent (where possible) or minimise the negative impacts of a changing climate.

Box 4: Resilience building

Resilience is the capacity of individuals, households, communities, organisations or natural systems to anticipate, prevent (where possible), minimise damage, withstand, and survive the negative impacts of acute shocks or chronic stresses such as those resulting from climate change. Resilient systems are able to recover, learn, revitalise, and transform in response to such shocks. As individuals, communities, or organisations build resilience, they become better able to prevent or minimise their sensitivity to stresses and shocks they can identify and become better able to respond to those they cannot predict or avoid. They also develop greater capacity to bounce back from crises of different kinds, learn from it and achieve revitalization. Ideally, individuals and communities become more adept at managing disruption and skilled at resilience building, and are better able to create and take advantage of new opportunities in both good and bad times.

Recognising mitigation potential: While mitigation is not the primary objective of this strategy, the potential to reduce greenhouse gas emissions from agriculture (including crops, livestock, and fisheries), either in absolute terms or by reducing emissions intensity (e.g. through more efficient food production), is recognised and encouraged where it doesn't undermine broader development objectives.

[6] **FAO**. 2013. Climate-smart agriculture sourcebook (available at http://www.fao.org/3/i3325e.pdf).; p. ix

5 Strategic Vision and Objectives

5.1 Vision

The vision of this Framework is inspired by that of the current Comprehensive Agriculture Policy Framework (2012-2032), which strives for 'a prosperous, diverse and competitive agriculture sector, ensuring food and nutrition security significantly contributing to sustainable development.'

5.2 Goal

A climate resilient and rewarding agricultural system improving national food and nutrition security, and driving socio-economic development.

5.3 Outcome

The intended outcome of this Framework is 'sustainable, large-scale adoption of CSA' in Zimbabwe in response to climate change.

5.4 Objectives

To drive sustainable large-scale adoption of CSA, this Framework will facilitate investments in five key areas (herein called 'the objectives') to:

Objective 1: Improve access to, and sustainable use of CSA inputs, tools and technologies;

Objective 2: Increase the use of climate smart farm practices;

Objective 3: Improve participation in vibrant markets for farm produce;

Objective 4: Strengthen coordination, knowledge management and capacity for implementation;

Objective 5: Mainstream CSA into policy, regulatory and disaster risk management frameworks.

5.5 Results Framework

The results framework (Figure 4) presents the logical flow of activities that will be supported to expected results that drive achievement of stated objectives and ultimately the goal.

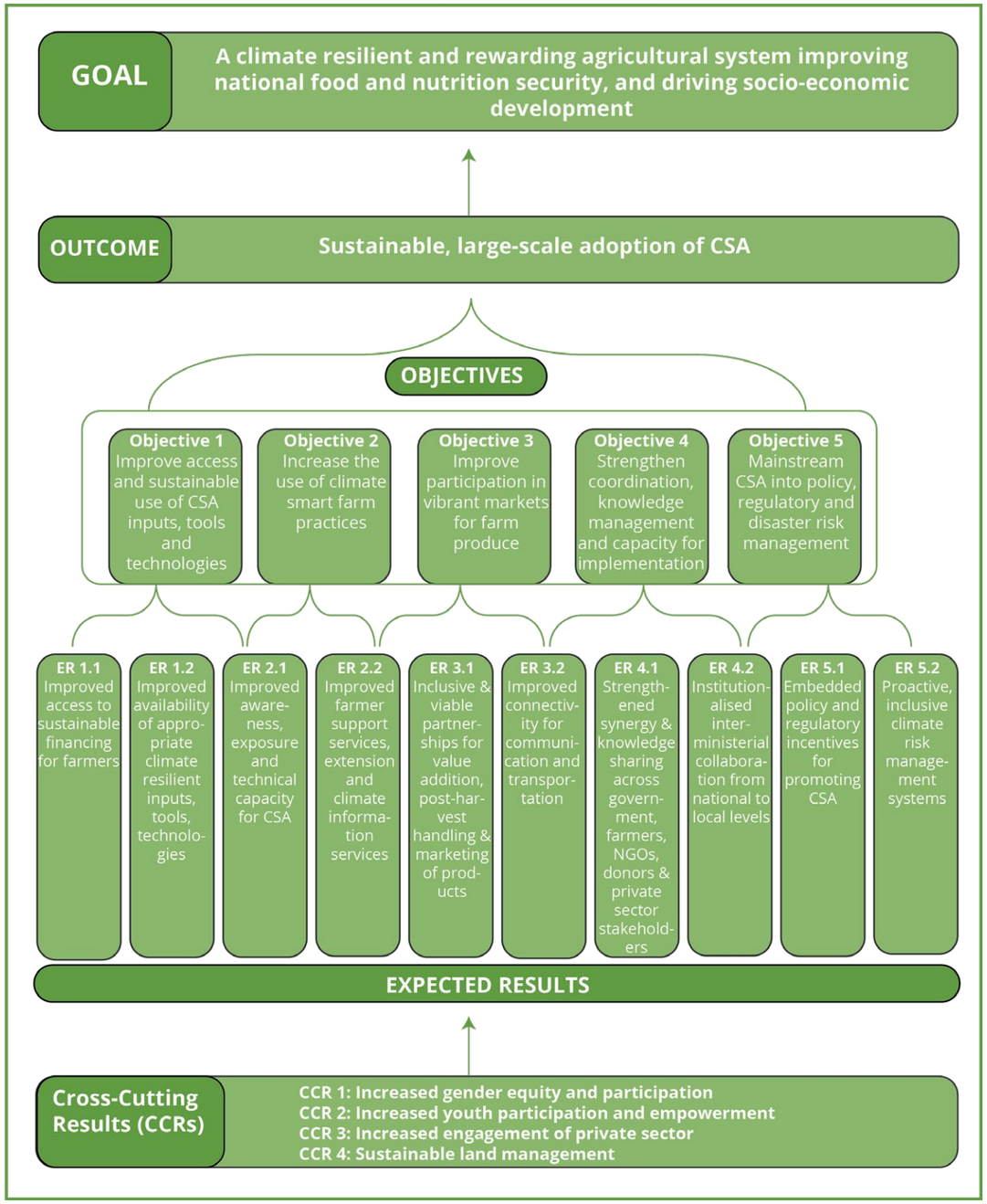


Figure 4: Zimbabwe Climate Smart Agriculture Results Framework

Activity Outcomes		
Objective 1	ER1.1	• Innovative, more inclusive models for financing farmers, including through contract farming, out-grower, cooperative/group lending, credit guarantees, government input schemes • Private sector/farmer partnerships for improving access to upfront input financing
	ER1.2	• Research/private sector/farmer partnerships for developing and testing appropriate CSA inputs, technologies and tools • Partnerships for local multiplication of proven stress tolerant seed including for food and fodder crops, trees and pastures • Drought/flood tolerant crop varieties, aquaculture • Preservation of indigenous livestock breeds • Breeding program for locally adapted but highly productive cross-bred livestock, including through Artificial Insemination (AI) • Local adaptation, mass production and after-sale support for CSA implements • Innovative models for accessing CSA implements, include through service providers • Improved fertilizer formulations (e.g. slow release, coated fertilizers, bio-fertilizer), related application methods • Low cost products/kits for: water efficient irrigation; renewable energy generations (solar, biogas, wind); on-farm food storage, drying, preservation • Cost effective products for: better pest/disease/weed management, mulching (e.g. plastic), soil testing; bio-energy generation
Objective 2	ER2.1	• Increased use of ICTs in awareness raising, training, extension support • AI training for farmers and service providers • Structured CSA training programs for farmers and service providers • Integration of CSA into formal and informal training curricular for extension officers • Establishment of local CSA study groups for farmers • Public/Private/Donor cooperation in funding extension services • Farmer/private/public/donor partnerships for showcasing CSA technologies and practices • Centres of CSA excellence (training hubs) established in each district • Training on CSA practices: CA, including improved soil, water and integrated nutrient management, weed management, diversified productions systems, integrated pest management; agroforestry; fodder production & preservation for supplementation/fattening livestock; grazing & rangeland management; energy efficiency on-farm • Precision fertiliser application, organic fertiliser use (including on-farm compost making, integration of legumes, livestock manure) • Water-smart, energy efficient irrigation systems, water harvesting, agroforestry, low cost irrigation techniques • Integrated crop-livestock systems • Diversified cropping systems, bee keeping, diverse climate risk profile • Food storage, drying, preservation, value addition • On-farm renewable energy generation (solar, bioenergy, wind, small hydro)
	ER2.2	• Public/private/donor partnerships for funding high quality extension services • On-going support for farm operations, crop/livestock husbandry • Soil maps for better farm planning, precision nutrient management (needs-based applications) • On-farm soil testing to match nutrient needs with fertiliser application rates • Artificial insemination services for farmers • Services for key farm operations (e.g. tillage, planting, weed management, harvesting, threshing) • Early warning systems and climate advisories • On-farm weather monitoring • Improved infrastructure, pest/disease control, nutrition management, stocking rate management for livestock • Interpreting seasonal patterns, timing of operations, choosing crop varieties, breeds • Market intelligence, trends, price information

Activity Outcomes		
Objective 3	ER3.1	• Private sector/farmer partnerships for marketing, e.g. outgrower schemes, contract farming • Aggregator services for commodities, including online tools • Registered/accredited area brokers for commodities • Pre-season commodity production planning and synchronisation • Improved storage (including warehouse receipt systems), value addition, post-harvest handling
	ER3.2	• Climate resilient infrastructure for communication and transportation • Physical infrastructure for marketing (e.g. for auctions), with multi-purpose functionality • Improved climate-proofed tools and platforms for communication and coordination • Weather early warning systems, mobile based information sharing tools • Local area farmer group social media networks for day-to-day and emergency functionality , connected to local authorities • Online auction systems for buyer/seller interactions, social media marketing platforms
Objective 4	ER4.1	• National CSA coordination task team, hosting regular meetings • Electronic CSA coordination platform/network, hosted by a designated entity • Government/NGO/donor CSA feedback systems through the platform, inbuilt into MOUs • National CSA map with meta data • Harmonised local CSA plans integrated into development planning • Farmer organisation for more effective partnership with other stakeholders
	ER4.2	• Inter-ministerial policy for collaboration on CSA, incentive/KPA targets system for cross disciplinary collaboration • Inter-ministerial, multi-stakeholder CSA coordination committee, at national, provincial and district level, with focal persons
Objective 5	ER5.1	• CSA recognised in key policies as the overarching climate change response framework in the agriculture sector • Fiscal incentives for CSA within relevant policies (import duty exemptions on equipment, renewable energy components, rural investment tax rebates, concessionary funding for private sector supporting CSA, feed-in tariff systems for renewable energy etc.) • Local procurement incentives (e.g. aid) • Regulatory standards on minimum guidelines for fertilizer formulations • Revised water management regulations for more efficient and inclusive allocation of surface and groundwater
	ER5.2	• Cost effective but effective options for weather information services, e.g. satellite based, mobile based systems • National insurance system to replace /compliment food aid/drought relief system and disaster risk system,(including funded by international climate finance) • Legislation and regulatory system for weather based index insurance • Public/private/donor/farmer weather based index insurance • Large-scale water harvesting/flood management infrastructure.

6 Priority Areas of CSA Investment

To give clarity and detail on how this Framework will support sustainable large-scale adoption of CSA, each of the five objectives identified in Section 5 and which are also aligned to the SADC RAP, are further outlined in this section. The rationale of each objective and how it will drive CSA adoption (the theory of change) are also outlined, including specific details and examples of activities that will be facilitated by public, private, and development stakeholders. These are given below under each of the objectives.

6.1 Objective 1: Improve access to, and sustainable use of CSA inputs, tools and technologies

Rationale

This objective details an innovation driven strategy for CSA adoption that aims to achieve sustainable increases in productivity, profitability and resilience of farming systems by improving access to, and use of, climate resilient inputs such as drought, flood, and heat tolerant seed varieties, and livestock breeds. Although there has been a significant increase in use of high yielding hybrid seed, more still needs to be done especially, the emphasis on climate resilience. There is significant potential for improving both the productivity, profitability, and the climate resilience of livestock through targeted breeding and better husbandry. Uptake of many climate smart practices has been held back by limited access to suitable and affordable implements. For instance, the small hectarage currently being put to CA has been attributed to the lack of key implements such as rippers and direct seeders that lower costs and reduce labour demand. A focus on how to improve availability and affordability of CSA tools and technologies is aimed at bridging this gap.

Theory of Change

The Theory of Change (ToC) for Objective 1 is summarised in Figure 5 below. Key among the constraints to improving sustainable access to improved seed varieties and livestock breeds is the dual challenge of high costs and limited availability of such inputs. Equally limiting is the lack of appreciation among some farmers of the benefits of high quality inputs. The CSA Framework aims to overcome these bottlenecks through three key strategies: (i) improving farmers' access to financing; (ii) improving availability of appropriate climate resilient inputs on the market at reasonable cost; and, (iii) increasing awareness, exposure, and technical capacity of farmers. Details of how the first two strategies will be executed and the expected results of such actions are outlined below under Expected Results 1.1 and 1.2. The third strategy on increasing awareness, exposure and technical capacity is further outlined in Objective 2 of Section 5.2 under Expected Result 2.1. The Theory of change is summarised in Figure 5 below.

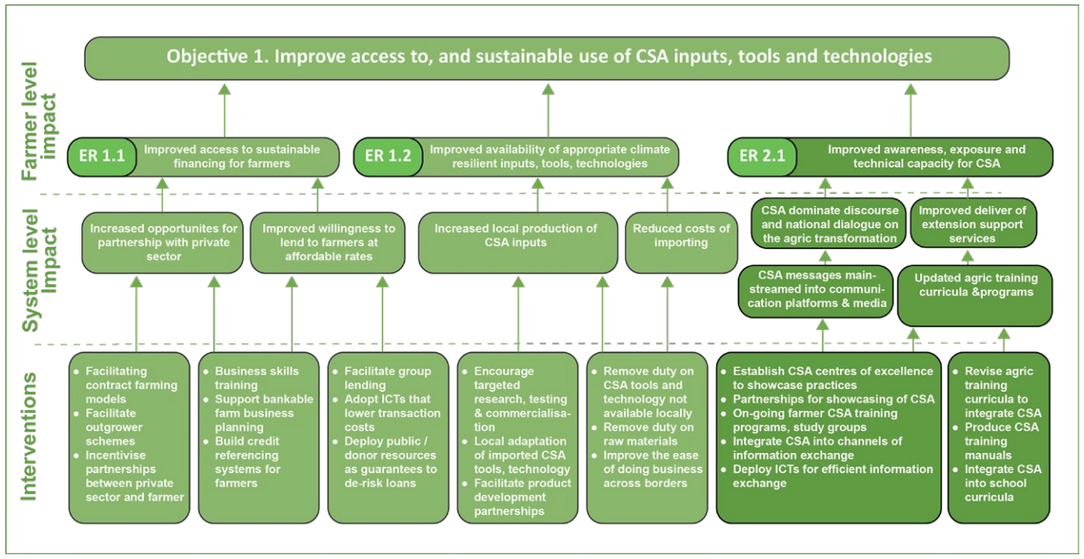


Figure 5: Theory of change: Objective 1 – Improve access to, and sustainable use of CSA inputs tools and technology

Expected Result (ER) 1.1: Improved access to sustainable financing for farmers.

Large scale sustainable adoption of improved inputs that have been proven to improve productivity and build resilience will require improved access to predictable, affordable, and consistent financing for farmers. Although available commercial financing approaches could support this objective, more innovative models for financing farmers, especially those in the smallholder sector, are required that address numerous obstacles that have been well documented. Key strategies that will be pursued to improve access to financing include: promoting inclusive, viable, and fair partnerships between farmers and other private sector players; improving models for commercial financing of smallholders to improve access and reduce cost of borrowing; blending public, development and private sector financing instruments to lower risks and costs of borrowing; cooperative business models for financing and marketing; and capacity building in financial management and partnership management for farmers.

Examples of activity areas that will be facilitated to improve access to financing include:

(i) refining the contract farming model to address issues of fairness, and to safeguard investments by value chain actors among others;

(ii) options for blending private, public, and development resources to buy down the risk and cost of financing smallholder farmers;

(iii) information communication technology (ICTs) for improving efficiencies in transactions;

(iv) group lending models that build scale and lower transaction costs;

(v) a framework for grassroots-based micro-lending institutions with lower operating costs to improve accessibility and lower the cost of borrowing;

(vi) a nation-wide credit referencing system for farmers that tracks behaviour and protects borrowers;

(vii) deployment of international climate finance to leverage local resources.

Expected Results (ER) 1.2: Improved availability of appropriate climate resilient inputs, tools, technologies.

Improving the local availability of key inputs, tools and technologies will be facilitated through three main strategies: (i) targeted research and testing, commercialisation; (ii) local mass production and distribution, and (iii) lowering the cost of importing from other markets. To have a meaningful impact on farming practices, appropriate inputs need to be available timely, as close as possible to farmers, and at affordable prices.

Targeted research and testing: A strong emphasis on targeted research will be at the centre of the strategy to ensure availability of appropriate inputs, tools and technologies. A number of proven technologies are now aiding the production of climate smart inputs. Significant progress has been made in breeding drought, flood, and heat tolerant seed varieties and livestock breeds for use under different conditions. Cataloguing these varieties and breeds, matching them with local conditions and expected climate trends, and testing these on-farm will be intensified in collaboration with the private sector, farmers and other players. This work is already on-going and will be a big driver of the transition to CSA. Research and testing to locally adapt and commercialise technologies developed elsewhere will also be supported. This is expected to improve local availability of appropriate and affordable products for improving soil fertility management, water productivity, precision farming, renewable energy generations, and reducing drudgery of farm operations.

Local mass production and distribution: A new generation of improved inputs such as 'smart fertilisers', adaptable seed varieties and livestock breeds, water-smart and energy efficient irrigation systems and specialised implements for tillage are currently the focus of significant investments worldwide. For instance, slow release fertilizers, blended fertilization formulations as well as biofertilisers (e.g. phosphobacterium) have been shown to increase nutrient availability to crops, lower costs, and reduce losses into the environment (see Box 5).

Similarly, mass local production of key tools and equipment such as those for water smart irrigation, minimum or no-tillage, post-harvest storage and value addition, weed management, and renewable energy generation will be promoted. Ensuring local availability to such improved inputs is a key focus of the CSA Framework as it is expected to both reduce cost and improve availability.

Lowering the cost of importation: Reducing the cost of imported tools and technologies is key to accessing key products that are not locally produced. Key to reducing the cost of such products is to review import duties payable on such imports. Equally important is improvements in transport infrastructure and improving the ease of doing business across borders (e.g. efficient handling and processing of customs procedures).

Box 5: New Generation Smart Fertilisers

Slow release: New technology is now available for developing slow release fertilizers that increase availability of nutrients to crops through gradual release into the soil, and reduce losses through leaching, volatilisation and denitrification. This is usually achieved by coating traditional nitrogen fertilizers, which are typically very mobile, with a bio-degradable polymer that helps slow down the process of decomposition as well as release of nutrients into the soil. These fertilizers have been shown to significantly increase yields, and reduce cost, while lowering N2O emissions by up to 80%.

Blended fertiliser: Blended fertiliser options are now allowing 'high analysis' formulations (with higher concentrations of nutrients) that can be better matched with nutrient requirements of specific farmers. This reduces cost of nutrients and their application, while also lowering the cost of packaging, transportation, and storage.

Biofertilizers: Phosphate Solubilising Bacteria (PSB) is beneficial bacteria capable of solubilising inorganic phosphorus from insoluble compounds. PSB have been introduced to the agricultural community as phosphate biofertiliser. Phosphorus (P) is one of the major essential macronutrients for plants and is applied to soil in the form of phosphate fertilisers. However, a large portion of soluble inorganic phosphate, which is applied to the soil as chemical fertiliser is immobilised rapidly and becomes unavailable to plants. When PSB is used with rock phosphate, it can save about 50% of the crop requirement of phosphatic fertiliser. The use of PSB as inoculants increases P uptake by plants. Simple inoculation of seeds with PSB gives crop yield responses equivalent to 30 kilograms P2O5 per hectare or 50% of the need for phosphatic fertilisers. Alternatively, PSB can be applied through fertigation or in hydroponic operations.

Bridging the last mile: Village level networks of agro-dealers (some of them farmers) are offering an innovative approach to bridging the last mile in linking farmers with input suppliers. Being able to purchase key inputs such as seed and fertilisers from outlets within walking distances has been shown to greatly increase the use of improved inputs. Examples of partnership models between local agents and input companies have shown that inputs can be made available locally at the same prices as those at large retailers in major centres.

A service provider model: The high cost of implements and the majority of other relevant technologies is the single biggest constraint to a shift towards technology driven agriculture, particularly for smallholders. Other barriers include limited exposure to available options and generally limited capacity to operate more sophisticated equipment. The Framework adopts a service provider approach to improving access to mechanised services for operations such as land preparation, planting, weed control, harvesting and threshing of grain, as well as other specialised services such as artificial insemination (AI). Large numbers of farmers are already hiring tillage services. The thrust will be to broaden this to cover most critical operations and specialised services. A new generation of service providers (most of them farmers themselves) is emerging especially among the youth who are leveraging such business opportunities to overcome difficulties in accessing land and financing for market oriented production. A service provider model has shown better prospects in attracting financing for acquiring implements as repayment periods are much shorter and cash flows are more favourable.

Smallholder farmers in seed value chains: The Framework will facilitate partnerships between smallholder farmers and seed companies to ensure involvement of farmers in local multiplication of seed. Such partnerships are improving both the local availability of seed and the income prospects of farmers. High quality extension support and exposure to high levels of agronomic excellence required in seed multiplication is also elevating technical competencies of smallholder farmers.

Pathways that will be pursued to improve availability of inputs, tools and technologies include:

(i) Private/public/farmer/donor partnerships for promoting targeted development, testing and showcasing of seed varieties of key crops, livestock breeds, and CSA tools and technologies;

(ii) Local modification of imported CSA implements to suit local conditions and mass local production to reduce cost;

(iii) Mass programs for improving local livestock breeds through cross-breeding with more productive breeds, including through AI;

(iv) Local multiplication of seed for fodder, trees, pasture grasses, crop varieties by farmers, partnerships with seed companies;

(v) Encourage the widespread local production and use of improved fertilizer formulations including, blended high analysis options, controlled release options (e.g. polymer coated controlled release urea), nitrification inhibitors and effective micro-organisms that reduce nutrient losses, as well as N2O emissions. These technologies reduce emissions, lower costs while simultaneously increasing yields;

(vi) Explore the local suitability of other products for example the use of plastic film to reduce evaporation and increase moisture retention;

(vii) Local designs for low cost, water efficient irrigation systems;

(viii) Local building/manufacturing of bio-digesters, solar power generation kits and other renewable energy products;

(ix) Local production of low cost on-farm food storage, preservation, and value addition;

(x) Encourage locally produced products for pest and disease management;

(xi) Harness available ICT tools to make information exchange, transactions and farm management more efficient;

(xii) Lowering the cost of importation of key products not produced locally;

(xiii) Improving the ease of doing business across borders.

6.2 Objective 2: Increased use of climate smart farm practices

Rationale

Ensuring sustainable and large scale uptake of available good agricultural practices has proved to be the most challenging aspect of transforming agriculture in Zimbabwe and in other parts of the developing world. Similarly, the success of a transition to CSA hinges on a solid plan for ensuring large scale and sustained adoption of practices by farmers.

Theory of Change

The Theory of Change (ToC) for Objective 2 is summarised in Figure 6 below. Increased awareness of climate risks, its impacts and available adaptation options as a result of training and capacity building is expected to elevate farmers' appreciation of the need and capabilities to adopt CSA practices. To complement the improvements in awareness and capacity, farmers will also need exposure to CSA practices and how they can transform their farming systems, as well as on-going, targeted extension support and climate information services. These services are expected to both encourage and guide the appropriate adoption of CSA practices to ensure maximum payoff for farmers. In addition to boosting productivity, profitability, and building resilience of farming systems, the increased use of CSA practices is also expected to build strong value chains that support agribusiness players on both the input supply and the offtake. This broader impact on value chains is expected to drive mutual interest and cooperation across actors and thus offer opportunities for commercially sustainable and mutually beneficial partnerships between farmers and private sector agribusinesses.

Below are highlights of actions that will lead to achievement of two key result areas: (i) ER 2.1 - improved awareness, exposure and technical capacity for CSA; and, (ii) ER 2.2 – improved farmer support services, extension and climate information services.

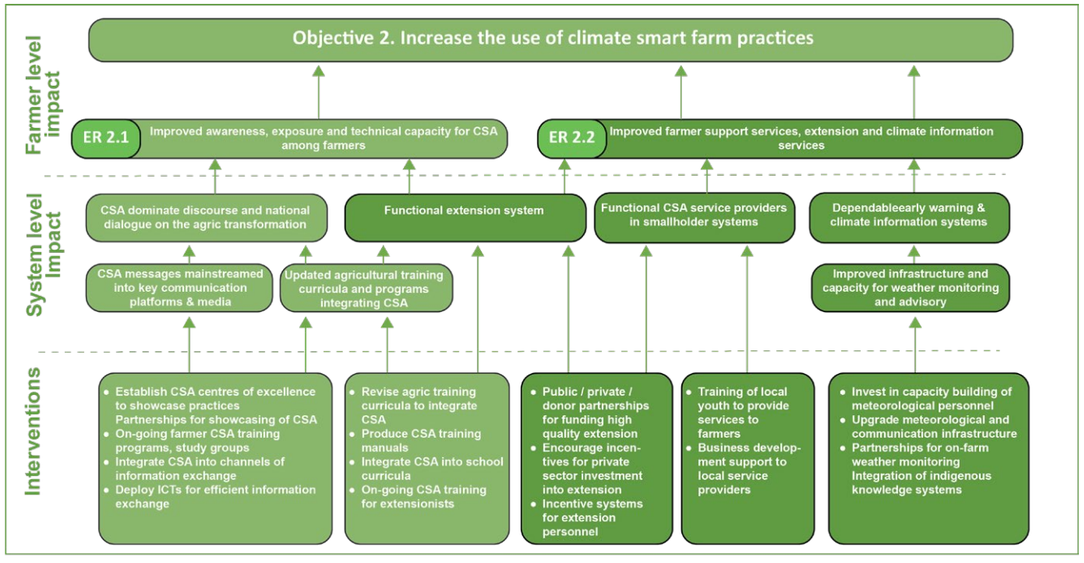


Figure 6: Theory of change: Objective 2 - Increase the use of climate smart farm practices

Expected Results (ER) 2.1: Improved awareness, exposure and technical capacity for CSA.

Awareness raising and training: The uptake of CSA inputs, technologies, and practices at scale will require sustained investment in raising awareness as well as building technical and managerial capacity of farmers. Production of CSA materials for integration with curricula for training of extension staff, including on-going CSA training of field extension staff are some of the key strategies promoted by this Framework. Partnerships between private, public, donors, and farmers that are tailored to specific circumstances also offer promising options for improving the delivery of CSA to farmers. Structured CSA training programs for farmers, including establishment of local CSA study groups for farmers and hubs of CSA excellence will also form a central part of capacity building for driving a transition to CSA. Early introduction of CSA within the agricultural curricula within the school system is also key to internalising this approach as the norm in farming.

Precision based approaches: Improve precision in terms of timing, accuracy of operations (planting, applications); selection of appropriate varieties/breeds will be a key strategy in improving technical capacity of farmers. For instance, increased nutrient use efficiency through precision application will be promoted to raise productivity, lower costs, and minimise negative environmental effect. A site specific nutrient management approach will be promoted, to capture temporal and spatial variability in soil fertility in smallholder systems. This is attributed to spatial variability in inherent nutrient levels of soils that are not accounted for in broad recommendations that are averaged over large geographical areas. This leads to under-fertilisation in some areas and over-fertilisation in others. Such a needs-based fertiliser application that matches nutrient supply with crop demand is expected to increase productivity, cut costs, and reduce emissions.

Cheaper and farmer friendly kits for soil testing are also key to improving precision in fertiliser application that meet crop demand exactly, avoiding over-application and thus lowering the cost of fertiliser and improving productivity. This example demonstrates the potential of such technologies to increase productivity, reduce cost, while reducing emissions due to lower fertiliser use (and therefore reducing N2O emissions).

Improved water productivity: Given the expected scarcity of water due to drier conditions in many areas, improving water productivity[7] is a key strategy. The Framework will promote a conception of water productivity that aims to maximise yield per unit of water used as part of climate resilient water management systems, in both rain-fed and irrigated systems. As such there will be emphasis on developing and promoting available products and practices for maximising efficiencies in water use such as drip and micro sprinklers in irrigated systems, moisture monitoring probes, reduced tillage practices such as CA that emphasise mulching, cover cropping, and both in-situ and ex-situ water harvesting.

Diversified crop/livestock systems: To spread risk and capitalise on complementarities, a diversified production systems approach will be promoted as a key strategy for CSA. Crop/livestock systems that maximise synergies and diversify risk profiles of income sources will be promoted, including less common enterprises such as bee-keeping, forestry and aquaculture where these are appropriate.

Sustained partnerships for showcasing CSA: To be successful, the promotion and showcasing of CSA farm practices need to adopt a hands-on and a farmer-to-farmer approach. This is premised on the assertion that farmers learn best from other farmers and also when they get an opportunity to try new ways of doing things themselves. As such, the CSA Framework will seek to expose farmers to relevant CSA practices through encouraging a number of innovative and interactive programs that also capitalise on potential mutual interests with the private sector. For instance the use of farmer managed demonstration plots that showcase new CSA practices will be supported and expanded, particularly by facilitating partnerships with inputs suppliers or equipment manufacturers also seeking to market their products. This approach is more sustainable and will ensure wider coverage while also cultivating strengthened connections and relations between farmers and the private sector. These demonstrations are also expected to act as local centres of excellence for use in trainings, field days and other promotional activities. Programs for recognising, rewarding and celebrating excellence at various levels (not only for farmers, but also extension staff, and private sector companies and their agencies) will be facilitated to galvanise interest and motivate good practice.

[7] There is useful distinction between water use efficiency (WUE) and water productivity (WP), concepts that are sometimes used interchangeably. WUE is a more ecological efficiency measure, which represent the actual water used by a crop compared to total water applied, while WP is an economic efficiency indicator that represents the amount of crop produced per unit of water applied. WP is more useful as it relates more directly with other important CSA indicators such as volume of emissions per kilogram of crop produced.

Examples of activities that will be promoted to achieve this result include:

(i) Awareness on climate trends and associated risks, impacts on agro-ecological systems and available adaptation options;

(ii) Awareness on the importance and correct use of appropriate inputs such as improved seed, fertilizers, manure, mulching etc.;

(iii) Training on techniques and practices for improved soil, water and nutrient management, such as CA, water efficient irrigation systems, water harvesting, nutrient management, on-farm production of compost;

(iv) Facilitating partnerships for systematic, sustained and large-scale demonstration of CSA practices;

(v) Establishing a national program for recognising, rewarding and celebrating CSA excellence among farmers, private sector, extension staff and other service providers at all levels;

(vi) Establishing regional centres (hubs) of CSA excellence for training and showcasing practices and technologies;

(vii) Harness the power of the media (radio, newspapers, farmer magazines, TV etc.) to inform, educate and showcase good CSA practice;

(viii) Low-cost techniques for improved crop storage, preservation and value addition;

(ix) Diversified crop/livestock systems, including bee-keeping, aquaculture;

(x) Grazing management, pasture improvement, stock management including use of feedlots for efficient finishing of livestock;

(xi) Fodder planning, production, and preservation, including nutrient enhancement of crop residue (e.g. maize stover through urea treatment to improve digestibility), baling of fodder;

(xii) The use of AI technology to introduce new livestock genetics;

(xiii) Shift towards organic nitrogen sources such as legume intercrops, rotations or fallow/cover crops;

(xiv) Fire management;

(xv) Precision nutrient management, closing the gap between crop needs, nutrients applied and nutrient uptake;

(xvi) Efficient irrigation, moisture management to avoid over/under-irrigation.

Expected Results ER (2.2): Improved farmer support services, extension and climate information services.

Provision of on-going, high quality support services such as extension and veterinary services is key to improving adoption of CSA. The role of extension and other support services for farmers is well understood but for various reasons the levels of these services across the country has been in a state of decline. Among some of the challenges that need to be addressed include adequacy of training, levels of remuneration and motivation, resourcing of staff with transport and operational budgets, and farmer-to-extension staff ratios. Ensuring a functional, well-resourced extension service that is equipped to response to climate related challenges is at the centre of this strategy. This will be achieved through a combination of better training of extension staff, innovative funding of farmer support services, and structured capacity building programs for farmers. Many of the planned actions for strengthening training have been outlined in ER 2.1 while some of the resourcing related solutions are addressed under Objective 4 and 5 as they relate to coordination, budgetary and policy responses. In addition to these, new approaches to funding and implementing farmer support services are also envisaged. For instance, harnessing the use of ICTs in delivering extension and other support services will be pursued to improve efficiencies, ensure wide coverage and reduce operational costs. Innovation will also be promoted around funding models that blend resources from public, private, and development sources to ensure high quality and sustainable support, including recognising and rewarding outstanding performance.

Climate information services is one of the support services that is poorly developed in Zimbabwe. To support an appropriate response to climate risk, government, farmers, service providers and private sector practitioners require accurate, timely, and easily accessible climate information such as long term trends, seasonal, day to day forecasts and well as early warnings. Equally important is the processing of this information into usable advisories to guide appropriate responses by all the players. An effective climate information system requires a combination of the necessary infrastructure to gather information, the capacity to process and interpret information, and the network to efficiently communicate information and the accompanying targeted advisories on appropriate action. The CSA Framework seeks to promote a focus on large scale building the necessary network of infrastructure such as weather stations, including in collaboration with the private sector (e.g. mobile service providers with base stations across the country) and farmers. This will be complemented by a technology based thrust to use satellite based geodata to accurately and efficiently gather climate information such as precipitation and evaporation as well as its impact on agro-ecological systems such as crops, vegetation and water bodies. Training and capacity building in the field of agro-meteorology and climate science is also a key part of this plan. While traditional communication platforms such as radio and TV are still invaluable, new mobile based platforms that improve timeliness, targeting and coverage of communication will be implemented.

Some of the activities that will be supported to achieve this result include:

(i) Facilitating innovative partnerships for funding and providing high quality extension and other farmer support services;

(ii) Deploying ICT solutions for improving efficiencies in extension and other support services;

(iii) Programs for recognizing and rewarding innovation, cooperation and excellence in providing extension and other services to farmers;

(iv) Roll out of large scale infrastructure for gathering high quality climate information, including through partnerships between government, private sector, farmers, donors;

(v) Strengthening capacity in agro-meteorology and climate science;

(vi) Strengthening existing communications systems, complemented by new innovative, more accessible and efficient ICT based systems.

6.3 Objective 3: Increased participation in vibrant markets for farm produce

Rationale

The role of markets in driving agricultural transformation in a manner that supports productivity growth, farmers' incomes and broader national economic growth is widely appreciated. This Framework advocates for and promotes a market based approach to driving a transition to CSA. The market is the 'chain' that pulls technology development and adoption. Increased productivity or improved resilience is unlikely to be sustained unless farmers have a means to transform these into higher incomes to support their livelihoods and to provide the means to pay for improved inputs, tools and other technologies. Ensuring that farmers are well positioned and supported to exploit existing and emerging market opportunities is an on-going challenge in Zimbabwe, especially in the case of smallholder farmers. Overcoming these challenges is a pre-requisite to sustained and large-scale adoption of CSA. A number of investments are key to achieving this objective. Increased access to information, large scale improvements in infrastructure for communication and transportation are all central to this effort. To complement these investments, a partnership based model for engaging the private sector will be promoted and facilitated. Rather than viewing agribusinesses as merely input suppliers or buyers of produce, this Framework seeks to elevate the role of the private sector as a key partner in transforming agriculture in a manner that unlocks value by increasing productivity and building the resilience of all value chain players.

Theory of Change

The Theory of Change (ToC) for Objective 3 is summarised in Figure 7 below. The CSA Framework seeks to strengthen the engagement of the private sector that, until recently, has only been viewed as a passive player with a limited role in driving agricultural transformation. A value chain perspective in tackling climate risk is expected to foster mutually beneficial, value unlocking partnerships and cooperation among key players such as farmers and agribusinesses on both the input and outputs sides. Farmers and agribusinesses share common climate risks that threaten their operations, their competitiveness, and their profits. A growing number of agribusinesses now acknowledge these as 'shared imperatives,' which they can only tackle jointly with farmers who also face them. They are increasingly open to investing in commercially sustainable partnerships with farmers that address shared risks. Such innovative and inclusive approaches present compelling arguments for private sector engagement to tackle climate change while also unlocking shared value through increased productivity and incomes, and building the resilience of farmers and their value chain counterparts.

The potential offered by more innovative partnerships with the private sector will help take proven and viable CSA options to scale. This is expected to overcome inherent flaws in many project based strategies that have developed, often at significant cost, very localised and isolated solutions that benefit only small numbers of farmers and do not go to scale. Engaging private sector players in those models provides scope for scale-up if/when those partners see the commercial opportunity of CSA innovations. The private sector offers 'scale agency' where project and/or government-focused initiatives have struggled.

The Framework will promote comprehensive win-win partnerships with the private sector that unlock access to technology (e.g. drought tolerant seed varieties, livestock breeds, implements, equipment), finance, markets, information, insurance and other risk management tools that build resilience of smallholder farming systems. By helping smallholder farmers increase productivity, stabilise yields, improve quality of products, reduce production costs, and transfer risk (through insurance), such

investments are concurrently helping businesses stabilize supply (or demand in the case of input suppliers), increase trade volumes and capacity utilisation, access better quality products, lower transaction costs, and minimise contractual defaults while building trust and a better understanding of the smallholder context. The incentives that drive these partnerships are commercial and provide significant momentum for CSA investment and implementation if/where they can be effectively harnessed. Greater attention will be paid to aligning private sector commercial incentives with the goals and objectives of farmers in cases where these may be divergent.

Expected Results (ER) 3.1: Inclusive and viable partnerships for value addition and marketing of products.

A market driven transition to CSA is the most sustainable option for leapfrogging Zimbabwean agriculture into a productive and climate resilient economic sector supporting improved wellbeing of millions of households. Connecting farmers with vibrant markets for their produce has been an elusive goal of many projects. Many lessons are, however, now available on how a partnership approach with the private sector is changing this scenario. Areas of improvement remain but there is huge potential in pursuing promising contract farming arrangements, guaranteed offtake partnerships, the use of local aggregators/commodity brokers and capacity building to fulfil market requirements. Support to improve farmer organisation and better market understanding is equally important if farmers are to respond to market needs and trends that support their businesses.

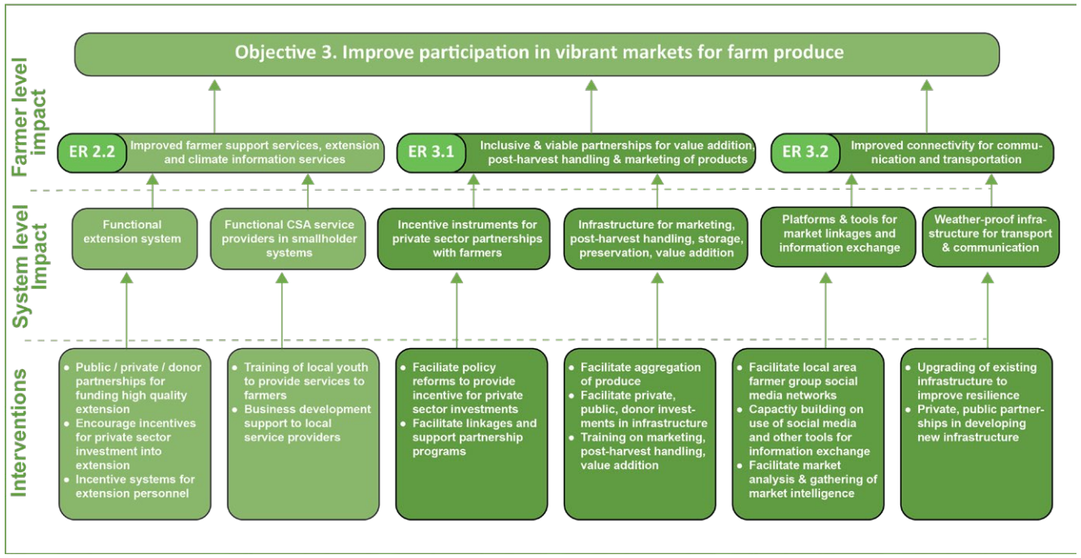


Figure 7: Theory of Change Objective 3 - Improve participation in vibrant markets for farm produce

Examples of activities that will be facilitated to support this expected result include:

(i) Improving existing models and developing new models of inclusive, fair, and mutually beneficial partnerships between farmers and the private sector for marketing of products;

(ii) Capacity building and support on market intelligence for farmers to better synchronise production with market needs and trends;

(iii) Formalisation, regulation, registration/accreditation of local aggregators/commodity brokers;

(iv) Effective and proactive mechanisms for avoiding side-selling and other contractual breaches by farmers;

(v) Increasing participation of local farmers in regional and international markets;

(vi) ICT based platforms for marketing produce.

Expected Results (ER) 3.2: Improved connectivity for communication and transportation.

Climate change further complicates the already poor linkages of most farmers with lucrative markets due to the risk of damage to physical infrastructure. Extreme events such as heavy down pours and flooding have become a common occurrence and a major cause for severe damage to roads, bridges, and communication infrastructure. In recent years, many rural communities have been cut off from major centres for extended periods, making it impossible or very costly to reach markets.

A climate resilience approach to infrastructure provision for farming communities is advocated in this Framework. The significant need for infrastructure investment that exists for most rural communities means Zimbabwe has an opportunity to leapfrog into more climate resilient investments that reflect the new reality of frequent climate related extreme events. Emphasis should be on more robust, climate proofed investments that can withstand the new level of challenge from climate hazards, fail-safe provisions in case of failure in certain parts of the system, and recovery mechanisms to support timely responses to systems failures to minimise loss of life and economic opportunities. Some examples of investments that will be facilitated to achieve this objective include:

(i) Design and implementation of climate-proofed transport and communication infrastructure;

(ii) Innovative use of ICTs to better organise local communities for information exchange and early warnings (e.g. local area social media farmer groups/networks for day-to-day and emergency functionality, connected with local authorities).

6.4 Objective 4: Strengthen coordination, knowledge management and capacity for implementation

Rationale

Climate change is a multi-sectoral issue that also calls for cross sectoral response measures. The complexity of work across sectoral, disciplinary and institutional bounds is at the centre of poor implementation. At the governmental level, tackling climate change will require collaboration between ministries, and across national, local and traditional authorities. In addition most of the efforts call for close partnerships between governmental, private sector and the development community. A strong centre that coordinates CSA efforts by these multiple stakeholders is required to maximise synergies, complementarities and cost efficiencies, while minimising competition, duplication and incoherencies. This approach also better addresses cross-sectoral implications of climate change, for example by analyzing across-sectors interactions, and looking at co-benefits and potential trade-offs in adaptation between sectors. These are often missed when sectoral responses are designed and implemented in isolation, by a multiplicity of governmental, non-governmental, and private sector teams of experts. For instance, competing adaptation needs of the water sector and the crop sector will need to be harmonised. Similarly, the overarching need for natural resources management will require careful balancing to minimise trade-offs and maximise synergies with adaptation measures that depend on surface and ground water supplies.

Theory of Change

The Theory of Change (ToC) for Objective 4 is summarised in Figure 8 below. This Framework positions the government as a centre for coordination and implementation. To effectively play this role, all relevant government departs that support CSA need to fully understand, embrace and institutionalise a cross-ministerial approach to facilitating a climate change response. This should be reflected in policies and guidelines, budgets, key performance measures and incentives, as well as the configuration of task forces (committees) on CSA.

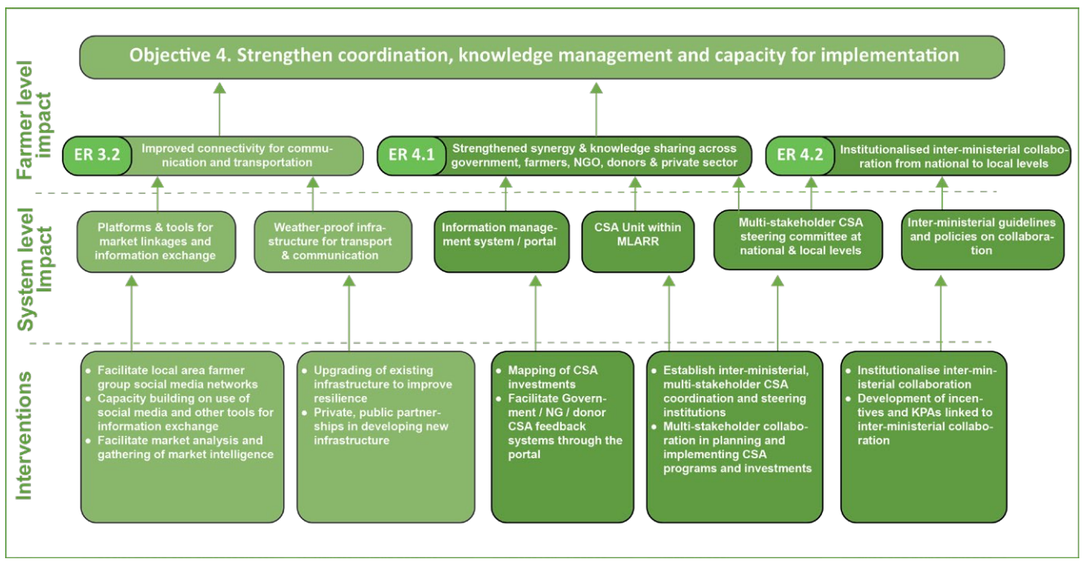


Figure 8: Theory of Change Objective 4 - Strengthen coordination, knowledge management and capacity for implementation

These institutional systems need to cascade from national to local levels, with mechanisms for both vertical feedback mechanisms between these levels. An efficient information management system powered by modern ICT tools is required to facilitate seamless, multi-source and real-time information exchange across stakeholders.

An effective and well aligned governmental platform for CSA coordination and implementation will provide a viable framework for long-term cooperation and collaboration with other non-governmental, developmental and private sector stakeholders and partners. Such a seamless formation is expected to more effectively coordinate and facilitate CSA activities in line with a common vision and objectives set out in this Framework.

Expected Results (ER) 4.1: Strengthened synergy and knowledge sharing across government, NGOs and private sector stakeholders.

National capacity for coordination and implementation of CSA will be built on existing government led platforms although these would need significant institutionalised support and resourcing. An existing national CA coordination task force will provide a basis for institutionalisation of a CSA Unit within the MLARR, a National CSA Steering Committee and a Technical Working Group that will anchor coordination and implementation of all CSA in the country (see Section 7). Investments will be required to make this institutional set up more efficient and better embedded with key stakeholders as well as its provincial and district level entities. Some of the activities that will be implemented to support this objective include:

(i) Establishment of inter-ministerial, multi-stakeholder National CSA Steering Committee, a Technical Working Group and a CSA Unit, provincial and district level CSA committees. These will be re-modelled on existing structures where possible;

(ii) Design and institutionalisation of tools/platform for efficient information exchange across governmental, non-governmental, private sector, and farmer stakeholders, hosted by a designated entity;

(iii) Establishment of government/NGO/private sector/donor/farmer CSA feedback systems through the platform, inbuilt into MOUs and other operational agreements;

(iv) National CSA map with meta data, continually updated by all stakeholders, moderated by designated entity;

(v) Harmonised local CSA plans integrated into national development planning;

(vi) Farmer organisation for more effective partnership with other stakeholders;

(vii) On-going monitoring, evaluation and learning.

Expected Results (ER) 4.2: Institutionalised inter-ministerial collaboration from national to local levels.

To be effective as the nucleus of CSA coordination, relevant governmental entities need to be better coordinated. Key ministries such as MLARR and MEWC need clear, well recognised, and institutionalised frameworks for collaboration on an ongoing basis. These need to be inbuilt into policies and procedures as well as institutional structures for handling cross cutting issues such as climate change. Some of the improvements that will be facilitated include:

(i) Development of inter-ministerial policy/guidelines for collaboration on CSA, incentive/KPA targets system for cross disciplinary collaboration;

(ii) Budgetary provisions for supporting core functions of the CSA Unit, National CSA Steering Committee and Technical Working Group.

6.5 Objective 5: Mainstream CSA into policy, regulatory and disaster risk management frameworks

Rationale

Large scale adoption of CSA will require a proactive, predictable, supportive and informed policy and regulatory framework that facilitates long term investment and delivery of support services. A national framework for risk management will also guide investments by public and private players into safety net options such as insurance. These will be put in motion in cases where adaptation actions prove inadequate to prevent the negative effects of extreme climate related occurrences.

Theory of Change

The Theory of Change (ToC) for Objective 5 is summarised in Figure 9 below. This Framework will inform a proactive policy and regulatory regime that helps to improve access to CSA inputs, technologies, and support services, while also enabling markets to support long term productivity growth and resilience building in key value chains. It will also inform the deployment of budgetary, fiscal and monetary based instruments to facilitate the necessary investments in large scale infrastructure, inputs and services to support CSA adoption. This Framework identifies such opportunities and how they could be brought to bear in advancing sustainable and large scale investments that support CSA. Safety net options such as insurance and disaster risk response measures will also support recovery responses in instances where adaptation response proves inadequate to prevent negative impacts of climate change.

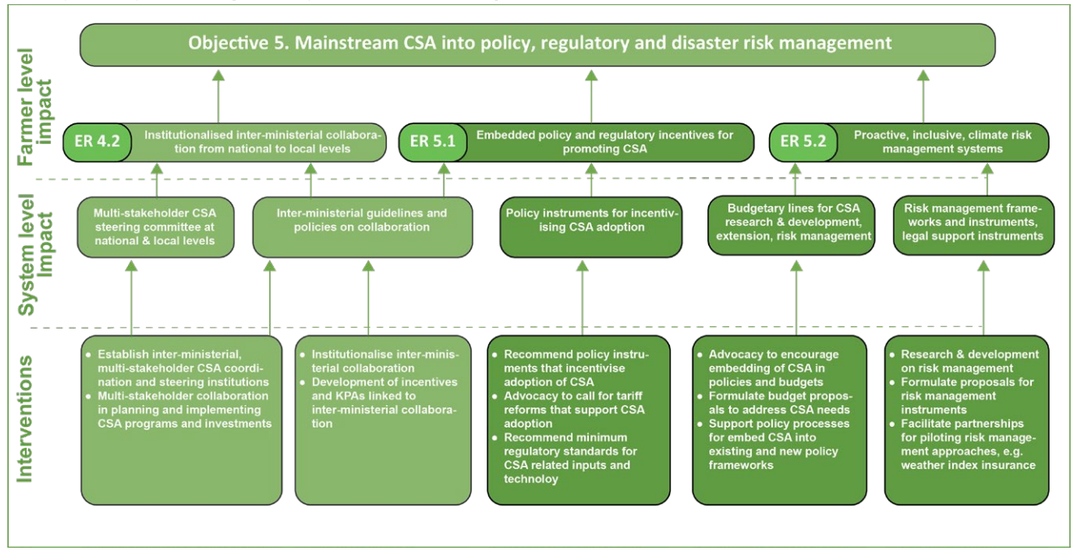


Figure 9: Theory of Change: Objective 5 - Mainstream CSA into policy, regulatory and disaster risk management

Expected Results (ER) 5.1: Embedded policy and regulatory incentives for promoting CSA.

The Framework will guide government policy with a view to establishing a decisive and unequivocal position on CSA as the overarching framework for responding to climate change in the agricultural sector. This will strengthen the case for deliberate fiscal and monetary incentive instruments and a regulatory framework to support CSA investments.

Examples of interventions that will be proposed include:

(i) A policy position on CSA as the overarching climate change response framework in the agriculture sector, with budget provisions;

(ii) Advocacy to have CSA adopted as the driver of national flagship programs such as Command agriculture;

(iii) Fiscal incentive (import duty exemptions on equipment, renewable energy components, rural investment tax rebates, concessionary funding for private sector supporting CSA etc.);

(iv) Local procurement incentives;

(v) Minimum guidelines on fertilizer formulations and other inputs specifications.

Expected Results (ER) 5.2: Proactive, inclusive climate risk management systems.

(i) National insurance system to replace /complement food aid system and disaster risk system, (e.g. linked to international climate finance);

(ii) Legislation and regulatory system for weather based index insurance;

(iii) Public/private/donor/farmer weather based index insurance;

(iv) An early warning system, including a national climate information system.

6.6 Cross-cutting results

CCR 1: Increased gender equity and participation.

The impacts of climate change on gender equity and women participation is widely acknowledged. The challenge to be overcome is how the design and implementation of CSA can help reduce gender based inequalities, increase the participation of women in climate resilient production systems. All facets of this climate response, from tools and technologies, farm practices, markets, policies and disaster risk management measures need to consistently adopt gender disaggregation in assessing design and implementation needs, as well as in evaluation of outcomes.

CCR 2: Increased youth participation and empowerment.

Harnessing the energy, potential, and creativity of youth will be a critical part of the strategy to transform towards climate resilient agriculture, reduce unemployment and alleviate poverty while reducing the risk of conflicts fuelled by growing numbers of marginalized and frustrated youth. As is the trend across the continent, youth are the largest population segment in Zimbabwe. Most of the unemployed are young people. As such, levels of extreme poverty and feelings of hopelessness are highest among this group.

This framework will promote activities for youth to understand that many profitable and desirable opportunities exist within rural and agricultural systems. A combination of activities envisaged in this framework will achieve this objective by:

- Addressing barriers and risks that disproportionately affect young people's ability to enter into profitable agricultural activities, at various points along the value chain, including non-production activities, e.g. access to land by encouraging partial leasing arrangements, share farming etc., finance;
- Especially encourage and support those graduating from agricultural colleges to go into farming;
- Building practical technical skills that empower youth in agricultural enterprises;
- Using digital technology based systems that engage youth, such as mobile money, mobile devices, satellite data, and the internet;
- Providing agricultural business development and entrepreneurship skills training, including financial management and related skills needed for youth to succeed as producers, agro-dealers, processors, and farm service providers;
- Developing innovative business models that promote financial inclusion and unlock capital, and business mentorships needed by the youth.

CCR 3: Increased engagement with the private sector.

Experiences from CSA interventions such as CA in Zimbabwe and elsewhere across sub-Saharan Africa during the past two decades point to the difficulty of achieving sustained positive impact at scale. Many of the lessons suggest that going beyond pilot phases or isolated success stories has been the single biggest challenge facing initiatives to build climate resilience among farmers. Most of the interventions do not seem to be having large scale sustained positive impact and are not resulting in "climate resilient farmers". While there are promising CSA solutions that have been developed to address some if not most the threats, most farmers, particularly smallholders, have not been able to access and use them to solve the challenges they face.

Box 6: Engaging the Private Sector - Shared Imperatives

Farmers and agribusinesses share common climate risks that threaten their operations, their competitiveness, and their profits. These are shared imperatives that form the basis for cooperation between the private sector and farmers in jointly tackling the climate risks they face. There is significant scope for win-win outcomes from such partnerships that unlock access to technology (e.g. drought tolerant seed varieties and livestock breeds), finance, markets, information, insurance and other risk management tools that build resilience of value chains. By helping smallholder farmers increase productivity, stabilize yields, improve quality of products, reduce production costs, and transfer risk (through insurance), such investments will concurrently help businesses stabilize supply (or demand in the case of input suppliers), increase trade volumes and capacity utilization, access better quality products, lower transaction costs, and minimise contractual defaults while building trust and a better understanding of the smallholder context. The incentives that drive these partnerships are commercial and provide significant momentum to CSA innovation investment and roll out if/where they can be effectively harnessed.

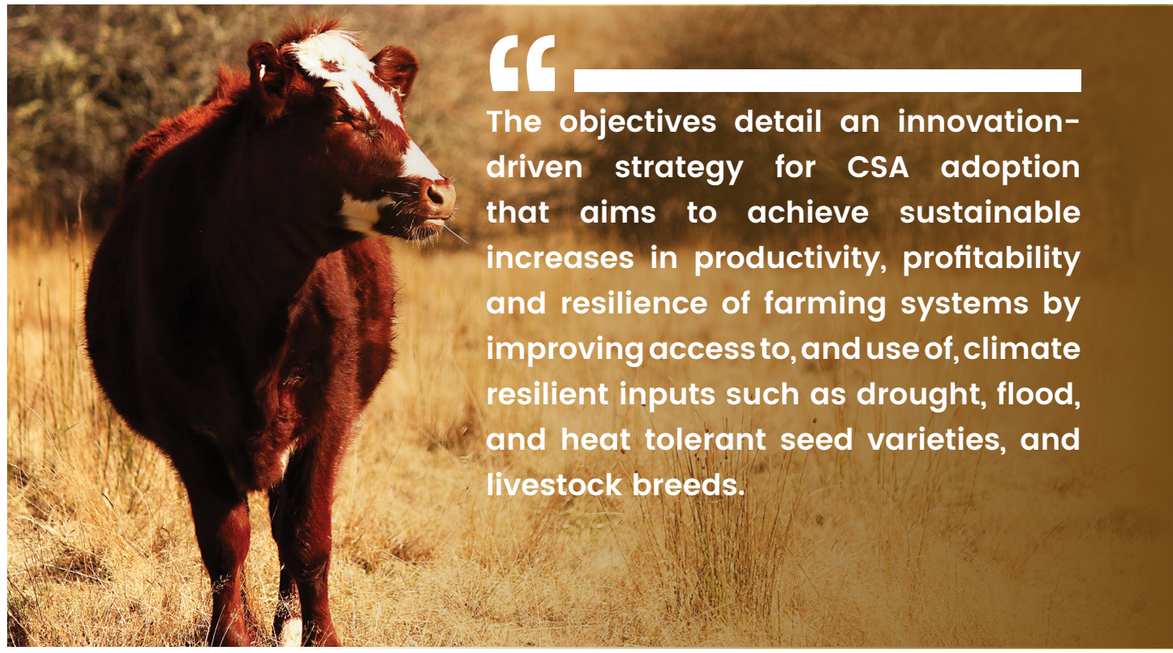
An inherent flaw in many previous strategies has been to develop (at significant cost) very localised and isolated solutions that benefit only small numbers of farmers and do not go to scale. Engaging private sector players in those models provides scope for scale-up if/when those partners see the commercial opportunities. The private sector offers 'scale agency' where project and/or other development initiatives have struggled. Harnessing the financial, technological and intellectual capital within the private sector to complement public sector driven climate responses presents a new dimension in designing and implementing climate smart solutions. The potential offered by innovative partnerships with the private sector is taking proven and viable delivery models to scale. The unique expertise of the private sector, its capacity to innovate and produce new technologies for adaptation, and its financial leverage can form an important part of the multi-sectoral partnership that is required between governmental, farmers, private and non-governmental actors. The private sector brings unique expertise and market-based solutions for sustained improvement in productivity and incomes as well as diversifying livelihood sources.

The government will work with other stakeholders to facilitate innovative and inclusive commercially sustainable partnerships between agribusiness and farmers in a manner that unlocks shared value by raising productivity and incomes while also building resilience of value chains. The CSA Framework will seek to promote multiple partnerships with the private sector, to mobilize resources and investments in support of climate resilience where there is strong alignment between business interests and development objectives. While various approaches to private sector engagement will be supported, the overarching objective should be to deliver shared value to all parties and align around shared goals, with shared resources, risks, and responsibilities. These partnerships will seek to go beyond simply leveraging financial and intellectual resources but will also serve to broker fair, long-term, and rewarding relationships between corporate entities and farmers.

Public-private partnerships will leverage unique core capacities and resources, such as financial resources, access to strategic investment locations or intellectual property and contribute to many objectives of the strategy. Through this strategy, government will more efficiently and effectively mobilize and facilitate the participation of local and global private sector players into specific investments and financial facilities that improve national food security and incomes while also building resilience of value chains. Inclusive agricultural value chain development partnerships will help small-scale producers, especially women, gain greater access to the inputs, skills, resource management capacity, networking, bargaining power, financing, and market connections needed to sustain their long term economic prosperity. Partnerships with financial intermediaries will target unlocking additional investment and credit to value chain stakeholders, especially smallholder producers, cooperatives, and small and medium enterprises.

CCR 4: Sustainable Land Management.

Climate change impacts resulting from extreme weather events (droughts, heavy downpours, floods) and the resultant food insecurity and livelihood disruptions have caused severe land degradation in many farming areas. Although the linkages between good agricultural practices and broader natural resources management are well understood, climate change is elevating the importance and urgency of production systems that promote a healthy balance between agriculture and the environment. While many of the natural systems such as water systems, forests, and rangelands are critical to agriculture, they are also under severe pressure due to a changing climate. The incorporation of land care initiatives therefore becomes a basic pre-requisite to ensuring sustainable productivity of land through the application of appropriate land conservation measures and efficient utilization of external inputs and other resources. Sustainable land utilization positively correlates to productivity and profitability, resilience and mitigation, thus enhancing the three pillars of CSA. It is therefore imperative for all CSA programmes to satisfy basic land care principles to ensure that the basic CSA objectives are met. As such, CSA can only be successful if it leads to better outcomes in the management and protection of these key natural resources.



7 Key drivers

Key drivers have been identified as those critical catalysts, game-changing actions and investments that will be required across a number of objective areas of this Framework for adoption of CSA to materialise at the scale and pace that will represent a real transition. The following six drivers have been identified: (i) Targeted research; (ii) Information and communication technology (ICT); (iii) Engaging the private sector; (iv) Harnessing the youth; (v) Innovative finance; and, (vii) High quality extension. Each of these is summarised below.

7.1 Targeted research

A strong research focus will support development and testing of required CSA inputs, tools, practices, and technologies to help farmers build resilience and manage climate shocks. Key research areas will include improved understanding of the local climate system, including local climate trends and future projections, their impacts and vulnerability of local agro-ecosystems; improving productivity in livestock, aquaculture, and crops including legumes and forage while improving resilience of these production systems; addressing critical plant and animal pests and diseases and how these are changing with climate change; approaches for sustainably intensifying production systems that also build resilience; low-cost but effective farm implements and water smart irrigation systems, affordable systems for renewable energy generation (e.g. bioenergy, solar, wind) for agricultural systems, increasing water productivity and demand management; accurate and user friendly climate information services, cost effective insurance products, financing models for smallholder systems; addressing critical value chain bottlenecks, including around processing, preservation, storage, and transport; improving nutrition; and food safety.

7.2 Information and communication technology (ICT)

The rapid growth of mobile and digital technologies has prompted new business models and expanded the frontiers of information access and application, for example, by delivering access to more efficient and cheaper banking and payment tools, bringing weather forecasts, and providing real-time pricing information to farmers in remote locations. The framework will also capitalise on the potential of digital financial services as the primary avenue to reach previously un-served, low-income customers in remote locations, due to low costs and easy access made possible by the rapid expansion of mobile phones across Zimbabwe. This is expected to drive financial inclusion that accelerates economic activities across value chains. At the farm level, innovations will help smallholder producers, especially women, increase their profitability, save labour, and access new markets.

Other digital technologies such as remote sensing technologies, geospatial data, ICT-enabled extension services (e.g. farm management apps[8]) and digital marketing are also making agriculture more precise, productive, resilient, profitable, financially inclusive and more fashionable, particularly among the youth. This framework will take advantage of the decreasing cost of these technologies to broaden their application, particularly by smallholder farmers, in supporting good practice on farms and in value chains.

7.3 Engaging the private sector

The role of the private sector is driving technology uptake, sustainable incomes, and capacity building has been outlined elsewhere in this document (Section 2.2 and 5.6). This framework aims to unlock the potential of this private sector driven transition to facilitate adoption of CSA at scale.

7.4 Harnessing the youth

The unique contribution of the youth to the agricultural sector is yet to be fully exploited in Zimbabwe as is the case in other countries in the region. A climate change response that is information and technology driven requires a level of literacy and numeracy, savviness and enthusiasm that is abundant within the youth. Deliberate strategies to enable greater participation of the youth as outlined elsewhere in this document (Section 2.2 and 5.6) is key to driving the adoption of CSA and a broader transition of agriculture in Zimbabwe.

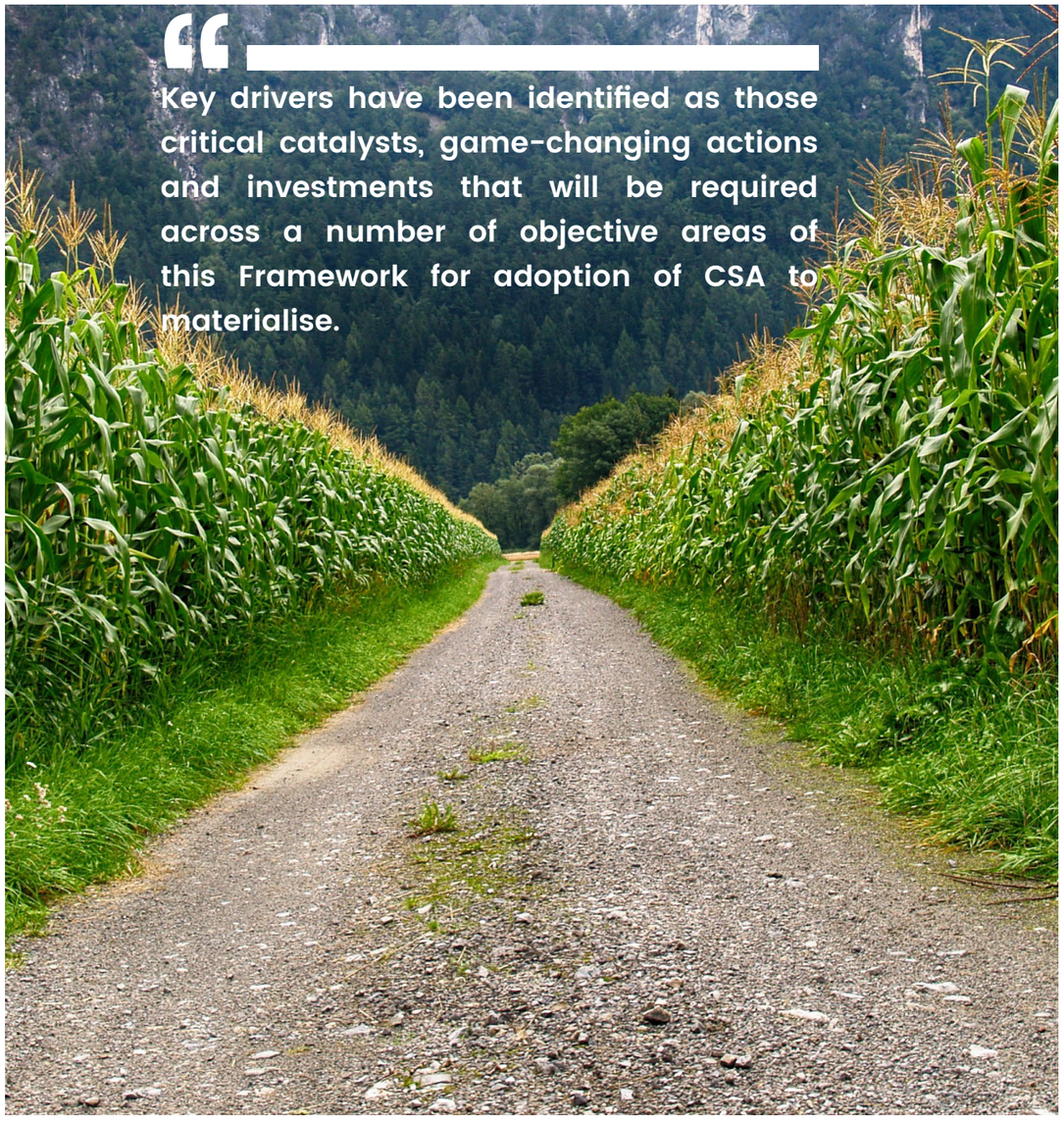
[8] Examples include freely available apps for area measurement, farm mapping, plant nutrient deficiency, soil moisture management, weather forecasts, chemical application guide etc

7.5 Innovative finance

The key role of finance in driving technology adoption and improving efficiencies within production systems has been identified as one of the key result areas (ER1.1) for this framework. Without sustainable and cost effective financing mechanisms, CSA and agriculture, in general, is unlikely to thrive in a manner that results in inclusive and large scale benefits. As such, this will be a key area of focus during the implementation of this strategy. The success of this strategy will likely be defined by successes in finding sustainable models for financing agriculture, especially for smallholders.

7.6 High quality extension

The role of extension in driving awareness, capacity building and motivating change remains a key part of any strategy to drive transformation of agricultural systems anywhere in the world. Many of the elements of extension that are key to adoption of CSA, including options for revolutionising its delivery, have been outlined in Section 5.6. This will be a key area of focus for the Framework and significant progress is required in this area if CSA is to take over as the norm in farming across the country.



8 Implementation Plan

The implementation plan describes the Institutional Structure (Section 8.1) that will drive the implementation of the Framework, outlines the Roles and Responsibilities (Section 8.2) of key stakeholders and the Plan of Action (Section 8.3) for rolling out the Framework.

8.1 The institutional structure

The implementation of the CSA Framework will be driven and coordinated by two main bodies – the National CSA Steering Committee and the CSA Unit to be housed within MLARR. Provincial and District CSA Committees will also ensure local level coordination. The structure and mandate of these bodies are outlined below (also see Figure 2).

The National CSA Steering Committee (NCSASC): The implementation of the CSA Framework will be driven by the NCSASC that will be co-chaired by the Principal Directors of MLARR and MEWC. The role of the Committee will be to provide policy guidance and visibility, as well as oversight on resource mobilisation and donor relations, implementation, monitoring and reporting. The Committee will report to the Permanent Secretaries of MLARR and MEWC, as well as to a National CSA Stakeholder Conference that will be held annually. Members of the committee will be distinguished professionals in positions of responsibility, selected from government, private sector, academia, INGOs/NGOs, FOs, CSOs, and Donor community. Committee members will include a mix of respected leaders, practitioners and technical experts with substantial experience in the agricultural sector.

The CSA Technical Working Group: The National CSA Steering Committee (NCSASC) will appoint a Technical Working Group (TWG) that will act as a sub-committee of the Steering Committee itself. The TWG will advise the Committee on technical matters. Each member of the TWG will be responsible for overseeing a specific portfolio of the CSA Framework and will periodically appraise the Committee on progress on their allocated portfolio. The TWG will also provide expert technical leadership for driving the objectives of the Framework by providing technical support to the CSA Unit in program design, resource mobilization, implementation support and coordination, ME&L and knowledge management. Members of the TWG will be outstanding experts on CSA with a track record in CSA and program management.

The CSA Unit: A CSA Unit that will be the nucleus of CSA, will be established within MLARR to drive day-to-day planning and coordination activities, resource mobilisation, program management, partnership management and provide technical support to ongoing programs. The Unit will be resourced initially through reassignment of existing staff, and later through secondments from development partners, and new recruitments as resources become available. The Unit will be led by a Senior Officer who will be supported by mid-level Officers with specialities in relevant disciplines and the necessary support staff. The CSA Unit will act as the CSA core team that will anchor the implementation of the Framework. The Unit will receive direct support from the CSA TWG and will report to the National CSA Steering Committee. The Unit will coordinate program design and resource mobilization, support implementation and reporting, manage program budgets, fulfil reporting requirements to donors, and facilitate partnerships with stakeholders. The CSA Unit will install and maintain a knowledge management system to facilitate communication and knowledge among all key stakeholders on CSA.

Provincial and District CSA Committees: Provincial and District CSA committees will be convened, comprising government entities, locally based NGOs, CSOs and implementation partners working in the area. The Committee will coordinate and facilitate CSA program implementation in their area. They will also directly engage with the National CSA Steering Committee through the CSA Unit at MLARR to ensure coordination and efficient knowledge management.

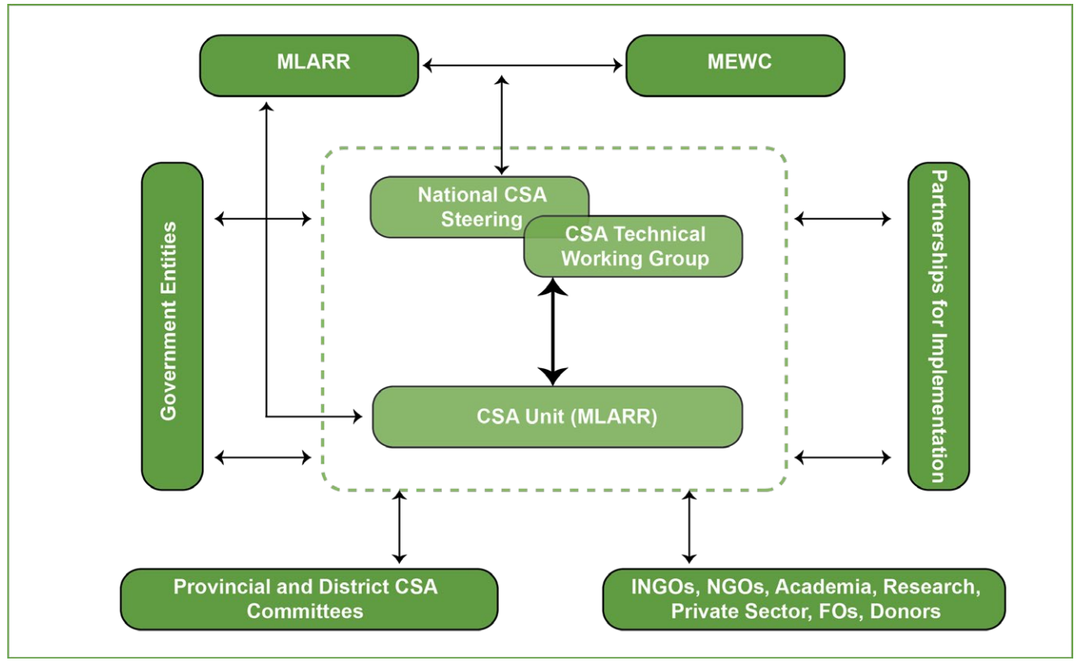


Figure 10: CSA Institutional Structure

8.2 Roles and responsibilities

The various stakeholders have been segmented into three tiers based on the level of their involvement, responsibility and accountability for delivering the objectives of the CSA Framework. The three tiers are described below and the stakeholders in each tier as well as their roles are outlined in Table 3.

Tier 1 Stakeholders – Those stakeholders at the centre of driving the CSA Framework. These entities have direct roles, influence and reasonable control over the achievement of Framework objectives, and are directly accountable for its implementation. Without effective participation of any one of these stakeholders, achievement of the Framework objectives is unlikely.

Tier 2 Stakeholders – Stakeholders that are key to the success of the achievement of the Framework objectives, but have limited or no control over implementation. They have CSA/climate change as a key part of their own organisational strategy and priorities. These stakeholders have strong and on-going interaction with Tier 1 stakeholders and are included in partnerships for implementation. They are, however, not directly accountable for the implementation (or lack thereof) of the Framework. While some framework objectives may still be achieved without the involvement of some of these stakeholders, their effective participation will significantly enhance the scale, pace and sustainability of outcomes.

Tier 3 Stakeholders – These stakeholders have a support function and their involvement strengthens implementation outcomes. They have limited and intermittent interaction with Tier 1 stakeholders and CSA or climate change is not necessarily a key part of their own organisational strategy and priorities.

Table 1: Stakeholder roles and responsibilities

Type of Entity	Organisation/Stakeholder	Roles/Responsibility
Tier 1 Stakeholders	MLARR and MEWC	• Leadership and motivation • Program visibility and political commitment • Policy guidance and alignment • High level planning and implementation support of CSA • Budget support for CSA • Drive necessary policy and regulatory reform to support and mainstream CSA • High level engagement for resource mobilisation • National Extension, vet services, regulation, enforcement
	National CSA Steering Committee	• Policy alignment of CSA with national priorities • Oversight on planning, program design, resource mobilisation and implementation • Monitoring and reporting
	Technical Working Group	• Thought leadership • Providing technical support to the CSA Unit on planning, program design, resource mobilisation and implementation • Monitoring, evaluation and learning and knowledge management
	CSA Unit	• CSA focal point in Government • Catalyse policy and regulatory reforms to drive CSA • Identify policy and regulatory bottlenecks working with stakeholders • Formulate policy and regulatory response options • Engage relevant policy making processes, government entities • On-going coordination, resource mobilization, program design and management, partnerships • Implementation support • Budget centre for partnerships • Technical and administrative support for programs • Monitoring and reporting • Knowledge management and information sharing • Program visibility
	Provincial/District CSA Committees	• Coordinate and facilitate local CSA program implementation, • Local monitoring and evaluation • Information exchange, including indigenous knowledge
Tier 2 Stakeholders	National/International Research/academic institutions, agricultural colleges	• Technology development and evaluation • Technical support • Capacity building/training • Knowledge sharing • Agro-climatology research
	Private sector Equipment manufacturers, seed & fertilizer companies, financial institutions, insurance companies, millers and food processors, abattoirs etc	• Technology development and commercialisation, • Input supply • Capacity building • Farmer support services • Market for produce, value addition and processing • Aggregators, service provision • Partnerships for investment • Financing and insurance services
	INGOs/NGOs Examples: CADS, Foundations for Farming, Oxfam, CARE, World Vision, etc	• Program design and implementation • Resource mobilisation • Technology testing and promotion • Awareness raising & Capacity building • Monitoring, evaluation and learning Knowledge sharing • Policy Advocacy
	Development Partners Examples: DFID, USAID, World Bank, GIZ	• Resource mobilisation • Technical support • Capacity building
	Farmers Organisations	• Organising and mobilizing farmers • Awareness raising & capacity building, • Technology testing and promotion, • Policy inputs, advocacy, • Monitoring of value chain relations, • Coordination and partnerships for investment
	UN Agencies UNDP, FAO	• Technology development and testing • Resource mobilisation • Technical support • Capacity building • Monitoring, evaluation and learning, Knowledge sharing • International collaboration
	Traditional Authorities	• Mobilising and organising farmers • Coordination • Enforcement of local by-laws • Custodians of indigenous knowledge
	MET services	• Climate information services, • Early warning systems
	Zinwa	• Water demand management and allocation • Catchment management
Tier 3	Min of Finance, RBZ	• Fiscal and monetary frameworks
	EMA	• Natural resources management and environmental regulatory frameworks and enforcement
	Department of Civil Protection	• Disaster risk management
	CSOs	• Awareness raising, capacity building, advocacy, gender and youth empowerment

8.3 Plan of action

The Plan of Action for implementing the Framework has been organised into five Phases that include: (i) Phase 1: Inception; (ii) Phase 2: Institutional Setup; (iii) Phase 3: Planning and Program Conception; (iv) Phase 4: Resource Mobilisation; and, (v) Phase 5: Program Implementation. Key activities to be undertaken in each Phase are summaries below.

Phase 1: Inception

- First National CSA Stakeholder Conference
    - Nomination of NCSASC members
    - Appointment of NCSASC members
- First NCSAST meeting
    - Establish modalities for committee operations
    - Appointment of TWG
    - Formal resolution to institutionalise the CSA Unit

Phase 2: Institutional Setup

- Establishment of CSA Unit
- Assigning key staff
- Convening of Provincial and District CSA committees

Phase 3: Planning and Program Conception – on-going

- Priority setting and sequencing of intervention areas in the CSA framework
- Facilitating Project pipeline development by key stakeholders
    - Convening Consortia for conceptualising bankable projects
    - Technical and financial proposals
- Influencing technical designs of CSA programs by stakeholders

Phase 4: Resource Mobilization – ongoing

- Identification and tracking of funding opportunities
- Prepositioning for funding programs
- Capacity building and readiness arrangements for accessing funds from Green Climate Fund
- Presentation of Framework to Donor platforms
- Facilitating Partnerships – private/public/donor
- Host agreements with funding partners
- Grant management in collaboration with partners

Phase 5: Program Implementation

On-going activities

- Catalyse policy and regulatory reforms
    - Identify policy and regulatory bottlenecks working with stakeholders
    - Formulate policy and regulatory response options
    - Engage relevant policy making processes, government entities
- Knowledge management and coordination
    - Establishment of a knowledge management platform
    - Mapping of national CSA programs
    - Communication with stakeholders
    - Monitoring and reporting on progress in implementation
    - Sharing of lessons, best practices, further needs, opportunities for collaboration
    - Convene annual CSA stakeholder conference
    - Visibility and advocacy, promotional activities

Programmatic activities

- Work streams as per the framework objectives and result areas.

> **The Plan of Action for implementing the framework has been organised into five phases.**

9 Monitoring and Evaluation Framework

This section presents a broad framework for M&E for the CSA Framework. While this is intended to inform a better understanding of the key elements of an M&E framework for CSA, it is not a comprehensive M&E framework for individual interventions. These are expected to be developed on a case by case basis as part of program designs. A logical framework summarizing this this broad M&E is presented in Annex 1.

The CSA investments within the framework broadly seek to achieve the twin objectives of sustainable development and resilience building in the face of a changing climate. While M&E approaches for development outcomes are well established, tracking and measuring resilience or adaptation benefit is a relatively new field.

The M&E framework presented here borrows from other prominent approaches for tracking adaptation benefit such Tracking Adaptation and Measuring Development (TAMD) that is widely recommended as the M&E framework for tracking and measuring CSA investments. The M&E framework is a twin-track approach to monitor and evaluate climate change adaptation by assessing changes to the broader (institutional) changes and quality of support for adoption of CSA, and direct adaptation benefits and development outcomes for target beneficiaries (mostly farmers). As such, the M&E framework seeks to evaluate adaptation success as a combination of how well key institutions and stakeholders manage climate risks, and how successfully adaptation interventions reduce vulnerability, build resilience and keep development on course.

9.1 Key elements of the M&E framework

A twin-track M&E framework that will track adaptation benefit and development outcomes of CSA investments will include:

i. Track 1: Assesses progress in the broader environment - institutional changes and quality of services to support adoption of CSA;

ii. Track 2: Tracks adaptation and development performance (these processes are linked to each other and across scales.

Track 1 interventions target national or sub-national governmental and non-governmental stakeholders that have an influence on development and adaptation outcomes in Track 2. These interventions include: creating enabling policies; by-laws and regulations for adaptation at various levels; ensuring that planning takes into account relevant climate information and predictions; allocating budgets for adaptation actions; coordinating the relevant actors who are implementing CSA interventions, raising awareness and building the capacity of relevant actors-for example, politicians, technical staff, private sector, and community leaders.

Track 2 assesses the benefits that accrue from implementing CSA in response to climate hazards such as floods and drought over time. Adaptation and resilience building are long-term endeavors, so Track 2 benefits are measured from the project implementation period to beyond the project's lifetime. The M&E is intended to explicitly address the assessment of outcomes, impacts and outputs; it therefore seeks to go further than many existing or emerging adaptation M&E approaches. Given the highly technical and detailed nature of some aspects of adaptation and mitigation benefits of CSA, this Framework will also depend on detailed regional Monitoring, Reporting and Verification (MRV) frameworks that are currently being developed by other stakeholders.

9.2 Key steps in developing and applying the M&E framework for CSA

Six key steps will be followed in developing and applying the M&E for CSA interventions: define the scope; develop a theory of change; define and construct indicators; measure indicators; analyze and interpret results; learning and feedback processes. These steps are iterative - results from one step can feed back into previous steps, and steps may be repeated. Steps 1 and 2 have been developed in detail in Sections 5 and 7. This can help refine the processes represented in previous steps of the current intervention or improve the way these steps are followed or applied in future initiatives. The results of the M&E can therefore be used to inform the planning of subsequent CSA investments and activities, and to improve the enabling environment.

Below is a brief description of each of the six steps.

Step 1: Define the scope

This step spells out the purpose of the M&E and identifies who should be targeted by the M&E: key stakeholders at national and sub-national levels (Track 1) and target beneficiaries (Track 2). These are the key levels at which change is needed for sustainable adoption of CSA. The scope should include clear details of the target populations (including gender disaggregation), time scales, systems, hazards (e.g. droughts, floods) and consequences of exposure. Information on the prevalence of different hazards and their consequences for different populations, groups, places and sectors is available from national databases, meteorological and hydrological services or other sources such as technical reports, academic papers and news media. Identifying sources of such information-including climate data for characterizing climate hazards (see Step 3)-is an important part of scoping.

Step 2: Theories of Change (ToC)

This step involves development of ToC for both Track 1 and Track 2 as already presented in Section 5. Detailed ToC will, however, be required for specific CSA investments. A ToC is a model that explains the links between actions, outputs, outcomes and impacts. Theories of change help to understand how changes in the environment or CSA investments by different stakeholders will support the resilience building for farmers and value chains. On the basis of these ToC, indicators and tools will be chosen. Assumptions are important in interrogating the logic of a ToC. These are usually circumstances that are outside the control of a project, programme or local government. The M&E framework defines any underlying assumptions, as this helps to define the results of a ToC. Once assumptions are defined, one can develop and resource a risk mitigation strategy to ensure that anticipated changes in adaptive capacity, resilience and/or development are not derailed and the possibility of enhancing impacts is increased.

Step 3: Defining and constructing indicators

Three types of indicators are used-institutional capacity indicators, those on resilience and vulnerability (shorter term) and longer term wellbeing indicators. These are identified after the ToC process when it is understood what changes in resilience and/or climate risk management are being sought, and how these are expected to deliver increased wellbeing. At the local level terms such as outputs, outcomes and impacts are commonly used to understand changes over time. Outcomes are identified as shorter term changes over time in capacity to cope, that can be measured using resilience indicators, and impacts as longer term improvements in the development situation that can be measured using wellbeing indicators. Improvements in resilience (outcomes) should contribute to enhanced wellbeing (impacts) in the face of hazards that might be intensifying as a result of climate change.

Enabling environment Indicators

The M&E uses scorecard-based indicators with different stakeholders to assess institutional changes and processes for supporting adoption of CSA at various levels. Scorecards are also used to construct baselines and identify areas that need addressing to ensure effective CSA and to prioritize interventions. Examples of scorecard based indicator categories include:

i. Climate change integration into planning;

ii. Institutional coordination for integration;

iii. Budgeting and finance;

iv. Institutional knowledge and capacity;

v. Climate information services;

vi. Participation;

vii. Education, training and awareness;

viii. Existence and coverage of disaster risk management processes.

Vulnerability and resilience indicators

Vulnerability and resilience indicators measure the factors that make people or systems more or less likely to experience harm when they are exposed to a hazard (in this case a climate shock or stress). These factors can be identified in vulnerability or resilience assessments that are done prior to the development of an M&E framework. Different factors will be important for the vulnerability and resilience of different groups of people; vulnerability and resilience indicators should reflect this and be context specific. Some common 'dimensions' of resilience that can be used to guide and inform the identification and selection of resilience (and vulnerability) indicators have been outlined to guide further case-specific details. Because vulnerability and resilience indicators represent people's, household's and communities' circumstances and characteristics,

they can be measured at any time. It is not necessary to wait until a climate shock or stress has occurred to measure these indicators. They therefore provide a means of measuring adaptation performance over relatively short timescales. They can be considered as "outcome" indicators.

The following broad dimensions of resilience have been identified to guide finer context specific elements:

i. Assets: the five capital assets: physical, natural, human, economic and social assets;

ii. Access to services: water, energy, early warning systems, transport, knowledge, information - to help people plan for, cope with and recover from stresses and shocks;

iii. Adaptive capacity: ability to anticipate, plan for and respond to longer term changes, e.g. by modifying current practice, creating new strategies;

iv. Income and food access: the extent of people's poverty or food insecurity before a stress or shock;

v. Safety nets: formal and informal support networks, emergency relief, financial mechanisms such as insurance;

vi. Livelihood viability: the extent to which livelihoods can be sustained in the face of shock/stress; the magnitude of shock/stress that can be accommodated;

vii. Institutional and governance contexts: the extent to which governance, institutions, policy, conflict and insecurity constrain or enable adoption of CSA;

viii. Infrastructural contexts: the extent to which CSA is supported or constrained by the quality and functioning of built infrastructure, environmental systems, natural resources and geography;

ix. Personal circumstances: other factors that make individuals more or less able to anticipate, plan for, cope with, recover from and adapt to changes in stresses/shocks e.g. debt, low socio-economic status.

Step 4: Measuring indicators

Data gathering for enabling environment indicators will be done through the following approaches:

- Self-assessment – for example, stakeholders are requested to track the development of its own capacities using score-cards;
- Structured or semi-structured interviews with key stakeholders, led by staff from the CSA unit;
- Focus groups that bring together stakeholders from different departments, convened by the CSA unit.

Resilience and vulnerability indicators will be measured at regular intervals (ideally annually, or at least every 2-3 years or at the beginning and end of an intervention). These indicators will represent key factors that make people and systems resilient. Surveys, focus group discussions, field visits and key informant interviews will be used to measure these indicators. Some of this information will be available from routine national statistical surveys.

Step 5: Analyzing and interpreting results

To get a true picture of the performance of CSA, the M&E framework will place any measured changes in wellbeing indicators in the context of changes to climate hazards. At the most basic level, monitoring will involve identifying whether enabling environment and wellbeing indicators have changed, and in what direction. This simple approach is useful for aggregating across indicators and across interventions.

Step 6: Learning

Given the complex nature of many CSA initiatives, learning should be an integral part of M&E. There are several approaches that will used to ensure learning is meaningful:

- M&E will be developed in initial planning of CSA interventions, including a clear ToC, that will be tested and revised throughout the implementation process;
- A stakeholder learning strategy will be developed where stakeholders can analyze challenges and document lessons in various forums such as learning workshops;
- Lessons learnt will be disseminated in appropriate formats for different audiences;
- Lessons learnt will be used to enhance local level decision making on climate change.

Annex 1: Logical Framework (Log Frame)

Logframe				
	Summary of quantified SMART targets for each level in the Logframe	**Indicators (quantitative and qualitative)**	**Means of Verification**	**Assumptions**
Impacts	A climate resilient and rewarding agricultural system improving national food and nutrition security, and driving socio-economic development	• Stability of yields • Incidences of food and nutrition insecurity • Profitability of farming enterprises • Stability & growth of agric contribution to GDP • Incidence of rural poverty	• National crop assessment reports • National statistical surveys	• Agriculture continues to be a key driver of economic growth and inclusive socio economic transformation • Current CSA options are effective in building resilience to climate risk
Outcomes	Sustainable, large-scale adoption of CSA in Zimbabwe in response to climate change	• Annual % increase in number of farmers practicing CSA • Annual % increase in land area under CSA practices • Annual changes in proportion of agric income from climate sensitive production systems • Level of diversity of household income profiles	• Monitoring and Evaluation surveys and reports • Independent program level assessments	Farmers appreciate the benefits of CSA
Intermediate outcomes	Improved access to, and sustainable use of CSA inputs, tools and technologies (Objective 1)	Annual % increase in number of farmers using CSA inputs Annual sales of CSA inputs	• Monitoring and Evaluation surveys and reports • Independent program level assessments • Annual reports from input suppliers	Private sector players find value in supplying CSA inputs
	Increased the use of climate smart farm practices (Objective 2)	• Annual % increase in number of farmers using CSA farm practices • Annual % increase in hectares under CSA practices	Monitoring and Evaluation surveys and reports	Farmers appreciate the benefits of CSA

Logframe				
	Summary of quantified SMART targets for each level in the Logframe	Indicators (quantitative and qualitative)	Means of Verification	Assumptions
Intermediate outcomes (continued)	Improved participation in vibrant markets for farm produce (Objective 3)	• Annual % increase in number of farmers participating in formal markets • % increase in proportion of agricultural produce reaching vibrant markets	• Annual reports from off-take private sector partners • Monitoring and Evaluation surveys and reports	Private sector partners appreciate the mutual benefits of jointly tackling climate risk with over value chain players
	Strengthened coordination, knowledge management and capacity for implementation (Objective 4)	• Number of multi-stakeholder CSA collaborations • Numbers of stakeholders accessing and sharing information on CSA • Proportion of CSA initiatives covered in national monitoring reports • Number of national CSA programs designed, resourced and implemented	• Monitoring and Evaluation surveys and reports • Statistics from knowledge sharing portals	All key stakeholders appreciate the benefits of knowledge sharing and cooperation rather than competition
	CSA Mainstreamed into policy, regulatory and disaster risk management (Objective 5)	• Number of policies introducing provisions, incentives, changes, and regulatory instruments for supporting CSA • Number of unfavourable policy inconsistences realigned to facilitate CSA • % Increase in budgetary allocations funding CSA activities • % increase in budgets for disaster risk responses • % of rural households covered by climate risk management instruments	• Policy documents • Monitoring and Evaluation surveys and reports • National budget documents	CSA gains sufficient traction among policy makers

Logframe				
	Summary of quantified SMART targets for each level in the Logframe	Indicators (quantitative and qualitative)	Means of Verification	Assumptions
Outputs	Improved access to sustainable financing for farmers (ER1.1)	• % of farmers accessing financing • Proportion of the loan book allocated to farmers • Increase in loans to farmers • % of farmers in private sector partnerships for financing	• Monitoring and Evaluation surveys and reports • Annual Reports from financial institutions, other private sector partners	
	Improved availability of appropriate climate resilient inputs, tools, technologies (ER1.2)	• % of farmers accessing CSA inputs • Number of local suppliers of key CSA inputs and tools • Variance of local prices compared to neighbouring countries	• Monitoring and Evaluation surveys and reports • Annual Reports from input suppliers	
	Improved awareness, exposure and technical capacity for CSA (ER2.1)	• Uptake of CSA messages in local media • Reference to CSA in farmers meetings and needs analysis • Number of CSA demonstrations, field days, competitions	• Media reports • Reports of farmers meetings • Monitoring and Evaluation surveys and reports	
	Improved farmer support services, extension and climate information services (ER2.2)	• Number of farmers accessing support services • Number of functional platforms for climate information services • Number of governmental and Non-governmental entities providing climate information to farmers	• Monitoring and Evaluation surveys and reports • Reports of Farmers Organisations • Statistics from climate information platforms	
	Inclusive & viable partnerships for value addition & marketing of products (ER3.1)	• Number of functional partnerships • Number of farmers linked to functional partnerships with Private sector	• Reports of Farmers Organisations • Monitoring and Evaluation surveys and reports • Reports from private sector players	
	Improved connectivity for communication and transportation (ER3.2)	Number of farmers with access to climate proofed communication and transport networks	Assessments from disaster risk management department Monitoring and Evaluation surveys and reports	

Logframe				
	Summary of quantified SMART targets for each level in the Logframe	**Indicators (quantitative and qualitative)**	**Means of Verification**	**Assumptions**
	Strengthened synergy & knowledge sharing across government, NGOs and private sector stakeholders (ER4.1)	• Number of functional information sharing platforms • Number of stakeholders accessing information sharing platforms • Number of national monitoring and evaluation studies	• Statistics from information sharing platforms • Monitoring and Evaluation surveys and reports	
	Institutionalised inter- ministerial collaboration from national to local levels (ER4.2)	Number of cross ministerial collaborations on CSA	• Ministerial reports • Monitoring and Evaluation surveys and reports	
	Embedded policy and regulatory incentives for promoting CSA (ER5.1)	• Number of policy proposals presented to policy makers for facilitating CSA • Number of regulatory instruments designed to support CSA	Policy advocacy submissions by stakeholders	
	Proactive, inclusive climate risk management systems (ER5.2)	• Number of functional insurance schemes covering farmers • Number of farmers covered by insurance schemes	• Annual reports from insurance companies • Monitoring and Evaluation surveys and reports	
Activities	See Implementation Plan (Section 7)			
Inputs	See Section 7			

Annex 2: Climate Risks and Trends in Zimbabwe

Irrefutable evidence of climate change

There is irrefutable evidence that the global climate system is undergoing profound change. Human activities are the dominant cause of the observed increase in GHGs since 1750 and of the consequent global warming (IPCC, 2014a). In its Fifth Assessment Report (AR5), the Intergovernmental Panel on Climate Change (IPCC) reports that heat trapping Greenhouse Gases (GHGs) (made up of mainly carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O)) have increased more rapidly since 1970 than during prior decades (IPCC, 2014a). Present-day abundances of GHGs exceed the range over the past 800,000 years. Since the beginning of the industrial revolution, AR5 estimated that atmospheric concentrations of CO2 have risen by 35%, primarily from burning of fossil fuels and deforestation. Annual emission of CO2 from fossil fuels and cement production was 9.5 gigatonnes of carbon (GTC) in 2011, 54% above the 1990 level (IPCC, 2014b). More than 20% of this added CO2 will remain in the atmosphere for longer than 1000 years (IPCC, 2014a).

On a global basis, agriculture and forestry, including deforestation, contribute approximately 24 percent of annual GHG emissions, and together are the second-largest emitter after the energy sector (IPCC 2014c). The largest shares of these emissions are derived from cattle production, fertilisation, and deforestation. Smaller quantities of emissions come from rice production, the burning of crop residues, and fuel use on farms. While the aggregate contribution of Sub-Saharan Africa to global GHG emissions is only about 3.8%, it is expected to increase sharply with population and income growth (World Resources Institute, 2014).

Climate risk already endemic to Zimbabwe and the region

Understanding climate changes in much of Southern Africa including Zimbabwe, is complicated by the fact that risks such as drought, flooding, and variable rainfall patterns are endemic in this region. As such it is easy to confuse annual anomalies in weather patterns (e.g., a later start to rains or a severe drought) with an evolving climate risk. There is however growing evidence that these risks are changing as a result of rising levels of greenhouse gases (GHG). If CSA aims to improve adaptation and resilience to current climate risks as well as future risks that are resulting from climate change, this distinction is less important. The challenge is simply to better demarcate these current risks, and to seek understanding of how these risks are likely to change over time.

Unambiguous trend of rising temperatures

Detailed long term trend analysis of key climate variables such as temperature and rainfall reveal changing patterns that are already affecting agro ecological systems as well as socio-economic aspects of people's lives in many parts of the world. Warming of the global climate system is unequivocal, as evidenced from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice-caps, and rising global average sea level. The IPCC has reported that average temperature of the earth's surface has risen by 0.74 °C since the late 1800s. Of the 12 warmest years since 1850, 11 occurred between 1995 and 2006. They also found that the last 50 years from 1956 to 2005 were nearly twice as warm as the average of the last 100 years. More than a dozen studies cited by the IPCC's fifth assessment report (AR5) concur that temperatures over most African regions have increased by 0.5 degree centigrade or more over the past 50 to 100 years. In Southern Africa, related studies confirm the increasing trend in annual average, minimum, and maximum temperatures in the last 60 years, with most of the warming occurring in the last two decades. In Zimbabwe, an analysis of temperature data from the Department of Meteorological Services for Makonde Communal Lands suggest a progressive warming trend since 1962 (Sango and Nhamo, 2015). Further analysis showed that the period of most rapid warming occurred since the early 1980s to date.

The IPCC Fourth Assessment Report cautions that if current trends in GHG emissions continue, global temperatures could rise by 1.4 to 5.8 C by 2100. Such temperature changes are likely to have detrimental impacts on the climate system, agricultural production, ecosystems, water supply, forests and overall human development. Some of these changes are already occurring in different regions of the world. By 2020, in some countries, yields from rain-fed agriculture could be reduced by up to 50% and access to food could be highly compromised. By 2080, Arid and Semi-Arid lands in Africa are projected to increase by 5-8% under a range of climate change scenarios.

Declining rainfall and worsening variability

Rainfall risks are endemic in much of sub-Saharan Africa and climate change is worsening the situation. While the trends on annual rainfall are not as conclusive as those for temperature, a number of studies suggest that sub-Saharan has experienced a downward trend in rainfall. The early 1990s had 20% lower rainfall than the 1970s, with significant droughts in the 1980s, early 1990s, 2002 and more recently in 2015 (Unganai et al, 2015). In Southern Africa, historical rainfall records

indicate a reduction in late summer precipitation during the second half of the 20th century, particularly over the region's western half, from Namibia to Angola and Congo, the western parts of South Africa, Zimbabwe, and Botswana. In addition to declining rainfall, some observers cite intra-seasonal changes to the onset of the rainy season, increasing intensity of dry spells, and increasing intensity of daily rainfall. Rainfall varies by year and by intensity within the season. Seasons start late and end early. Mid-season dry spells are common. These risks have been identified as the most significant climate-related threat to food production in the near term (FAO, 2016). In combination with higher temperatures, lower rainfall and erratic seasonal patterns result in significant yield losses due to moisture stress, especially when they occur at critical stages of crop growth such as flowering and grain filling.

In Zimbabwe, the patterns of annual rainfall between 1962 and 2008 for Makonde Communal Lands based on figures from Department of Meteorological Services concur with the evidence of a progressive decrease in annual rainfall over parts of southern Africa (Sango and Nhamo, 2015). The findings highlight the extreme fluctuations that suggest the increasing inter-annual rainfall variability, and the increasingly frequent and severe drought spells over the past 20 years. The alternating patterns of below-normal (most frequent) to above-normal rainfall periods reveal the trends of both climate variability and climate change in the Makonde Communal Lands (Sango and Nhamo, 2015).

Local evidence confirms impacts on agroecosystems: the case of Chiredzi district

The 'Coping with Drought and Climate Change Project' (Unganai et al., 2015) used historical climate data from 1966 to 2006, and downscaled climate change projections for the period 2045-2065 to assess the sensitivity of crop and livestock livelihood systems in Chiredzi district to climate change impacts using the IPCC (2001) framework for vulnerability assessment. Chiredzi district is mostly in Natural Region V. The region is subject to periodic seasonal droughts, erratic rainfall and severe dry spells during the rainy season. It is generally marginally suitable for dryland cropping and suited to extensive livestock production or game ranching. Sorghum, maize, groundnuts and cotton are the main crops currently grown among small-holder farmers in Chiredzi district.

Community participatory climate risk analysis conducted revealed that drought is the most important climatic hazard and five types of drought are normally experienced in the district: early season - characterized by delayed or slow onset of the rains; mid-season - rains break for weeks on end about January/February; terminal - rains terminate from about January/February); seasonal - rains are light and patchy throughout the season; and extreme drought - in this case rains fail for two or more consecutive seasons.

Applying ten-downscaled models to the Save Basin for the high emissions, high sensitivity scenarios generated by the IPCC for the Third Assessment report, the study identified a number of possible outcomes for Chiredzi, including:

- An increase in annual average temperature of between 1.5 to 3.5 C by 2050 from the current baseline
- Total rainfall does not change much, but the rainfall pattern may undergo significant modifications by 2050.
- Most models project rainfall increases in most months followed by decreases during the second part of the season, and;
- Runoff shows high inter-annual variability in future

A Standardized Precipitation Index (SPI) was used to assess drought hazard exposure for Chiredzi district, using 3, 6, 12, 24 and 48 months' time steps. A time series analysis of the SPI for Chiredzi from 1966 to 2005 revealed a high frequency of moderate and severe drought conditions between 1980 and 2000. Moderate drought is when SPI ranges from -1 to -1.49, for severe drought SPI is from -1.5 to -1.99 and for extreme drought it is below -2.0. The period 1980-1996 had the lowest runoff with devastating impacts on livelihoods in Chiredzi district. Future water balance projections across the Save Basin show an increase in inter-annual variability of runoff, with some sub-basins such as Chiredzi experiencing water deficits.

Under the current climate, the whole of Chiredzi district is suitable for sorghum production. Mean yields for rural small-holder farmers have averaged 0.52 t/ha from 1990-2000 compared with the global average of 1.8 t/ha. However, under the worst case climate change scenario (i.e. temperature increases significantly and rainfall declines by up to 50% by 2050) the district becomes largely unsuitable for sorghum production. Chiredzi is marginally suitable for rain-fed maize production under the current climate. Production records from the district show a mean yield of about 0.55 t/ha for smallholder farmers under rain-fed production compared with a national average of about 1.2 t/ha for the same category of farmers. If the temperature and rainfall for Chiredzi district were to change as projected by the best case climate change scenario, its suitability for maize production would improve from the current situation to cover the whole district. However, under the worst case climate change scenario (high temperature increase and rainfall declines by up to 50%) the whole district becomes completely unsuitable for the crop. Chiredzi district is currently suitable for cotton production and yields for small-holder farmers growing the crop under rain-fed conditions average 0.41 t/ha. For the best case climate change scenario the suitability of the project area for the cotton production improves from the current situation to cover the whole district. However, for the worst case climate change scenario, the whole district becomes unsuitable for cotton production.

Using NDVI (Normalized Difference Vegetation Index) data for the period 2002 – 2007, empirical relationships between Net Primary Productivity (NPP) and temperature and rainfall were derived. Using an estimate of daily intake of an average cow and goat the crude carrying capacity of the district was estimated. Areas with high carrying capacity have low sensitivity scores while areas with low carrying capacity have high sensitivity scores. Under the current climate it can be seen that the whole of Chiredzi district has low sensitivity for both cattle and goats. The findings reveal that both cattle and goats will become sensitive under both the worst and best case climate change scenarios, with the worst case scenario showing the greatest sensitivity.

Results from the study reveal that most of Chiredzi district will become unsuitable for maize, sorghum and cotton production under the worst case climate change scenario. Both goats and cattle also show significant sensitivity to climate change under both the best and worst case scenarios. The inherent dryness of the district, increasing demand on water from a growing human population, heavy reliance on underground water has led to significant saline water intrusion. Poor environmental management practices and institutional failures are some of the factors identified to be worsening the impacts of drought.

Annex 3: Evidence and insights on CA in Zimbabwe

The Origins: CA was first implemented by Brian Oldrieve at Hinton Estates in northeastern Zimbabwe in the late 1980s. The farm and surrounding areas were able to tremendously increase yield levels and successfully reduce soil erosion through the use of conservation farming (comprising reduced tillage and mulch retention) (Oldrieve, 1993). CA was subsequently introduced to the smallholder sector by donors and non-governmental organizations (NGOs) in the 2003/2004 agricultural season to sustainably address the low productivity of farmers and improve their food security and overall cereal production. The CA option that has been mostly promoted in Zimbabwe is a manual system based on planting basins that act as planting stations for the crops (Twomlow et al., 2006). This option was promoted mainly to address the draught power shortages in the communal farming sector, which delays planting and consequently negatively affects final crop yields. This strong focus on planting basins is currently shifting in Zimbabwe as more and more organizations are interested in also serving more resource-endowed farmers with animal- and tractor-drawn CA options (Marongwe et al., 2013).

Between 2004 and 2010, the numbers of farmers practicing CA has increased from about 4700 to over 250 000 in more than 500 wards across the country (Marongwe et al., 2013). Currently, the numbers of wards where farmers are practising CA without support (557) outnumber those where farmers are practising CA with input support (503). The involvement of the private sector to supply inputs in some CA projects has helped to initiate a market-oriented agricultural production system. The private sector is also involved in the evaluation and manufacture of CA equipment. The promotion of CA has evolved from provision of inputs to focus on training of extension staff and farmers.

The benefits: The most reported benefits of CA include timely planting of CA fields, availability and precision placement of fertilizers and better moisture conservation (Nyagumbo et al., 2009). Yield advantages in CA systems compared to conventional systems have been observed across several agro-ecological regions of the country (ICRISAT, 2009). Rising temperatures and erratic rainfall patterns are better addressed in CA through increased rainfall use efficiency due to increased water infiltration, improved soil moisture holding capacity and reduced evaporation from the soil. Increased infiltration is a result of improved soil physical structure due to minimum soil disturbance, reduced surface run-off and surface crop residue retention according to research done at Domboshava training centre. While conventional plots lost 20% of the annual precipitation to runoff, the loss was just 1% in CA systems (Nyagumbo 2002). Reducing soil movement and soil disturbance ensures that soil moisture is kept on-site and more water is available for crop consumption (Thierfelder and Wall, 2010). While soil losses of about 30tons per hectare have been recorded in conventional tillage, a six fold reduction in soil loss was recorded in CA systems at the Institute of Agricultural Engineering (Nyagumbo, 2002).

Local research across farmers' fields by Nyagumbo et al. (2009) has shown a higher carbon content in CA systems (0.609 per cent) as compared to conventional systems (0.397 per cent). A general increase in soil aggregate stability due to a doubling of soil organic carbon build-up and reduced soil disturbance has been observed in CA systems over several years in similar trials by CIMMYT (Thierfelder and Wall, 2010). Soil nutrient status is improved by increasing soil carbon and nitrogen through the use of organic soil cover and legumes in rotations and intercrops (Marongwe et al., 2010). The precise application of fertilizers increases the efficiency at which fertilizers are used. Mazvimavi et al (2012) found that although CA technology is implemented in relatively smaller plots than conventional farming (0.36ha compared to 0.85ha), it has a significant contribution to total maize production, on average 50% of output share. Their results show significant yield gains in CA practices and significant contributions to food production. The study concluded that CA is land-saving, and thus important for land constrained farmers because they can still have viable food production on smaller area. High labor demands in CA however present some problems in adoption, particularly for the poorer farmers. Research done by ICRISAT (2009) across 15 districts in Natural Region II to V also found that yields nearly doubled in CA fields (1,546kg/ha) compared to conventional fields (970 kg/ha).

Pedzisa (2015) reported unambiguous positive and significant effect of CA on maize yield. More intense users of CA (those that combined more of the CA principles such as mulching, rotations, reduced tillage) were found to have higher productivity. The study also found that the poor are more likely to persist with CA, confirming that CA is an accessible technology. The study concluded that there was dis-adoption in some cases despite evidence of higher yields, pointing to the need to better understand the constraints faced by farmers.

The constraints: High labour requirements for digging planting basins, weeding and sourcing mulch have been cited by many communal farmers implementing manual CA systems as a major deterrent (Mazvimavi et al., 2010). As a response to these issues, many CA farmers are concentrating on small areas. Some households within villages work in groups when undertaking labour intensive activities such as digging planting basins (FAO, 2011). The use of herbicides has also expanded among CA farmers to address the challenge of weed management.

References

FAO, 2009, Quarterly reports for the project, 'Up-scaling CA for Improved Food Security', July 2009, October 2009 and January 2010, FAO, Harare, Zimbabwe.

ICRISAT. (2013). Conservation agriculture and micro-dosing in Zimbabwe. ICRISAT.

Marongwe, L. S., Kwazira, K., Jenrich, M., Thierfelder, C., & Kassam, A. (2010). An African success: the case of conservation agriculture in Zimbabwe. International Journal of Agricultural Sustainability.

Marongwe L.S., K. Kwazira, M. Jenrich, C. Thierfelder, A. Kassam and T. Friedrich (2011) An African Success: The Case of Conservation Agriculture in Zimbabwe, International Journal of Agricultural Sustainability, 9, pp. 153-161.

Mazvimavi, K., Ndlovu, P. V., An, H., & Murendo, C. (2012). Productivity and Efficiency Analysis of Maize under Conservation Agriculture in Zimbabwe. Paper presented at the International Association of Agricultural Economists (IAAE) Triennial Conference. Foz do Iguaçu, Brazil: International Association of Agricultural Economists (IAAE).

Mazvimavi, K., Ndlovu, P. V., Nyagumbo, I., and Dimes, J. P. (2009). "Trends in Adoption of Conservation Farming Practices Among Smallholder Farmers in Zimbabwe," September 2009. International Crops Research Institute for the Semi-arid Tropics, Bulawayo, 63 pp.

Nyagumbo, I., 2002, 'The effect of three tillage systems on seasonal water budgets and drainage of two Zimbabwean soils under maize', PhD thesis, University of Zimbabwe.

Nyagumbo, I., Mbvumi, B. M., Mutsamba, E., 2009, 'CA in Zimbabwe: socio-economic and biophysical studies', a paper presented at the SADC Regional Conference on ustainable Land Management, Windhoek, Namibia, 7–11 September

Nyagumbo, I., Mutsamba, E., Barrett, T., Dengu, E., & Thierfelder, C. (2013). Prospects for up-scaling Conservation Agriculture in Zimbabwe using animal traction mechanization technologies. Harare: Unpublished Report.

Oldrieve, B., 1993, Conservation Farming – A Farm Management Handbook for Communal, Small-Scale, Resettlement and Co-operative Farmers of Zimbabwe, Mazongororo Paper Converters, Harare, Zimbabwe, 77.

Sango, I., & Nhamo, G. (2015). Climate change trends and environmental impacts in the Makonde Communal Lands, Zimbabwe. South African Journal of Science. vol.111, 7-8.

Thierfelder, C., Wall, P. C., 2009, 'Effects of conservation agriculture techniques on infiltration and soil water content in Zambia and Zimbabwe', Soil and Tillage Research 105, 217–227.

Thierfelder, C., Wall, P. C., 2010a, 'Investigating conservation agriculture (CA) systems in Zambia and Zimbabwe to mitigate future effects of climate change', Journal of Crop Improvement 24, 113–121.

Thierfelder, C., Wall, P. C., 2010b, 'Rotations in conservation agriculture systems of Zambia; effects on soil quality and water relations', Experimental Agriculture 46, 1–17.

Twomlow, S. J., Rohrbach, D., Hove, L., Mupangwa, W., Mashingaidze, N., Moyo, M., Chiroro, C., 2006, 'Conservation farming by basins breathes new life into smallholder farmers in Zimbabwe', SADC Land and Water Management Program Scientific Conference – February, Lilongwe, Malawi.

Unganai, L., 2015. Vulnerability and Adaptation to Climate Change: A focus on Chiredzi District, Zimbabwe. Harare: UNDP.

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