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Climate-smart agriculture packages

UNDP GCF adaptation project proposal preparation for Zimbabwe

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Contents

Executive summary

This sub assessment report supports the development of a full proposal "Building climate resilience of vulnerable agricultural livelihoods in southern Zimbabwe" to the GCF. It complements and builds on the value chain sub assessment and the irrigation sub assessment in proposing site specific costed CSA Packages for the GCF project for each of the identified value chains.

The proposed model for rolling out climate smart agriculture at scale has been developed informed by analysis of baseline and past experiences in introducing climate-smart agriculture in Zimbabwe, high-impact climate smart crop-livestock combinations identified in the value chain sub assessment and through consultations, the proposed number and location of irrigation schemes for the project, the business challenges faced by farmers and possible solutions for linking up with markets. On this basis, this study provides a set of recommendations and costed CSA package options for the project to consider.

A commercial take on smallholder farming is key to both food security, more secure and profitable livelihoods, and successful adoption of climate-smart agriculture practices, crops and livestock. The introduction of climate smart agriculture practices and climate resilient crop and livestock combinations at scale hinges on **effective models for learning and uptake** among small holder farmers as well as **effective and inclusive value chain development** to ensure that small holder farmers are integrated in the agricultural economy. The Farmer Field School methodology is a well-known, tried and tested tool for introducing new methods and crops to farmers and combined with Innovation Platforms, farmers may be effectively linked to market players in an inclusive manner; securing the income and investments that are needed to shift to climate smart production.

Innovation platforms and farmer field schools are interventions that needs to be used strategically to produce sustainable outcomes that can be **scaled out and up in a cost-effective manner.** The study therefore recommends that the project increases the probability of sustainability of the CSA interventions by scaling up successful practices, by providing evidence based input and influence development of policies and regulatory framework in the agricultural sector to support promotion of CSA practices with a focus on smallholder farmers as well as inclusion of smallholder farmers in key value chains. Likewise it is recommended to scale out successful CSA promotion approaches through public and private extension services, based on experiences and strategies developed through Innovation Platforms.

As the climate changes farming practices and value chains needs to adapt continuously, the study recommends to strengthen systematic knowledge management within key government institutions to make sure that the most successful agricultural practices are replicated at scale and that there is a continual adaption of practices according to the changing climate. The **sustainability and exit strategy** on CSA packages depends on the ability of public and private stakeholders to continue to engage on how best to adapt to changing climate conditions. Institutional barriers such as limited horizontal and vertical coordination however limits the capacity to manage and share knowledge, to coordinate well and capitalise on synergies across departments and stakeholders – and needs to be addressed.

Based on this, the study recommends the following **investments**:

- Capacity building for agricultural extension workers in CSA and market linkages
- Capacity building of smallholder farmers in CSA through Farmer Field Schools
- Faciliation of market linkages and CSA solutions through crop-livestock innovation platforms and a platform for upscaling best practice to the policy level
- Systematic knowledge management capacity building and sharing of best practice

Background and purpose of sub-assessment report

This sub assessment report responds to comments provided by the GCF secretariat to the concept note, submitted in September 2016. The GCF secretariat requested that the full funding proposal should have specific information on technologies to be implemented (e.g. more specific than climate-proofed irrigation schemes), inputs which will be financed by GCF (e.g. training, workshops rather than "strengthening" or "support") and finally the full funding proposal should have well defined climate-smart packages to be implemented, rather than have this definition as a first activity to be financed by the project. Also, it was requested that the market analysis should be further developed in the full proposal.

As such this sub assessment complements and builds on the value chain analysis conducted by VUNA and the irrigation sub assessment and focuses on proposing **site specific costed CSA Packages** for the GCF project for each of the identified and value chains. The sub assessment provides an analysis of the context, baseline projects and past initiatives for promoting climate smart agriculture in Zimbabwe and gives recommendations for a strategy for implementing climate smart agriculture at scale in the Southern part of Zimbabwe.

Methodology

The term 'climate-smart agriculture' (CSA) describes a range of agricultural approaches, that aim to achieve food security in a changing climate and develop agriculture in a sustainable way. Climate-smart agriculture (CSA), was defined and presented by FAO at the Hague Conference on Agriculture, Food Security and Climate Change in 2010 and integrates economic, social and environmental dimensions of sustainable development by jointly addressing food security and climate challenges[1]. The definition of CSA includes:

- Sustainably increasing agricultural productivity and incomes;
- Adapting and building resilience to climate change
- Reducing and/or removing greenhouse gases emissions, where possible.

As such CSA has a broad scope and requires a comprehensive approach to addressing technical, policy and investment barriers to achieve sustainable agricultural development for food security under climate change. This entails integration of climate vulnerability assessment and climate smart measures into national agricultural planning, investments and programs and broad stakeholder engagement across the agricultural value chains.

For the purpose of this study, CSA packages will be explored as a range of:

- Climate-smart / climate resilient agricultural practices, tools and technologies for integrated farming systems and landscape management
- Inputs (seed, fertilisers)
- Capacity building for smallholder farmers and extension service providers
- Market related components that enhance climate-smart agricultural practices and livelihoods

The packages will be specific to the identified target areas in the three provinces of Matabeleland South, Masvingo and Manicaland in Southern Zimbabwe – covering the catchment areas of Umzingwane, Save and Runde. The packages will take into account the natural farming regions and livelihood zones for these areas as well as the historic weather hazards and projected climate changes that have been identified (prolonged dry spells, extremely high temperatures and intense rains leading to flash floods). The targeted districts are as follows:

Province	District
Matabeleland South	Umzingwane, Insiza, Beitbridge, Gwanda, Mangwe, Matobo
Masvingo	Masvingo, Zaka, Bikita, Chivi, Chiredzi Mwenezi,
Manicaland	Buhera, Chiredzi, Chimanimani

Key questions to be answered by this study are:

- What is the **baseline and past experiences** in introducing climate-smart agriculture packages in Southern Zimbabwe?
- What **barriers and gaps** exist to the roll out of CSA packages?

[1] (FAO, 2013)

- What **combination/package of climate-smart agricultural practices and livestock/crops provide high-impact solutions** for smallholder farmers in Southern Zimbabwe? For irrigated land and for dry-land? What are the numbers of beneficiaries reached through irrigation and dry-land interventions?
- What **capacity building efforts** and **institutional arrangements** are key to ensure that smallholder farmers are able to take up climate-smart and commercially viable agriculture packages?
- How to strengthen and manage the **evidence base and knowledge** to determine good practices and continue to adapt to changing conditions? At farmer level and at the level of institutions providing services.
- How may **links between smallholder farmers, processors and markets/buyers** be facilitated for the proposed climate-smart packages?
- What will be the **cost** for the proposed climate-smart packages?

The study utilised both secondary and primary data. The data collection methods used were as follows:

- **Desk study,** incl. policy frameworks, project documents and lessons learned, research publications, case studies, news articles, in order to establish key stakeholders, successful CSA practices/experiences and high impact opportunities. The analysis of the climate-smart packages also drew on the complementary sub assessments developed for the feasibility study and project proposal, e.g. the study on irrigation schemes, where irrigation specialists have analysed the need for climate proofing irrigation infrastructure based on flooding risk and the value chain assessment that identified strategic climate smart agricultural value chains that the project can focus on with a focus on climate resilient crops and livestock.

- **Key informant interviews interviews.** Several conversations with AGRITEX staff, DR&SS staff, research institutions, NGOs and other key stakeholders, including, FAO, IFAD, ICRISAT, OXFAM, UNDP ZRBF and several market actors were carried out to gather information, lessons learnt and qualify CSA packages. A list of consultations and persons consulted is annexed.

- To complement the desk study and the key informant interviews, the project development team carried out a **CSA package design and validation process with key stakeholders.** The process was carried out over a series of consultations:

Date and location	**Meeting and objective**	**Participants**
10.3.2017 Harare	First phase of CSA package development	National stakeholders: Department of Research and Specialist Services, AGRITEX, Department of Irrigation, Department of Agriculture Markets and Economics, MEWC Climate Change Management Department, Meteorological Services Department, ICRISAT, UNDP
2.5.2017 Harare	Second phase of CSA package development	National stakeholders: Department of Research and Specialist Services, AGRITEX, Department of Irrigation, Department of Agriculture Markets and Economics, MEWC Climate Change Management Department, Meteorological Services Department, WFP, UNDP Probincial level stakeholders: Provincial agronomists.
April – July 2017	Individual conversations with government, CSO and value chain stakeholders	DR&SS, AGRITEX, FAO, OXFAM, value chain actors, ICRISAT, CIMMYT, ACIAR among others. Key conversations listed below.
6.6.2017 Mutare, Manicaland 7.6.2017 Masvingo, Masvingo	Validation of CSA packages for Manicaland – Save Catchment Validation of CSA packages for	National stakeholders: Department of Irrigation, AGRITEX, MEWC Climate Change Management Department, UNDP. Provincial stakeholders: AGRITEX incl. AGRITEX provincial agronomist, Department of Irrigation, Department of Mechanisation, Livestock department. Any other relevant provincial level stakeholders incl. NGOs and Academia

8.6.2017 Gwanda, Mat. South	Masvingo – Runde Catchment Validation of CSA packages for Matabeleland South – Umzingwane Catchment	District level stakeholders: incl. AGRITEX district heads/coordinators from 4-5 selected districts (districts with proposed irrigation schemes or proposed value chains), Field officers (AGRITEX, Livestock), Farmers representatives, Officials from EMA, ZINWA and MET, RDC Officials from the proposed districts Districts represented: Manicaland: Buhera, Chimanimani, Chipinge Masvingo: Mwenezi, Zaka and Masvingo Matabeleland South: Insiza, Mzingwane, Gwanda, Matobo & Beitbridge

During the **CSA package design and validation process,** stakeholders were presented with background information on the proposal development process, the feasibility studies already conducted (including the irrigation assessment and the value chain study) and the process of choosing the target areas. An overlay of maps for the climate hazards and irrigation sites were presented – with indications of catchment areas and districts – to identify the irrigation schemes and rain fed areas around which CSA packages would be designed. Next, based on the value chain study and information from the Ministry of Agriculture, the team discussed the proposed value chains – i.e. Livestock, Sesame, Horticulture, Small Grains (by crop) in order to identify in which sites the value chains would likely be most viable and guarantee results in the face of climate risks, if targeted.

Given the strong interrelationship between land and asset ownership, natural resource access and use, agricultural livelihoods, climate change impacts and gender, there is a need to analyze the **gendered aspects and impact of agricultural investments and interventions** proposed. However, this analysis is to a large extent contained in the gender sub assessment, and this sub assessment draws on the gender analysis in its recommendations but does not include in-depth gender analysis.

On the basis of the desk study, interviews with key stakeholders and consultations, and analysis and conclusions of other sub assessments, this study provides a set of **recommendations** and **costed CSA package options** for the project to consider.

Context

Over the last decade, Zimbabwe has experienced a number of unprecedented economic, environmental and political shocks and stresses, many of which will have long-lasting impacts. The multiple crises have left a large proportion of the population poor and dependent on food aid in case of a bad harvest season. In the 2016 Global Hunger Index, Zimbabwe's food situation was rated 'serious' and at the peak of the 2017 lean season, 4.1 million people were estimated to be food-insecure, due to the El Niño-induced drought[2]. The reasons for food insecurity are manifold, ranging from the effects of widespread and endemic poverty, a struggling economy with limited employment opportunities, low agricultural productivity practices and difficulty in accessing markets – especially among the most vulnerable, smallholder farmers, who depend on own production for food security. These challenges are exacerbated by increased degradation of land and water resources and increasing climatic variability.

The agricultural sector has traditionally been central to the economy of Zimbabwe – and while the economy as a whole has shrunk, the agricultural sector continues to contribute about 13-14% to the country's GDP in 2014-15 (World Bank data 2014-2015). The agricultural sector is the largest single source of export earnings, estimated at over 40 per cent and accounts for 60 per cent of raw materials for agro-based industries[3]. It is estimated that agriculture is a direct and indirect source of livelihoods for about 70% of the total population.

Currently, in addition to the medium and large scale commercial farmers, about 1.3 million households/families are communal smallholder farmers. The smallholder farmers are covering about 75% of

[2] (Global Hunger Index 2016), ((ZimVAC), 2016/2017)

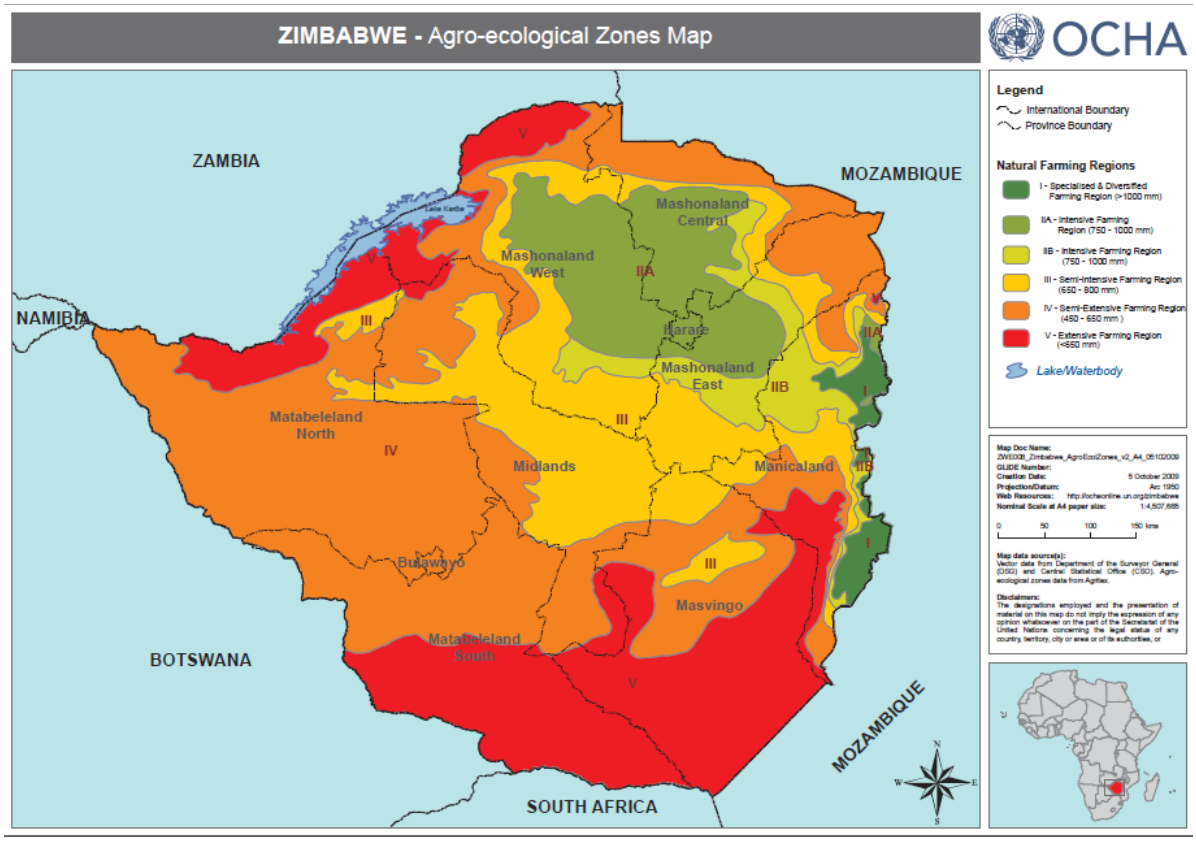
[3] Zimbabwe Comprehensive Agriculture Policy Framework

the agricultural land[4]. The Ministry of Gender and Women affairs estimates that about 70% of smallholder farmers are women.

Agro climatic conditions and livelihood zones in Southern Zimbabwe

The diverse agro-climatic conditions that prevail in the country makes it possible to grow and support a wide variety of food and commercial crops and livestock. The main agricultural exports include tobacco, raw sugar, horticultural crops, coffee, tea and cotton (2014)[5]. Main agricultural imports in 2014 were rice, maize seed, wheat, raw tobacco and raw sugar and processed foods.

The agricultural potential for the country has been mapped out in five Natural Farming Regions, determined on land use, soil conditions and weather patterns among other factors (Vincent and Thomas 1960). Currently, the World Bank is providing technical assistance to MAMID and MEWC in updating the agro-ecological zone map, taking into account climate change effects. As seen on the map, the Southern and Western regions marked in orange, Natural Farming Region IV and red, Natural Farming Region V refer to marginal lands, with low rainfall and least suitable for intensive farming. Much of the land designated for communal and small holder farming is situated in the Southern and Western part, presenting smallholder farmers with challenging farming conditions.



The 2011 Zimbabwe Vulnerability Assessment Committee study of livelihood zones across the country provides a picture of the livelihood options and strategies of small holder and communal farmers.

The project target areas span a diverse range of agricultural livelihoods and different crop-livestock combinations. Most of the areas targeted by the project are located in the Natural Farming Regions IV and V and are semi-arid areas which are challenging to farm for small holder farmers, who are often poor with few other livelihood choices. See annexes for a sum up of each livelihood zone across the Southern provinces.

[4] Moyo and Yeros 2009 quoted in (Ward Anseeuw, 2012)
[5] 2014 – Harvard Economic Atlas.

Poverty mapping by ward shows that the majority of the population in the rural areas, and in particular the marginal areas such as the Natural Farming Region IV and V, are struggling with high poverty rates in the range of 73-96% [6]. The widespread and deep poverty makes it difficult for small holder farmers to prepare for and adapt to risks to agricultural livelihoods presented by climate change.

Climate risks

Zimbabwe lies in a semi-arid region with limited and unreliable rainfall patterns and temperature variations and has historically suffered frequent droughts and mid-season dry spells with more or less severe impacts on the agriculture sector. While there have always been variations in climate, the current pace and intensity of these changes mean that traditional methods of coping with changes in weather patterns are no longer sufficient. Meteorological data for the Southern part of Africa, including Zimbabwe, show increasing and significant temporal variability of rainfall in terms of onset of rains, frequency and intensity of heavy rainfall events, increases in the proportion of low rainfall years and increases in the frequency and intensity of mid-season dry-spells[7]. Mid season dry spells are here defined as a period of at least 10 consecutive dry days during the rainy season, which may have severe implications for crops that depend solely on rain[8]. Climate projections for Zimbabwe, based on the Global Climate Models (GCMs) used in the IPCC Fourth Assessment Report, show an expectation of increasing temperatures of around 2.5°C by the 2050s and possible decrease in rainfall particularly during the onset stage of the rainy season (Sep- Nov)[9]. Impacts may include changes in crop yields and crop patterns, decreased water availability and decreased soil water retention ability. As Walker (2016) notes, temperatures increase the evaporation of water from the soil and surrounding watershed, and also increase evapotranspiration rate from plants. Even with no changes in rainfall, crops are likely to be more stressed with by temperature increases[10].

Also, the El Niño-Southern Oscillation phenomenon of higher sea surface temperatures in the equatorial zone of the central and eastern Pacific Ocean may be used as a predictor for rainfall patterns in Southern Africa. Much of Southern Africa, including Zimbabwe, generally receives lower rainfall under El Niño conditions and higher seasonal rainfall under La Niña conditions – and despite increased understanding of the impact of anthropogenic climate change on the processes that contribute to ENSO, it is not known how and to what extent climate change will affect the frequency and intensity of El Niño and La Niña events[11, 12].

In an effort to better understand and plan development interventions according to current vulnerabilities, climate risks and other hazards, the Zimbabwe Resilience Building Fund recently developed a hazard map based on longitudinal data from a wide range of government, non-governmental and research institutions. The hazard maps show that in particular, the Southern and Western regions of Zimbabwe have historically been prone to droughts and mid-season dry spells and also have high levels of vulnerabilities on other parameters such as HIV/AIDS rates, crop pests and livestock diseases. This, coupled with climate projections, make the Southern and Western regions highly vulnerable[13]. In line with this, Walker (2016) argues that climate smart agriculture efforts need to place higher priority on improving the capacity of farmers to make us of climate and weather predictions in order to cope with drought. Droughts affecting agriculture are already endemic in the region, and they remain the most prevalent and significant climate risk faced. Walker notes that the costs of

[6] (UNICEF, ZIMSTAT, World Bank, 2015)

[7] (Tadross. M, P. Suarez, A. Lotsch, S. Hachigonta, M. Mdoka, L. Unganai, F. Lucio, D. Kamdonyo and M. Muchinda, 2008)

[8] ZRBF defines dry spells as "prolonged periods of dry weather of at least ten consecutive days that happen after the onset of the wet season". In the ZRBF mapping of dry spells across Zimbabwe, the mid-season dry spell is described in terms of its length expressed in days and the frequency of occurrence. Its impact is directly related to the length and time of occurrence and therefore scores can be treated as one combined score. A 5-point scale was adopted after consulting with Agronomists and Crop Science Specialists at the AGRITEX Headquarters in Harare. **None:** 0 -10 days; **Low:** 11 -14 days; **Medium:** 15 -21 days; **Medium high:** 22 -31 days; **High:** > 32 days – with data spanning over the period from 2010-2015. (ZRBF, 2016)

[9] https://www.weadapt.org/knowledge-base/using-climate-information/zimbabwe-climate-analysis . Analysis carried out by the Climate System Analysis Group at the University of Cape Town

[10] (Walker, 2016)

[11] (Cai et al., 2015).

[12] The IPCC 2014 AR5 report, p. 60 states that: 'Globally, in all RCPs, it is likely that … (…) …El Niño-Southern Oscillation (ENSO) related precipitation variability on regional scales will likely intensify'. (IPCC, 2014)

[13] The hazard mappings have been used to select the provinces and districts targeted by the project proposal to GCF.

drought relief and recovery are substantial and that finding solutions to today's droughts will improve the capacity to cope with future and potentially more frequent droughts.

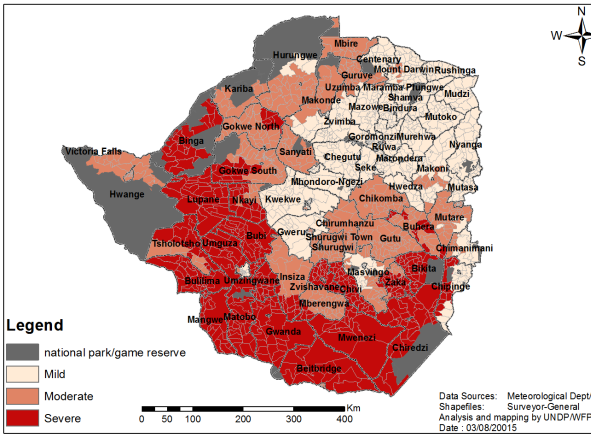


Figure 1: Drought

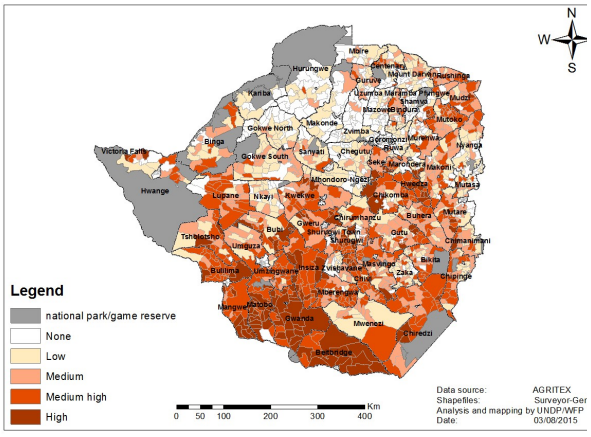


Figure 2: Mid season dry spells

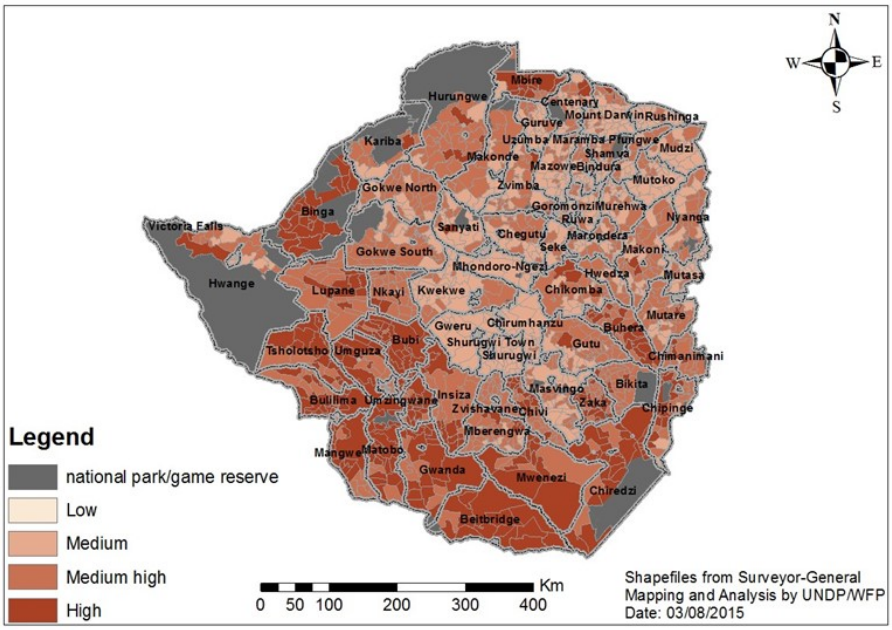


Figure 3: Combined hazard map, including climate and non climate vulnerabilities.

In addition to the current and projected climate risks, unsustainable farming practices contribute to a situation of increased degradation of land and water resources. Communal smallholder crop production in Zimbabwe is often done in marginal areas, especially in the Southern and Western regions. Most of the soils in the smallholder sector are deficient in nutrients, low in organic matter and water holding capacity[14].

Maize is the main food crop grown in Zimbabwe, even in region IV and V where conditions are not optimal for this crop. As can be seen from the figure below, an estimated 88% of households across the provinces grew maize during the 2016/17 season; 84% in the 2015/16 season. For both years, the more drought prone provinces, Matabeleland North and South as well as Masvingo had a higher proportion of households opting for small grains such as sourghum, pearl millet and finger millet; which are more drought resistant. However, the proportion of households adopting drough resistant crops still remain low vis a vis the climate vulnerability in the areas.

[14] FAO. LFSP. CLIMATE-SMART AGRICULTURAL SMALLHOLDER PRODUCTION IN ZIMBABWE

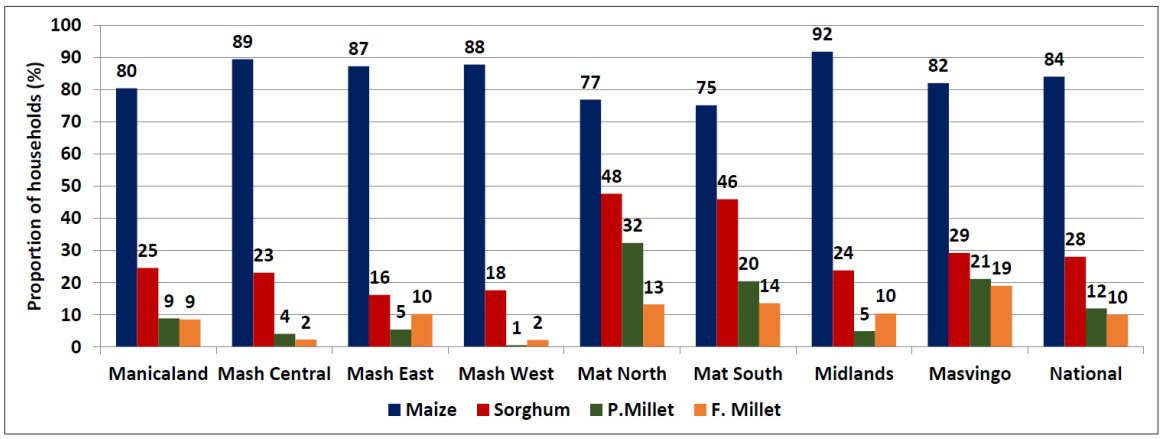


Figure 4: Proportion of households which planted cereals by province in 2015/16 season - Source: ZIMVAC, 2016

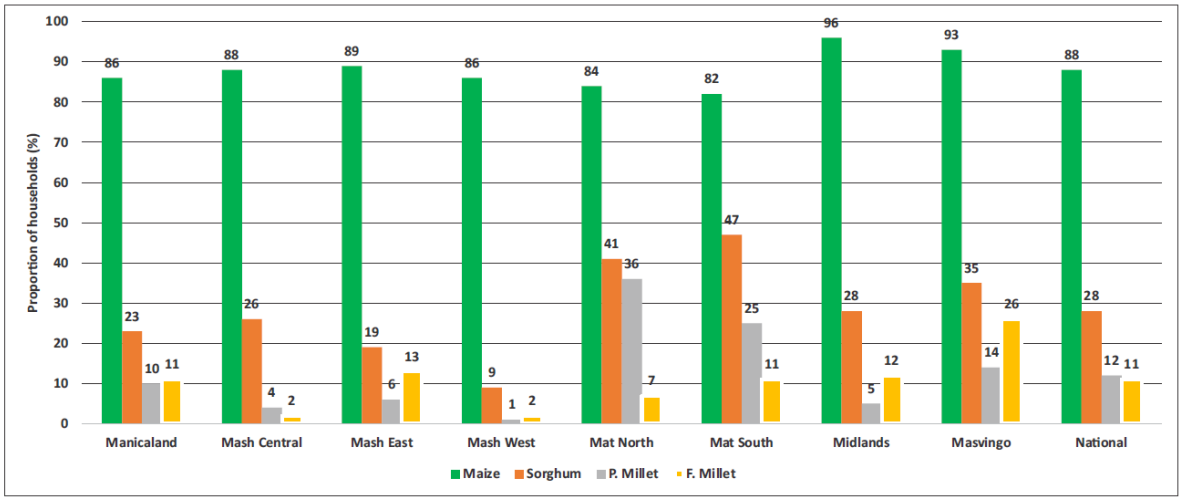


Figure 5: Proportion of households which planted cereals by province in 2016/17 season - Source: (ZIMVAC, 2017)

The risks incurred by households in growing maize can be seen by the fluctuations in the average household production in a good rainfall year versus a low rainfall year; assuming that the planted area remains about the same size. The 2014/15 and 2015/16 season were low rainfall seasons with average household production of maize being as low as 22,8 kg in Matabeleland South and the 2016/17 season receiving high rainfall with higher household average production.

Table 1: Average household cereal production. Source: (ZIMVAC, 2016) and (ZIMVAC, 2017)

Average household maize production by province per season				
	Maize (kg)			
Province	**2013/14**	**2014/15**	**2015/16**	**2016/17**
Manicaland	396,3	292,4	108,6	335,1
Masvingo	399,7	136,4	42,3	356,7
Matabeleland South	375,1	74,6	22,8	174,5

Adding to the challenges of growing maize in an increasingly dry climate, the maize crop is often grown continuously in the same field, without or with little intercropping. The dominance of maize not only risks crop failure and hunger in years with inadequate rainfall, but also decreases soil fertility through mono cropping[15].

[15] (FAO, Livelihoods and Food Security Programme. CLIMATE-SMART AGRICULTURAL SMALLHOLDER PRODUCTION IN ZIMBABWE)

Small grains and legumes cultivation is better suited for the dry regions – but farmers are often reluctant to grow them due to food preferences, production constraints and limited input and output markets markets.

Also, the production of livestock is particularly vulnerable to extreme weather events such as the El Nino induced drought in Zimbabwe in 2016 demonstrated, resulting in widespread livestock deaths and loss of income from crop-livestock value chains. Between October 2015 and February 2016, over 25,000 cattle were recorded dead, mainly in the Southern part of the country (ZIMVAC, 2016)

Zimbabwe has a large irrigation potential and suitable agro-ecological conditions for many horticultural crops provided water availability, but only about 22 percent of all rural wards in the country have irrigation schemes (ZIMVAC, 2017). The ZIMVAC 2017 assessment concluded that of these wards, 54,4% had functional irrigation schemes, 22% had partially functional and 22,6% had non-functional irrigation schemes. According to the ZIMVAC assessment, equipment breakdown, the need for infield works, seasonality of water sources, lack of capital and failure to afford inputs were main challenges in most irrigation schemes. In a recent study, FAO adds that many community assets (e.g. irrigation facilities, roads, processing, storage, bulking centres) are dysfunctional or operating below their optimal capacity due to wear and tear and lack of operational and maintenance capacity by communities - and that the low yields and poor access to markets also diminish the viability of irrigation schemes[16]. The food security and livelihoods of a large part of the population thus depends on small scale rain fed or partly irrigated crop production, which in turn is heavily dependent on the changing rainfall patterns and temperatures - and vulnerable to climate hazards affecting crops, such as drought and mid-season dry spells.

Small holder farming and barriers to market linkages

The majority of smallholder farmers in Zimbabwe grow crops and they require inputs (improved seeds, quality fertilizers and crop protection products) every season at the right time, in the right quantity and quality, in reasonable proximity to their farms and for a reasonable price.
However, due to the depressed economic situation and multiple climate and non-climate hazards affecting the poor, rural population, smallholder farmers often do not have the needed cash or credit to pay for the inputs. To earn a sufficient income from the harvest, the farmers need market systems in place to sell their goods for a decent price. In many areas, the formal systems and marketing infrastructure is lacking or small holder farmers are not well integrated in the formal mechanisms. Small holder farmers therefore mostly sell their produce through local, informal channels for whatever price they can get. Few farmers are organized in farmers associations or commodity associations and have little capacity to negotiate for better prices, store their products until prices increase or produce and sell at large scale. In consultations with AGRITEX at national, provincial and district level the importance of smallholder farmers groups linking up to markets was emphasized as essential for generating sufficient, consistent income for livelihood and investments in farming input, technologies and assets to sustain efficient production[17].

The problem of insufficient market access for smallholder farmers contributes to the entrenched poverty and vulnerability of farmers. Without the prospect of sufficient and steady income, farmers are less likely to improve farming practices and productivity, make use of natural resources sustainably and build resilience to deal with shocks from climate changes. Currently, there is an increased focus on strengthening farmers organization and facilitating market linkages for smallholder farmers from government institutions, I/NGOs and research institutions. It is notable that when farmers are organized in producer groups and market links are facilitated, as demonstrated through the UNDP/GEF funded Scaling Up Adaptation project and CGIAR-supported innovation platforms, incomes are significantly higher than for individual farmers[18].

Policy environment and key institutions

ZimAsset (2013-2018). The GoZ five-year economic blueprint plan: "Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimAsset)" is scheduled to run from 2013 to 2018. ZimAsset recognises agriculture as one of the key productive economic sectors to generate economic growth and employment creation, and agriculture is one of the sectors with the highest growth targets for 2018, at 12.5%. The plan also states that

[16] (Venema)
[17] Consultation 6-8. June 2017
[18] See chapter: Baseline and past experiences in introducing climate-smart agriculture packages in Southern Zimbabwe

impacts of climate change limits the potential of the agriculture sector, especially smallholder rain fed agriculture and livestock production[19].

Zimbabwe Comprehensive Agriculture Policy Framework
The Zimbabwe Comprehensive Agriculture Policy Framework (ZCAPF) provides the overarching policy framework for the agricultural sector (2012-2032). Climate change and climate-smart agriculture is not mentioned in the ZCAPF, although it recognizes the importance of sustainable farming systems and technologies and conservation agriculture principles. The ZCAPF also highlights the importance of improved marketing systems, market information and regulation to ensure that all agricultural actors are well integrated in the market systems.

Zimbabwe Agricultural Investment Plan
The Zimbabwe Agricultural Investment Plan (ZAIP 2013-2018) is the shared national framework for coordinating public, private and development partners' investment into the agriculture sector. It aims to enhance the realization of the objectives of the Zimbabwe Comprehensive Agriculture Policy Framework (2012-2032), Food and Nutrition Security Policy (FNSP) (2012), and ZimAsset (2013 – 2018). ZAIP works on the basis that agriculture is the backbone of the Zimbabwean economy and plays a critical role in sustaining equitable national growth and development required for poverty reduction. It recognises that as part of the land reforms, the agricultural sector has undergone massive changes, leading to increased numbers of farmers and relatively smaller sizes of farms, which are operating at sub-optimal levels. For the sector to operate viably and profitably for farmers and the economy, ZAIP's 'strategic thrust' focuses on supporting farmers, including smallholder farmers, to become more productive and an integral part of domestic and export value chains. Climate change is highlighted as one of the major risks to the development of the agriculture sector.

Climate Smart Agriculture Framework
In September 2017, the first draft for the Climate Smart Agriculture Framework was presented. Supported by VUNA and developed together with MAMID departments, namely AGRITEX, in collaboration with the MEWC Climate Change Management Department, the framework aims to provide a ten year national strategy intended to guide, coordinate and promote climate smart investments in the agricultural sector. It highlights the climate risks, vulnerabilities and impacts on agro-ecosystems, as well as promising options for climate smart investments to adapt to 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. It is expected that the CSA Framework will be finalized in 2018.

Zimbabwe Resilience Strategic Framework
In 2015, stakeholders around the Zimbabwe Resilience Building Fund (ZRBF) - a multi donor fund initiative, implemented by MAMID in management arrangement with UNDP – developed the Zimbabwe Resilience Strategic Framework to ensure a shared conceptual understanding of resilience. The framework provides strategic guidance to the policy level and involved institutions on strengthening resilience of vulnerable rural areas to climate and non-climate related shocks and stresses. Resilience programming shifts the balance of effort and resources from short-term humanitarian assistance efforts toward a combination of disaster risk management, climate change adaptation, livelihood diversification, social protection programmes, and longer-term institutional development. As part of the development of the Strategic Framework and the subsequent work of the ZRBF, several hazards and vulnerability analyses was carried out to inform planning.

National climate policy
The national climate policy (2017) follows the NCCRS and provides the policy framework for climate action in Zimbabwe. The agriculture a key sector, where initiatives towards sustainability and climate change adaptation, weather information systems and capacity building are seen as essential to reducing vulnerability to climate changes.

National Climate Change Response Strategy
The National Climate Change Response Strategy (NCCRS) (2013) provides the strategic framework and a response plan to deal with climate change. The risks and impacts of climate change are analysed and sectoral

[19] ZimAsset p. 24-25

strategies are presented. The agricultural sector is one of the sectors in focus with relevant strategic objectives to: Promote resource use efficiency and less carbon intense pathways in all economic activities; Promote sustainable development, management and utilization of water resources under changing climatic conditions; and Promote sustainable land-use systems that enhance agricultural production, ensure food security and maintain ecosystem integrity.

Government of Zimbabwe institutions and initiatives supporting climate-smart agriculture

The **Ministry of Agriculture, Mechanisation, and Irrigation Development** (MAMID) has overall responsibility for the development and implementation of agricultural policy and services. Responsibility for various aspects of agricultural services is shared among units within the MAMID, as follows:

i. The **Department of Agricultural Research and Extension Services (AGRITEX)** – responsible for providing extension services to all farmers (including irrigators), in collaboration with the MAMID research institution (DR&SS). AGRITEX is responsible for providing technical, planning and extension agricultural services to farmers, including farmer training, food technology (including post harvesting processing and product development), dissemination of technologies, and market oriented extension for sustainable farming[20]. AGRITEX deploys extension personnel to both rain fed and irrigated farming systems. Usually, there are 3 AGRITEX officers per ward[21] complimented by one livestock extension officer. However, in extensive farming systems in Natural Region V, such as in Matebeleland South and North provinces, one extension worker is allocated per ward. Recently, the Government of Zimbabwe has been considering to downscale extension officers to 2 per ward, which may challenge the provision of face-to-face agricultural extension services further or necessitate new formats of extension service. Government is reported as the most common provider of extension services (88% of ZIMVAC 2017 respondents) followed by NGO's. The proportion of households receiving agricultural training has however been relatively low for the past 3 years at 38% in 2014/15, 35% in 2015/16 and 34% in 2016/17 (ZIMVAC, 2017) due to budget constraints in AGRITEX, e.g. in terms of transport for extension officers. This calls for the need to capacitate and effectivize the extension service; especially in the light of possible downscaling of the number of staff. Usually, the extension workers are organized in zones of three wards and report to an Agricultural Supervisor, who in turn reports to a District Agricultural Extension Officer (DAEO). The DAEO reports to the Provincial Agricultural Extension Officer (PAEO). Specialists in agronomy, irrigation, marketing, and veterinary services are available at both district and provincial level. Within AGRITEX there are several units, with the main units related to the promotion of climate-smart agriculture being the Agribusiness and Marketing Unit, which advises farmers on agribusiness and marketing and the Training Branch which offer training to farmers and extension workers.
ii. **The Department for Research and Specialist Services** (DR&SS) is responsible for research to support agricultural policy and services.
iii. The **Department of Irrigation (DOI)** – The DOI is mandated with all irrigation activities in the country, which include planning, identification of schemes, designing, construction, operation and management of existing irrigation schemes. The Department's focus is reviving and maintaining irrigation infrastructure to help reduce the negative impacts of water scarcity being brought about by climate change. The emphasis is on promoting smallholder irrigation.
iv. The **Department of Economics and Markets.** The department of Economics and Markets plays a key role in coordinating the agriculture policy nationally. It is responsible for drafting agriculture-related policy on behalf of MAMID, in collaboration with the Attorney General's (AG) office, and this includes coordination of policy drafting with other departments and relevant parastatals under the Ministry. The Department of Markets is also a key stakeholder in managing the Zimbabwe Resilience Building Fund.
v. **The Department of Livestock and Veterinary Services.** The Department of Livestock and Veterinary Services is an arm of MAMID with the mandate to provide services and facilitate the development and coordination of the livestock sector. It provides services to the livestock

[20] http://www.AGRITEX.gov.zw/

[21] The ward is the basic administrative unit in the country.

industry for enhancement of production, productivity and competitiveness of livestock and animal products.

In addition, several parastatal agencies play a role in agriculture. Key parastatal agencies related to climate-smart agriculture packages are mentioned below:

i The **Agricultural and Rural Development Authority (ARDA)** – a parastatal agency responsible for the operation of government-owned, irrigated estates and farms. It works closely with the Department of Irrigation;

ii The **Grain Marketing Board (GMB)** – a parastatal agency in charge of marketing the country's strategic crops. All controlled crops such as maize and wheat from irrigation schemes are sold to the GMB at regulated prices.

iii **The Agricultural Marketing Authority (AMA)** - a parastatal agency with the mandate to facilitate a level playing field between producers and buyers, facilitate financial resources for the agricultural sector, promote of contract farming relationships, provide market information, and advise MAMID on formulation of agricultural policies.

The Ministry of Environment, Water and Climate.

The MEWC is mandated with the task of managing environment and natural resources, integrated water resources development and management and climate change management as well as developing the relevant policy and legal framework. The responsibility for various aspects of environment, water and climate related management and services is shared among departments within MEWC; key departments for climate smart agriculture are as follows:

i. The **Department of Climate Change Management Department.** In recognition of the need to address climate change, in 2012 GoZ established a Climate Change Management Department (CMD) within the Ministry of Environment Water and Climate (MEWC), with a mandate to coordinate national climate change action. This includes a focus on climate smart agriculture and has included support the development of a CSA framework as well as a CSA guide.

ii. The Ministry of Environment, Water and Climate also hosts the **Department of Meteorological Services**, which is responsible for the climate observations and weather forecasts relevant to agriculture. In recent years, the MSD has worked in partnership with AGRITEX, academic institutions and NGOs, such as OXFAM to pilot targeted forecasts to small holder farmers to inform agricultural decision making.

In addition, parastatal agencies under the MEWC play a role in agriculture:

i. The **Zimbabwe National Water Authority** (ZINWA) - a government owned parastatal agency under the MEWC, with the mandate to protect and govern the country's water resources. ZINWA is responsible for managing catchment areas together with catchment councils and administering water permits and water user payments, e.g. for irrigation schemes.

ii. The **Environmental Management Agency** (EMA) is responsible for ensuring the sustainable management of natural resources and protection of the environment, the prevention of pollution and environmental degradation, the preparation of Environmental Plans for the management and protection of the environment. EMA has a role in climate smart agriculture in terms of managing ecosystems and catchments, e.g. in reducing stream bank cultivation and other unsustainable agricultural practices.

iii. The **Forestry Commission** (FC) is mandated with the regulation and sustainable management and development of the nation's forest resources. FC has a role to play in climate smart agriculture in terms of managing forests in catchments, e.g. in reducing stream bank cultivation, deforestation, supporting agro forestry and reforestation.

Baseline and past experiences in introducing climate-smart agriculture packages in Southern Zimbabwe

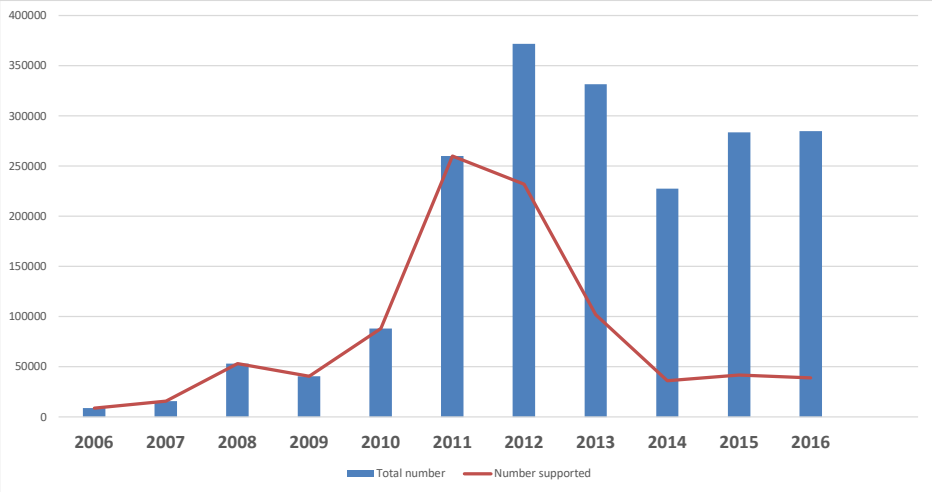
In the past 15 years, much of the focus in the support provided to the agricultural sector in Zimbabwe has been focused on *reactive* food aid and emergency relief. The trend is now to more towards a more *proactive* production and development approach which includes market linkages, long term resilience building perspectives and support to structural changes in policy and investment. The focus has also shifted from a focus on sustainable intensification to a climate-smart focus where both the sustainability aspect as well as adaptation to and mitigation of climate change is included.

The promotion of conservation agriculture and the transition to the promotion of climate smart agriculture

The promotion of CSA in Zimbabwe builds on the previous work to introduce Conservation Agriculture (CA) practices and interventions. CA is understood as a no-till system that increases yields while protecting fields from erosion, improving soil quality and mitigating the effects of drought, but it does not necessarily take into account climate projections. CA in Zimbabwe builds on a long history of conservation tillage and CA has been promoted by GoZ to smallholders from the early 2000's as an alternative to traditional hand-hoe techniques[22]. In 2008, a CA taskforce was setup, chaired by MAMID and FAO with the involvement of research institutions, NGOs and others[23],[24]. The Conservation Agriculture Upscaling Framework (2010-2015) had aimed at a target of 500,000 small holder farmers across the country practicing CA, on 250,000 ha land with a target yield of 1,5 T/ha. The GoZ also budgeted for CA promotion for the first time in the 2010/11 agricultural season and the AGRITEX continued to support CA demonstrations across the country in the following years. CA issues were included in the annual National Crop and Livestock Assessment and a CA module for colleges delivering the Diploma in Agriculture was launched in October 2010. Recently, it was estimated by AGRITEX that about 285,000 small holder farmers in Zimbabwe were practising CA[25], a little above half of the target set in 2010.

[22] (FAO, Conservation agriculture contributes to Zimbabwe economic recovery. , 2013)
[23] The National Conservation Agriculture Task Force has developed a CA manual with AGRITEX, which documents CA practices, tools and training tips for extension staff throughout the country to guide farmers in implementing CA. *Source:* (FAO C. A., 2009)
[24] (FAO, Scaling up conservation agriculture in Zimbabwe, 2013)
[25] Draft CSA Framework (Government of Zimbabwe, 2017)

Numbers of supported and unsupported farmers using CA practices



Source: Marongwe, S. 2017. Presentation at the CSA Stakeholder workshop. MOAMID, Harare

CA has been widely promoted as a climate smart agriculture practice in the country for small holder farmers with the promise of increasing yields, food security and incomes in the face of a changing climate and feasible for small holder farmers with few ressources. However, despite some progress in promoting uptake of CA by governmental and non-governmental entities across the country, challenges remain to go beyond pilots and success stories of individual projects and achive a successful uptake of CA at scale. The CSA framework analysis identifies key factors undermining the adoption of CA as 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[26]. Many of the lessons from the implementation of CA are vital in shaping the strategy for the transition to CSA in the coming years – both in policy as well as in for the CSA packages for the present project.

Key lessons learnt identified in the CSA framework situation analysis

- **Complex systems, diverse contexts, multiple pathways.** The complexity of rural development in Zimbabwe require that multiple pathways are pursued together with multiple stakeholders and partnerships at various scales. What is climate smart in one part of the country may not be climate smart everywhere. This calls for targeted approaches to CSA investments.
- **Achieving sustainable results at scale is the single biggest challenge.** Lessons from recent CSA interventions, including CA, suggest that the going beyond pilots or isolated success stories is a main challenge. 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 emission.** Many of the CSA practices tried and tested in Zimbabwe 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. There is also a diverse typology of husbandry practices which can be termed climate smart with more benefits: Integrated soil fertility management (ISFM); improved grazing management on pastures or rangelands; and, mixed farming, i.e. combining crop and livestock systems.

[26] Draft CSA framework (Government of Zimbabwe, 2017)

- **Labour demand for practices strongly linked to adoption rates.** The labour demand of different CSA practises are important determinants of whether a practice is sustainably adopted by small holders with few resources. Mechanisation is key to reducing drudgery and labour requirements and innovative ways of improving access to affordable mechanisation such as equipment pooling and service provider models have been shown to enhance adoption.
- **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 profits. Many of the risks and opportunities are shared and increasingly, proactive agribusinesses now acknowledge these as 'shared imperatives' which can only be tackled jointly with those who also face them. There are examples of private sector 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 smallholder farmers who have limited resources for such investments (e.g. access to technology such as drought tolerant seed varieties and livestock breeds, finance, off-take markets, information and insurance). Such partnerships help farmers increase productivity, stabilize yields, improve quality of products, reduce production costs, and transfer risk (through insurance), while also concurrently helping businesses stabilize supply (or demand in the case of input suppliers), increase capacity utilization, access better quality products, lower transaction costs, and minimise contractual defaults. This is particularly important in context like Zimbabwe where the private sector depends on the small holder farmers for a big share of the agricultural produce.
- **Mobile and digital technology driven solutions**. The exponential growth of mobile and digital technologies is fuelling innovation, new market dynamics and improving efficiency of delivering financial, communication and risk management solutions to small holder farmers. These innovations are empowering smallholder farmers with powerful information and communication tools e.g. for weather forecasts and farming advice, as well as facilitating more productive interactions and financial transactions among actors across agricultural value chains.
- **Catalyse systemic change to sustain impact.** The CSA framework seeks to promote a shift from project based approaches that have focused at localised and isolated solutions to actively engaging private sector players to be part of scale-up if/when those partners see the commercial opportunity of CSA innovations. To leverage on this potential for scale up, collaboration and coordination across ministries and departments, with agribusiness and service providers, farmers and NGOs is required.

Source: Draft CSA Framework (Government of Zimbabwe, 2017)

While CA is widely practiced and understood, the concept of CSA, which encompasses a wider range of practices than just CA, is relatively new and not widely understood by all governmental and non-governmental service providers. However, there is commitment to promote CSA at every level from government, research and development institutes, NGOs, CBOs and farmer organizations. Many agriculture interventions already include elements of CSA promotion, involving thousands of vulnerable households. The CSA framework currently being developed by MAMID 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 definition is in line with the Food and Agriculture Organization of the United Nations (FAO)[27] and the Consultative Group on International Agricultural Research (CGIAR)[28].

Also, realising the need to provide CSA training to current and future agriculture extension, workers and students of agriculture, the MEWC, MAMID, the Green Impact Trust, Zimbabwe and Climate Technology Centre and Network have been working to develop a CSA Manual for Zimbabwe for agricultural colleges across the country.

Resilience building as a strategic priority in climate smart agriculture

Both the CSA framework and the recently updated extension policy also take into account resilience concepts.

[27] (FAO, CSA sourcebook, 2013); p. ix
[28] Draft CSA framework, (Government of Zimbabwe, 2017), p. 19

This is to a large extent based on the recent work of the multi donor initiative the Zimbabwe Resilience Building Fund, led by the Government of Zimbabwe through MAMID, to develop the Zimbabwe Resilience Strategic Framework through a broad consultative process and implement resilience building activities in a coordinated manner, at scale.

The strategic resilience building framework (ZRBF, 2015) states that "*the starting point for reversing the downward spiral of chronic vulnerability lies in understanding that while the frequency and severity of shocks and stressors are likely to increase as a result of climate-related change, this trend exacerbates and is exacerbated by other underlying factors such as poverty, malnutrition, degraded ecosystems, inadequate physical infrastructure, conflict and ineffective governance*". The aim is therefore to increase 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.

The Strategic Resilience Framework integrates a livelihoods approach, a disaster risk reduction (DRR) approach, and elements of a climate change approach to address the underlying causes of vulnerability. The livelihoods approach focuses on the importance of productive assets, institutional structures and processes, and livelihood strategies (incl. agricultural production strategies) pursued by rural households. The DRR approach focuses on preparedness, prevention, response and recovery in response to shocks and stressors – and finally the climate change adaptation (CCA) approach is similar to that of DRR, but focuses specifically on actions to be taken in response to, and preparation for changes in climate. The climate change approach also integrates considerations to the threats caused by loss of biodiversity and decrease in ecosystem services.

As seen in the figure below, the Strategic Resilience Framework shows vulnerability as an interlinked function of exposure to and the sensitivity to shocks and stresses for key livelihood assets, structures and processes and livelihoods stratregies. Based on abilities of a particular system or group of people to cope with and adapt to the shocks and stresses, the system or group may either bounce back better, bounce back, recover but be worse off than before or collapse under the pressure of shocks.

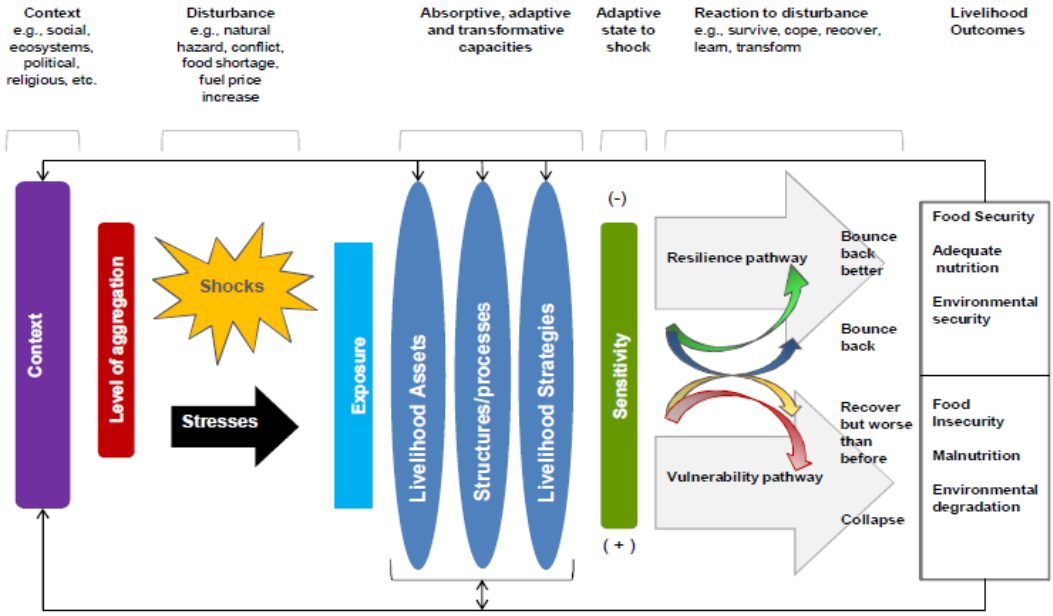


Figure 6: Illustration of the resilience building conceptual framework – source: (ZRBF, 2015)

Similarly FAO, in its 2013 Sourcebook on CSA, illustrates resilience in agriculture with vulnerability as a function of exposure and sensitivity to shocks - and resilience being defined by the capacity to absorb and adapt to shocks, reducing vulnerability and adapting with a changing context.

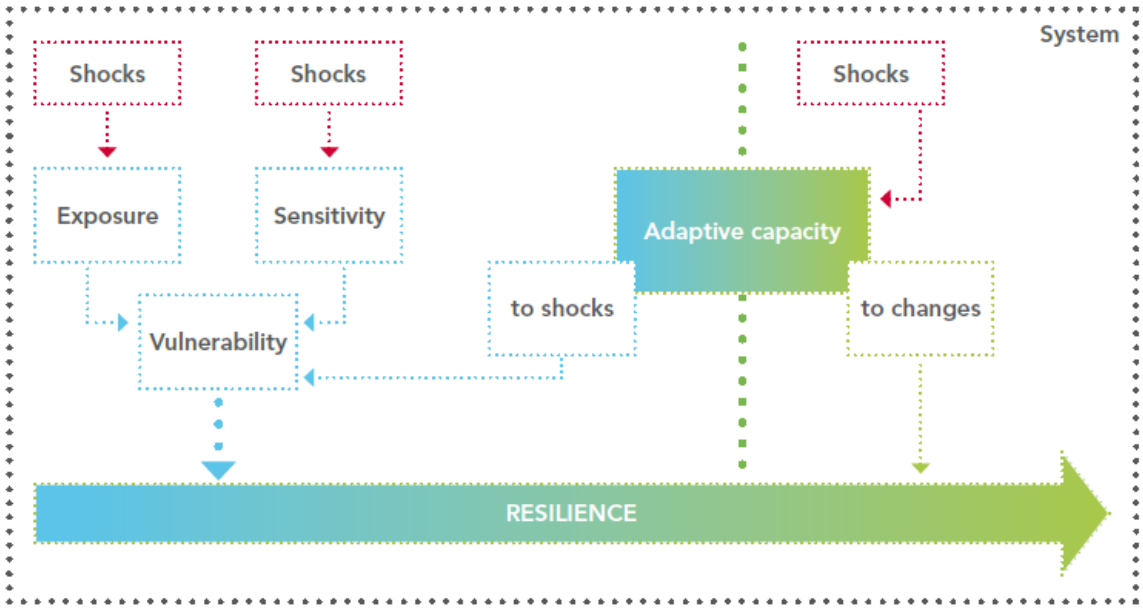


Figure 7: Components of resilience in relation to agriculture. Source: (FAO, CSA sourcebook, 2013) with reference to Gitz and Meybeck, 2012

In terms of an agricultural context, shocks and stresses are largely experienced in biophysical, economic and social domains, they are interrelated across domains and levels and may interact in complex, cumulative, long-term effects. Depending on the geographic area climate change affects the agricultural systems and the functioning of ecosystems in multiple ways. Examples of climate change effects on agricultural systems are changes in rainfall patterns and evapotranspiration, impacting on the potentials for growing certain crops; effects on ecosystems include the impacts of rising temperatures on the population of pollinators, the balance between pests and their predators, and the prevalence of animal diseases – which in combination with non climate factors such as low technical and financial capacity to respond to new threats may decrease agricultural production and contribute to food and nutrition insecurity. In a Zimbabwean context, drought, mid season dry spells, rainfall variability and increased temperatures are some of the projected climate changes to affect agricultural systems, namely in the already dry regions of the country. The figure below illustrates the potential impacts of drought on an agricultural system based on livestock production, leading to a vicious cycle of increased vulnerability if the risks are not properly analysed and addressed with resilience building interventions.

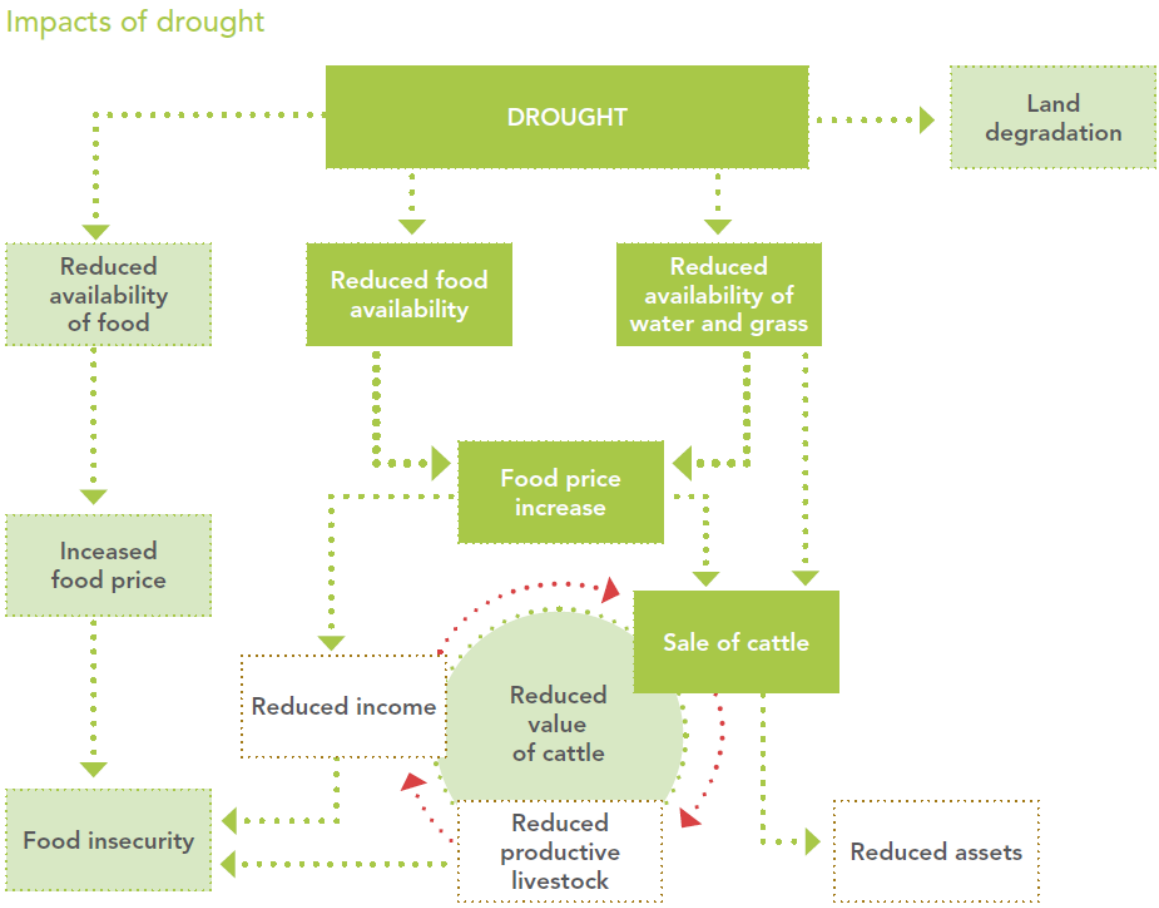


Figure 8: Impacts of drought on an agricultural system based on livestock production. Source: (FAO, CSA sourcebook, 2013) with reference to Gitz and Maybeck, 2012

FAO (2013) defines the following three ways to build resilience:

1) **Reduce exposure**. There is a fundamental difference between climatic and non-climatic shocks as most of the shocks on farm can be reduced at the source, or limited in their extension, contrary to climatic shocks. This is for instance the case in eradicating a particular disease.
2) **Reduce the sensitivity of systems to shocks**. Using drought-resistant varieties of crops, adopting water conserving practices or keeping adequate stocks of hay for livestock during the dry season may reduce sensitivity to drought.
3) **Increase adaptive capacity.** This includes modification of agricultural systems to take into account the potential shocks and changes together – that is to into account how shocks may have cumulative or exacerbating effects and how to plan for and adapt to it.

The Government of Zimbabwe definition of resilience capacities in the Zimbabwe Strategic Resilience Framework goes a step beyond the FAO definition, in that it explicitly, states the need for **transformation of higher level systems beyond a particular sector** such as governance mechanisms, policies/regulations and formal and informal social protection mechanisms that constitute the enabling environment are necessary for systemic change and enable more lasting resilience.

The Strategic Resilience Framework focuses on the following resilience capacities:

- **Absorptive capacity:** The ability to minimize exposure to shocks and stresses through preventive measures and appropriate coping strategies to recover quickly and avoid permanent, negative impacts.
- **Adaptive capacity:** Proactive and informed choices about alternative livelihood strategies based on an understanding of changing conditions improve the capacity to adapt. Livelihoods diversification, access to relevant productive assets, and improved social and human capital and networks are key to achieve adaptive capacity in rural communities.

- **Transformative capacity:** The governance mechanisms, policies/regulations, infrastructure, community networks, and formal and informal social protection mechanisms that constitute the enabling environment are necessary for systemic change. Transformative capacity refers to systemlevel changes that enable more lasting resilience and often challenge the business as usual.

Building on both the FAO and the Strategic Resilience Framework definition of resilience the CSA framework states that supporting a transition of current farming systems towards climate resilience is a key priority and that "*effective response measures are urgently required to sustainably increase productivity, food security and incomes, while building the adaptive capacity and resilience of farming systems*"[29].

The Strategic Resilience Framework contributes to shifting the focus from a humanitarian approach to shocks and crisis in vulnerable rural communities to a more long term and cost effective strategy for sustainably improving the capacity of vulnerable communities and reducing the need for humanitarian assistance. This focus on long term resilience is reflected in the ZRBF initiatives[30] as well as other large scale, long term projects financed by donors such as USAID, DFID, EU and SIDA. The Zimbabwe Strategic Resilience Building Framework highlights that resilience building goes beyond merely reworking classic humanitarian and development interventions and that a strong knowledge and evidence base is central to build long term resilience. In this logic, resilience is guided by a distinct set of ideas that charts a new path forward for programming – which also has relevance for agriculture based interventions.

- **Focus on understanding shock dynamics in depth:** Resilience is a capacity that is exercised both in preparation of and in response to a disturbance. In relation to ensuring food and income security based on agricultural livelihoods, this includes large scale disturbances (covariate shocks) such as catastrophic weather events, pests that threaten crops and epidemic diseases, as well as more localized or individual events (idiosyncratic shocks). According to the resilience building framework, effective resilience building draws on detailed knowledge of potential shocks and stressors; and how a household, community, institution, higher-level system or process is able to respond to a shock. In the context of agricultural livelihoods, this requires an indepth analysis of the type of shock, the effects on the agricultural systems and the people depending on these systems, the timing of a shock or stressor with respect to a critical event (e.g., planting, growing, harvesting) as well as the duration of the shock.
- **Resilience as a multidimensional capacity:** The capacity to be resilient draws on a wide array of resources. These include human resources such as skills and general well being, social networks, economic capacities, physical assets, ecological resources and system or programmatic capacities such as safety nets and other support mechanisms. Effective resilience building requires an understanding of the optimal set of absorptive, adaptive, and transformative capacities that may be used to deal with a given shock in a given context and for a particular population.
- **Resilience is understood as a capacity in relation to a particular shock:** Resilience is a capacity enacted in connection with a particular shock and there are different types of resilience, including absorptive, adaptive, and transformative capacities, to prepare for and respond to disturbances. The

[29] Draft CSA framework, (Government of Zimbabwe, 2017), p. 8

[30] This strategic priority is supported through the ZRBF initiatives, which works through 3 main components with a focus on vulnerable rural communities and great emphasis on diversified and climate smart agricultural livelihoods:

- **Component 1:** Application of evidence in policy making for resilience increased. This includes the work to mainstream resilience into the extension policy and the CSA framework as well as the production and dissemination of studies.
- **Component 2:** Absorptive, adaptive and transformative capacities of at-risk communities increased and improved. Under call for proposals, the fund disburses money to consortia of civil society, academia, private sector and other partners on a competitive and coordinated basis with a focus on resilience building projects in the most vulnerable areas. All projects have components on climate smart agriculture and a strong focus on adaptive management of practices according to the context and circumstances and documentation of lessons learnt and good practice in CSA.
- **Component 3:** Timely and cost effective response to emergencies rolled out via existing safety net and other relevant programs. The ZRBF Crisis Modifier is linked to early warning systems, so that there is early processing and release of early action funds to limit the negative effects of disaster and preserve development investments in the Funds areas of operation. This also includes a focus on adaption of agricultural approaches and investments.

capacity to withstand the effect of a shock (e.g., absorptive capacity) is often the only option available, and may be essential for survival.

- **Resilience capacities should be seen in relationship to a given outcome:** Resilience capacity should be indexed to a given well-being outcome or a dimension of wellbeing outcome such as basic health, food and nutrition security, or poverty status. In relation to agricultural livelihoods, sustained or increased food security, yield levels and income levels might be indicators of resilience capacities.
- **Resilience capacities are multi-level and systems-based:** Resilience capacity is often observed at a given level (e.g., household, community) but is understood as a multi-level construct. Resilience building interventions should take into account the interrelationships and dependencies between, for example, households and communities, communities and regions or links to higher levels such as macro-economic policies or national agricultural policies.

Zimbabwe Strategic Resilience Framework: Resilience principles

In order to harmonize resilience building efforts with Zimbabwe's existing national development plans and strategies and create synergies among initiatives, the Zimbabwe Strategic Resilience Framework provides a common set of resilience operating principles to guide the work of development and humanitarian actors. The following principles have been adapted from various resilience frameworks (e.g., UNDP, Mercy Corps, DFID, USAID, EU) and represent the set of core principles for resilience building in Zimbabwe. It will be key for the proposed GCF project to also align to these principles in its programming of interventions related to building resilience to climate change impacts for rural communities, where possible.

Comprehensive multi-stakeholder risk analysis: Resilience building interventions require good programme design, which depends on a theory of change (TOC) that correctly identifies the underlying problems and the appropriate leverage points needed to affect desired change. This in turn should be based on a thorough multi-hazard, multi-sector participatory assessment of all the contextual factors that affect how households, communities, and governments prevent, cope with, and recover from shocks and stresses. In a rural, agricultural context stakeholders should include members of the target communities and farmers, community and local government officials, community-based organisations and NGOs with a particular focus on agriculture, development partners and other entities (e.g., research institutions, private sector, and universities) from relevant sectors.

Integrated and holistic programming approaches: Resilience building relies on integrated programming and a cross-sectoral approach with a long-term commitment to improving the three critical resilience capacities: absorptive capacity (disaster risk management), adaptive capacity (longer-term livelihood investments) and transformative capacity (improved governance and enabling conditions). Simply combining cross-sectoral interventions does not necessarily result in the expected synergistic effects and it is necessary to plan with synergies in mind to achieve the desired change.

Long-term commitment: Building resilience is a long-term process (i.e., 10-15 years) that requires the sustained commitment of all relevant actors. International partners should support governments in developing comprehensive national plans and align their support behind those plans in a coordinated manner and according to their comparative advantage.

Strengthening social capital: Previous research demonstrates that the extent of social capital is an important element in achieving resilience, particularly at the community level and initiatives to build resilience in Zimbabwe should therefore include strengthening of social capital and social networks in the design of their programmes. Project activities should encourage collective action, collaboration, and self organization, which promote self-sufficiency, enhance decision-making, and facilitate supportive social relationships, which communities may draw in order to cope with shocks.

Regional approach: A regional approach may enhance the effectiveness and efficiency of resilience capacity-building programming in Zimbabwe by allowing stakeholders (e.g., government, NGOs, UN agencies, donors, private sector, academia) to align resources, build staff capacity, and address cross-country themes that require systems thinking and approaches (e.g., large-scale natural disasters). A regional approach also provides significant opportunities for cross-learning and enhanced knowledge management (i.e., identifying and addressing critical knowledge gaps or drawing on best practices e.g. for CSA)

Iterative and flexible process that allows for real-time changes in programming: The context is dynamic, the climate changes over time and vulnerabilities vary based on how individuals, households or communities deal with and respond to risks and shocks. Interventions must be designed in a way that allows for changes and improvements to programming through regular feed-back and shared learning. Programme designs must include a flexible and iterative monitoring system based on early warning triggers that allows for more timely and efficient procurement of resources to protect development gains and facilitates a quick transition from development to humanitarian activities if needed.

Build national and local capacity: Ultimately, resilience building should be led by national governments wherever possible, particularly in providing the enabling environment (e.g., functional institutions, good governance, productive infrastructure, healthy natural resource base) that is necessary for improving the absorptive, adaptive, and transformative capacities of households, communities and higher-level systems. Given Zimbabwes recent political and economic crises, resilience building must include capacity building at all levels of government, but particularly at the national level, that can lead to systemic changes in the structural constraints that contribute to food, nutrition, and livelihood insecurity in Zimbabwe.

Multi-track approach that combines humanitarian and development interventions: A linear, phased approach to relief, recovery and development has had limited long-term success in preventing recurrent emergencies in areas with chronic vulnerability and protracted emergencies. Instead, a multi-track approach that builds strong linkages between short-, medium-, and long-term programme interventions and span humanitarian (short-term track) as well as development responses (medium and longer-term tracks) is needed. Interventions should complement each other and be coherent. They may be initiated simultaneously, sequenced over time, and/or layered, depending on need. This calls for joint or mutually-informed project designs.

Anchored in national and local actors realities and contexts: Building resilience is context-specific, i.e., it is defined by the type of shock or stressor experienced, as well as by the social, economic, environmental, and political context in which the shock occurred and in which household or community response decisions are made. Understanding local perceptions of the challenges and priorities, and tailoring programmes to strengthen or improve limiting contextual factors is an important component of resilience building at the individual, household and community levels.

Build strategic partnerships and dynamic relationships that are transformative: Building resilience requires a diverse range of actors with complementary capacities and skills. Agricultural livelihoods programming initiatives should engage the most vulnerable to the most powerful stakeholders, and maintain awareness of the incentives, motivations and power dynamics that define relationships in the agricultural sector. Strategic partnerships between government entities, NGOs/CBOs, private sector, development partners and others can drive formulation of new ideas and solutions, support identification and promotion of shared interests, help clarify programming priorities, and capture important lessons learned from similar interventions. Strategic and mutually advantageous partnerships are also important for joint risk analysis and multi-sectoral approaches to building resilience.

Source: (ZRBF, Zimbabwe Strategic Resilience Building Framework, 2015)

Knowledge management and evidence generation

One of the key aspects of rolling out climate smart and resilient small holder agriculture effectively at scale and sustaining the efforts in Zimbabwe is the importance of the national government leading CSA implementation, managing and sharing knowledge effectively and strengthening the collaboration of key stakeholders. These efforts should ideally be led by government institutions in a coordinated manner and include private sector players, research and education institutions, civil society and development partners, and last but not least the farmers own organisations.

Efficient institutional coordination, both centrally in national-level government ministries and departments, and across levels, provides a clear framework to guide service providers to deliver services to farmers.

Institutional coordination is also essential in facilitating system-level changes to enable sustained and transformational climate resilience and adaptation impacts that last beyond the lifetime of interventions.

The CSA framework identified the need to go beyond pilots or isolated success stories and enhance collaboration across projects, non government actors and government departments. Recent capacity assessment studies of key MAMID departments and insitutions have also shown that there are a series of institutional coordination and knowledge management gaps and barriers, which makes collaboration, knowledge management and evidence generation difficult [31]. Key challenges identified were:

- Evidence generation and use in MAMID is challenged by limited ICT equipment and tools (such as GPS equipment and moisture probes) that enable data collection and evidence generation for agricultural climate resilience building, inadequate advanced data analysis skills and limited information management systems that links the different levels of government structures (district, province and head office). While the roles and responsibilities in and between departments and levels is clearly guided by the Department Integrated Performance Agreement (DIPA), information on is not always updated and is not always effectively channelled through the different levels and across departments (MAMID/ZRBF 2016).
- While MAMID should ideally take leadership in evidence generation for resilience building, this is compromised as there is often little or no on-going dialogue between the Government departments and development partners implementing projects at the national level. There is however often a good collaboration between development partners and district level AGRITEX staff and generally a good coordination mechanism between national and district level Government departments and Rural District Development Committees, which are a good platform for exchanging information at district level (MAMID/ZRBF 2016).

In terms of department specific challenges, the MAMID/ZRBF assessment argued that the AGRITEX department demonstrated basic capacity[32] in knowledge generation, accountability, institutional arrangements and leadership role in evidence generation, but that evidence generation was compromised by lack of ICT systems, transport and data collection equipment, ad-hoc sharing of data and limited in-service training, due to budgetary constraints. The division of Livestock Production and Development provides livestock technical and advisory services to the agricultural sector to enhance production and productivity. Main challenges identified in this department were the data collection and the dissemination of information. Both departments are struggling with mobility challenges, mainly as a result of lack of fuel and maintenance of motorcycles that officers use when conducting surveys and extension work.

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[31] Recent reports include: Report on needs assessment within the department of agricultural economics and markets, Odreck Mukorera, 2013, MAMID/FAO (MAMID/FAO, 2013); Application of evidence in policy-making for resilience building capacity assessment report, MAMID/ZRBF, 2015 (MAMID/ZRBF, 2015); capacity assessment of the Food and Nutrition Council (FNC) of Zimbabwe; Barefoot Education for Africa Trust, Professor Mandivamba Rukuni, Dr Mabel Hungwe, and Mr Cuthbert Kambanje, 2014 (Barefoot Education for Africa Trust, 2014).
In particular, the MAMID/ZRBF assessment of "Application of evidence in policy-making for resilience building capacity" is interesting for assessing the capacity of MAMID in rolling our climate change adaptation activities in agriculture. The assessment looked into 4 key aspects: **(i) Knowledge management and utilisation**- The process of creating, sharing, using and managing the knowledge and information generated by the department. **(ii) Accountability** – The abilities of the departments to monitor progress, measure results and codify lessons, for learning and feedback to ensure accountability to partners and the ultimate beneficiaries of development. It also covered results-based management and monitoring and evaluation systems, as a means of reporting on evidence generated to influence resilience policies. **(iii) Institutional arrangements** – The policies, practices and systems that allow for effective evidence generation and utilisation by departments in order to fulfil their mandates for resilience building. **(iv) Leadership** – The capacity to foster ownership; manage relationships with key external stakeholders, including the ability to negotiate; develop, communicate and give direction on vision, mission and values; develop and implement a system for overall management; and create an environment that motivates evidence generation for resilience building.

[32] The classification of findings in the MAMID/ZRBF assessment followed the following definitions:

- The department has a mandate to generate evidence but has not generated any evidence- **Low capacity**
- 2: The department has a mandate to generate evidence and is facing substantial challenges in the process of generating evidence– **Basic capacity**
- 3: The department has a mandate to generate evidence and is moderately generating evidence - **Moderate capacity**
- 4: The department has a mandate to generate evidence and is substantially generating evidence **-Strong capacity**

While the DR&SS is mandated with agricultural research, knowledge management and specialist support to other departments, the assessment rated the department as having major challenges in ICT equipment and mobility. Lack of equipment such as laptops and desktops were noted as major gaps for data capturing, storage and analysis and the department would benefit from a time framed funding to set up a strong knowledge management unit that includes centralised documentation and publications.

The irrigation development division focuses on planning, developing and rehabilitating irrigation systems, providing farmer training on irrigation water management and testing, research and M&E of irrigation projects. The ZRBF MAMID capacity assessment rated the department as having a moderate to strong technical capacity. The department has a technical centre which facilitates needs assessments and training and has recently finalized an irrigation inventory for the country, facilitating continuous M&E and systematic data collection. The department has a data analysis unit, which however lacks the resources to send experts to provinces to guarantee quality control of data collected. Systematic data collection and sharing is also limited by lack of hardware and software for data collection and analysis.

The department of Economics and Markets plays a pivotal role in coordinating agriculture policy nationally.In terms of capacity, the ZRBF/MAMID assessment noted that, the department is struggling with the lack of a central agriculture information management database and need for training in identifying and analysing policy issues, data analysis and M&E. This conclusion is supported by the MAMID / FAO needs assessment of the Department of Economics and Markets (2013), which also argues for developing an information and M&E strategy, which will provide guidance to the setup of an agricultural information management database and the software required. However, while the information management challenges seem to have continued from 2013-2016, the recent ZRBF/MAMID assessment also ratesthe institutional arrangements, the relationship and regular contact with stakeholders, accountability and leadership above average and notes that the department is well situated for coordinating agricultural issues at national level and across MAMID departments.

Overall, on the practical level, lack of internet access, an efficient network system and insufficient information management systems make the data analysis and systematic knowledge management difficult. A need for more advanced data collection methods, equipment and training was also identified as a key challenges. Some of the prioritized actions for capacity building efforts by the ZRBF MAMID assessment therefore point to the setup of effective data collection systems, training of technical staff in data collection, analysis and packaging and knowledge exchange activities for improved utilization of evidence for resilience related policy, planning and programming (MAMID/ZRBF, 2015).

Another recent capacity assessment looks at the Food and Nutrition Council which is mandated to promote a cohesive national response to the prevailing household food insecurity and malnutrition through coordinated multi-sectoral action (Barefoot Education for Africa Trust, 2014). A critical expectation of the FNC is that it should also lead and co-ordinate the implementation of a structured food and nutrition security information system that provides a timely and robust analysis of the food and nutrition security situation to inform action including advocacy, resource mobilization, policy guidance and programmes. The assessment concluded that capacity needed to be built in terms of technical expertise, leadership, coordination, representation and drive for results. It has not been possible to access a more recent assessment of whether this capacity has been built.

A key aspect ot the ZRBF initiative implemented through MAMID is to base project interventions on solid evidence, to encourage learning and adaption of practices and to support MAMID with capacity building in making use of evidence in programming and policy making. It is therefore expected that in terms of systematic knowledge management the GCF project may build on and complement the ZRBF supported capacity building efforts on knowledge management, sharing of lessons learnt and best practices, and evidence generation with MAMID.

Baseline investments and interventions

In addition to the experiences of promotion of CA and CSA and the knowledge management efforts through the GoZ, previous and ongoing projects, carried out in cooperation between the GoZ, development partners and research institutions, provide important insights on baseline investments, lessons learnt and best practices

to support the promotion of CSA at scale. A key task of the proposed GCF project will be to explore and leverage on synergies with other development actors and expertise.

The figure below: “Figure 9:Projects that are currently working with long term development and resilience building - as per January 2017” shows projects that are currently working with long term development and resilience building efforts based on a mapping conducted by the ZRBF. There are good potentials for building on and complementing efforts of other projects and initiatives, namely the work of the ZRBF, which is led by the national government through MAMID. “Figure 10:ZRBF projects - consortia selected in 2016 and October 2017” shows the ongoing ZRBF projects that the GCF project may build on or complement.

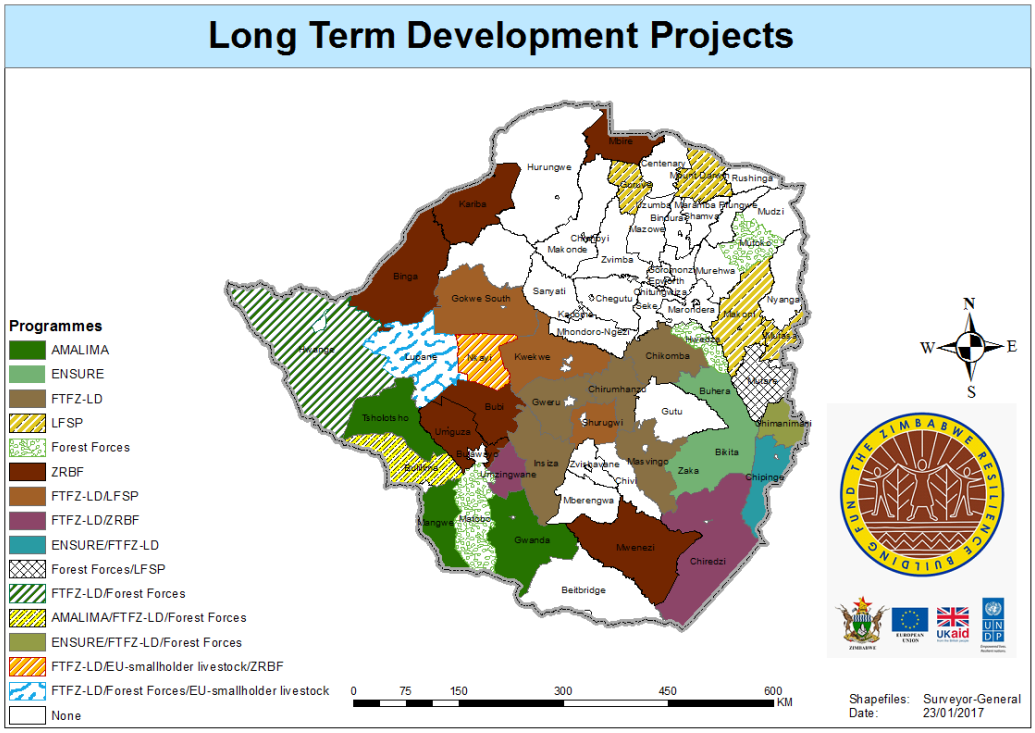


Figure 9:Projects that are currently working with long term development and resilience building - as per January 2017

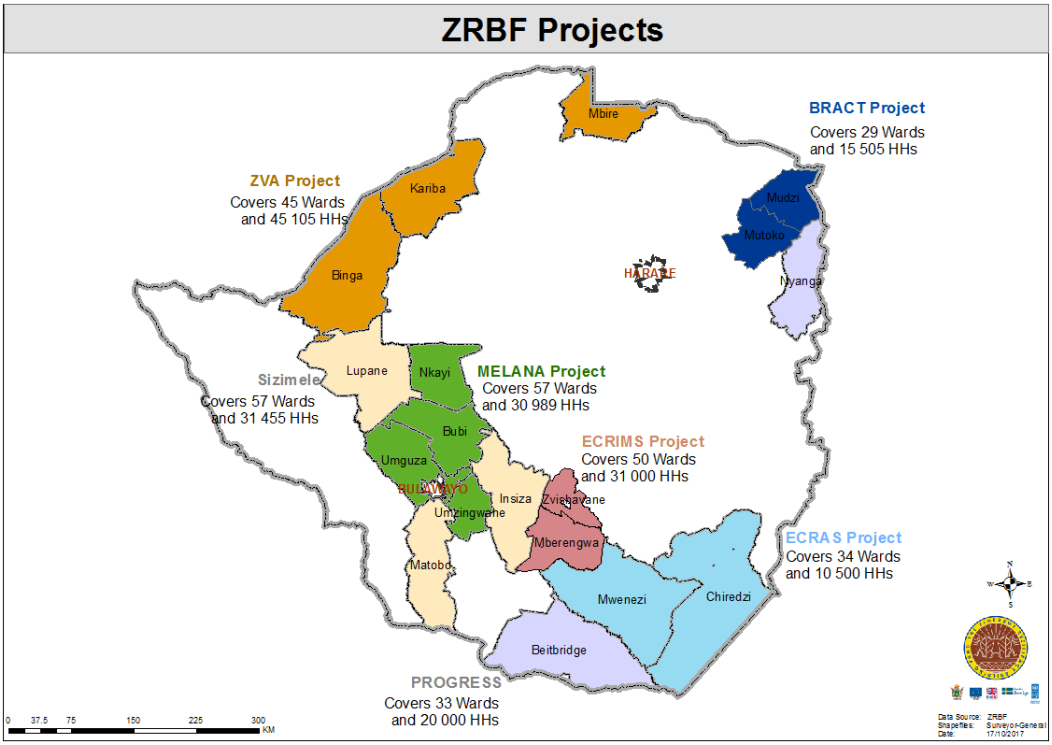


Figure 10:ZRBF projects - consortia selected in 2016 and October 2017

Below, selected programs and projects with a focus on rural resilience building and activities related to climate-smart agriculture and market linkages are briefly described.

On-going interventions		
Programme/project details	Description	Key results
Zimbabwe Resilience Building Fund (ZRBF) Donor: Financed by EU, DFID, SIDA, UNDP Implementing partner: MAMID, with the PMU and administration of fund resources supported in management arrangement with UNDP. Duration: 2015-2020 Budget: USD 70 million.	The ZRBF programme seeks to address the increasing vulnerabilities of rural communities in Zimbabwe – both due to continued economic and social crisis and the current and projected climate change risks. Focus is on building the resilience and ability of vulnerable communities to anticipate, cushion, adapt to and bounce back from shocks and stressors. The ZRBF programme prioritizes 21 vulnerable districts, targeting 800,000 people over the full programme period. Under the call for proposals in 2016, 3 projects are being implemented in 9 districts, incl. Mwenezi, Umzingwane and Chiredzi, targeting a total of 86,595 households. Under the 2017 call an additional 4 consortia were selected targeting a total of 97960 households in 8 districts, including Beitbridge, Matobo and Insiza.	The ZRBF has produced maps of hazards and vulnerabilities in the country, which have been used for targeting ZRBF and UNDP interventions. All interventions carried out by consortia aim to increase capacities of communities to withstand shocks and stresses, all with CSA components, and may complement the GCF project interventions. 2017 annual review of consortia interventions were positive and the GCF project may build on lessons learnt and good CSA practices identified and tried out through the 3 first consortia projects.
Name: Scaling Up Adaptation Donor: UNDP/GEF	A clear focus of this project is to climate proof agricultural livelihoods for smallholder farmers, develop agricultural value chains in a climate	Mid-term review conducted in 2017, with positive evaluation of results. Namely the holistic investments around climate

Implementing agencies: Oxfam, Safire, Plan international Duration: 2015-2018 Amount: USD 16.68 million including co-funding	smart way and increase smallholders' access to inclusive financial services with a target group of 10,000 vulnerable smallholder farmers in Chiredzi, Chimanimani and Buhera. Also, the project aims to increase knowledge and understanding of climate variability and change-induced risks – through climate information services for agriculture and DRM targeted smallholder farmers.	smart villages was highlighted, as was the success of a holistic watershed approach, which included reforestation initiatives, CSA practices and climate proofing of irrigation schemes. Other successful experiences included the establishment of VSLA groups, which successfully contributed to increased savings and access to loans for vulnerable communities; introduction of climate smart crops and production methods and facilitation of market linkages for several climate smart value chains, which increased farmers' incomes significantly.
Name: Livelihoods and Food Security Programme Donor: DFID Implementing agency: FAO, GRM International and Coffey. LFSP is partnering with local organisations to implement a variety of projects aimed at achieving LFSP's goals, incl. WHH and Care. Duration: 2014-2018 Amount: $72 million	The project aims to improve the livelihoods and reduce food insecurity for 350,000 people by targeting 127,000 smallholder farmers in 8 rural districts in Zimbabwe, incl. Mutare. The project introduces improved, climate appropriate agricultural practices, stimulates demand and supply of affordable nutritious foods, links farmer groups to input providers and buyer markets, and facilitates access to rural finance. The project uses Internal Savings and Lending Associations (ISLAs) to empower women.	A number of studies have been conducted to inform the design of interventions. This includes the baseline, a study on climate-smart options for smallholder farmers, a study on market linkages for smallholders among others, which have also informed this feasibility study. It is yet to early to report on the achievements of the project, but one promising practice is the OXFAM led gender equality and women empowerment component of the project, Gender Action System Learning, which has shown successful initial results in improved gender equality and empowered female farmers in target areas.
Name: Stepping Up Resilience and Enterprise (ENSURE) Donor: USAID Food for Peace Implementing agencies: World Vision Zimbabwe, CARE, SNV, Safire and ICRISAT Duration: 2013-2018	The ENSURE Food Security Program, World Vision-led and USAID-funded, targets 215,000 vulnerable and food-insecure Zimbabweans in Manicaland and Masvingo Provinces. Main components of the intervention are agriculture for food and nutrition security, economic empowerment and risk management and community resilience. World Vision is the lead implementing partner in Buhera, Chipinge and Chimanimani Districts of Manicaland Province. CARE serves as lead implementing partner in Bikita, Chivi and Zaka Districts of Masvingo Province.	In 2016 ENSURE reported that producer groups enhanced community assets (e.g. dams, irrigation schemes, wells and gardens) and value chains. Lessons learned include the need to link farmers to finance. Marketing has to be the core - and CSA interventions benefit from being based on diversification of crops and high value commercial crop to build resilience.

Name: Amalima Donor: USAID DFAP Implementing agency: A consortium consisting of Organization of Rural Associations for Progress (ORAP), Dabane Water Works, International Medical Corps, the Manoff Group, and Africare Duration: 2013-2018	The project provides support to over 56,000 households in Tsholotsho, Bulilima, Gwanda and Mangwe districts. The project promotes conservation agriculture practices and drought resistant crops, engages vulnerable households in productive value chains and utilizes matching grants to help producer groups scale-up production. This includes promotion village savings and loans groups and business management and technical training to agrodealers to improve the availability of and access to quality inputs to farmers. Particular focus on women.	Results have not yet been shared, but key lessons learned include that marketing has to be at the core of interventions. CSA interventions benefit from being based on diversification of crops and high value commercial crop to build resilience.
Name: Feed the Future Zimbabwe Livestock Development Donors: USAID Implementing agency: FINTRAC Duration: 2015-2020	Feed the Future aims to increase incomes and food security for 3,000 beef and 2,000 dairy smallholder producers. FTF trains farmers on good business practices and marketing: identifying lucrative markets within their reach, organizing themselves into groups, and negotiating with buyers for better prices. The program targets smallholder farmers in Manicaland, Midlands, Matabeleland North and South, incl the districts Chimanimani, Chipinge, Chiredzi, Insiza, Masvingo and Umzingwane.	To date, 3,593 rural households have benefited from program interventions. With increased access to banks, markets and training, beef and dairy farmers are entering into productive and sustainable investments. Each beneficiary household will own at least 15-20 beef cattle by the close of the program, and the program will link farmers to local milk processors to facilitate formal sales.
Name: Vuna, the Climate-smart Agriculture Programme for East & Southern Africa Donor: DFID Amount: £18 million Duration: 2016	Across the Southern Africa region, Vuna is piloting innovative delivery mechanisms that encourage the inclusion of CSA in education, adoption of climate-smart agriculture practices and drought tolerant crop varieties, climate risk management into business models of agribusinesses' supply chains and supporting access to climate adaptation finance for farmers as well as governments.	Results have not yet been shared, but a key focus of Vuna is to strengthen the evidence base around climate smart agriculture (CSA), and the use of this evidence. VUNA has recently supported the development of the draft CSA framework with MAMID and a CSA manual together with MEWC. The program experiences and evidence base may be relevant to draw on in the future.
Name: Smallholder Irrigation Revitalization Programme Donor: IFAD Lead agencies: AGRITEX and DOI Duration: 2016-2023 Budget: US$ 51.27 million	The project will be implemented in 16 Districts in 4 Provinces - Manicaland, Masvingo, Midlands and Matabeleland South - with a focus on supporting smallholder agriculture through rehabilitation of irrigation schemes, training in business skill and market linkages and capacity building of extension services. The project targets a total of 127000 people and 500 extension and technical service providers.	Programme in starting phase. Coordination on choice of irrigation schemes has been carried out between IFAD and UNDP. Results have not yet been shared.
Name: Smallholder Horticulture and	SHEP is an innovative development approach being implemented by JICA in	So far, according to JICA and AGRITEX, the approach of linking

Empowerment Promotion (SHEP) Donor: JICA Implementing Partner: AGRITEX Duration: 2014-	23 countries in Africa. In Zimbabwe, the project is implemented in Mashonaland East and Mashonaland Central. The approach focuses on promoting farming as a business and linking farmers and market actors directly. Plans are to expand in 2018.	farmers directly to markets and buyers has empowered farmers to negotiate with business actors, has increased their incomes and improved working relationship among extension agents, private sector and farmers.
Past interventions		
Programme/project details	Description	Results/current status
Name: Coping With Drought Implementing agency: UNDP Donor: GEF Duration: 2008-2012 Funding: 983,000 USD	The *Coping with Drought and Climate Change Project* aimed to demonstrate and promote adoption of a range of gender sensitive approaches for adaptation to climate change among rural agricultural communities in vulnerable areas of Chiredzi District as a national model for climate change adaptation.	The project piloted a range of adaptation measures that effectively reduced vulnerability to drought in Chiredzi District. The project successfully made use of FFS and research collaborations with a focus on crop diversification, soil moisture management, irrigation systems, livestock enhancement and community based NRM. These experiences were used to contribute the development of a national climate change response strategy and policy – as well as fed into the development of the SCCA project to scale up the interventions.
Name: Agro Initiative Zimbabwe (AIZ) Donor: DFID Implementing agency: TechnoServe Duration: 2011-2014, with extension phase with focus on gender equity to 2016	The project aimed to develop the agro-processing and agriculture sectors by supporting innovative medium-sized agribusinesses that are committed to integrating smallholder farms in their supply chain. Target set to work with 40% women-led businesses and women smallholder farmers in 2016.	Businesses received tailored technical assistance to integrate smallholders into contract farming arrangements. The project demonstrated small-scale farmer capacity to produce top-quality horticulture for international markets, e.g. chilies for the US market. In terms of economic opportunities for women, the program successfully exceeded the project's 40 percent gender target through targeted extension services and women empowerment programs.
Name: Zimbabwe Agricultural Income and Employment Development (Zim-AIED) Donor: USAID Duration: 2012-2015	The focus of the project was to increase incomes and food security of agricultural producers and to generate more income and rural employment of rural agro-business through increased agricultural production, productivity, agro-processing and investment. The project provided technical assistance to improve income food security and income for 150,000 households in Mashonaland Central, Mashonaland West, Mashonaland East, Midlands and Masvingo.	Lessons learned from ZIM-AEID include the success and importance of promoting farming as a business. Market understanding and links has to be the core and communities should be encouraged to work together to be able to bring sufficient amounts of goods to market / buyers collectively.

Name: Rural Agriculture Revitalisation – Commercialisation of Smallholder Farming Project (RARP-CSF) Donor: DANIDA Implementing agency: SNV Duration: 2010-2015	The project aimed to contribute to sustainable food security, incomes and employment creation for 280,000 commercially oriented smallholder farmers across Zimbabwe's eight rural provinces. Main components included re-establishment of sustainable commercial marketing channels, technical development services and business development e.g. through win-win sustainable contract farming arrangements and provision of effective business development services [33].	The project succeeded in facilitating contacts between farmers and a network of 1,200 agro dealers across Zimbabwe. The Zimbabwe Agricultural Development Trust (ZADT) and its CREATE Fund, which started off as a value chain financing component in 2010, now works as a fully-fledged institution. 34 agri-business SMEs have been linked to funding facilities. The project pioneered the development of the sesame and groundnuts value chains – with a focus on improving small-holder farmers' resilience to shocks.
Name: The Climate Resilient Infrastructure Development Facility (CRIDF) initiative, Donor: DFID Duration: 2017-	CRIDF supports projects and initiatives across the SADC region with a focus on climate proofing water infrastructure and resource management with a focus to better enable people – particularly the poor – to predict, manage, or mitigate the impacts of extreme climate events on infrastructure.	In Zimbabwe CRIDF has supported the construction of climate resilient irrigation infrastructure in Chivi and Bikita, water planning in Zimbabwe and transboundary water management.
Research institutions		
Institution	Description of work	Results/current status
The International Crop Research Institute for the Semi-Arid Tropics – ICRISAT Donors: Various Various projects	ICRISAT is part of the global CGIAR research network working for a food secure future. ICRISAT in Zimbabwe has worked towards climate resilience in crops and livestock value chains over the years including small grains, goat and cattle value chains with a variety of partners incl.donors such as DFID, USAID and ACIAR and a variety of NGO's through a wide range of projects[34]. Also, ICRISAT has worked on agricultural scenario planning in relation to climate change – and has facilitated Innovation Platforms related to the above mentioned value chains.	ICRISAT brings significant research and successful practice experience on climate-smart crops and varieties, in particular small grains; groundnuts, drought tolerant breeds in the livestock value chain; climate-smart agriculture practices for crop-livestock integration and facilitation of market systems and linkages through market infrastructure and Innovation Platforms.
The International Maize and Wheat Improvement Center - CIMMYT Donors: Various Various projects	CIMMYT is part of the global CGIAR research network working for a food secure future. CIMMYT in Zimbabwe is based in Harare. CIMMYT is about to finalize an eight-year food security program supported by the Australian Centre for International Agricultural Research (ACIAR) in several Southern and Eastern African countries (not including Zimbabwe) and is envisioning	Over the years CIMMYT has carried out several successful interventions to breed and promote drought tolerant varieties of maize and wheat in Zimbabwe – including capacity building interventions such as FFS and demonstration platforms as well as support to market linkages through Innovation Platforms. Since February 2014,

[33] (SNV, 2016)

[34] Cf. ICRISAT publication "ICRISAT and Zimbabwe" (ICRISAT, 2015) for an overview of projects

	that the successor project – SIDICSA - could also include Zimbabwe.	CIMMYT has participated in the project Farm Mechanization and Conservation Agriculture for Sustainable Intensification, which points to the importance of improving access to simple mechanization to reduce labour drudgery and minimize biomass trade-offs.
CIAT-PABRA bean production support initiative Duration: April 2015 - March 2019. Funded by: Swiss Agency for Development and Cooperation (SDC) and CIDA Implemented by the International Centre for Tropical Agriculture (CIAT) and the Pan Africa Bean Research Alliance (PABRA).	The Pan-Africa Bean Research Alliance (PABRA) encompasses 3 regional bean research networks, covering 29 countries, which are working to improve the livelihoods of small scale bean farmers in sub-Saharan Africa. In Zimbabwe PABRA is facilitated by the International Center for Tropical Agriculture (CIAT). The goal of PABRA is to enhance the food security, income and health of resource-poor farmers in Africa through research and development of the bean sector.	A recent collaboration between CIAT-PABRA and DR&SS and AGRITEX in Chimanamani showed interesting results for the bean value chain. 2 Innovation Platforms for technology adoption established which resulted in increased uptake, improved yields, better market linkages and incomes for participating small holder farmers. A total of 67 bean demonstrations were established and improved bean varieties were successfully promoted through field days, agricultural shows and trade fairs.

Overview of CSA practices and their effectiveness

In the following, a number of CSA practices and their effect will be discussed in terms of their relevance to the proposed project.

A central aspect of the climate change challenges projected for Zimbabwe is the availability of water. Rainfall is projected to become increasingly variable and namely the dryer areas of the country are expected to experience water scarcity due to droughts and mid season dry spells with implications for agriculture. The table below lists possible climate smart agriculture actions with a focus on adapting to water scarcity:

Table 2: Options for climate change adaptation for water scarcity – adapted to a Zimbabwean context

Options / Levels	**Field/farm**	**Irrigation scheme**	**Watershed/ aquifer**	**River basin**	**National**
1.Investments					
On-farm water storage and water harvesting	x				
Groundwater development	x				
Climate proofed and modernized, efficient irrigation infrastructure		X			
Dam construction/ enhancement		X	x	x	
2. Land, water and crop management practices	**Field/farm**	**Irrigation scheme**	**Watershed/ aquifer**	**River basin**	**National**
Enhancing soil moisture retention capacity	x				
Crop selection, changing cropping pattern and diversification	x				
Adapting cropping calendar	x				
Supplementary irrigation	x	x			
Drainage and flood management		x	x	x	

Irrigation scheme operation improvement		x			
Integrated water resources management				x	
Adaptation of dam operation rules to reflect climate change concerns				x	
Natural resource management and riparian habitat restoration for climate resilience				x	
Policies, institutions and capacity building	**Field/farm**	**Irrigation scheme**	**Watershed/ aquifer**	**River basin**	**National**
Climate proofing irrigation infrastructure		X	x	x	x
Improved weather forecasting capacity	x	X	x	x	X
Improved hydrological monitoring			x	x	
Crop insurance	x				

Source: Adapted from the FAO CSA sourcebook (2013), with reference to Turral et al., 2011 and the CSA framework.

Most of the suggested land, water and crop management practices are not new to development programmes operating in the semi-arid climate in Southern Zimbabwe. In Zimbabwe, **on-farm water conservation, soil moisture retention and drought resistant crops** have been promoted for a long time as a response to water scarcity in the dry parts of the country as per conservation agriculture principles. However, the need to address increasing water scarcity at the level of watersheds and catchment areas through better co-management of water is needed in many water-stressed areas. Through the Scaling Up Adaptation project, OXFAM has also emphasized the need to work with integrated water management and catchment protection and has addressed local water scarcity through **catchment level natural resource management**. Activities implemented by OXFAM and partners with positive effects on catchment protection and thus water availability include reforestation, upstream-downstream dialogue on water management and natural resource management trainings[35]. In addition, the Scaling Up Adaptation project has worked to improve weather forecasting targeting smallholder farmers to support more efficient water management for both dryland farmers and farmers on irrigated land. The Scaling Up Adaptation project has also tested different farm and irrigation scheme level water conservation techniques for pros and cons. The list of soil and water management techniques below, was compiled by OXFAM based on experiences from the project[36]. Case stories and M&E data from the project indicate that farmers have increased their crop production, improved yields and improved incomes due to the application of these techniques in combination with improved market linkages[37]. Based on the context, farmers needs, interests and financial capacities, different techniques may be applied.

Technique	Pros	Cons
Basins (Zai pits)	Very effective for infield rainwater harvesting. Can be used by farmers without draught power. Same station used every year for planting.	Labour intensive, especially for women. Can be maladaptive during seasons with excess rains.
Ridges/tied ridges	Effective at infield rainwater harvesting. Can be mechanised. Works well for both drought and very wet years.	Requires good access to draught power, which may not be available for some farmers
Furrows	Effective and preparation can be easily mechanised	The equipment may be expensive for some farmers

[35] Mid Term Review of Scaling Up Adaptation, project annual reports 2015,2016,2017.
[36] Source: OXFAM, 20.3.2017.
[37] Scaling Up Adaptation Annual reports (2016,2017) and Mid Term Review

Deep ploughing	Very effective at infield rainwater harvesting	Requires good draught power. Coming out of dry season draught animals tend to be too weak to pull a deep plough.
Infiltration pits	Can capture a lot of water.	Have not been widely tested
Contour ridges	Effective for both soil erosion control and rainwater harvesting.	Pegging requires technical support and also requires draught power to open up the contours. These will not work for areas where slope is less than 2-5%. Cost is typically around $15 per hectare.
Contour ridges with infiltration pits	Captures a lot rain	The infiltration pits require a lot of labour. The captured water may percolate beyond crop root zone.
Mulch	Effective at conserving soil moisture	Difficult for farmers to get sufficient mulch. Using crop stover conflicts with animal feed requirements.
Green mulch	This gives the farmer an additional crop and effectively conserves soil moisture	Pests and disease can be a problem. Requires further evaluation to get the right crops to use as green mulch. Currently legumes such as cowpeas are mostly used.

Figure 11: Overview of soil and water conservation techniques being tried out by OXFAM through Scaling Up Adaptation project

In addition to water management practices, **sustainable and effective soil management practices** contribute to create optimal physical and biological conditions for sustainable agricultural production (including food, fibre, fodder, bioenergy and tree crops, and livestock). Degraded soils are at much greater risk from the damaging impacts of climate change, such as increased soil surface temperatures, droughts and extreme rainfall, which may contribute to losses of soil organic matter and increased rates of soil erosion and landslides (FAO, 2013). In addition, land degradation is also a major contributor of GHG emissions and as emphasized by FAO (2013), sustainable crop, grazing and forest systems can sequester substantial amounts of carbon from the atmosphere and store it in soils and vegetation.

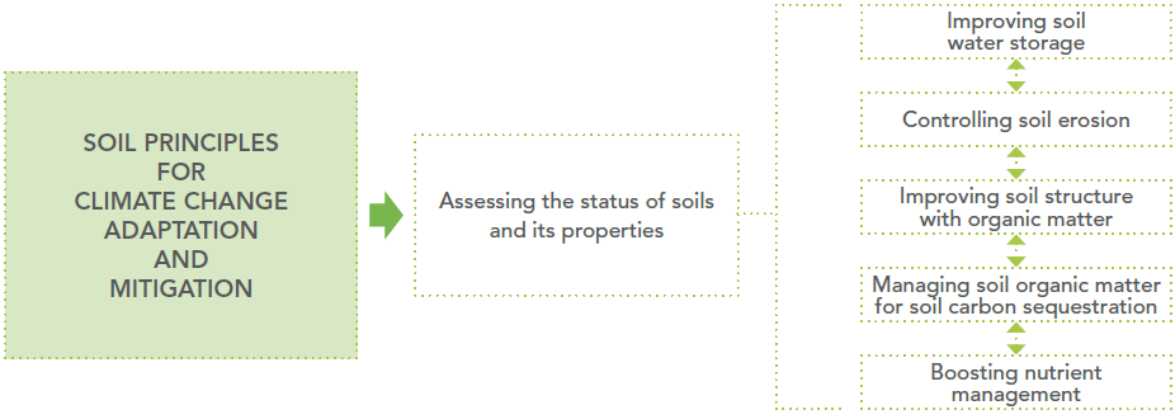


Figure 12: Soil management principles for climate change adaptation and mitigation - Source: FAO CSA sourcebook (2013) with reference to Vargas, 2013

The figure above provides an overview of basic soil management principles for climate change adaptation and mitigation, highlighting the need to assess the soil composition to take relevant adaptive measures and emphasizing the need to work with integrated soil and water management.

In Zimbabwe, several projects have worked with **integrated soil and water conservation techniques** in accordance with the FAO recommendations. Many projects and initiatives in Zimbabwe have promoted **conservation agriculture practices** which focuses on minimal tilling and soil disturbance, mulching and minimal burning of crop residue, mixing and rotating crops, timely and precise operations and efficient use of

inputs such as fertilizer that contribute to maintain productive soils that are rich in carbon, improve the soils capacity to retain nutrients and water and therefore require fewer chemical inputs.

The evidence of the impact of CA practices in Southern Africa and in Zimbabwe however is mixed – while the practices are actively promoted by international research and development organisations as a solution to poor agricultural productivity and soil degradation in sub-Saharan Africa, there are also critical voices arguing that there is an urgent need for critical assessment under which ecological and socio-economic conditions CA is best suited for smallholder farming in SSA [38]. The varying **impacts of CA practices** in Zimbabwe are documented in the CA Task Force guidance publication Farming for the Future (2009) as well as other publications.[39] The Farming for the Future guide to implementing CA argue that incomes and yields are increased through the use of one or more CA practices. The table below shows a gross margin analysis of conservation agriculture practice vis a vis conventional smallholder farmer practices and fertilizer application under different rainfall scenarios based on a maize crop. While the gross margin calculations may no longer be valid given the economic developments since 2007 to 2018, the data on yield levels point to significantly higher yields under CA methods than under conventional farming practices, even with fertilizer, and increase over the years with consistent CA practice[40]. The data also indicates that farmers who adopt CA practices do better than conventional farmers in years of both high and low rainfall, as may be more frequent under the projected climate scenarios.

Other cost benefit calculations [41,42] also indicate better gross margins per hectare in CA systems and relates increased productivity to length of time since adoption, the adoption of the full CA package and being situated in high potential agricultural areas in Zimbabwe.

[38] (Giller, 2009) and (Giller KE, 2015)
[39] Farming for the Future (FAO C. A., 2009). (Mafongoya, 2016).; and (Thierfelder, 2009); and (Lungowe Sepo Marongwe, 2012); and (Mazvimavi, 2011); and (Mazvimavi et al., 2010)
[40] Source ICRISAT survey data from 2007, table from Farming for the Future (FAO C. A., 2009), p. 12
[41] (Mutiro et al., 2009) CBA report for the *Protracted Relief Programme (PRP)* . The PRP was a multi-faceted, four year project aimed at providing short-term nutritional, economic, and agricultural interventions to one-third of all smallholder households in the country and (Jennings et al., 2013)
[42] (Mvumi et al. , 2017)

Table 1.2 Sensitivity analysis for conservation agriculture package versus conventional farming practices under high, normal, and low rainfall situations in Zimbabwe					
		Conservation agriculture practice		Conventional farmer practice	
		First year	Second + year	No fertilizer	With fertilizer
High rainfall					
Maize grain	kg/ha	2000.00	2650.00	678.00	1120.00
Gross margin	US$/ha	654.18	866.84	196.64	357.16
Cost per kg	US$/kg	0.07	0.07	0.15	0.12
Returns to labour	US$/day	6.25	7.03	3.30	4.94
Normal rainfall					
Maize grain	kg/ha	1750.00	2200.00	560.00	728.00
Gross margin	US$/ha	529.42	697.17	152.77	191.06
Cost per kg	US$/kg	0.10	0.08	0.17	0.18
Returns to labour	US$/day	5.47	6.27	3.00	3.28
Low rainfall					
Maize grain	kg/ha	1520.00	1780.00	368.00	400.00
Gross margin	US$/ha	473.36	535.35	70.60	48.19
Cost per kg	US$/kg	0.09	0.10	0.25	0.32
Returns to labour	US$/day	5.22	5.26	1.90	1.50

Figure 13: Sensitivity analysis for conservation agriculture versus conventional farming - based on ICRISAT data – Farming for the Future (FAO C. A., 2009)

A more recent example of gross margin analysis from 2017 also concludes that conservation farming and conservation agriculture methods contributed to higher gross margins. Conservation agriculture is here defined as a broader term that encompasses activities such as minimum tillage and zero tillage, tractor powered, animal powered and manual methods, integrated pest management, integrated soil and water management, and includes conservation farming; a technology which uses planting basins and soil cover. In the gross margin analysis, conservation farming had the highest GM/ha of $99.88 and 196.20 with and without family labor cost respectively, while Conservation Agriculture came second with GM/ha had $63.82 and 158.60, respectively. Conventional farmers had a negative GM/ha of $25.16 with family labor cost and a positive GM/ha of $65.20 without family labor cost.

Practice	CA	CF	ConvT
Gross income*	270	288	132
Less expenses			
Seed	35.68	36.32	39.84
Fertiliser	59.10	60.00	50.52
Total labor	111.40	91.80	66.80
Total costs that vary	206.18	188.12	157.16
GM ($/ha)			
With family labor cost	63.82	99.88	-25.16
Without family labor cost	158.60	196.20	65.20
Returns to inputs			
With family labor cost			
To purchased inputs ($/$)	0.67	1.04	-0.28
To family labor ($/Mds)	1.15	2.18	-0.75
Without family labor cost			
To purchased inputs ($/$)	1.67	2.04	0.72
To family labor ($/Mds)	2.85	4.27	1.95

*A local maize price of $300/MT, and a local hiring rate for labor of $2/day. Source: Survey data.

Figure 14: Gross margin calculation for farmers for Conservation Agriculture, Conservation Farming and Conventional tillage[43]

[43] (Mvumi et al. , 2017)

The recent ZimCLIFS[44] project also demonstrated that participating farmers who employed conservation agriculture methods and practiced **rotations of cereals and legumes** experienced improved household food security and incomes[45]. The project registered that farmers' crop fields yielded higher gross margins than conventional plots, where the crops were not rotated. As an example, farmers planting a maize crop after a nitrogen-fixing legume crop in the second season produced the highest gross margins, averaging more than USD600, compared to planting a second maize crop after the first. For many smallholder farmers crops are grown for food security, but due to the higher yields some also benefitted from the incomes they got from selling their excess harvest.

While the above gross margin analyses point to that CA practices (in its various forms) increase yields and incomes for smallholder farmers, existing systematic analysis of CA practices impact on yield, however often relies on data from experimental trials and relatively small scale samples [46]. One of the key information gaps is a solid, evidence based understanding of to what extent farmers adopt CA practices in their own fields, with what impact based on each practice and what factors support uptake. Studies on the adoption trends of CA in Zimbabwe[47] indicate that farmers often don't adopt the full CA package for various reasons incl. limited financial resources, labour demands and priorities in terms of crop-livestock production. Among the farmers who have adopted CA practices, many have adopted some components of the technology like digging planting basins while leaving out other recommended practices. Mazvimavi (2011) and Marongwe et al. (2012) note that crop rotation, mulching and winter weeding are some principles that have hardly been adopted and that the prioritization of staple cereals over legumes has limited crop rotations. The multiple uses of crop residues, e.g. for livestock feeding, fuel wood and construction, have also limited their use for mulching.

Also, there is a lack of data on the contributions of CA to building resilience to drought conditions, which are projected to increase with climate change – especially when CA practices are adopted by farmers in nonexperimental conditions on their own fields[48].

A recent VUNA report on CSA has assessed the contribution of CA to building yield resilience to drought based on data from the 2015/16 season, which was characterised by El Nino induced drought[49]. Firstly, the report concludes that only about 25% of Zimbabwean smallholder farmers who practice CA (based on an assessment of 295 maize plots) adopt the key CA principles of minimum tillage, mulch and crop rotation as a full package. Also even though a majority of sampled farmers indicated that they applied more than one CA practice, often their application differed from recommendations namely on mulching and crop rotation[50]. Because of this, the VUNA study only looked at the correlation between minimum tillage and yield resilience in the context of drought – and the study therefore does not speak to what effect the partly or full adoption of CA practices such as mulching and rotation has on yield resilience.

[44] The Integrating Crops and Livestock for Improved Food Security and Livelihoods in Zimbabwe (ZimCLIFS) project started in 2012 and ran until 2015. Three CGIAR centers—the International Livestock Research Institute, CIMMYT, and International Crops Research Institute for the Semi-Arid Tropics —launched the project jointly assisted by the Australian Aid Program through the Australian Centre for International Agricultural Research (ACIAR).
[45] (ILRI webpage, n.d.)
[46] (Mazvimavi K. , 2017)
[47] (Mazvimavi K. , 2011) and CSA framework 2017
[48] (Mazvimavi K. , 2017)
[49] (Mazvimavi K. , 2017)
[50] For instance, when farmers implemented crop rotation, they did not allocate the full plot to legumes because they would give preference to producing cereal crops and in particular maize (Mazvimavi K. , 2017)

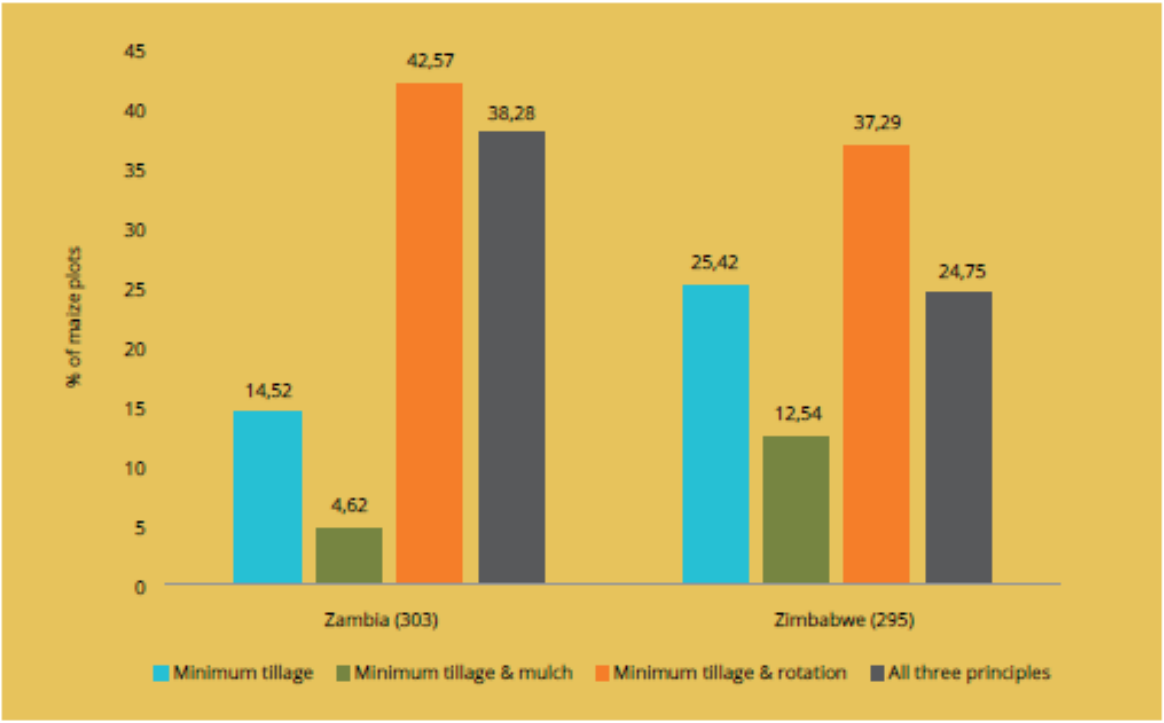


Figure 15: Proportion of maize plots among selected smallholder farmers in Zimbabwe and Zambia with adoption of different CA practices. Source: VUNA 2017

The report acknowledged the usefulness of CA tilling practices in terms of overall mean yields improvements and long term soil fertility improvement in comparison to conventional farming methods, but it also concludes that in periods of drought there is no consistent correlation between CA tilling practices, water availability and resilience of maize yields. Rather the report pointed to that the planting date (in combination with rainfall patterns), application of fertilizer and improved, drought resistant seeds are the main determinants of whether farmers will achieve yield resilience in periods of drought. [51] The report also suggested that low soil fertility is more constraining to crop growth than water availability in smallholder farming systems, even in drought years. Due to low soil fertility, plants are unable to take full advantage of even the limited amounts of water available in a drought year. While CA contributes to soil fertility, it takes several years to build up these beneficial effects; the impact of fertiliser application on the contratry is immediate. The report concluded that the CA promotion, which often includes promotion of fertilizer and improved seeds, seems to have contributed to farmers adopting higher rates of input use in what have been traditionally low-input farming systems in Zimbabwe. Thus, increased yields traditionally attributed to CA may in fact be due to the use of greater quantities of fertiliser by these farmers; but as the study also notes, there is need for more systematic evidence generation. The report emphasized the need to not only promote CA practices, but include CA practices as a part of a bigger package that focuses on improving the soil fertility in the long term and linking it with other improved farm-management practices.

Complementing the recent VUNA study (Mazimavi 2017), a study conducted by Michler et al (2016) argues that while the study finds little evidence to support the claims that adoption of CA in Zimbabwe increases yields in normal rainfall years (and may in some cases be less effective than conventional practices), CA can be more effective in mitigating yield loss in environments with abnormally high and abnormally low rainfall than traditional cultivation practices. The study therefore concludes that CA is indeed an example of 'climate smart'

[51] The report notes that CA farmers are more likely to use fertiliser and certified seed. It may be the use of these improved inputs associated with CA, and not the practices of CA itself, that contributed to higher yields on CA plots. Discussions with agricultural extension officers also revealed that in the province of Masvingo, most CA farmers planted CA plots with the first rains in 2015/16, but after planting there was a long dry spell, which affected crop growth in CA plots. Owing to resource constraints, some farmers failed to replant their CA plots. Most plantings on conventional plots was done after the long dry spell, and the harvest was therefore better than in CA plots (Mazvimavi K. , 2017).

agriculture to the extent that a changing climate will result in more abnormal rainfall patterns and CA appears more effective than conventional smallholder farming practice in mitigating yield loss due to deviations in rainfall. The study emphasizes that this does not imply that CA is a sustainable approach to agriculture for all smallholder farmers in Zimbabwe and it also highlights the need to test the long term benefits of CA on yields and incomes.

The experiences and evidence base above point to that while CA practices may be a component of the proposed CSA packages for this project, the packages should link CA with other improved farm practices, such as improved water and weed management, effective use of fertiliser and purchase of improved seed to maximize impact in the short term. It is however also recommended to invest in more systematic research and evidence building as to what CSA practices are most effective for smallholder farmers in the long run in terms of yield resilience, building up soil fertility and strengthening sustainable water management.

Based on research from the Nkayi district in Zimbabwe, which is comparable in terms of agro-ecological conditions to the areas targeted by the GCF proposal, ICRISAT argues that **more efficient use of crop-livestock interactions may contribute to sustainable intensification[52]**. Crop residues left on the field for mulching is expected to bring long-term environmental and soil amendment benefits. However, in dry contexts in Zimbabwe, crop residues are often critical dry season feed for livestock for smallholder farmers. Although farmers see soil fertility as a critical constraint, they have limited crop residue resources to spare for mulching. Or, as highlighted in the VUNA study mentioned above, the crop residues are stored where they can't be consumed by livestock and only applied at planting time. This is different from the ideal practice monitored in the agronomic trials/demo plots, where mulching material is left in the field throughout the year. As a result, the benefits of mulching may be limited in practice[53]. In order to improve livelihoods and promote sustainable intensification, it is necessary to address feed shortages while ensuring efficient crop residue utilization for soil improvements concurrently. Possible solutions identified include:

- Access to alternative feed such as dual purpose crops and forages of high protein and biomass content.
- Strengthened market linkages, better managed herds and higher off-takes will allow farmers to reinvest in enhancing profitability both through rangeland management and soil fertility.[54]

Agroforestry, the use of trees and shrubs as part of agricultural systems, may also contribute significantly to prevent soil erosion, facilitates water infiltration and diminishes the impacts of extreme weather. Agroforestry also helps diversify income sources and provides energy and often fodder for livestock. As documented by FAO (2013)[55], agroforestry systems contribute to making yields less variable, partly due to better retention of moisture in the soils and as wood is produced in these fields, these agricultural systems also contribute to preventing forest degradation. Agroforestry systems use less fertilizer, reducing the direct emissions of N2O and indirect GHG emissions created through fertilizer production.
In Zimbabwe, ICRISAT has documented and promoted mixed crop-livestock and agroforestry systems as a method to increase livelihoods options and incomes while enriching and buffering water and nutrient supplies, protecting soils and moderating microclimates. Experiences from the recent ZimCLIFS project[56] shows that farmers may increase incomes through sales of quality crop and livestock products by actively growing forage. The project increased the use of forage legumes (lablab/mucuna) and higher quality residues (e.g. groundnut stover and fertilized maize) for livestock feed production for subsistence and commercial

[52] (Homann-Kee Tui et al., 2013)
[53] (Mazvimavi K. , 2017)
[54] (Homann-Kee Tui et al., 2013)
[55] CSA Sourcebook (2013) FAO. Also the FAO's "Guidelines on Sustainable Forest Management in Drylands of Sub-Saharan Africa" (FAO, 2010) provides information on tree species and their uses, which includes considerations on water and soil conservation and stabilisation or reduction of global carbon emissions.
[56] The Integrating Crops and Livestock for Improved Food Security and Livelihoods in Zimbabwe (ZimCLIFS) project started in 2012 and ran until 2015. Three CGIAR centers—the International Livestock Research Institute, CIMMYT, and International Crops Research Institute for the Semi-Arid Tropics —launched the project jointly assisted by the Australian Aid Program through the Australian Centre for International Agricultural Research (ACIAR).
https://news.ilri.org/2017/09/19/closer-smarter-integration-of-crops-animals-and-soils-has-bolstered-food-security-livelihoods-and-incomes-in-rural-zimbabwe/

production[57]. By setting up pen-feeding demonstrations, the project also demonstrated that the net-profit for beef production by smallholders could be increased by 7–10%, when farmers used mucuna-based feed supplements. This in turn generated bigger incomes from livestock sales[58]. In Nkayi, which is an area comparable to the target districts for the proposed project, the project reported that the prices per steer rose from about USD400 to USD800–1000. Prices per goat rose from USD20 to USD50–70 for breeding animals. In addition to this, the project reported that farmers experienced benefits from higher milk yields and fewer livestock deaths. The home-based feeding systems also contributed to that fewer animals were lost to predators[59]. Also, the Scaling Up Adaptation project has experimented with the introduction of fodder trees and shrubs for alternative fodder for livestock to mitigate drought and overgrazing in partnership with Matobos research institute with good results in the dry Chiredzi district. The NGO CESVI has supported the rehabilitation of the Shashe irrigation scheme in the Beitbridge area in a way that integrates short term cash crops and long term citrus production, increasing incomes and supporting commercialization of the irrigation scheme by linking farmers to citrus buyer Schweppes. Given that Zimbabwe has a high deforestation rate[60] agroforestry may also contribute positively to reducing the Zimbabwean GHG emissions from the agriculture sector.

Farm power for field operations in the context of Zimbabwe's smallholder agriculture has historically been limited to manual, animal traction and for the more commercial farmers, a four wheel tractor based systems. The CSA framework evaluation of uptake of CA practices indicated that the labour demand and farm power demand had been impacting negatively on CA uptake among small holders with few resources. **Mechanisation is key to reducing labour requirements** and innovative ways of improving access to affordable mechanisation such as equipment pooling and service provider models have been shown to enhance adoption. Recent work done through the Farm Mechanisation and Conservation Agriculture for Sustainable Intensification project (FACASI)[61] implemented by CIMMYT indicates that small scale mechanization may be an effective way of supporting conservation agriculture uptake. The FACASI project has piloted the use of two wheel tractors to conservation agriculture in Zimbabwe using private sector based supply chains. Some of the preliminary findings are as follows:

Table 3: Preliminary findings of the FACASI project.[62]

Comparative productivity	The piloted two wheel tractor single row Fiterrelli planter combination had a 9 fold increase in crop establishment productivity over an animal traction based conventional system and a 2 fold productivity increase over a no till system. Labour productivity of the piloted two wheel tractor system was 14.7 times that of an animal traction based conventional system and 2.7 times of the no till planters system. FACASI estimated the labour productivity in conventional animal traction based systems at 44 md/Ha (man days per hectare) and 8 md/ha for a CA animal traction based system, in comparison to 3md/Ha for a two wheel tractor no till system, allowing farmers to free up labour for other tasks.
Entry level costs	Entry level costs for the piloted two wheel tractor single row Fiterrelli planter combination were pegged at US$2800 in Zimbabwe (2015) in comparison to US$2600 for animal based

[57] The mucuna velvet bean for instance serves to improve soil fertility, functions as green manure, cover crop and as a forage crop with high protein contents – and in addition it has proved resistant to dry conditions. The lablab bean is mostly used as a pulse crop and can be consumed by humans. It also produces large quantities of forage biomass, with high crude protein content; it can function as a cover crop to suppress weeds and provice nitrogen rich mulch, it can be intercropped, e.g. with maize or sorghum to improve soil fertility. Cf. Chakoma et al (2016) The agronomy and use of Lablab purpureus in smallholder farming systems of southern Africa. ILRI extension brief & Chakoma et al (2016) The agronomy and use of Mucuna pruriens in smallholder farming systems in southern Africa. ILRI extension briefs (Chakoma et al., 2016); (Chakoma et al , 2016)

[58] (ILRI, 2017)

[59] (ILRI, 2017)

[60] The deforestation rate has been about 300,000 ha/ year in recent years according to the 2015 Country Needs Assessment for the REDD+; conducted by the Ministry of Environment, Water and Climate in 2015.

[61] FACASI is funded by the Australian International Food Security Research Centre (AIFSRC) and managed by the Australian Centre for International Agricultural Research (ACIAR). The project is implemented by the International Maize and Wheat Improvement Center (CIMMYT).

[62] See FACASI homepage for more details. (FACASI, 2017)

	CA system. While it is difficult for smallholder farmers to access loans, the two wheel tractor/single row combination had more or less the same entry point costs as the animal draft based kit (4 oxen). In comparison to this a 4 wheel tractor based CA system was costed at US$21,000.
Grazing needs vis a vis the two wheel tractor system fuel needs.	The FACASI project estimated that animal traction based systems need extensive grazing infrastructure support systems. Given the low carrying capacity of most small holder lands (3-5Ha/livestock unit) in Zimbabwe and the standard conventional tillage crop establishment team composed of 4 oxen, extensive areas are set aside for grazing to sustain draft power. FACASI estimated fuel consumption data indicate that the two wheel tractor uses 9.5% and 40% of diesel fuel per hectare than a 4 wheel conventional and no till combinations respectively.

Overall FACASI in its preliminary findings suggested that as Zimbabwean agricultural markets are open to international competition, increasing the producer prices to maintain smallholder farmer margins are not a sustainable option. The two wheel tractor system combines low entry procurement costs and low operational costs (high labour productivity, low energy costs, high work rates) and may be one option for improving smallholder farming viability. In terms of climate smartness of the method, it will however be important to assess the benefits of integrated crop-livestock systems vis a vis fewer livestock, carrying capacity of land vis a vis the current animal draft power system and analyse the potential fuel consumption vis a vis GHG emissions from livestock and conventional farming practice.

The **availability of seeds for drought resistant crops as well as appropriate varieties**, suited for the Zimbabwean climate is key for smallholder farmers. Often they are faced with challenges such as availabiltity and access to drought resistant crops and improved varieties from the formal seed sector as well as budget constraints in terms of buying seeds.
During drought years, smallholder farmers can be forced to replant two to four times (using two to four times the amount of seed at several times the cost). Here community seed banks with locally available seeds and crops and varieties adopted to the local context is one way of promoting affordable seed security for smallholder farmers. Under the Sowing Diversity=Harvesting Security program, the Community Technology Development Trust (CTDT) and OXFAM have promoted farmer seed systems and have linked smallholder farmers with the Crop Breeding Institute of Zimbabwe, private sector institutes and international crop research centres (namely ICRISAT and CIMMYT, which are very active in developing new varieties of their mandate crops). In addition to seed security the seed banks also contribute to provide reservoirs of plant genetic resources that are needed in the longer term to adapt agriculture to climate change, pests and diseases. The African Seed Access Index (2014)[63] reports that the seed sector in Zimbabwe is dominated by private sector companies and highly focused on maize. The main seed company in Zimbabwe, SeedCo, currently only stocks two varieties of sorghum, two varieties of groundnuts and one cowpea variety[64]. The government monitoring from November 2017 showed that in practice, small-grain and groundnut seeds were not widely available from agro-dealers in the five regional centres surveyed[65]. Farmer seed systems may therefore plug a gap in the market for less commercially attractive crops – while there is also need for a broader availability of commercial seeds. A 'Facilitators' Field Guide for Participatory Plant Breeding in Maize, Pearl Millet, Sorghum and Groundnut', was developed jointly by FFS representatives, Oxfam Novib and the CTDT in Zimbabwe[66]. Other initiatives include the SADC/ICRISAT Sorghum and Millet Improvement Program, which promoted the genetic preservation of local small grains varieties and development of improved varieties in collaboration with DR&SS as well as work done by DR&SS on developing improved varieties e.g. the development and promotion of the NUA45 bean variety (also see case study on innovation platforms below).

Lastly, the availability of relevant weather and climate information is increasingly important for smallholder farmers decision making in the face of a changing climate. The increased focus on meteorological and climate research has also contributed to improve the quality of seasonal forecasts of agricultural drought and mid season

[63] (African Seed Access Index, 2014)
[64] Seedco website, accessed Feb 2018. (Seedco, 2018)
[65] (AMA, 2017)
[66] (SDHS, n.d.)

spells, but VUNA in a recent report on agricultural drought and climate smart agriculture (2016)[67] points to that the most immediate challenge for climate smart agriculture is to better **use seasonal forecasts to guide farmer decision-making**. If rains are likely to be more favourable (e.g. based on predictions for a La Nina affected rainy season), farmers may be encouraged to grow crops and varieties that make use of the higher rainfall (such as late maturing varieties) and in the likelihood of dryer seasons, farmers should be encouraged to plant drought resistant, earlier-maturing varieties and invest more in assuring the capture of water in the field. Droughts are already endemic in Zimbabwe, and finding solutions to today's droughts will improve the capacity to cope with future droughts that may become more frequent. Through the Scaling Up Adaptation project, OXFAM and partners, have found a similar need for providing smallholder famrers with relevant weather information and have piloted a model for targeting forecasts to smallholder farmers needs, which may form the basis for rolling out climate and weather information to smallholder farmers in the proposed project to GCF.

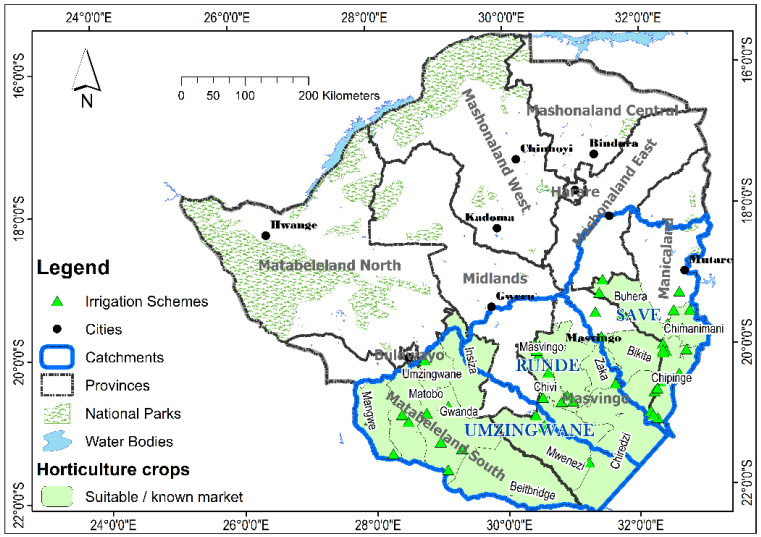
[67] (Walker, 2016)

Overview of suitable crop-livestock combinations

The value chain sub assessment identified the following value chains as high impact potential crop and livestock opportunities based on on criteria such as documented, ready market and potential for establishing market linkages with key market actors in identified value chains, climate resilience potential of the crop/livestock and potential for decreasing poverty and food insecurity.

Proposed Value chains	Justification
Irrigated horticulture - Irrigation schemes	Irrigation removes the risk of rain failure during the rainy season and allows for cultivation in dry season. High profitability, depending on horticultural product. High impact horticultural products were selected through the VUNA sub assessment of potential high impact value chains and the possible support from AGRITEX workers at the national, provincial and district level. Focus was on **commercial crops** which were selected for high value per hectare, existing production skills, low perishability, well defined markets and formal and informal unmet market demand. The study also concluded that there is **scope to expand and complement** these products as variety is one of the key competitive advantages mentioned by buyers.
Sesame - Dry land farmers	New crop, but well suited to Zimbabwean climate and agricultural systems. Drought tolerant and grows under rain fed farming. Low cost of inputs with a good rate of return. High impact and income potential for smallholder farmer, with e.g. WHH under ZRBF demonstrating success.
Small grains - Dry land farmers	Drought resistant alternative to maize. The most reliable cropping option for food security and good nutrition value. Low cost in terms of input. Potential for diverse value addition. Existing research expertise in both government departments, NGO's and among research institutions such as ICRISAT.
Livestock – Cross cutting. In combination with irrigation and dryland farming.	Critical element of farming systems in the three provinces and socio-cultural priority. High level of livestock management knowledge, livestock research expertise in government departments, NGO's and among research institutions such as ICRISAT. Some basic value chain infrastructure present. Research from ICRISAT in collaboration with government departments indicate that a combination of crops and livestock is most effective for small holder farmers.

The high potential crops-livestock combinations and suitability of the proposed crop/livestock value chains were validated with key stakeholders and matched with the targeted areas. The maps below shows the validated overview of suitable crops and markets per district.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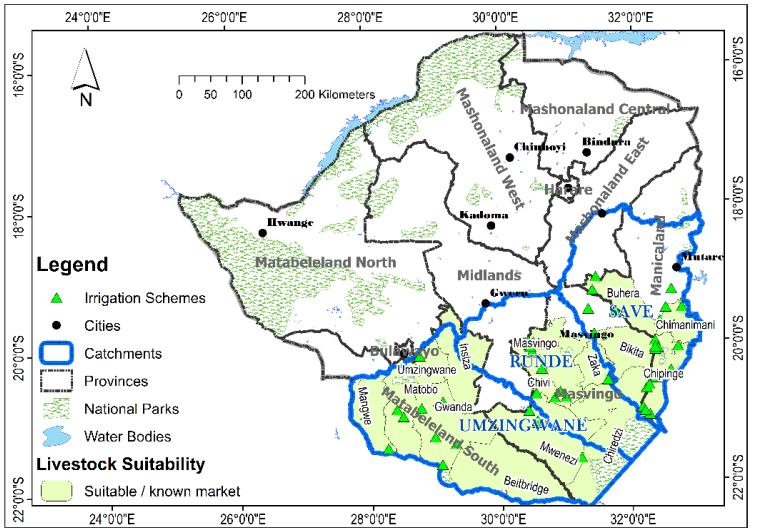
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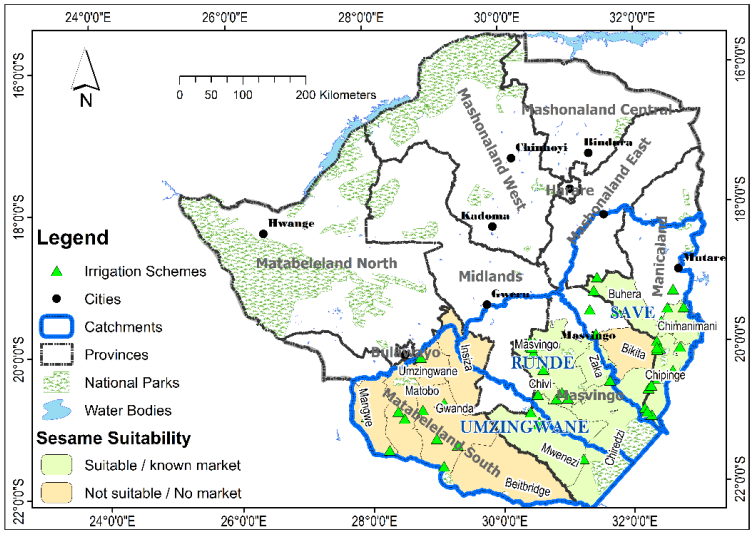
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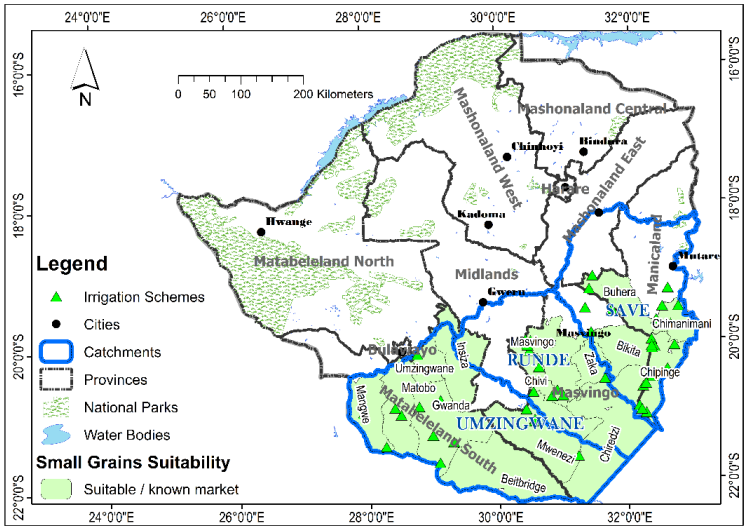
Suitable / known market
Not suitable / No market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Harare
Chinhoyi
Bindura
Hwange
Kadoma
Matabeleland North
Midlands
Gweru
Manicaland
Mutare
Buhera
SAVE
Chimanimani
Masvingo
Bikita
Zaka
Chipinge
Chivi
RUNDE
Insiza
Umzingwane
Matobo
Gwanda
Mangwe
Matabeleland South
UMZINGWANE
Beitbridge
Mwenezi
Chiredzi
Legend
Irrigation Schemes
Cities
Catchments
Provinces
National Parks
Water Bodies
Small Grains Suitability
Suitable / known market

Proposed crops for irrigated land

In terms of potential profits, the value chain subassessment argued that irrigated horticulture offers the highest crop returns per ha. Simple average gross margins for a number of crops were found to be 54% (based on AGRITEX budgets of nine crops). The study also noted that horticulture offers high local employment opportunities for surrounding dryland farmers and downstream segments of the value chain which increases the value of investment of the project. Besides incomes, about 10% of horticulture produce is consumed on farm, which improves food and nutrition security benefits of the project.

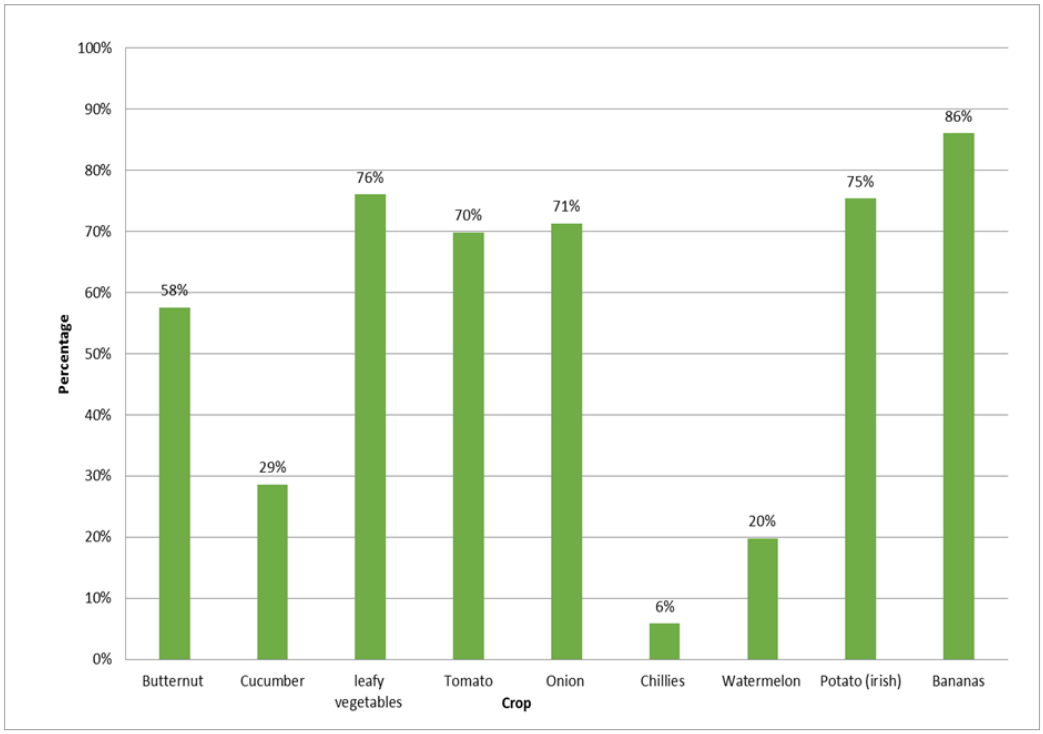


Figure 16: Simple Gross margins for selected irrigated horticulture crops in Zimbabwe. Source: Value chain subassessment, sourced from AGRITEX

Summary of viability indicators from selected smallholder horticulture crop budgets												
Crops	Income						Returns					
	Prices	Gross Yield	Pack Out	Expected Net Yield	Gross Income	Total Variable Costs	Gross Margin	Break -even Price	Break -even Yield	Net Returns Per $	Returns to Family Labour	
	$/kg	kg/ha	%	kg/ha	$/ha	$/ha	$/ha	$/kg	kg/ha	$1/$	days/ha	$/day
							GI-TVC	TVC/ny	TVC/pp	GM/TVC		GM/Lf
Fine beans	$1.00	7,200	70	5,040	$5,040	$2,668	$2,372	$0.53	2,668	$0.89	168	$14.12
Butternuts	$0.20	20,000	75	15,000	$3,000	$1,572	$1,428	$0.10	7,860	$0.91	114	$12.53
Gem Squash	$0.40	15,000	75	11,250	$4,500	$1,384	$3,116	$0.12	3,461	$2.25	114	$27.33
Tabasco	$0.50	6,000	100	6,000	$3,000	$700	$2,300	$0.12	1,400	$3.29	371	$6.20
Tomatoes	$0.75	24,000	70	16,800	$12,600	$4,869	$7,731	$0.29	6,492	$1.59	224	$34.51
Cucumbers	$0.35	10,000	60	6,000	$2,100	$570	$1,530	$0.09	1,628	$2.68	109	$14.04
Green Peppers	$1.50	7,500	80	6,000	$9,000	$2,430	$6,570	$0.40	1,620	$2.70	228	$28.82
Rape	$0.30	10,000	80	8,000	$2,400	$1,242	$1,158	$0.16	4,139	$0.93	50	$23.17
Onions	$0.50	20,000	90	18,000	$9,000	$2,398	$6,602	$0.13	4,796	$2.75	120	$55.02
Carrots	$0.50	8,000	99	7,929	$3,965	$995	$2,970	$0.13	1,990	$2.98	250	$11.88
Cabbages	$0.40	15,000	73	11,000	$4,400	$930	$3,470	$0.08	2,325	$3.73	120	$28.92
Bananas	$0.22	40,000	100	40,000	$8,800	$5,952	$2,848	$0.15	27,055	$0.48	411	$6.93

*

Figure 17: Gross Margin analysis for selected horticulture crops. Source: (SNV, Smallholder horticultural production and business trainer manual, 2016)

Also, the recent SNV horticulture assessments estimates gross margins for several horticultural crops, showing that even smallholder farmers with a 0,2-0,5ha plot in an irrigation scheme may gain a significant income from irrigated horticulture taking into account the possibility for 3 cropping seasons.

Key high impact horticultural crops identified in the value chain sub assessment were:

Fruits: Banana and citrus (oranges and lemons). The study noted that although these crops are relatively new in the smallholder sector, successful new initiatives with the private sector represent huge potential for transformation of commodity mix and management models for smallholder agriculture in the targeted regions.

Vegetables: Onions, butternuts, green mealies, chillies, sugar beans and leafy vegetables were selected for high value per hectare, low perishability, well defined markets, formal and informal unmet market demand and existing skills in growing these crops. Other crops such as tomatoes also show high value per hectare as per the gross margin analysis above, but score low on criteria such as perishability which may be a challenge in terms of projected increased temperatures. Tomatoes may however be profitable to grow if schemes establish an effective transport and contract buying relationship with a buyer such as Best Fruit Processors as there is an unmet, formal market demand[68]. The value chain study also noted that there is, however, a huge **scope to expand and complement these products as variety is one of the key competitive advantages mentioned by buyers**. From a climate smart agriculture perspective there is also be scope to explore which other cash crops complement the above mentioned crops in terms of soil fertility improvements through **intercropping and crop rotation.**

One of the key concerns that came out of the consultations with AGRITEX staff was that it may be challenging to introduce new horticultural crops to farmers, who are often very bound by habit and challenged by limited financial resources and knowledge on growing a particular crop. AGRITEX staff **recommended to ride on existing horticulture value chains**, making use of the technical and input support provided by companies through contract arrangements, so as to speed up adoption by farmers of CSA packages. For instance, sugar beans were recommended as a value chain with a very high output by the value chain study, and farmers are used to growing the crop[69]. As noted above, **bananas** and **citrus fruits** were also identified as high value, high

[68] Phone conversation 23.5.2017, Best Fruit Processors, Agronomy Executive indicated that in 2016, the requirement for tomatoes were 30.000T and only 4000 T were sourced.
[69] Consultations with AGRITEX 6-8 June, 2017

impact irrigated crops in the value chain sub assessment, based on experience from USAID supported banana projects in Manicaland and a cooperation between the Italian NGO CESVI and Schweppes in Beitbridge. However the crops were deemed too difficult to work with by AGRITEX officers – in terms of facilitating fair marketing arrangements for farmers, the long term investments needed and the capacities present in AGRITEX[70]. The case stories for both crops are however promising, so it is recommended to learn from the cases but also to consider building capacity in AGRITEX for supporting smallholder farmers to transition into more long term agriculture ventures with time.

Banana case study

The value chain study draws on the case of banana production in Manicaland. Here smallholder farmers in Rusitu Valley (7,500 families farming 0.5 ha, each family); Honde Valley (4,000 families farming on average 0.4ha each family) and Mutema/Chibuwe) (440 families farming on average 0.25 ha) farm bananas in a partnership with Matanuska, Sunspun and FAVCO, and sell through these actors to markets such as Mbare Musika, Sakubva market, venders and supermarkets. Matanuska treats bananas with fungicides and sells to high value markets; and Sunspun and FAVCO sells approximately 90% of their produce to venders. Matanuska provides transport and extension services.

NGOs, especially ZimAied and SNV introduced tissue culture bananas that are yielding on average 60MT/ha as compared to the local variety (nzarayapera) which yields on average 15 MT/ha. In Honde Valley, Zim Aeid reported in 2014 that banana farmers had increased their average yield from 4 to 12 tons per hectare on the old plantations, and were already achieving yields of 40 tons from tissue-cultured plantings – a 10 fold yield increase. At the same time incomes per farmer had increased from 200 USD per year from 2011 baseline to 3500 USD per year in the 2012/13 season – for an average sized plot of 0,57 ha.

The farmers were also linked up to microbanking and financial support which allows for smallholders to purchase fertilisers at an interest rate of 4% per month, with a repayment period of 6 months. Agribank is funding rehabilitation of irrigation equipment organised through FAVCO, the loan has an interest rate of 18-24% per annum, with a repayment period of 6 months.

Source: SNV Horticulture Sub Sector Study, 2014 and ZimAeid case study on banana production, 2014

Citrus case study

The SNV horticulture sub sector study, 2014, argues that it is not easy for small scale and communal farmers to enter into the citrus growing industry because of the costs. For a viable citrus farming unit, there is need to put a minimum of 40ha under citrus, which cost about US$ 7,000/ha to establish, and the farmers need to wait for 6-7 years before harvesting export quality fruit.

In 2003, Nottingham Estate, a large-scale commercial citrus farm some forty kilometres from Shashe promoted a consultation among local plot holders. The smallholder farmers in the scheme wanted to have greater jurisdiction and ownership of the scheme, including the irrigation infrastructure. In conclusion, the group decided to engage in a partnership with commercial institutions or NGOs to raise capital to revitalize the scheme. It was suggested to introduce high value marketable crops such as citrus fruits, due to that local farmers had long been involved in citrus production and had expertise in this field. The NGO CESVI was engaged to modernise the scheme in 2011, setting up an orange farm cultivated and managed directly by Shashe community. The community adoped a climate smart irrigation model, which was both cheaper and led to a reduction of at least 50% of water usage. CESVI reports that saving water automatically also translated into saving electricity, for the amount of about USD 50,000 per year. This money thus became available to the community for further investments and also represented a reduction in GHG emissions. In order to ensure a reliable market for the crop, the community entered into a market arrangement with the Beitbridge juicing company.

The crop production model introduced at Shashe was based on researches carried out over a number of years at regional and national level as well as local participative research with and by the Shashe Community. 22,000 orange trees were supplied by CESVI and planted by the community. It takes at least

[70] Consultations with AGRITEX 6-8 June 2017.

four to five years for the young orange trees to reach maturity, so in order to generate short term returns, crops such as seed beans, squash, sweet potatoes, turnips, cabbage and maize were cultivated in between trees, either on contract for cash or for basic food requirements. Smallholder farmers are allocated 80 trees each, or about 0.4 ha. Each grower is also allocated a strip of irrigated land of about 0.2 ha on which to grow food and scah crops. Through contract farming, farmers were able to borrow inputs (i.e. seeds, fertilizers) as part of their contract with agri-business companies and to repay the loan by detraction from the yield. Ths allowed even the poorest farmers to farm high-value crops with the right inputs.

Technoserve, in a case study on the Shashe irrigation scheme, explains that the cost of growing productive trees is less than $250 per year during the first 5 years, including costs for fertilizer and chemicals, electricity for irrigation, and all management costs. By the fifth year, the smallholder farmers reach a break-even point. Thereafter, the cost of maintenance of the trees increase, but as the tree also starts producing fruit the farmers obtain revenues from the sale of oranges. An estimation of gross margins per farmer are shown below.

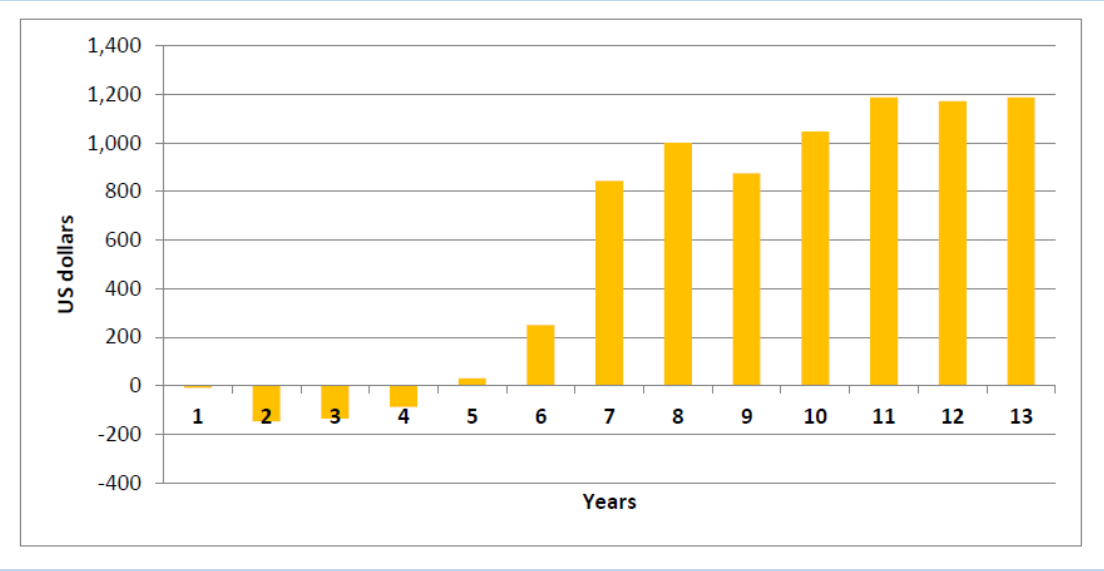


Figure 18: Expected revenue for smallholder farmers in Shashe Irrigation scheme. Source: Citrus Industry in Zimbawbe report, Technoserve, with reference to Shashe Irrigation Scheme

In addition, CESVI has introduced smallholder farmers in the scheme to take up seeds as cash crops. The fresh food market in Beit Bridge is too far to make the transport of vegetables profitable and insteas the production of seed crops on a contract basis is lucrative and feasible. Being dry, seeds can be stored and transported at the convenience of both buyer and seller. In the Shashe irrigation scheme, the company Seed Coop Ltd. has provided inputs for growing seed sugar beans, and East-West Seeds have supported growing butternut seed. The Technoserve case study notes that even at moderate production level of 2.5 tons per ha for sugar bean seed and 300 kg per ha for butternut seed, smallholders can profit.

	Sugar Bean Seed	**Butternut Seed**
Total production costs ($)	167	399
Yield (tons)	0.50	60
Price per ton	1,700	15
Revenue ($)	850	900
Gross Margin (0.2ha)	683	501
Returns (Gross Margin/Cost)	4.10	1.26

Figure 19: Gross margins for sugarbeans and butternut for Shashe Irrigation scheme smallholder farmers. .Source:Citrus Industry in Zimbabwe, Technoserve

As such the scheme provides a case story for how farming communities may shift from subsistence agriculture to a community-based commercial enterprise through innovation and collective management of land and resources. Also, the carbon sequestration potential for the Shashe orchard demonstrates that even small rural communities can play an important role in climate change mitigation.

Source: SNV Horticulture Sub Sector Study, 2014; Citrus Industry in Zimbabwe Research Paper, Technoserve 2016 and CESVI case story on the Shashe irrigation scheme, 2016

Proposed crops for dry land

The value chain subassessment also identified the drought resistant sesame crop as well as the drought resistant resistant small grains and livestock as high potential value chain options for smallholder farmers on dryland.

Sesame case story

In the example of the Welt Hunger Hilfe led MELANA consortium under ZRBF in Bubi, Umguza, Umzingwane and Nkayi, the International Export Trading Group has supported farmers in terms of training and commitment to buy the sesame crop.

The farmers have bought own inputs and the MELANA project has contributed with Farmer Field School trainings. Most farmers opt for a 0,5ha investment in the first year, while learning how to grow the crop and are then able to expand in the following years.

With an initial expense of 250USD / ha, a farmer can expect to grow 1,5 T of sesame per ha, if the right practices are applied. The crop has been sold at between 55-70 c/kg in recent years. Based on these prices, a farmer with a 1ha plot and a 1,5 T harvest would be able to earn between 825 and 1050 USD, making a profit of about 575-800 USD after subtracting initial investments. Even if the harvest is not optimal at e.g. 1 T/ha, farmers would still be able to get a decent profit in comparison to other crops grown by small holders in Southern Zimbabwe.

In terms of value addition to sesame, the company buying the sesame would provide small holder farmers with appropriate storage bags, limiting the need for value addition investments. Also, harvest is relatively easy with sesame and does not require additional equipment.

Source: Conversation with WHH, August 2017.

Climate change has substantial effect on the ecosystems and the natural resources, that the livestock sector depend on. Increased temperature, changes in the amount of rainfall and shifts in precipitation patterns will impact on the changes in the yields, quality and type of feed crops, possible increases in animal diseases and increased competition for resources. At the same time, livestock are major contributors to GHG emissions making up 20% of total GHG emissions globally. Major sources of emission are land use change from forest cover and other natural vegetation replaced by pasture and feed crops, feed production, animal production and manure management[71]. The value chain subassessment identified the use of improved fodders and feed management as possible mitigation options. Improved rangeland management is currently being implemented in Hwange District[72] in Matabeleland North by the Africa Centre for Holistic Development (ACHD). The Scaling Up Adaptation project is similarly piloting promising methods of grassland rehabilitation and management and nutritious (and carbon sequestrating) fodder trees for livestock in partnership with the DR&SS Matopos research station.

However, it is also important to take into account that livestock are a critical element of farming systems in Zimbabwe, namely in the dry regions. Most households in semi-arid Zimbabwe are unable to grow enough staple food to meet their own requirements and they tend to supplement what they grow with food that they buy - the source of this cash is often from the sales of livestock. ICRISAT points out that of all their farming activities, most small-scale producers say that animals are their most important source of cash. In particular, goats represent small discrete bundles of cash for school fees and medical expenses and farmers are more willing to part with them than their cattle[73]. In the current economy, where smallholder farmers have few

[71] (FAO, CSA sourcebook, 2013)
[72] (http://www.chronicle.co.zw/achm-leaders-in-land-water-and-wildlife-restoration/ , n.d.)
[73] (Van Royen and Homann-Kee Tui,, n.d.)

options for saving up and gaining an income, livestock are both a socio-cultural priority and an important coping mechanism for communities faced with climate and non climate shocks.

Also, the value chain subassessment argues that there is a high level of livestock management knowledge, livestock research expertise and value chain infrastructure present meaning that a project investment would be building on well-established foundations.

Integrated crop-livestock agricultural systems

One of the key actors on livestock research in semi arid regions of Zimbabwe, the research institution ICRISAT and DR&SS through Matobos research institute has worked with strategies to build agricultural resilience and reduce poverty in semi arid regions in Zimbabwe. ICRISAT research on livestock systems include studies of the impact of conservation agriculture practices, options for integrated crop-livestock production and sustainable crop intensification. In semi-arid Zimbabwe, there is limited biomass and rangeland feed resources are increasingly being converted into cropland - crop residues are therefore increasingly serving the important function of supplementing livestock feed, especially during the dry season. A recent ICRISAT study[74] assesses the trade-offs of intensifying crop production and improving livestock feed. The consequence of feeding most crop residue to livestock is that there are few alternatives to return biomass to the fields, which in turn limits the replenishment of organic material and protection of the soils. The study points to that **effective integrated crop-livestock production technologies** are available and have higher profitability potential than crop production alone (such as fodder production and integration of livestock production with effectively applied CA practices), but need to be better integrated in farmers practice. The study also concludes that a **maize/mucuna** (cereal / legumes) rotation which supports soil fertility and biomass production for feed and mulch is promising in terms of profitability – farmers without cattle can almost double their net returns and those with cattle can increase net returns by about 30%, through mucuna biomass surplus, which positively affects cattle productivity.

The study stresses that barriers to the adoption of promising practices should be addressed, including demonstrations of profitability and risk considerations. Key barriers include limited capacity in extension services to advice on integrated crop-livestock management, poor access to crop and livestock input and output markets[75]. Also, limited coordination and collective action among stakeholders is highlighted, in order to link farmers to markets, ensure relevant agricultural support services and improved capacity to adjust to changing requirements, e.g. better preparedness to reorganize the activities in case of droughts or other shocks, or better ability to respond to new market opportunities.

The value of livestock

Highlighting the importance of functional markets, ICRISAT researchers in a 2013 study[76], argued that the development of more effective output market systems in Gwanda, resulted in improved prices for livestock. Farmers used to sell their goats for a maximum of USD 20 at farmgate sales; whereas the average price for a medium-quality goat rose to USD 35–50 at auctions. As a result of improved marketing infrastructure, increased prices per animal and a marketing system that rewarded the quality of goats, farmers took better care of their goats (e.g., providing dry season feeding and adequate housing structures) in an attempt to reduce animal mortalities and loss of income. Similarly, through the Scaling Up Adaptation project, OXFAM and partners have worked to facilitate market linkages between farmers and butcheries. During the El Nino induced drought in the 2015/16 season, middlemen bought goats at farm gate from vulnerable, desperate communities, who usually market goats as individuals. The middlemen were offering prices ranging from 18- 25 USD / goat against the potential 30- 50 USD/goat (for live weight). The project successfully engaged the Montana Carswell Meats as a formal market partner in the development of the goat value chain. Montana Carswell Meats now buys goats in the respective wards on a monthly basis at a price of $1.00/kg of live weight. Adding to the challenges of fetching low prices for goats in the absence of adequate marketing systems, current goat breeding practices are often uncontrolled, all year round and common inbreeding has resulted in the production of animals of small stature and little weight, fetching lower prices. During 2017, SAFIRE supported the introduction of more drought resistant and improved breeds through

[74] (Homann-Kee Tui, S., et al., 2014)
[75] (Homann-Kee Tui, S., et al., 2014)
[76] (Van Royeen, et al., 2013)

the Scaling Up Adaptation project, notably the Boer goats, and better management and breeding practices to increase livestock resistance to drought and improve farmer incomes[77, 78].

Similarly hightlighting the importance of a commercial mindset to livestock production, Technoserve, a NGO providing business solutions to poverty, in a 2016 study on the cattle livestock sector noted that because smallholder farmers view cattles as a status symbol and a storage of wealth rather than a commercial production, they tend to seel cattle ad hoc, often under pressing circumstances (such as the El Nino induced drought), reducing their bargaining power and the prices significantly.

The value chain sub assessment identified small grains as an important drought resistant food crop in semi arid areas as well as a crop with commercial potential. Small grains (sorghum, pearl and finger millet) are ranked second staple cereal crops after maize in Zimbabwe and could potentially play a vital role in the Zimbabwe's food security and improve nutrition. While small grains production has been promoted in the dry parts of the country for many years by both the Government of Zimbabwe, research institutions and NGO's, the rates of uptake have been low.

Small grains yield in drought conditions

Under the Sowing Diversity=Harvesting Security program, the Community Technology Development Trust (CTDT) and OXFAM promoted farmer seed systems through farmer field schools as well as the planting of drought tolerant crops, such as sorghum, pearl millet and groundnuts in Zimbabwe. Using data from the CTDT farmer field schools, the CTDT reports that small grain yields were six times higher than yield for hybrid maize in the same districts[79].This was despite the fact that maize, with its large grains, usually yields more than smaller grains. While the small-grain harvests (of about 0,6 T/ha) were still a fraction of what would normally be expected, farmers could at least produce some food for some months despite the worst drought in 20 years. The project reports explained that small grains like sorghum and pearl millet are able to rejuvenate and re-establish themselves from tillers, while maize does not have this capacity. When the rains fell late in the 2015/2016 season, the small grains were able to recover thanks to an indeterminate growth characteristic that allowed them to rejuvenate and re-grow after having been earlier destroyed to the ground.

Small grains

ICRISAT has researched on promotion of production and processing of small grains, crop-livestock interactions, CSA, climate modelling, food science and market linkages over the years and has established a regional hub in Bulawayo in Zimbabwe. From 1983-now the SADC/ICRISAT Sorghum and Millet Improvement Program has focused on improving food security and incomes among small holder farmers in semi-arid areas of the SADC region by **developing and disseminating new technologies to improve productivity in sorghum and millet-based systems**[80]. A "seed bank" was established at Matopos, which has helped preserve and document indigenous genetic diversity, and create a more diverse genepool from which national breeding programs can select and incorporate specific traits. SMIP also supported distribution of over 130,000 sorghum and pearl millet genotypes to SADC national programs, assisting them in the development of a range of new varieties suitable for their own environments - in Zimbabwe, the SMIP national program resulted in release of in two varieties, sorghum SV 2 and pearl millet PMV 2. Research and promotion of applying fertilizer microdosing and adopting soil and water conservation practices has improved the yields of 300,000 farmers in the drought-prone regions of Masvingo and Matabeleland. ICRISAT estimates that farmers using conservation agriculture methods have often achieved yields that are 15 to 75 percent higher than with conventional practices; however the success depends on the extent to which CA practices and promoted inputs, such as improved seeds and fertilizer, are fully adopted [81]. Also,

[77] During the El Nino induced drought in the 2015/16 season, on average a household disposed 7-10 goats in Buhera, as reported by the NGO SAFIRE. SAFIRE project report, 2017.

[78] The goat population of Zimbawbe is estimated at three million goats and goat mortality rates as high as 30% - equating an annual loss of 900,000 goats and related potential income (Van Royeen, et al., 2013)

[79] (SDHS, Our seeds, lessons from the drought , 2016)

[80] Partnerships for Progress: The SADC/ICRISAT Sorghum and Millet Improvement Program (2003)

[81] "Zimbabwe and ICRISAT. Innovation Platforms improve livelihoods" (2015) ICRISAT (ICRISAT, 2015)

ICRISAT food science researchers have identified how different small grains varieties can be used in bread, baking and other non-traditional products as well as livestock feed.

Recently, ICRISAT has been involved in the ZRBF barrier analysis of the small grains value chain in Zimbawe (2017)[82]. The barrier study highlights that small grains adoption face challenges in terms of input provision in terms of distancse to seed market, treated seed being very expensive and in some cases no access to treated to seed. In terms of agricultural production, major barriers include high labour demand for processing, challenges with birds and animals, limited access to viable markets and limited access to relevant extension services. The marketing and consumption of small grains is also affected by poor harvest methods, poor pre-processing, lack of drying facilities as well as challenges with pests. **Improved seed availability, improved harvesting methods and storage facilitaties and labour saving processing facilities** are identified as key enabling factors for scaling up small grains production – for both food production and commercial purposes.

Other crop-livestock options

In addition the crops and crop-livestock combinations identified in the value chain sub assessment, other promising crops and crop combinations have been identified in other studies and by other actors.

Experience from the CA Task Force incl. ICRISAT and CIMMYT as well as the Scaling Up Adaptation project and many other projects highlighted the potentials of soil fertility and environmental benefits enhanced through crop rotation and biological nitrogen fixation. Some crops, such as legumes, are natural nitrogen fixing crops and their use in crop rotation systems can contribute to improve nitrogen availability to subsequent crops, such as cereal. This is especially important for smallholder farmers with few ressources and limited access to nitrogen fertilizers. ICRISAT identified **groundnuts** as a high value cash crop, which along with fixing nitrogen may contribute to increase farmers incomes. In order for this potential to be realized, improved access to high yielding ground nut varieties, improved functioning of markets and strengthened partnerships between government, small holder farmers and agro businesses is essential[83].

DR&SS and AGRITEX in collaboration with the CIAT-PABRA initiative has piloted introduction of an **improved bean variety** (see case study on innovation platforms below) with promising results in terms of yields and income levels. DR&SS reports that capacity building efforts also led to an increase in yields from an average of 0.9t/ha to a new average of 1.8t/ha and that the project succeeded in linking farmers to markets with an average increase in price from around US$1.00/kg to US$1.40/kg – a percentage increase of 40%. As a result of both improved yields and prices, the returns from NUA45 bean sales per farmer increased by 180%.

Overview of experiences of facilitation of market linkages for small holder farmers

Despite the economic decline in Zimbabwe over the past 15 years, there is a considerable agricultural potential to serve domestic and export markets. Due to the agrarian reforms, there are more smallholders than before, who need to be integrated into the market infrastructures and support systems. Several value chain studies indicate that there is significant demand and ready markets for a variety of agricultural products, but that companies often struggle to meet the demand as the smallholder farmers are not well integrated into the market systems[84]. Smallholders depend on agriculture to meet their own-consumption needs and as a primary source of income. If smallholders are better integrated into markets, they will contribute to both national food security as well as improved food security at the farm household level[85]. It is increasingly recognized among

[82] Draft version of *UNDP/ZRBF (2017), "Small grains value chains, Policy Issues, Opportunities and Recommendations for Zimbabwe"* (UNDP/ZRBF, 2017)

[83] ICRISAT, Partnerships for unlocking potentials in groundnut value chains in Zimbabwe, Homann-Kee Tui et al. , as part of the Integrating Crops and Livestock for Improved Food Security and Livelihoods in in Zimbabwe project (2012-2015), (Homann-Kee Tui et al., 2015)

[84] Technoserve value chain studies (Technoserve, 2016), SNV value chain studies as part of the RARP (SNV, Div. value chain studies, 2014)), ICRISAT diverse studies on goat value chain (Homann-Kee Tui et al., 2013) (Homann-Kee Tui et al., 2013) (Van Royen and Homann-Kee Tui,, n.d.) (Van Royeen, et al., 2013), VUNA value chain sub assessment (2017), conversations with private sector stakeholders.

[85] LFSP market study (FAO, LFSP market study). In this study, FAO draws on experiences from FAO, the World Bank, the International Fund for Agricultural Development and the International Food Policy Research Institute (IFPRI) to understand the nature and extent of the problems related to market linkages for smallholder farmers in Zimbabwe.

donors, NGOs, and government actors as well as private sector players, that there is a need to support smallholder farmers to run their farming more commercially. Based on lessons from projects, studies and consultations, some key challenges and best practices are emerging [86]:

Limited knowledge and capacity of both AGRITEX extension staff and smallholder farmers make it difficult for smallholders to link up to markets and do farming as a business[87]. Through desk study and consultations, it has been identified that capacity building is needed for both AGRITEX extension workers and farmers. Farmers are struggling to sell their products to a ready market and often do not realise the necessary profits to invest substantially in productive assets. In order to do this, farmers need to understand the market mechanisms, requirements and key players. For instance, farmers need to understand and be able to live up to standards for minimum quantities and consistent quality to engage with formal markets. Also, AGRITEX workers are struggling to provide farmers with the right support, knowledge and networks to improve market links. In introducing new crops as part of efforts to build climate resilience in crop production, there is also a need to explore and link up with new markets and market players.

Currently, smallholder farmers participate in a number of markets that include agricultural inputs (seed, fertilizers, chemicals etc.); credit (banks, SACCOs, ISALs); agricultural produce (crops, livestock, horticulture, fruits etc.); labor and small-scale and cross-border trading.Market platforms and commodity associations are key, but currently **there are few, well-functioning market platforms working in favour of smallholder farmers.** Currently, smallholders depend on middlemen, wholesalers, bulk suppliers or other market forces, where the power dynamics are not in the favour of the smallholder farmer, who have weak bargaining power[88].

The ZRBF private sector strategy background analysis highlights that **the concept of inclusive business and the emphasis on the triple bottom line, i.e. people, profit and planet, is a fairly new concept in Zimbabwe[89].** The strategy emphasizes that in order to support meaningful and impactful smallholder involvement in formal value chains and formal markets, it is important that leading companies are committed to investing in creating opportunities for the poor.

Inclusion of small holder farmers in formal value chains

Examples of private sector led interventions to include small holder farmers in formal value chains;

- Sourcing of raw materials/products from smallholder farmers,
- Contract farming relationships, which may include inputs and extension services
- Involvement of low-income rural communities and local small and medium sized enterprises in the distribution channels of products and services,
- Increased provision of affordable goods and services to low income communities
- Direct employment

As presented in the ZRBF private sector strategy background analysis (ZRBF, 2018)

In line with this analysis, recent consultations with AGRITEX officers also highlighted the need to support farmers to understand and engage with formal markets in a fair way, where both smallholder farmers and companies understand each other, live up to agreed commitments and where smallholder farmers fetch a fair price for their produce. The issue of weak organization and little bargaining power of smallholder farmers, weak markets and dependency on middlemen were mentioned as key obstacles[90].

The experiences from collaborations between CGIAR research network organizations, DR&SS and AGRITEX show that market linkages facilitated through innovation platforms contribute to increased incomes (see case

[86] For instance, LFSP market study, SNV Rural Agriculture Revitalisation Programme publications, Scaling Up Adaptation publications

[87] Consultation 6-8. June 2017

[88] Constraint identified in FAO LFSP markets survey to support design of LFSP programme in Zimbabwe (FAO, LFSP market study)

[89] ZRBF Private Sector strategy (draft version 2018)

[90] Consultation 6-8. June 2017

story on innovation platforms below). Also, the Scaling Up Adaptation project, along with other similar projects, have documented significantly increased smallholder farmer incomes through facilitation of market linkages and contract farming arrangements. While **contract farming** has been identified as a useful measure to make sure that a group of farmers have a guaranteed ready market – but there are also challenges in making contract farming work. Both farmers and the contracting company need to live up to commitments, which requires mutual understanding. There seems to be a need for facilitating fair contracts – as well as legal assistance for farmers to understand the contracts. Currently, there is no contract farming policy in Zimbabwe and few options for assistance if a contract is broken – either by the farmer or the buyer. In consultations, AGRITEX has stressed the need to move away from dependency on donors, governments, and NGOs negotiating on behalf of farmers[91] - and the project may consider how best facilitate market links between smallholder farmers and market actors in a way that empower farmers to continue linking with markets beyond the project [92]. Adding to this, consultations identified **a need for farmers to organize and for farmers' associations to coordinate and work together**. Many smallholder farmers are used to working independently on their own plots and not necessarily pool resources, work together or organize themselves in a commodity association to produce and sell at scale. The Scaling Up Adaptation project has successfully piloted models of organizing farmers in producer groups, who liaise collectively with markets and value chain actors, e.g. on contract farming of horticultural crops, honey and livestock. "Farmer meet/explore the market" visits[93], meetings between producer groups and relevant companies[94], innovation platforms/fora to facilitate solutions to joint value chain challenges[95] are also highlighted from Scaling Up Adaptation project experience and in the ZRBF private sector strategy as effective methods to facilitate shared understanding and business linkages[96].

Other challenges facing smallholder farmers include fluctuating prices, high transaction costs and high levels of risks. As the ZRBF has shown through its hazard mapping, there is a widespread tendency for the **crop and livestock prices to fluctuate significantly** in most of rural Zimbabwe[97]. This tendency may increase with extreme weather patterns and disruptions in food production as a consequence of climate change. The smallholder farmer's food security is threatened if the price of the cash crop at harvest is lower than expected - or if the retail price of food is higher than expected. Smallholder farmers who grow commercial crops may not be growing crops to meet their own food requirement and many farmers don't have storage facilities for harvested crops and are forced to accept lower prices for perishable crops, such as tomatoes. In order to counter price fluctuations small holder farmers would benefit from improved storage facilities as well as better weather forecasting systems and market knowledge, so they can produce the right product with the right timing.

For smallholder farmers, **growing an unfamiliar crop or variety involves more uncertainty than growing a well-known staple food crop.** Crops like fruit trees only yield several years after planting - and commercial crops are often more vulnerable to pests and diseases, making it necessary for farmers to have the appropriate knowledge and inputs to deal with these risks[98]. To be able to market the produce, the products need to be of a certain quantity and quality and may require intensive and costly inputs. The promise of a higher profit margin for commercial crops may erode with the extra cost, the additional risks and potential for losses in yield. In recent consultations, AGRITEX extension staff highlighted the need for capacity building of both farmers and extension workers on crop production methods for newly introduced climate smart crops and

[91] AGRITEX officers in consultation on 6.-8. June 2017, mentioned that the AGRITEX / JICA Smallholder Horticulture Empowerment Program (SHEP) encourages farmers to look for markets on their own, relating with other farmers and to companies without middlemen. AGRITEX pointed out that the SHEP has received very positive feedback from both farmers and AGRITEX extension officers, who now feel more confident in relating with market players on their own.

[92] It will be key to build on the work of Scaling Up Adaptation, ZRBF consortia partners, SNV and others in doing so. For instance, the 2016 SNV Trainers Manual for Smallholder Horticultural Business and Training based on the contract farming support programme includes a part on contract farming and a guide to what to include in a contract.

[93] This is also backed up by experience from JICA, FAO, SNV, Technoserve

[94] This is also backed up by experience from JICA, FAO, SNV, Technoserve

[95] This is also backed up by collaborations with and experience from CGIAR institutions ICRISAT, CIMMYT, CIAT

[96] ZRBF private sector strategy (draft 2018)

[97] ZRBF Hazard mapping 2016. Cereal and Livestock inter-seasonal prices changes (June and October prices) have been mapped in variances in prices per kg crop and beast respectively, using data from AGRITEX and the National Early Warning Unit (NEWU) over the period of 2010-2014. In the majority of wards in the Southern Provinces, price fluctuations range from **medium:** $0.05 - $0.10, m**edium high:** $0.10 - $0.15 to **High:** > $0.15.

[98] Constraint identified in FAO LFSP markets survey to support design of LFSP programme in Zimbabwe

varieties to minimize risk of production losses, when growing new crops [99]. Facilitation of contacts between private sector suppliers and farmer organizations/commodity associations may reduce risks in accessing inputs and marketing with contract farming – especially for new types of crops. Support to public and private initiatives to increase productivity and production for the market by improving access to credit facilities, affordable inputs and relevant technical assistance may also be considered.

Also, smallholder farmers struggle with **high transaction costs**: Moving small volumes of crops/livestock to the markets becomes expensive due to poor infrastructure, poor transportation networks and costly transport. Often smallholders sell to middlemen at local markets or at farm gate, fetching low prices for the products. There are also examples of that overregulation and sporadic intervention from government in formal markets also create uncertainty[100]. While some infrastructure investments may be made by the project, larger scale investment will need to be driven by the farmers themselves, private and/or public sectors to ensure long term sustainability.

Facilitating contract farming relationships

An increasing number of companies are looking towards smallholder farmers as a source of supply for raw materials. In the past years, the contract farming schemes have been the main model for engagement between companies and small holder farmers and contract farming has proved to be a viable approach to revive the agricultural production and markets for both companies and smallholder farmers. SNV (2016) argues that for the foreseeable future smallholder farmers will rely on contract farming for inputs and markets and that contract farming should be upscaled to

Contract farming is understood as an agreement between the farmer and a company or institution with the intent of purchasing all or part of the produce.

While the contract farming models and their application in Zimbabwe are very promising and address the main challenges of smallholders (e.g. access to finance, inputs, technical assistance, guaranteed markets), contract farming relationships are also affected by many challenges including the following;

- Private sector has limited knowledge about rural communities and lack of knowledge on how to deal with smallholder farmers. In turn, smallholder farmers have limited understanding of business
- Unclear contracts coupled with the ignorance of farmers on the implications of contractual obligations may lead to smallholders defaulting on their commitment and side marketing of crops by smallholder farmers. According to a 2012 SNV study, most smallholders however show commitment to honour their contractual obligations[101].
- Unbalanced power relationships that normally favour the contractors
- Mistrust between the parties involved, due to above mentioned challenges

Experience from recent projects shows however, that contract farming, if done in a transparent and honest manner by all parties involved, has the potential to improve production levels, unlock access to credit for inputs, develop farmers technical expertise, support access to buyers/markets, provide insurance and other services such as storage and transportation for smallholder farmers[102]. Contract farming also provides companies with access to sufficient quantity and quality of crops, reduction of transaction costs, building of trusted relationships as well as accumulation of critical information about the smallholder farmers, e.g. through a producer database.

One of the key projects supporting the integration of small holder farmers in markets through contract farming relationships was the DANIDA funded RARP initiative 2010-2014 including a variety of horticulture crops, sesame and dairy. As part of the RARP initiative, the NGO SNV led contract farming initiatives and produced a

[99] Consultation 6-8. June 2017

[100] Constraint identified in FAO LFSP markets survey to support design of LFSP programme in Zimbabwe

[101] (SNV, The Contract Farming Support Programme, Post-Harvest Survey report 2011/12 , 2012), p.25

[102] Scaling Up Adaptation annual reports 2016-2017; SNV contract farming support programme reports; (Anandajayasekeram, Ponniah., 2016)

number of studies and manuals to guide farmers associations and extension workers on contract farming and development of good contract farming relationships[103].

Some of the main conclusions of the SNV studies are that it is important to screen companies' ability to engage in a contracting scheme from input supply, extension to marketing so that farmers are not disappointed. Also it is important to ensure a good and fair dialogue between companies and farmers, so farmers are recognized as important business partner. Likewise, farmers should be mentored to realize that they are not an extension of the company workforce and that they need to honor commitments made.

SNV also noted that successful contract farming models were well-adapted and tailor-made for each and every arrangement taking into account the product in question and the needs and capabilities of both the target farmers and the contracting companies. Another key aspect was to organise farmers into strong producer groups/ associations for easy coordination of inputs, trainings, buying and payments (SNV 2016).

Main types of contracts recommended by SNV

- **Multipartite contract farming relationships**, where more parties are involved and each play a distinct role. This usually one or more buyers and the farmer. This model tries to address the smallholder farmer's need for a one-stop market for all grades of produce. SNV (2016) argues that one of the main reasons why smallholder farmers prefer channeling their produce through informal channels is that the informal market normally absorbs all grades. A tripartite agreement allows for the farmers to sell to both a company which has high quality standards for the fresh market and another demanding the same product for processing. This model is however only applicable to those crops where both the fresh market and the processing market are interested in the same variety- e.g. Cherry peppers/ Granadillas/ Gooseberries (SNV 2016)

- **Contract farming with full inputs, where the companies provide the full package of inputs,** leaving farmers to focus on production processes only. By providing the full input range, companies ensure the final product is of high quality. SNV however notes that whilst this potentially yields win-win results, there is also the risk of farmers defaulting through side-selling. If companies are financially constrained, advancing inputs may come at a cost and a risk that they cannot handle. The model was found to work best in horticultural crop production with mimimal side-selling opportunities and which are not generally part of the local diet, e.g. tabasco and birds eye chilies (SNV 2016).

- **Contract farming with partial inputs, where the contracting company provides partial inputs** for the production process and the farmer sources the remainder of inputs, either from own finances or through a micro finance institution. This model is used by a number of horticultural companies as this lowers their risk burden, but still allows for controlling the production through provision of the right variety of seed. At the same time, the model functions as a self screening mechanisms as committed farmers are ready to invest, while not fully committed farmers drop out. SNV (2016) provides an example of a farmer group that preselected members that could mke the investment and achieved higher production, better product quality, better sales, loan repayments and better income for the contracted farmers.

In some cases NGOs and AGRITEX extension services are also part of the contract arrangements and facilitate contacts and/or provide extension services.

Source: SNV (2016

[103] Horticulture Trainers Manual (2016) SNV; The Contract Farming Support Programme, Post-Harvest Survey report 2011/12 (2012) SNV, and a number of sub sector case studies.

The RARP initiative and SNV piloted and matured a number of contract farming relationships, incl. on the sesame value chain and horticultural crops. Other notable examples of contract farming relationships include the contract farming relationships between banana suppliers and producers Matanuska, Sunspun and FAVCO and smallholder farmers in Manicaland, supported by USAID and the collaboration at Shashe irrigation scheme in Beitbridge between the Nottingham Estate, Beitbridge Juicing Company, seed companies, the NGO CESVI as mentioned in case stories in previous chapters. Also, the ZRBF consortia and the Scaling Up Adaptation project has had successful experiences with contract farming that may be scaled up.

Examples of successful contract farming relationships as part of the Scaling Up Adaptation project include:

- The Scaling Up Adaptation project has supported horticultural value chain development, by facilitating market linkages and contract farming arrangements between smallholder farmers and private sector companies. On the Michigan pea bean value chain in Buhera and Chimanimani, the project facilitated a multipartite arrangement between small holder farmers and the private sector company Cairns as output market/buyer and micro finance institution Lions Finance and Major Family Savings provided farmers with a loan to access inputs. Prior to this, the project invested in organizing farmers in producer groups/ associations for each irrigation scheme and leadership training to ensure effective running of the group and scheme. To ensure productivity, Cairns provided extension services in collaboration with the project partners and AGRITEX. The success factors in this example were **transparency of contracts, facilitation of access to finance, organizing and organizational capacity building of farmers** and **technical skills development.**
- The Scaling Up Adaptation project has successfully supported livestock value chains, both in terms of cattle and goat production. In Buhera, the project supported the organization of a smallholder producer group, the Atikoreri Livestock Enterprise. Working in a multipartite arrangement with Montana Carswell Meats as off-takers of the cattle, the micro finance institution Lions Finance providing loans for feed and the project supporting technical skills development, the project has succeeded in increasing cattle prices and farmers profits. Similarly, the project is now testing models for improving goat production for meat and has facilitated market access for smallholder farmers through a goat innovation platform, where smallholder producer groups are linked up with buyers to improve understanding of market requirements. This has improved smallholder farmers understanding of the markets requirements for goat quality and quantities and private sector players have made agreements with farmers on supplying a number of goats. The success factors in this example were **transparency of contracts and market requirements, facilitation of access to finance, organizing and organizational capacity building of farmers** and **technical skills development.**

In the ZRBF districts, groups of farmers are benefiting from promising contract farming initiatives, these include:

- The ECRAS consortium has supported the setup of a cattle fattening contract farming scheme in partnership with Montana Carswell Meats, a private company. MCM assist farmers operating on feedlots to access stock feeds on credit, access vaccines for foot and mouth disease and sell their cattle collectively at a higher price than smallholders operating outside of contracts. This has resulted in a profitable business for the small holder farmers, who now have a guaranteed market for the cattle. The success factors in this example were **transparency of contracts** and **business training for farmers.**
- In the MELANA project, small holder farmers were linked to markets for red sorghum crops. The project complemented a recently ended World Vision Program (2017) where red sorghum was promoted in the Umzingwane district, but without having a strong market linkages component. The success factors in this example were **farmers with necessary technical skills**, **own funding** and **facilitation of market linkages** for farmers with excess sorghum production.
- In the Mwenezi district, the MELANA project has also facilitated contract farming relationships between smallholder farmers and the sesame private sector company IETC in Bubi, Umguza, Umzingwane and Nkayi districts. The IETC supported farmers in terms of training and commitment to buy the crop. The farmers bought their own inputs and the MELANA project contributed with Farmer Field School trainings. The success factors in this example were **transparency of contracts**, **farmers with adequate funding to buy inputs** and **technical skills development.**

As part of this CSA package sub assessment and the Value Chain subassessment, private sector interest in establishing contract farming relationships the proposed value chains has also been gauged. Consultations and

phone conversations included companies such as Sidella and IETC (sesame), Seed Co, National Seeds and Zim Super Seeds (Seeds), Best Fruit Processors, Matanuska and Brand Fresh (horticulture and fruits), Montana Carswell Meats, Cold Storage Company (meat) among others, who indicated interest in engaging with smallholder farmers. The box below gives an example of the potential intestest of a private sector player to engage smallholders in contract farming relationships.

Conversation with Best Fruit Processors

Best Fruit Processors, a division of Schweppes, is a processor of fruit and vegetables (juices and purees). The company is located in Norton near Harare. It currently works with about 3,000 smallholder suppliers of tomatoes and butternut through contractual relationships.

The companys agronomy executive, Mr. Mugani, indicated that the current demand for vegetables and fruits is high and the company cannot source enough supplies. For instance, in 2016, the company requirement for tomatoes were 30,000T and only 4,000 T were supplied.

In general, the company enters into contract farming relationships with small holder farmers groups who farm at least 20ha, sometimes with support from NGOs and in close collaboration with AGRITEX.

Before Best Fruit Processors enters into a contract relationship, a farm assessment is done. Here Best Fruit Processors looks at aspects of environmental friendliness, use of labour and payment to labourers. If the farm/ farmers are seen as potential partners, Best Fruit Processors works through different models of engagement.

The marketing department of Best Fruit Processors emphasized that the company tries to partner with different actors to make sure that small holder farmers are well integrated into the value chains and have access to funding for inputs and implements. Models of engagement include:

- **Contract farming with full input package:** Best Fruit Processors may offer all the inputs needed for the full production cycle for the farmers, agronomist services to support the full production cycle and provides a guaranteed output market.
- **Multipartite contract farming arrangement with partial or no input package:** Best Fruit Processors may provide the support of an agronomist to the irrigation scheme/ farmers group and guarantee the output market, while NGOs support with inputs, implements and rehabilitation of irrigation schemes. A well functioning model for this type of partnerships is the Shashe scheme in Beitbridge, where Best Fruit Processors partnered with CESVI and GIZ. Here the NGOs facilitated the inputs and contract arrangements and Best Fruit Processors provided a guaranteed market. The model of long term fruit tree production and short term cash crop intercropping such as sugarbeans proved to be a profitable model for small holders. NGOs may also facilitate access to finance for inputs and implements such as tractor hire and drip irrigation equipment by engaging with micro-finance institutions such as Lion Finance. Another example of facilitating access to finances is to work through a revolving fund. In a project in Manicaland, IRC together with Better Agriculture in 2012, inputted finance into a revolving fund for farmers. IRC and Better Agriculture managed the fund, but farmers could loan for inputs and repay to the fund after harvest on a revolving basis.

Through the contract arrangements Best Fruit Processors provides a guaranteed market for the farmers, but also take into account that some farmers find it more profitable to side market produce, e.g. sell at fresh vegetable markets where prices may be higher. The contract therefore includes a clause that obliges farmers to deliver 50% of the production to Best Fruit Processors and allows farmers to sell the remaining either to Best Fruit Processors or at other markets. The guaranteed market help farmers to plan their finances and production better.

In order to build a strong and trusted relationship with farmers, the marketing department emphasized that Best Fruit Processors has scaled up their agronomist engagement, so that agronomists are on site, supporting the farmers groups/ schemes throughout the production cycle.

The marketing department also expressed interest in engaging with different partners on strengthening value chains / market linkages. Training of farmers in farming as a business and understanding of business operations is also key, here NGOs may come in to support. As of now BFP works with Technoserve, LEAD trust, SAFIRE, CESVI but expressed interest in engaging in an innovation platform, where relationships can be build and practices tested and scaled up.

Source: Phone conversation 23.5.2017 with Mr. Michael Mugani, Agronomy Executive and Phone conversation 27.6.2017 with Ms. Ropafazwa Gwanetsa, Marketing.

Case: Building capacities for CSA practices and market linkages through Farmer Field Schools

In the ZIMVAC 2017 assessment, it was reported that the most common form of crop extension services is AGRITEX (88% of respondents, national average), followed by NGO's (7%), private companies (3%) and lead farmers (2%); for livestock AGRITEX is also the most common service provider (92% of respondents, national average). However as the general extension services operate with a constrained budget and are not reaching all smallholder farmers effectively – with only 34% of smallholders receiving agricultural training in the 2016/17 season (ZIMVAC 2017) - there is scope to strengthen the extension services outreach through peer learning among farmers.

Lessons learnt from the Scaling Up Adaptation project shows that FFS's have been highly successful as a collaborative learning space for lead farmers as well as an inspiration to their communities. However, the project also noted that there is need to work more on the support to farmers to link up with markets and the development of value chains. As part of consultations with key stakeholders in agriculture, it was suggested that a combination of Farmer Field Schools and Innovation Platforms would be effective and provide a sustainable impact in terms of promoting and upscaling adoption of CSA methods and climate-smart crops. As a FFS only targets a small group of farmers, the idea would be to start with a FFS in a representative/key area and then scale up the lessons from the experience through extension services and the Innovation Platforms. This would allow for lead farmers in FFSs to experiment first with the different climate-smart technologies and then select the best, which could then be upscaled[104, 105].

Mazvimavi (2017)[106] points to a number of factors, which differentiate full adopters of CA versus partial adopters and non-adopters in order to assess why some farmers are more likely than others to adopt these technologies. These findings may be useful in developing a strategy for targeting farmers. In Zimbabwe, CA was mainly promoted to poorer farmers, i.e., those farmers who due to a lack of education have few options other than farming. Male-headed household were less likely to adopt all three CA practices (minimal tilling, mulching and intercropping) compared to their female counterparts. This might be attributed to the fact that females usually manage legume crops, which makes it less likely that men will perform crop rotation. Also, the access to and use of credit is associated with adoption of all three CA practices, incl. effective use of fertiliser and the purchase of certified seed. In order to facilitate adoption of cliamte smart agricultural practices which are influenced by gender roles e.g. intercropping practices it will be key to target a mixture of both men and women to support learning across gender divisions.

Also, because succesful adoption of new practices takes resources it will make sense to target farmers with a certain level of human and financial resources as lead farmers and then allow them to teach the community through peer-to-peer learning. This is exemplified in the Scaling Up Adaptation Project in a recent livestock

[104] E-mail correspondence with DR&SS, director of crops. Validation of suggestion in CSA consultation workshop 2nd of May and 6-8th of June 2017.
[105] (Braun et al., 2006)
[106] (Mazvimavi K. , 2017)

intervention in Buhera, where farmers were selected based on their ability to contribute between 30-50% of costs of obtaining improved goat breeds[107]. This contributed to a large degree of ownership and spurred further investment from farmers into e.g. goat housing. Other smallholder farmers are now learning from the early adopters and are keen to invest in improved breeds and invest in goat housing, pen fattening and fodder production.

[107] May 2018, UNDP Scaling Up Adaptation Review visit report

Farmer field school and demonstration plots – an effective learning method

Farmer Field Schools are a tried and tested methodology in Zimbabwe. They have been used as part of promoting new agricultural methods and crops in Zimbabwe, through several modalities[108], [109]:

- Extension Agent system: Trained extension staff work with groups or clusters of farmers to support them in implementing CA on their own fields
- Lead Farmer system: Trained extension staff work with a group of lead farmers in a community, who in turn promote the CA methodologies to other farmers in the community. In order to create the most successful cascading of experience and skills, lead farmers should successfully have been practising CA for at least two seasons and should be individuals who are trusted by other farmers.
- Combined Extension Agent and Lead Farmer system: In some cases, organizations start by working with farmer groups, before they select the lead farmers who will continue to extend the method in the future.

One of the key experiences is that farmers learn more from other farmers, working side by side, than from outsiders with a top down approach. It is easier for farmers to mirror themselves in another farmer, trust each other's experience and explain the methodologies in a way that makes sense in a particular context. This is based on a recognition that farmers have valuable knowledge and experience that needs to be put into play and work together with extension services – a two-way extension approach[110]. Ideally Lead farmers should be both men and women, young and old, so that their experiences are relevant to a wide range of households in a given community. Whatever system is chosen, it is key to make sure that all stakeholders clearly understand the process and that a relationship of trust is built with the community before and during implementation.

The FFS are based on participatory adult learning / extension principles and aims to be as participatory and practical as possible to support learning. This process often entails the following elements:

- Establishment and preparation of a learning plot. This enables farmers to have a practical space for learning, as well as to go and put into practice what they have learned on their own plots.
- The CA package will be fully implemented on one part of the plot, and conventional methods will be showcased for easy comparison on the other part.
- Farmers meet regularly to learn and discuss, when there is something new to learn or observe during a season. This is often 5-6 times with key events being land preparation, planting, monitoring of crops, flowering, harvest. The condition of the crops and field dictates meeting periodicity and the learning topics, as training is done as a result of practical experimentation and dialogue in the field.

Other learning methods that can supplement the FFS are:

- Research collaboration with external resource persons e.g. DR&SS in terms of testing particular improved varieties or methods
- Field days – where the community and visiting farmers may come to experience the effectiveness of a particular agricultural crop/practice, share experiences and be inspired to try out practices on their own plots
- Farmer to farmer exchange: Projects may consider different type of peer knowledge and experience exchange, as most farmers learn well from their peers.

[108] Farming for the Future, A guide to conservation agriculture in Zimbabwe (2009); DR&SS 2017; (Braun et al., 2006); conversations with OXFAM SCCA project manager.

[109] A 2004 AGRITEX and ICRISAT study (ICRISAT, 2004) assessed the efficiency and cost-effectiveness of different farmers education and extension approaches, including the Master Farmer approach and more participatory Farmer Field School approach. In comparison to the FFS, the Master Farmer approach uses classroom teaching, written notes and examinations, and individual farm visits more extensively, while the FFS is more participatory, based on farmers interests and own decisions and work through group building exercises, experiments and trials, energizers, and look-and-learn visits. Both approaches employ field demonstrations, practical training, and group meetings. Impact was measured using a number of indicators including improved farmer knowledge, change in farmer practice or extension practice, degree of farmer empowerment, and cost-effectiveness. Results showed that the Farmer Field Schools had a positive impact in terms of better knowledge (higher scores in a knowledge test) of particular production methods, higher adoption rates of

Case: Good practices in building capacities for CSA practices and market linkages

Innovation platforms - a tool to facilitate learning and action among stakeholders

Several stakeholders and projects in Zimbabwe have emphasized the importance of facilitating market linkages and building capacity of both AGRITEX staff and smallholder farmers to engage with the market. Innovation Platforms are an example of how this can be done and the platforms have been successfully used as way of bringing different stakeholders together to identify solutions to common problems or to achieve common goals with a focus on integration of small holder farmers in agricultural value chains – in Zimbabwe and elsewhere.

The Innovation Platform approach grew out of the private sector as a means of gathering information and improving networking among key stakeholders in a particular economic sector, but has since caught the attention of development agencies and is now gaining popularity in research and development initiatives. Innovation Platforms are well suited for complex agricultural issues, such as the adoption of climate-smart crops, livestock and practices and related value chain development where the involvement of wide variety of stakeholders is critical. In Zimbabwe, the Innovation Platform methodology has been introduced in a partnership between research organizations (such as ICRISAT and others from the CGIAR network), AGRITEX and DR&SS and has involved a range of other stakeholders in the agricultural value chains. Through the multi-stakeholder Innovation Platform, different interests are taken into account, and the different groups contribute to finding solutions. Examples of succesful development and adoption of new approaches to improving agricultural practices and market links for small holder farmers through Innovation Platforms in Zimbabwe include the following: Innovation platforms on small holder farmers integration into goat value chains facilitated by ICRISAT, crop-livestock innovation platforms under the ZimClifs project in partnership among ICRISAT,CIMMYT, ILRI and University of Queensland; Innovation Platform on uptake of high-nutrient beans among small holder farmers facilitated by the International Centre for Tropical Agriculture (CIAT) and the Pan Africa Bean Research Alliance (PABRA) in Chimanimani and Innovation Platform on wheat improvement practices in Whedza carried out by The International Centre for Agricultural Research in Dry Areas (ICARDA) – all in close collaboration with AGRITEX and DR&SS[111,112,113]. During the CSA package validation sessions in June of 2017, AGRITEX staff at national, provincial and district levels also expressed interest and support for upscaling the use of Innovation Platforms to build a strong knowledge base on climate-smart agriculture, implement adaptive management practices in agriculture and build strong market linkages/value chains for climate-smart crops and livestock with a focus on small holder farmers. In an e-mail correspondence with DR&SS[114], it was further suggested that a combination of Farmer Field Schools and Innovation Platforms would be effective and provide a sustainable impact in terms of 1) identifying challenges and gathering experience on promotion of climate smart agriculture through FFS's and 2) developing approaches to CSA methods and climate smart value chains through Innovation Platforms. These experiences may then be further upscaled into policy and national level institutional capacity building and outscaled

improved soil and higher average yields than the master farmer approach. The FFS has higher operating and salary costs per farmer than the master farmer approach, due to more time traveling and working per group. However, because travel and allowances constitute the largest share of the total, costs can be drastically reduced and effectiveness improved by establishing FFS led by farmers rather than extension workers, e.g. in a combined FFS and lead farmers system, which involves peer learning and extension.

[110] The 2004 AGRITEX and ICRISAT study (ICRISAT, 2004) emphasized that FFS graduates expressed a strong preference for FFS over the traditional Master Farmer training and group approaches. In their opinion FFS increased knowledge sharing through farmers visiting each other's fields and practical evaluation of whether or not to apply what they learn in the FFS plots in their own fields what they learn in FFS plots. They also emphasized that learning-by-doing develops farmers' confidence to apply the techniques on their own fields.

[111] (ICRISAT, ICRISAT, n.d.)http://www.icrisat.org/how-to-scale-up-the-initial-success-of-crop-livestock-innovation-platforms-in-zimbabwe/;

[112] "Innovation Platform Approach, a Life Changing Strategy for Technology Adoption in Chimanimani District, Zimbabwe" (Gutsa F. et al., 2016); DR&SS Policy Brief on Innovation Platforms "Innovation Platform Approach (IP) for Technology Adoption: A Sustainable Strategy for Enhancing Production and Productivity in Agriculture" (DR&SS, 2017); and "Seven lessons learned to catalyze African innovation through engagement platforms" (CGIAR, n.d.) and Innovation Platfrom brief 6: Innovation Platforms for agricultural value chain development" (CGIAR, n.d.).

[113] Theory and application of Agricultural Innovation Platforms for improved irrigation scheme management in Southern Africa. (André F. van Rooyen, Peter Ramshaw, Martin Moyo, Richard Stirzaker & Henning Bjornlund,, 2017)

[114] E-mail correspondence with Dr. D. Kutywayo, Director for Crops Research, DR&SS. May, 2017.

through public and private extension services. While Farmer Field Schools only target a small group of farmers, FFS have been used in connection with Innovation platforms to develop practical solutions through an FFS in a representative/key area, select the best and then scale up the lessons from the experience through first the Innovation Platforms and then extension services.

Lessons learnt from ICRISAT in Zimbabwe[115] point to that innovation platforms in this context have been most successful and cost effective, when a few, strategic Innovation Platforms have been implemented very well, rather than putting the Innovation Platform to use at scale. This has allowed for innovations, experience and impacts to be scaled up and out to larger areas. ICRISAT has successfully established innovation platforms at district level, from where the institution has trained and linked extension officers with farmer groups and private sector players. The experiences and tested methodologies from one district have then been scaled out to reach other districts. ICRISAT notes that it is important to have strong facilitation in place to create the momentum that will pull in participation from farmers, private sector and other stakeholders. At the level of small holder farmers, ICRISAT notes that active and sustained participation happens because of farmers' interests in the theme of the Innovation Platform and because they see the concrete benefits and impacts from improved markets rewarding their IP engagements.

Based on successful experiences, lessons learnt and indication of interest from key stakeholders, it is recommended to include a combination of innovation platforms and farmer field schools to strengthen approaches to promote climate smart agricultural practices while facilitating entry into markets for small holder farmers. It is however also noted, that it is key to ensure that innovation platforms and farmer field schools are used effectively to reach out to a larger number of farmers and value chain actors.

Innovation Platform for beans in Chimanimani

The example of an Innovation Platform for exploring challenges around food and nutrition security as well as adoption of high-nutrient bean varieties in Chimanimani, Manicaland in Zimbabwe, demonstrates the usefulness of Innovation Platforms as a space for learning and action[116].

Beans improve farmers welfare[117]

Food insecurity and malnutrition is a serious challenge among small holder farmers in Zimbabwe as climate change impacts and unsuitable choices of farming practices, crops and varieties lead to low productivity. In a rural farming set-up, there are however big potentials for ensuring food and nutrition security as well as increased incomes through introducing new climate smart crops, improved varieties and improved farming practices.

Common bean is considered a cheap source of protein for small holder farmers. Manicaland province is one of the most suitable provinces for bean production. The 2014/15 national common bean average yield level stood at 0.44t/ha, while in Manicaland province the average yield stood at 0.53t/ha. Though productivity was above the national average, production was still on an ad hoc basis. The majority of those producing common bean in Manicaland were using retained seed and producing the sugar types such as Gloria and Sweet Violet, which are not as nutritious as the NUA45 variety.

An uphill process of introducing new bean varieties

In 2010, the Crop Breeding Institute of the Department of Research & Specialist Services in the Ministry of Agriculture, Mechanization and Irrigation Development released the micro-nutrient rich bean variety NUA45. The NUA45 bean variety has a 90 day maturity period and can produce up to 2900kg per hectare, in comparison to the average productivity of 0,4 t/ha of inferior varieties. It's a large seeded, kidney shaped bean which is very rich in proteins, minerals and fibre. As the improved NUA45 variety had largely been used by Non-Governmental Organizations (NGOs) in their food relief programs and feeding

[115] E-mail correspondence with researcher Sabine Homann-Kee Tui, 26th of June, 2017

[116] Freeman Gutsa, Rachel Muthoni-Andriatsitohaina, Bruce Mutari and Dumisani Kutywayo: Innovation Platform Approach, a Life Changing Strategy for Technology Adoption in Chimanimani District, Zimbabwe – not yet published (Freeman Gutsa, Rachel Muthoni-Andriatsitohaina, Bruce Mutari and Dumisani Kutywayo, Not yet published).

[117] Case study text adapted from: Freeman Gutsa, Rachel Muthoni-Andriatsitohaina, Bruce Mutari and Dumisani Kutywayo: Innovation Platform Approach, a Life Changing Strategy for Technology Adoption in Chimanimani District, Zimbabwe – not yet published.

schemes at schools and hospitals, farmers associated the bean with food for disadvantaged communities. The common bean market and consuming public were also skeptical about the new bean variety because of its physical appearance and the dark soup it produces when cooked. Consequently, the adoption of the variety was minimal on farmers' fields and it was not popular on local markets, despite its rich nutrient base.

The DR&SS soon realized that adoption of the new, improved variety would not come automatically. The next attempt was taking on board a variety of field demonstrations, participatory variety selection exercises with communities and farmer field schools hoping massive adoption would follow.

However, adoption was still minimal. DR&SS discovered that one of the main reasons was that value chain key actors had opposing interests and did not work together. Agro-dealers were skeptical to store and sell the NUA45 variety, and big buyers as well as local household consumers continued to demand light-skinned, less nutritious varieties such as Gloria and Sweet Violet. This presented a great challenge to the farmers who had taken up the production of the NUA45 bean - and to DR&SS which struggled to find a way to save both the adoption of the variety and the production of the crop from a total collapse.

Promising experiences from Manicaland

In 2015, the Innovation Platform for Technology Adoption (IPTA) came to the rescue of the NUA45 bean farmers in Chimanimani district in Manicaland.

The Innovation Platform was initiated under the CIAT-PABRA bean production support initiative which started in April 2015 and will end in March 2019. This initiative is under the funding of the Swiss Agency for Development and Cooperation (SDC) and is being implemented by the International Centre for Tropical Agriculture (CIAT) and the Pan Africa Bean Research Alliance (PABRA). These are the key partners working with the Department of Research & Specialist Services (DR&SS). A main focus of the initative was to improve the nutrition of small holder farmers in Manicaland, informed by recorded high degree of malnutrition in the area.

Two Innovation Platforms were established at Nyanyadzi and Gudyanga Irrigation Schemes in Chimanimani district to enhance adoption of NUA45 bean variety and common bean productivity.

In practice, an innovation platform creates a forum for interaction among a group of relevant stakeholders around a shared interest – in this case the adoption of a new bean variety. The methodology considers innovation as a dynamic systemic process and facilitates that innovations can emerge from interactions and knowledge flows among a diverse group of stakeholders.

The Innovation Platform for Technology Adoption in Chimanimani involved the following aspects:

- **Baseline survey** to understand the bean sector in the province and the district
- The **selection of key actors** to participate in the platform. In doing so, emphasis was on the involvement of all critical stakeholders along the value chain.
- Establishment of **governance and management frameworks** in the form of implementation management councils (IMCs) with the task fo overseeing the implementation of agreed strategies. In both Innovation Platforms, gender equal participation in the IMC was emphasized. At the Nyanyadzi IP, the IMC had five male and five female members. Gudyanga Implementation Management Council had six female and four male members.
- Following the establishment of the platform as series of **stakeholder workshops** were carried out. Stakeholders engaged in identification of issues and challenges affecting value chain profitability, interests of actors across the value chain, potential linkages of stakeholders, identification of solutions to existing bottlenecks in the value chain and a pool of best bet technologies and innovations. This collective identification of challenges and solutions ended up in stakeholders formulating a strategy for developing the value chain and allocating roles for implementation.
- The Innovation Platforms drew from experiences in **testing solutions together with small holder farmers in the field**. For each IP, a Farmer Field School was used as a platform for learning and engagement of small holder farmers. The Innovation Platform provided inputs for 30 selected farmers for each FFS, who then committed a 0.1 ha plot to the production of NUA45 beans. At

Nyanyadzi and Gudyanga IP sites, 37% and 22% of participating farmers were female plot holders respectively. The farmers, who participated in the FFS functioned as lead farmers who inspired other farmers and the surrounding communities and farmers were invited to observe the developments on the demonstration plots and learn from the lead farmers.

- Last but not least, the Innovation Platforms functioned as **a space to develop and maintain strategic linkages across the value chain**. Linkages between farming communities and inputs suppliers, between farmers and service providers, between farmers and financial institutions as well as between farmers and potential markets were created and made strong to ensure that the full value chain functioned.

Achievements in farmers welfare through innovation platforms

The establishment of an Innovation Platform in Chimanimani transformed the uphill process of adopting the NUA45 variety into a smoother process with good results and improved collaboration among stakeholders.

Key achievements include: **Increased knowledge of bean production and best management practices among small holder farmers.** Both farmers and extension workers were trained on a range of topics from variety selection, soil sampling, land preparation, planting, fertilizer application, irrigation scheduling, weed control, pest and disease control, harvesting methods, to farming as a business and output marketing. A total of 60 0.1 ha demonstration plots located around the Innovation Platform practice sites improved both the lead farmers' and surrounding communities' understanding of this micro-nutrient rich bean cultivar. By the end of the project, the DR&SS evaluated that the majority of farmers had shifted from low use of best management practices to medium use of the demonstrated best management practices.

- **Adoption of the bean variety:** As a result of the capacity building efforts, adoption of the improved variety increased among the participating farmers by a whopping 79%.
- **Improved yields:** The capacity building efforts also led to an increase in yields from an average of 0.9t/ha to a new average of 1.8t/ha. Although there was a general shift in yield levels due to other factors, the percent change attributable to the Innovation Platform for Technology Adoption (IPTA) approach was 80% according to DR&SS based on observations of average yields across the district and among non-participating farmers and participating farmers.
- **Impact on income levels:** As part of the FFS's participating farmers had a total of 6 hectares under the NUA45 bean variety and produced a total of 10,800kg, a jump from 5,400kg produced from the same area in 2014. During the same period, due to innovation platform efforts of linking farmers to markets there was an average increase in price from around US$1.00/kg to US$1.40/kg – a percentage increase of 40%. As a result of both improved yields and prices, the returns from NUA45 bean sales per farmer participant rose to US$252 from an average baseline value of US$90.00. Income levels per farmer participant therefore increased by 180%.

DR&SS concludes that one of the critical components of making the Innovation Platforms in Chimanimani district a success was the ability of the approach to foster interaction amongst a group of relevant stakeholders around a shared interest in a particular locality. The impacts in yield levels, income levels and farmer welfare are largely attributed to the collective identification of issues affecting the value chain, collective identification of possible solutions, collective commitment and buy-in – and in turn, the positive change in yield levels, income and farmer welfare guarantees improved adoption of new practices and varieties by farming communities.

Innovation Platform for goat value chains in Insiza, Matobo and Gwanda

The example of an Innovation Platform for the goat value chain in Insiza, Matobo and Gwanda, Matabeleland South in Zimbabwe, demonstrates the usefulness of the approach for developing a value chain to include small holder farmers and develop trust and linkages among value chain stakeholders[118].

Photos: ICRISAT/Swathi Sridharan

In Limpopo Basin: Goat auctions drive change

ICRISAT set up innovation platforms in Insiza, Matobo, and Gwanda Districts in Zimbabwe. Each platform is a gathering of stakeholders including farmers, traders, rural development agencies and extension officers who meet at regular intervals to discuss production and marketing challenges. The group then identifies possible solutions and evaluates them under real life conditions to determine whether they are feasible.

The platform group in Gwanda decided to tackle its livestock marketing issues by organizing monthly auctions. As these auctions became a regular fixture they grew in importance as a marketing channel for farmers. Farmers who used to sell one or two animals at their farm gate now plan ahead and sell their animals at the auctions, because they trust the system and are able to expect a certain price for their product.

A regular marketing channel with a reliable pricing structure has inspired the recent push in livestock related technology adoption rates. Farmers know what their animals are worth and are willing to invest in technologies that will protect them and see them through the dry season.

While these technologies have been in existence for a long time, it is only now that farmers are using them on a regular basis, mainly as a result of the context created by the recent livestock market development. These platforms are also becoming self-sustaining. Many rural district councils have taken over the management of the innovation platforms started under a project.

Expected outcome and function of innovation platforms

A recent publication[119] from the CGIAR network sums up the experiences from practice and provides guidelines as to how best to develop Innovation Platforms for development of agricultural practices. Innovation platforms come in many forms and may operate at different levels and have different functions, depending on the desired outcome (see annex for a detailed description of functions).

In general terms, Innovation Platforms may be **useful and efficient** for:

- Bringing stakeholders with a variety of interests, perspectives and resources together, who have a stake in the development of a solution for a particular problem
- Development of new solutions to a complex problem, that requires multiple knowledge sources or technical perspectives (technological/practice innovation), effective collaboration among stakeholders (organizational innovation), pooling of resources, new regulatory-incentive structures and better integration of solutions into existing institutional frameworks (institutional innovation).

However, innovation platforms are **not deemed efficient** for reaching out to a large number of farmers or stakeholders. For outscaling of a solution it will be key to build on wider networks and systems for out reach, such as the existing private and public extension services.

The proposed GCF project may make strategic use of Innovation Platforms to:

- Manage the roll out of new as well as tried and tested approaches of climate smart agriculture approaches at the level of each district – informed by experience from ward level Farmer Field Schools

[118] Case study text directly taken from: Seven lessons learned to catalyze African innovation through engagement platforms, CGIAR and Innovation Platfrom brief 6: Innovation Platforms for agricultural value chain development.
[119] Guidelines for Innovation Platforms in Agricultural Research for Development – under the CGIAR network. (Shut et al. , 2017)

- Identify challenges and develop solutions to link small holder farmers into value chains – with a focus on climate smart agricultural crops and livestock and sustainable production methods
- Use the experiences from the district level to scale out the approaches within the district as well as to other districts as well as inform provincial and national level decision making, policy development and AGRITEX extension work.

Key lessons learnt

Key lessons learnt for the promotion of CA and CSA in Zimbabwe are emerging from the above-mentioned government initiatives, development projects and research (through desk study and conversations). They can be summarized as follows:

Need to shift from humanitarian responses to building long term resilience
Shifting from humanitarian responses to building resilience has been shown to provide good value for money[120] and makes sense in Zimbabwe, which has been hard hit by consequent climate and non climate related shocks. Resilience building of vulnerable populations is about strengthening the ability of systems, communities and individuals to absorb and manage potential shocks, adapt their livelihoods and systems, bounce back and improve their social, economic and governance systems and ecosystem health so they are better able to avoid shocks in the future. It will be key for the proposed project to align with the Zimbabwe Strategic Resilience Framework and support small holder farmers as well as their support systems to move from a reactive approach to climate change induced stress to a proactive, prepared approach to dealing with climate change induced shocks and stressors.

Evidence based and systematic, adaptive management increases the chance of success and sustainability: There is a large amount of lessons learned and potential experts from past and ongoing projects, which could be of value to the present project proposal and allow the project to scale up and scale out successful experiences. A key learning is that climate-smart agriculture practices need to take into account the particular population group, context and agro-climatic conditions to be successful and this requires a process of testing, adjusting approaches and learning. While some CSA approaches are tried and tested in one part of the country, the scaling up to other groups require a process of adapting to a new context. In addition the changing climatic conditions requires ongoing adaptation of farming practices and business relationships to address the predicted and experienced changes. Here Innovation Platforms have also been successful in merging the capacity of centres of excellence in research on agricultural production with stakeholder engagement across the value chain to achieve adaptive management of a value chains faced with climate and non climate challenges. This also includes a focus on improved knowledge management within key government institutions to make sure that the most successful agricultural practices are replicated at scale and that there is a continual adaption of practices according to the changing climate. In doing so, the adoption of the ZRBF evidence generation principles form a good starting point and the project may build on and complement the knowledge base generated by the ZRBF partners to inform interventions.

Need for systematic scaling up of successful CSA experiences: Many projects have successfully used farmer field schools to build the capacities of smallholder farmers, but most capacity building has stayed on the project level and has not been scaled up to the national level. An innovative development from ICRISAT and CIMMYT, in partnership with AGRITEX and DRSS is the introduction of **Innovation Platforms**[121,122]. In Zimbabwe, Innovation Platforms have mainly been used as a tool to develop agricultural value chains by identifying challenges and solutions in collaboration with a wide range of stakeholders across the agricultural value chain in question[123]. But they also hold the promise of facilitating collaboration between farmers, private sector and different levels of government institutions with a focus on scaling out the successful solutions to a larger beneficiary group. The participatory practices and technology selection that are part of the farmer field school (FFS) methodology are critical for farmer buy-in and the eventual adoption of new agricultural practices and technologies as part of an innovation platform. In addition, Innovation Platforms contribute to strengthening linkages between different actors within the selected commodities' value chains and allows all value chain actors – producers, buyers, input suppliers, credit and technical assistance providers, etc. - to participate and enhance market linkages as well as provide access to technical services for the farmers. The last, and promising, aspect of innovation platforms is that they form a forum for developing and documenting best practice; and in collaboration with government institutions and private sector these good practices may be systematically scaled up to policy level and out through government and private sector extension service.

[120] Zimbabwe Strategic Resilience Framework, 2015
[121] (Homann-Kee Tui, S., Van Rooyen, A. F., and Minde, I., 2013) *National and Regional Livestock Markets: Opportunities for Growth in SADC.* Documentation. ICRISAT.
[122] (Van Rooyen, A. and S. Homann, n.d.). Innovation Platforms: A new approach for market development and technology uptake in southern Africa. ICRISAT.
[123] Seven lessons learned to catalyse African innovation through engagement platforms. (CGIAR, n.d.)

Several organizations and institutions have experience with these methodologies, namely AGRITEX, DR&SS, ICRISAT, CIMMYT, FAO and several CSOs, including the Scaling Up Adaptation project partners.

Build on and synergize with existing networks, platforms and initatives - supporting and scaling up what already works: This study has mapped out existing long term projects, initiatives and actors working with climate smart agriculture and market linkages for small holder farmers across Southern Zimbabwe. It is recommended that the proposed project makes use of these project experiences and build on networks established in the target areas for instance the past and existing innovation and commodity platforms set up by research institutions, DR&SS and Agritex. In addition to this, the project may build on ZRBF consortia and Scaling Up Adaptation projects work to facilitate market linkages for small holder farmers based on climate smart crops, livestock and CSA practices.

Commercialising small holder farming is key: Commercialisation of small holder farming receives an increasing emphasis in current and planned projects. Many of the lessons learnt from previous projects indicate that in order to ensure sustainability of CSA interventions, it is important to strengthen small holder farmers own understanding of markets and market players, along with their abilities to produce climate smart crops and livestock at a commercial scale and to link up with markets for climate smart products. Extension workers in consultations have pointed to the need to both build capacity of farmers as well as the extension workers, who help to facilitate fair and effective links between smallholder farmers, markets and value chain stakeholders – and have based this recommendation on successful projects, where AGRITEX workers have supported farmers to improve their understanding of market requirements and market mechanisms and link up with market actors themselves. Overall, experiences show that market linkage platforms, market price information, facilitated contact between farmers and the market e.g. through contract farming arrangements and capacity building initiatives have been useful to improve links between value chain stakeholders.

A series of international development partners have supported GoZ's investments in value chain development, with implementation support from international and local NGO's, such as SNV, Technoserve, SAFIRE and CESVI. Until now, efforts have predominantly focused on linking smallholders to markets through **contract farming arrangements** and providing '**business enterprise' skills** to farmers. For example, **USAID's Amalima, JICA's SHEP** and the **Livelihoods and Food Security** project supported by DFID is providing training for farming groups and communities to engage in value chains. A particular focus is on women and providing technical training to agrodealers to improve the availability of and access to quality agro and veterinary inputs to farmers. **USAID's Ensure** project also focuses on building the capacity of farmers to engage in value chains, focusing on the groundnut, small livestock and horticultural crops value chains, by supporting Farmer Field Schools, producer associations, agro-dealers and other actors in the value chains. Another important actor in smallholder commercialisation and strengthening value chains is **private companies in the agro-business sector**. Increasingly in Zimbabwe, private companies show interest in entering into contract farming arrangements with smallholders, incentivised by wishing to increase production and reliability of their supply chains. Such companies include Best Fruit Processing, Sidella, IETC, Matanuska, Schweppes, Cairns, AgriSeeds and Zimbabwe Super Seeds. These arrangements can provide farmers with agro-inputs, access to training, and links to the formal domestic market and have potential to be scaled up and reach out to more farmers. A key aspect here is to ensure that contract relationships provide value to both parties, that commitments are understood and respected by both parties and that smallholder farmers are supported to increase/effectivise production.

There have however only been a few efforts that explicitly have targeted the **climate smart or climate resilient** commercialization of farmers. **ZRBF interventions** have largely been based on an analysis of climate and non-climate risks and hazards. Initiatives under ZRBF include the consortia Enhancing Community Resilience and Sustainability (ECRAS) led by CARE International and the Matabeleland Enhanced Livelihoods, Agriculture and Nutrition Adaptation (MELANA) led by Welthungerhilfe. ECRAS and MELANA are focusing on supporting sesame value chains, based on an analysis of potentials for climate resilient crop production and in collaboration with CGIAR research institutions. **Vuna, DFID**'s East and Southern Africa Climate Smart Agriculture programme is working in the goat value chain in the south of the country. In two districts in Matabeleland province, Vuna has provided a grant to SNV and a private company (WholeBeef) to support communal farmers to improve their goat husbandry through CSA and links to the company. Another example is the **UNDP/GEF** supported **Scaling up Adaptation** programme, implemented by OXFAM and partners. The project has supported market linkages and developed short value chains, such as honey, beans, small grains, goats, cattle and indigenous chicken that support adaptation to climate change. The value chain development

has resulted in improved incomes for farmers, for example Chiredzi farmers from one irrigation scheme increased their income on sugar beans by 50% from a before project price of $0.5 to $1/kg. The project has a special focus on women farmers and seeks to develop and scale up pro-women value chains that support adaptation to climate variability and change. This includes the honey and goat value chains. The project also establishes inclusive financial services to support climate risk management, livelihood diversification and other adaptation investments. **Research centres** also play an important role in developing climate resilient value chains, particularly in the production of more 'drought tolerant' seeds and livestock varieties. For example, **CIMMYT** has collaborated on drought tolerant maize seed research with DR&SS's Crop Breeding Institute (CBI) and private sector partners such as Progene, AgriSeeds, SeedCo and Pannar. Similarly, **ICRISAT**, in collaboration with NGOs who facilitate pilot testing, in particular the Community Technology Development Trust, has invested in small grains variety research in the dry areas. Also, as mentioned earlier, the CGIAR research institutions have worked through innovation platforms as a way of analyzing challenges and opportunities across the value chain in a participatory manner with a range of value chain actors, incl. small holder farmers – contributing to improved market linkages, improved understanding among value chain actors and improved incomes for small holder farmers, e.g. in the goat and bean value chain.

Increasing small holders access to finance is key to rural development: Increasing smallholders' **access to finance** has been the focus of a number of interventions in the last decade. Financial services are crucial to rural livelihoods and the development of the rural economy, as they allow farmers to save capital and invest in agro-inputs to increase production[124]. Informal financial services are common in rural settings, such as Funeral Societies, Savings and Lending groups, and informal lending between families. The majority of efforts, such as those by Care, UNDP, TechnoServe, OXFAM, DFID, FAO, USAID and World Vision, have focused on supporting informal **Village Savings and Loan Associations** (VSLAs). VSLAs, developed by Care International in Maradi, Niger in 1991, is an approach to facilitate savings and credit in a flexible way, appropriate to the informal setting[125]. Members of the community form a group, which converts small amounts of cash into savings. The group's savings can be lent to members as credit[126]. In Zimbabwe, VSLAs are usually women groups who mobilize funds from their own savings and use the pool of funds to meet their borrowing and insurance requirements. The savings are an asset, and reduce livelihood risk. They serve as a mechanism for transitioning out of safety net programmes or for building resilience in times of emergencies or shocks[127]. In combination with market linkages and value chain development activities, UNDP's Scaling up Adaptation project has increased the income of 61.2% of the targeted male and female VSLA farmers by an average of 35.7% from savings and interest accrued on average across the three target districts of the project. In terms of facilitating **access to formal finance**, examples to draw on include that FAO, with DFID funding, is supporting financial and microfinance institutions in introducing, designing and scaling up financial services to smallholders, including women and youth. The Scaling Up Adaptation project has also successfully linked up mature farmers groups with microfinance instutions to help them graduate to increased levels of investments in production and this has contributed to successful multipartite contract farming and livestock buying arrangements with private sector players.

Targeted climate information services help farmers make better decisions: Appropriate weather information helps farmers make the right decisions on which crops to plant, when to plant and how and when to tend to crops over a season. However weather information needs to be targeted, actionable and in a language that farmers understand. AGRITEX plays an important role in facilitating farmers' understanding of messages and follow-on actions. The Scaling Up Adaptation project has piloted an innovative, low cost model together with AGRITEX, MSD and academic institutions, which may serve as a baseline experience for scaling up in the GCF project proposal.

[124] Inclusive Finance and Risk Insurance Sub-assessment.
[125] Saving Groups. World Vision Guidance for Development Programmes. (World Vision, 2015)
[126] Ibid.
[127] Ibid.

Proposed CSA packages

Overall, the development of CSA packages has been based on the above analysis of the **baseline and past experiences** in introducing climate-smart agriculture in Zimbabwe, the **proposed high-impact crop-livestock combinations** identified in the value chain study for the project, other **high-impact crop-livestock combinations and CSA practices** identified through desk study and conversations with key actors, the **proposed number and location of irrigation** schemes as per the sub assessment for the project, the **business challenges** faced by farmers and **possible solutions for linking up with markets** and a number of ad hoc **consultations with key stakeholders**. On this basis, the study provides a set of **recommendations** and **costed CSA package options** for the project to consider.

Based on the analysis of suitability of crops and ready markets vis a vis the targeted areas, relevant climate-smart practices/techniques were proposed for each crop/livestock combination. This was based on good practices and lessons learnt as identified above as well as practical experience of AGRITEX and DR&SS staff from the targeted areas. The consultations and desk study was complemented with conversations with key stakeholders, including value chain stakeholders. Lastly, the proposed packages were discussed and validated with district level stakeholders, incl. AGRITEX and small holder farmers representatives.

It is important to note that the CSA packages overlap - i.e. the project may end up with several CSA packages and crop-livestock combinations for the same or similar areas.

CSA packages: General principles

It is recommended that the CSA packages will employ general principles as well as being tailored to the specific crop-livestock combinations and target areas,

- **Combination of FFS and Innovation Platforms:** It is proposed to employ a combination of Farmer Field Schools and Innovation Platforms. FFS's will link to strategically placed Innovation Platforms at the district or provincial level, which will permit experiences and best practice from farmers to be documented and for challenges to be addressed with stakeholders in the relevant value chains. This should involve capacity building of AGRITEX officers to support production of crops/livestock in a climate smart way and to facilitate market linkages
- **High degree of private sector involvement and facilitation of market linkages:** Innovation Platforms facilitate the building of relationships and analysis of joint solutions to developing value chains among smallholder famers and value chain actors. Where possible, private sector players will be engaged to provide technical assistance and inputs to ease production and make investments less risky for farmers.
- **Focus on commercial production:** Smallholder farmers, especially in irrigation schemes, need to understand the principles of commercial production. There is a need for irrigation schemes to be run commercially and be able to sustain themselves over time. The capacity building elements of this package will be closely connected with training provided to irrigation schemes on organized, commercial crop production, organization and operations of an irrigation committee, and the collective generation and use of revenue for the O&M of each scheme.

It is proposed that the CSA packages involve the following components:

Capacity building of smallholder farmers through Farmer Field Schools	Farmer field schools should work with particular aspects of climate smart crop production and linkages to the relevant market/value chain actors, depending on the interest and challenges faced by the small holder farmers in a given area. It is suggested to work with a model of 30 Lead Farmers per FFS and a demonstration plot of 0,5 ha, established at a central location, where both FFS participants and other farmers in the ward may learn from it. The Farmer Field School should be carried out over 2 seasons to make sure that farmers become familiar with crop-livestock combination and the CSA practices and are able to confidently share their knowledge with others. It is also expected that gradual capacity building over this period of time will allow farmers to gain confidence in analyzing market opportunities and linking up with private sector and markets early in the process, learn how to manage the harvest and how to invest the income generated back into the development of their business. Farmers will be linked to and/or supported to organize in commodity associations/ farmers associations, which will also be key participants in the innovation platforms. It is expected that Lead farmers will be able to share experiences and engage other farmers in the community with the help of AGRITEX officers and private sector players; rolling out CSA practices through a peer to peer system.
Capacity building of AGRITEX	AGRITEX officers across the three provinces expressed the need for capacity building on CSA practices, selected crops as well as market skills. Although AGRITEX does have an agribusiness department at district level, there is need for additional capacity building of AGRITEX officers at district and ward level to ensure that extension packages address a wide range of issues. The package should therefore also include a component on training of AGRITEX officers.
Facilitation of market linkages through innovation platforms	Strategically placed Innovation Platforms will gather stakeholders so that experiences and best practices from farmers work with climate smart crops and CSA practices will be presented, discussed and documented, and so that smallholder farmers will be connected to private sector players with a focus on analyzing and developing the horticulture value chains together. Each innovation platform will be connected to a number of relevant FFS to be informed by practice. The innovation platform will be supported by the project over 4 seasons, after when it is expected that private sector and members contributions will keep it running if there is need and interest. The Innovation Platforms at the district/provincial level will feed into a national level upscaling platform, where experiences from across the innovation platforms will be discussed and feed into policy development as well as national level capacity building of AGRITEX
Training in farming as a business for smallholder farmers and AGRITEX	This component cuts across the Farmer Field Schools, the Innovation Platform and capacity building of AGRITEX. At the level of the FFS, the CSA package should include: - Training in business management skills and facilitation of communication with the private sector on input, technical assistance, buyers' demands for crop quality standards and potentials for entering into contract farming relationships. At the level of the Innovation Platform, the CSA package should include: - Participatory analysis of value chain development with a wide range of stakeholders, incl. private sector and small holder farmers - Capacity building of farmers associations / commodity associations based on needs assessment through Innovation Platforms In terms of capacity building of AGRITEX, it will be key to: - Provide training to the AGRITEX officers related to Farmer Field Schools - Build capacities of AGRITEX officers through a learning by doing approach through Farmer Field Schools and participation in value chain discussions and stakeholder engagement through Innovation platforms.

CSA package for horticulture crops in irrigation schemes

CSA package for Horticulture

The proposed package for horticulture will support smallholder farmers in selected irrigation schemes to grow a combination of horticultural crops with comparative advantage in the area, to use climate smart techniques and to be connected with private sector and other players through capacity building from AGRITEX.

Expected results of implementing the CSA package for horticulture

At the level of each irrigation scheme:

- Small holder farmers have improved understanding of climate smart horticulture crops / varieties and increased capacity to grow crops in climate smart way due to the capacity building provided
- Small holder farmers improve yields, due to application of climate smart agricultural practices and water efficient irrigation
- Small holder farmers improve incomes, due to the improved yields and improved market linkages
- Small holder farmers gain an improved understanding of how to run farming as a business, how to work together on the crop production as a scheme, manage the scheme and market produce jointly.

At the level of each innovation platform:

- Improved understanding and collaboration among stakeholders across the horticulture value chain
- Implementation of solutions to challenges and bottlenecks in the value chain, based on participatory analysis and mutual interests

Best practices and lessons learnt for development of climate smart value chains, with the inclusion of small holder farmers, are documented and scaled up and out through evidence based influencing of policy development as well as integration of best practices in capacity building programs for AGRITEX extension officers.

Proposed crops, expected yields and income increase

Crop combinations are to be determined per scheme, but overall the following crops are recommended based on the value chain sub assessment, consultations with AGRITEX and tried and tested good CSA practices. It is expected that farmers may have 3 cropping seasons per year and that intercropping and agroforestry options are assessed for each scheme. Proposed crops, expected yields and expected gross incomes are listed below:

Proposed crop	Expected yield without irrigation	Expected yield with irrigation	Expected gross income
Green mealies / corn on the cob	1-2 T/ha	6-10 T/ha	589-1879 USD/ha[128]
Butternut	1-5 T/ha	10-16 T/ha	2444-5032 USD/ha[129]
Sugar beans	0,3 T/ha	1,5-2 T/ha depending on variety	429-1086 USD/ha[130]
Leafy vegetables (tsunga)	Unknown	20-45T/ha	6716-18,332 USD/ha[131]
Chilies	Unknown	10-15T/ha	Unknown

[128] AGRITEX gross margin data on maize, 2017
[129] AGRITEX gross margin and yield data on butternut, 2017
[130] AGRITEX gross margin and yield data on large scale sugar bean production, 2017
[131] AGRITEX gross margin and yield data on tsunga production, 2017

Onions	Unknown	20-40T/ha depending on variety	6223-15,152 USD/ha[132]

Proposed CSA practices

Promotion of climate-smart agriculture practices:

- Climate smart agriculture practices related to the selected horticulture crop – contributing to water conservation and soil fertility
- Efficient use of inputs, e.g. fertilizer and efficient use of water through efficient irrigation practices, e.g. drip irrigation, centre pivot and irrigation scheduling.
- Integrated production and pest management, including soil fertility management through crop rotation, intercropping and agroforestry options, mulching, use of crop calendar and other techniques with a focus on improving soil structure and managing the land sustainably.
- Post-harvest management and improved storage for crops – in cooperation with private sector players

Key stakeholders in development of climate smart horticulture value chains

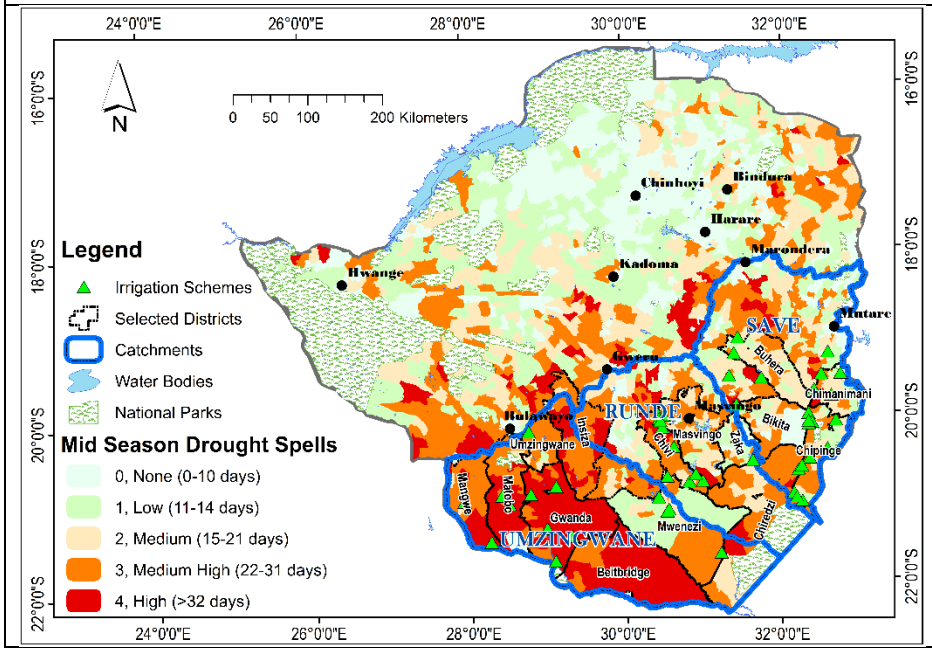
Potential NGO and research institution partners in horticultural value chains:	**Key market players and private sector partners in horticultural value chains:**
Manicaland: FAO, SAFIRE, CARITAS, Feed the Future, Africa University **Masvingo:** Great Zimbabwe University, Feed the Future, ENSURE, FAO, Plan International **Matabeleland South:** National University of Science and Technology, AMALIMA, FAO	Most horticultural products can be sold at small scale markets (local communities, institutions, supermarkets) across the three provinces. For a secure market, however, contract farming is key and there is appetite among private sector buyers, as long as the quantity and quality is right. Key companies in the horticulture contract farming industry include Best Fruit Processors for a range of horticultural products, African Distributors for products such as garlic, chilies and paprika and seed companies such as Seed Co for seeds. Also, there are formal aggregators and produce markets, where small holder farmers may sell larger quantities of produce. The main aggregators and produce markets are as follows: Manicaland: Brand fresh, Manica Produce; Masvingo: Masvingo Food Commodity Cooperation; Matabeleland South: Bulawayo Produce Market.
Barriers to implementing climate smart agriculture packages	**Proposed solution**
For many farmers, maize is a preference across the Southern districts and has traditionally been grown for food security – even in irrigation schemes; compromising the revenue needed to sustain both livelihoods and irrigation O&M.	The project will need to engage farmers to produce crops on a commercial basis rather than for food security. Habits and preferences are hard to change, and in some cases maize may be part of mixed or rotating crop systems; where high value cash crops are mixed with food security crops based on an assessment of the expected income and needs for revenue generation to run the scheme commercially. The VC sub assessment also identified green mealies / corn on the cob as a commercial option.
Limited understanding of market opportunities for a variety of horticultural products and limited capacity to engage with buyers in a manner that is fair and effective for smallholder farmers.	Facilitation of market survey and linkages through Innovation Platforms. Establish potential buyers, demand and quality expectations. Provision of legal assistance for farmers to enter into fair and effective contract farming relationships. Strengthen farmers own organizations to link up with private sector through the Innovation Platforms.

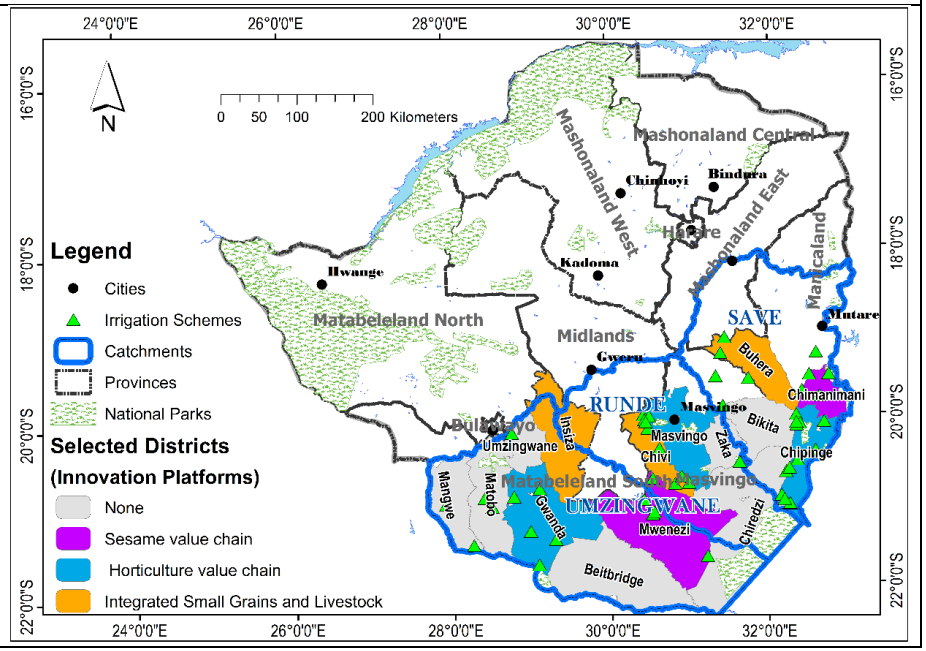
[132] AGRITEX gross margin and yield data on onion production, 2017

Limited potential for value addition at the level of small holder farmers.	In many cases, it is not cost effective for smallholder farmers to add value to products, e.g. through canning, drying and processing, because larger players can produce more consistent and cheaper.Need to analyze business case for value addition for crops carefully and to ensure a ready buyer before investing in value addition.

Proposed coverage of package

The figures below show the proposed location of irrigations schemes overlayed on a climate hazard map showing mid season drough spells – as well as the proposed location of innovation platforms.





CSA packages for dry land farmers

CSA package for Small Grains and Livestock

The proposed package for integrated small grains and livestock production will support smallholder farmers in selected wards to grow a combination of crops, incl. small grains and others with comparative advantage in the area, to link the crop production with livestock production, to use climate smart techniques and to be connected with private sector and other players through capacity building from AGRITEX.

Expected results of implementing the CSA package for small grains and livestock

At the level of each FFS / ward:

- Small holder farmers have improved understanding of the climate smartness of small grains and indigenous/improved livestock breeds. They have increased capacity to grow small grains in climate smart way and manage livestock sustainably due to the capacity building provided by the FFS.
- Small holder farmers improve small grains yields, due to application of climate smart agricultural practices[133]. To illustrate this, it is expected that yields for small grains such as sorghum and millet is improved from a current average of 0,8-1 T/ha to 3T/ha with CSA practices[134].
- Small holder farmers improve food and nutrition security as well as incomes, due to the improved yields for small grains and improved market linkages
- Small holder farmers gain an improved understanding of how to run farming as a business, how to work integrate crop and livestock production and how to work together to market produce

At the level of each innovation platform:

- Improved understanding and collaboration among stakeholders across the small grains and livestock value chains
- Implementation of solutions to challenges and bottlenecks in the value chains, based on participatory analysis and mutual interests

Best practices and lessons learnt for development of climate smart small grains and livestock value chains, with the inclusion of small holder farmers, are documented and scaled up and out through evidence based influencing of policy development as well as integration of best practices in capacity building programs for AGRITEX extension officers.

Proposed crops, expected yields and income increase

Crop combinations are to be determined per area, but overall the following crops are recommended based on the value chain sub assessment, consultations with AGRITEX and tried and tested good CSA practices. It is proposed that a relevant combination of climate smart agriculture practices are determined for crop production in each area based on farmers interests and ressources and it is expected intercropping, crop rotation and agroforestry principles as well as work with crop-livestock production in an integrated manner. Proposed crops include:

- Small grains such as sorghum, millet and pearl millet
- Legumes such as soy beans, cow peas, other beans, groundnuts
- Fodder crops for livestock such as mucuna and lablab bean

It is expected that based on improved livestock feed practices and marketing systems, cattle market prices will increase significantly from 400 USD/beast to around 800-1000 USD/beast[135] – and that with improved goat breeding, feeding and marketing systems goat market prices will similary increase from 15-25 USD to 35-50 USD/goat[136].

Proposed CSA practices

[133] Estimates based on conversation with AGRITEX horticulture specialist

[134] CSA workshop, May 2nd 2017

[135] (https://news.ilri.org/2017/09/19/closer-smarter-integration-of-crops-animals-and-soils-has-bolstered-food-security-livelihoods-and-incomes-in-rural-zimbabwe/, n.d.)

[136] SAFIRE reports, 2017 & Improving food security, nutrition and incomes: the contribution of small stock (Van Royeen, et al., 2013)

Introduction of **CSA farming principles for crop production, namely:**

- **Efficient use** of inputs, such as drought resistant, improved seeds, fertiliser, manure and water.
- **Minimum tillage:** Land preparation through minimum soil disturbance, planting stations, basins, ripping, direct seeding, as per CA principles
- **Crop rotations:** Climate-smart choice of crop – both improved and drought tolerant indigenous varieties. Use of crop mixing and rotation – e.g. small grains, legumes and cash crops rotation and application of agro-forestry, where possible and beneficial
- **Soil cover:** Provision of soil cover through mulching
- **Integrated production and pest management:** This includes soil fertility management and other techniques with a focus on improving soil structure. Limited use of pesticides, if any.
- **Promotion of crop-livestock interaction**
- **Post-harvest management** and **storage**

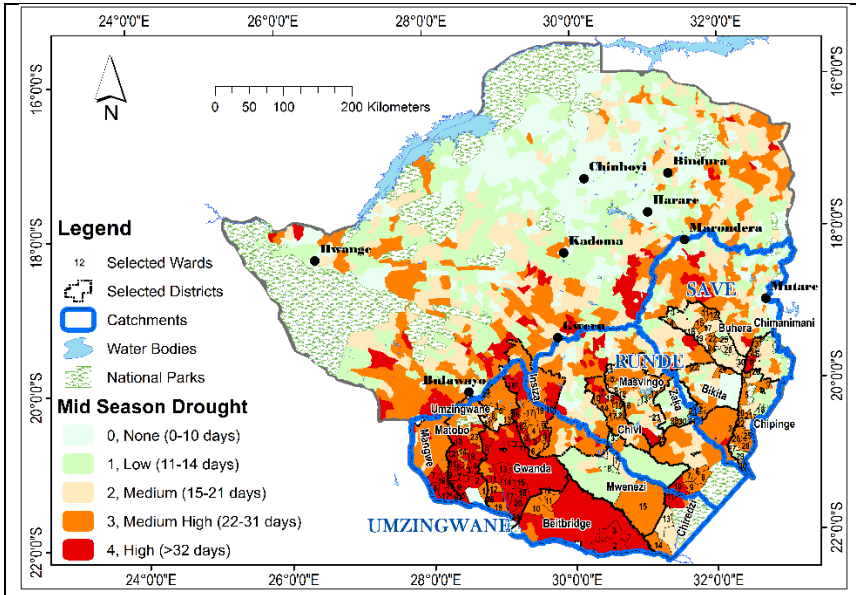
Introduction of **CSA principles and good practice for livestock production, namely:**

- **Improved management** of rangelands, paddocks, re-planting of pastures building on experiences from Matobos research station/ ICRISAT, Practical action in Gwanda and SCCA in Chiredzi. Guidance on improved stock management taking into account carrying capacity of land.
- **Fodder production,** supplementary feeding, pen fattening, feedlots, water provision. Agro forestry may play a role here.
- Linkages to climate-smart **crop production of small grains and other crops**
- Provision of advice on general **livestock management,** including breeding practices, dip tanks, veterinary services

Key stakeholders in development of climate smart small grains and livestock value chains	
Potential NGO and research institution partners in the relevant value chains:	**Key market players and private sector partners in the relevant value chains:**
Potential partners – NGOs and research institutions on small grains: **Masvingo:** Christian Care, Care international, CARITAS in Zaka, ECRAS (Plan International, ICRISAT, Care) in Mwenezi, Plan International (Chiredzi), Score against poverty, LDS, MDTC – Mwenezi Development Training Centre, Red Cross, WFP, CIMMYT **Matabeleland South:** World Vision, Caritas, WHH working in Umzingwane; ADRA, World Vision, Zimpro working in Insiza; LDS, Dabani, AMALIMA, Practical Action, World Vision, ADRA working in Gwanda; Food Security Committee, World Vision, CESVI, CARITAS, LDS working in Beitbridge. ICRISAT	**Key partners in small grains value chain:** Grain Marketing Board and other millers for all small grains. Delta for sorghum. K2 for seeds. Health foods actors with a focus on small grains. Animal feed producers **Key markets for small grains:** Small grains can be sold across the country, at local markets, town markets and city markets. It can be sold to the Grain Marketing Board as well as other millers, in all quantities and qualities. Contract farming opens up for sale to companies. Home consumption is also common.
Potential partners – NGOs and research institutions on livestock: **Manicaland:** SAFIRE, World Vision, Goal, ENSURE	**Key partners in livestock value chain:** Market players: Montana Castle, Livestock Meat Advisory Council (LMAC), abattoirs, local market players

Masvingo: WFP dip tanks, FFA projects, Feed the Future Livestock Development project **Matabeleland:** Important experiences / actors to work with on livestock in Matabeleland South. Communal livestock centres have been used as market facilitators. Past/current livestock Innovation Platforms facilitated by ICRISAT and DR&SS crop-livestock research centres (Makoholi Research Station and Matobo Research Station), ILRI and ICRISAT is working in project districts on climate resilience with small grains and livestock including work on improved fodder. Feed the Future Livestock Development project. Livestock feed centres by FAO and projected project proposal from FAO on livestock in Matabeleland South and North. Heifer International **Other:** The Ministry of Women Affairs which amongst other activities is conducting awareness raising of the new family law, related to women's ownership of livestock	**Key markets for livestock:** Manicaland: Small scale buyers e.g. food outlets, Montana castle, MOLU, Export markets, Local markets, festive seasons Masvingo: Small scale buyers e.g. food outlets, Montana castle, Export markets Matabeleland South: Small scale buyers e.g. food outlets, Montana castle, Export markets, Cycle Y (Mbokdo), Head and Hooves, abattoirs
Barriers to implementing climate smart agriculture small grains packages	**Proposed solution**
Key issues for marketing of small grains: The small grains value chain is already well known among AGRITEX extension staff and farmers, but a main challenge is to ensure the quality and quantity of products to access markets. There are limited formal marketing opportunities for small grains, except sorghum. The quality of small grains is also an issue, as sand and grit in the grain affects marketability and profitability. This challenge is related to harvest management, threshing, and processing at small scale. Also, hand methods of threshing and pre-consumption processes are labor intensive.	There is a potential for partnerships with MAMID, Ministry of Higher Education, academic institutions and research institutions on researching and building capacity on how to avoid grit in small grains products. Existing practices and initiatives include: - Awareness raising of farmers and training in proper harvest and post-harvest management practices - Threshing on concrete floor or similar clean surface instead of soil - Machinery to support – e.g. dehullers, taking into account O&M costs. There is currently an example of UZ-FAO-commercial smallholder cooperation around threshing technology and low cost threshing equipment in Matabeleland South.
Seeds – not available in the right quality and quantities. Need to upscale seed production for small grains and work to improve varieties. Except for sorghum, there has been little attention in terms of improvement of varieties. Need to make preferred varieties available to farmers.	There are good experiences on seed production to build on from Chiredzi, where the NGO Plan has worked with DR&SS to upscale seed production. A survey among AGRITEX extension staff and selected farmers may reveal which varieties are preferred and why.
For many farmers, maize is the preference across the Southern districts, although the AE zones IV and V are not suited for rain fed maize production, but better suited for small grains.	The VC sub assessment identifies examples of how community champions have successfully advocated for change of crops – from maize to small grains, increasing food and nutrition security in their respective communities. The project may learn from these examples when choosing lead farmers to implement the CSA packages. However, as habits and preferences are hard to change, in some cases maize may be part of mixed or rotating crop systems.
Pest management: Red-billed Quelea birds	No clear solution

Barriers to implementing climate smart agriculture livestockpackages	Proposed solution
Key issues for marketing of livestock: Establishment of market links, development of value chains and marketing structures is key to support smallholders to enter the formal markets.	Overall the following needs to be considered in strengthening marketing of goats and cattle: - **Need for capacity building of farmers**. Knowledge of business management and marketing is scarce among smallholders – e.g. selling at right price at right time. Farmers have limited understanding of grading systems. To improve the quality of livestock, capacity building on livestock management – e.g. breeding practices, use of selected bulls, breeding policy will be key. - **Market relationships:** Goats rarely auctioned in proper auction, but are rather sold to middle men at farm gate and fetching lower prices. Structured auctions or direct links to abattoirs has proven effective in other projects. - **Access to the market** is costly for the individual farmer: Transport and clearance of stock in terms of fees for Vet and policy is costly for smallholder farmers. Levies are high, charged to the buyer. - **Marketing structures:** Capital investments in improved livestock trading and handling facilities is needed to improve functioning of markets
Livestock are highly vulnerable to water scarcity and feed shortage. There is a high demand of feed in the dry season, but a lack of supply in remote areas. Isolated feedlots are not well plugged into the commercial value chain. Cattle stocking levels contribute to the problem: As cattle function as bankable assets, smallholder agricultural families may carry more livestock units for longer periods than dictated by profit motive.	Drought mitigation measures, e.g. water points may be a solution, as well as advocacy for commercial production of cattle/goats to avoid overstocking. Better functioning markets may incentivize farmers to sell small and big livestock, rather than carry them for long periods. Collective grazing management. Establishment of feedlots plugged into livestock value chain, fodder trees and fodder production.
Proposed coverage of package	
The figures below show the proposed wards for dryland csa packages overlayed on a climate hazard map (focusing on mid season dry spells) – as well the proposed strategic location of innovation platforms. Initial targeting on wards has been done based on AGRITEX priorities for interventions, prevalence of mid season dry spells, proximity to irrigation schemes or possibility for clustering of interventions as documented through consultation records. Data sets for targeting are available. By the start of the project, final targeting of wards and beneficiaries will be done in consultation with other actors working in the districts to avoid overlap and ensure complementarities.	



CSA package for sesame
The proposed package for sesame production will support smallholder farmers in selected wards to grow sesame commercially, to use climate smart techniques and to be connected with private sector and other players through capacity building from AGRITEX.
Expected results of implementing the CSA package for sesame
At the level of each FFS / ward: - Small holder farmers have improved understanding of the climate smartness of the sesame crop and increased capacity to grow sesame. - Small holder farmers achieve good sesame yields, due to application of climate smart agricultural practices[137]. - Small holder farmers improve incomes, due to good sesame yields and improved market linkages - Small holder farmers gain an improved understanding of how to run farming as a business, how to enter into sesame value chains and how to work together to market produce

[137] Estimates based on conversation with AGRITEX horticulture specialist

At the level of each innovation platform:

- Improved understanding and collaboration among stakeholders across the sesame value chain
- Implementation of solutions to challenges and bottlenecks in the value chain, based on participatory analysis and mutual interests

Best practices and lessons learnt for development of sesame value chains, with the inclusion of small holder farmers, are documented and scaled up and out through evidence based influencing of policy development as well as integration of best practices in capacity building programs for AGRITEX extension officers.

Proposed crop, expected yields and income increase

The expected yields and incomes for sesame production are listed below:

Proposed crop	Expected yield – conventional farming methods	Expected yield with application of CSA practices	Expected gross income per T
Sesame	1,5 T/ha	Needs to be determined through research	575-800 USD/ha after subtracting initial investments[138]

Proposed CSA practices

Introduction of **CSA farming principles for crop production, namely:**

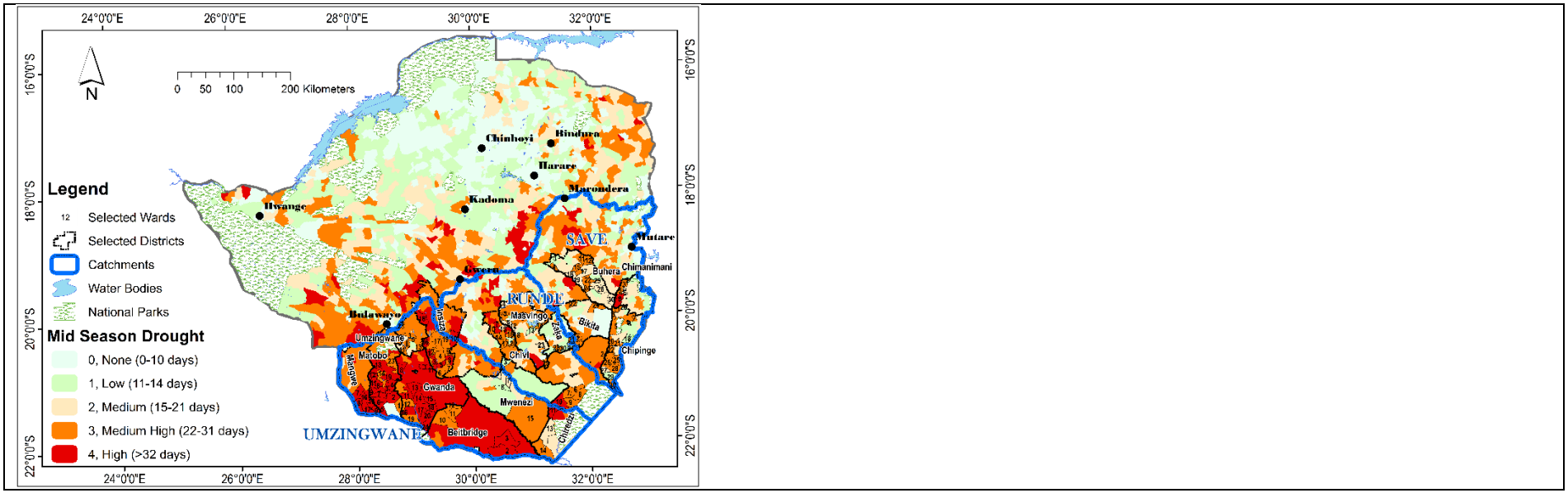
- **Efficient use** of inputs, such as drought resistant, improved seeds, fertiliser, manure and water.
- **Minimum tillage:** Land preparation through minimum soil disturbance, planting stations, basins, ripping, direct seeding, as per CA principles
- **Crop rotations:** Use of crop mixing and rotation – e.g. rotation of sesame with small grains and legumes and application of agro-forestry and crop-livestock interaction principles, where possible and beneficial
- **Soil cover:** Provision of soil cover through mulching
- **Integrated production and pest management:** This includes soil fertility management and other techniques with a focus on improving soil structure. Limited use of pesticides, if any.
- **Post-harvest management**

Key stakeholders in development of climate smart sesame value chains

Potential NGO and research institution partners:	Key market players and private sector partners:

[138] Yield and gross income data based on conversation with Welt Hunger Hilfe, August 2017, based on project experience. In comparison AGRITEX estimates sesame yields 800kg-1,4T/ha at a gross margin of 146-515 USD/ha. Similarly, the value chain subassessment estimates income ranges of US$200 to US$750 per ha, per annum from sesame which, with the low risk involved and low cost of external inputs per ha (US$100 /ha), offer smallholders a sustainable source of income.

Potential partners – NGOs and research institutions: **Manicaland:** SAFIRE, CARITAS, Africa University **Masvingo:** Christian Care, Care International, CARITAS in Zaka, ECRAS (Plan International, ICRISAT, Care) in Mwenezi, Plan International (Chiredzi), Score against poverty, LDS, MDTC – Mwenezi Development Training Centre, Red Cross, WFP, CIMMYT – ECRAS has the most potential as it is already focusing on sesame.	**Key markets:** Sesame was traditionally used for home consumption, informal local and export markets, e.g. Mozambique. Contract farming with Sidella or IETC. Local confectionary industry/bakeries. **Key partners in value chain:** Manicaland: Local informal market in Mozambique, Sidella, IETC, Local confectionary industry/bakeries Masvingo: Sidella. Sesame producers association / commodity organisation for sesame identified in value chain study. Alternative markets / market players need to be engaged to ensure competitive market. In Mwenezi, the ZRBF consortium works with sesame (ECRAS) – may build on/ ride on their work.
Barriers to implementing CSA sesame packages	**Proposed solution**
Sesame seeds are not available in the right quality and quantities at the local level agri-dealers	Seeds may be provided through private sector contract farming and technical assistance.
Farmers are not familiar with the formal buyers and marketing opportunities for sesame.	Facilitate market survey and linkages through Innovation Platform. Establish potential buyers, demand and quality expectations. Link farmers up with companies in contract farming relationships.
The sesame value chain is new to most AGRITEX extension staff and farmers, although some AGRITEX extension workers and farmers are currently growing sesame, mostly through contract relationships either with Sidella or IETC.	The project may facilitate a public private learning partnership and technical assistance and inputs from private sector players, such as Sidella and IETC who have demonstrated that productivity can be significantly increased with relatively cheap input packages.
The quality of sesame is also an issue, as for small grains, as sand and grit among the seeds affects the marketability and profitability.	This challenge is related to harvest management and may be solved through improved harvest management practices – these can be tested and promoted through FFS.
Proposed coverage of package	
The figures below show the proposed wards for dryland csa packages overlayed on a climate hazard map – as well the proposed strategic location of innovation platforms. Districts were selected for their suitability for sesame based on Natural Farming regions and success of past and current baseline projects. Sesame is to a large extent replacing cotton as a cash crop in targeted areas. Initial targeting on wards has been done based on AGRITEX priorities for interventions, prevalence of mid season dry spells, proximity to irrigation schemes or possibility for clustering of interventions as documented through consultation records. Data sets for targeting are available. By the start of the project, final targeting of wards and beneficiaries will be done in consultation with other actors working in the districts to avoid overlap and ensure complementarities.	



Proposed locations for Innovation Platforms to support implementation of climate smart crops, livestock and farming practices

It is recommended that the project establishes a number of district/provincial level Innovation Platforms based on crop-livestock combinations identified in the value chain study as well as a national level platform to up- and outscale interventions. In order to use innovation platforms in Zimbabwe strategtically to roll out climate smart agriculture approaches across different institutional levels and sectors, it is recommended to work with a variety of stakeholders.
Key stakeholders include[139]:

[139] Key issues and questions that have been considered, when determining proposed stakeholder composition:

- Which stakeholders represent a full system and can develop and prioritize solutions with relevance and legitimacy for all? Are the relevant stakeholders on board for capturing diverse perspectives and expertise?
- Which stakeholders have a genuine interest in developing solutions – and which stakeholders have the mandate, capacity and power to drive change?
- Which stakeholders can contribute to an enabling-improved environment for scaling solutations up to higher levels and out to larger numbers of people?
- Which stakeholders can bring resources to the table without taking over the platform to further own interests?
- Which stakeholders are influential and need to be informed and involved, but not necessarily be involved permanently?

- National level decision makers, relevant to agricultural and agri-business policy
- AGRITEX – National, provincial, district and ward level
- DR&SS – National level and research centres
- Agricultural colleges
- Relevant private sector players per value chain – National, provincial and district level
- Farmers associations and commodity associations – National, provincial, district and ward level

In addition, it is recommended to consider the roles and responsibilities of different actors involved in an Innovation Platform carefully[140]. Given the need to strengthen the capacity of AGRITEX and DR&SS in leading this work, it is recommended to employ a neutral facilitator/institution to collaborate with a DR&SS/AGRITEX facilitator and jointly support the capacity building of government actors. The neutral facilitator will be expected to:

- Effectively co-organize and manage platform meetings in collaboration with the DR&SS/AGRITEX co-facilitator
- Co-facilitate platform meetings and develop the capacity of actors in collaboration with the DR&SS/AGRITEX co-facilitator
- Develop mechanisms for feedback and accountability on the platform in collaboration with the DR&SS/AGRITEX co-facilitator
- Establish lessons with other Innovation Platforms and feed into work to scale up and out at the national level in close collaboration with DR&SS and AGRITEX
- Support capacity building and cooperation wirh government institutions in close collaboration with the DR&SS and AGRITEX

In order to strengthen institutional capacity, it is recommended that the project makes use of existing institutions and research centres to root the work and innovations in existing institutions. AGRITEX colleges at the level of the district and provincial and district level research stations such as the DR&SS Matobo research station (where ICRISAT is hosted), the Chiredzi research station (where some CIMMYT activities are hosted) may be strategic host institutions. Likewise it is key to choose strategic geographical locations that are representative to the climate change challenges faced in the Southern Provinces and which provide relevant market linkages opportunities.

The proposed strategic institutional levels, key stakeholders and geographical locations for each innovation platform to facilitate scaling up and out are illustrated in annex.

In proposing the number and strategic locations for the innovation platforms, the following criteria has been applied:

- Match of climate smart crop-livestock combination, number of irrigation schemes, market potential and geographic area, as identified and validated by agriculture stakeholders
- Potentials to build on or complement work of other stakeholders – or lack/need of CSA and market linkage interventions
- Potential to work through existing agricultural or research institution with expertise in the proposed theme
- Relatively equal distribution of platforms across districts and provinces to avoid overcrowding of platforms in one location.
- A sufficient number of innovation platforms to allow for effective, cross-province coverage as well as sufficiently broad/deep experience to provide legitimacy for solutions to be up and out scaled
- Cost effectiveness of platforms vis a vis expected outcomes

[140] Apart from the facilitation, several other functions need to be fulfilled to support governance and effective management of the platform. At the **national level** a project management team may provide overall management and coordination of the work of platforms. At the **level of the platform,** platform members may choose a chairperson to call for meetings and a platform monitor to support in the documentation of platform meetings and activities.

The map and matrix below shows the proposed geographic location and phasing of interventions for innovation platforms:

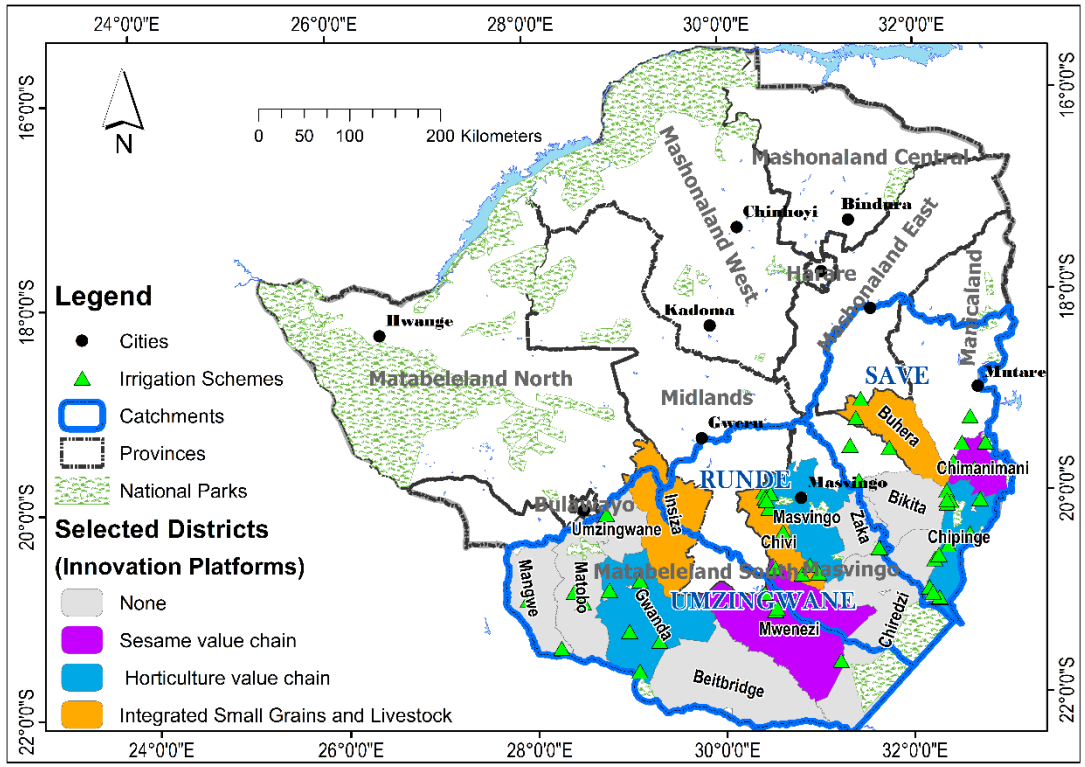


Figure 20: Map of proposed locations of Innovation Platforms

Type of platform	Possible location (District)	Considerations	Potential partnerships	Phasing of interventions						
				Y1	Y2	Y3	Y4	Y5	Y6	Y7
Horticulture Innovation Platform	Masvingo or Chivi	High number of irrigation schemes. Proximity to urban markets.	Possibilty to build on / connect to ENSURE work (ending 2018) in Chivi and Zaka, e.g. on market linkages platform.		Full funding	Full funding	Full funding	Phase out		

	Chipinge	High number of irrigation schemes. Proximity to urban markets and transport.	Build on / connect to ENSURE work (ending 2018) in Buhera, Chipinge, Chimanimani e.g. on market linkages platform. Build on Scaling Up Adaptation value chain work.		Full funding	Full funding	Full funding	Phase out		
	Gwanda	High number of irrigation schemes. Rural market hub.	Link to or expand on AMALIMA (ending 2018) and ICRISAT work.		Full fun	Full fun	Full fun	Pha se		
Type of platform	**Location**		**Considerations**	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**
Sesame Innovation Platform	Chimanimani	Good sesame potential and proximity to urban markets and transport.	Possibility to complement/continue market linkages work of Scaling Up Adaptation in Buhera and Chimanimani		Full funding	Full funding	Full funding	Phase out		
	Mwenezi	Good sesame potential and linkages to markets established. Potential for scale out.	Potential to build on ECRAS-ZRBF consortia work in Mwenezi on sesame value chain.		Full funding	Full funding	Full funding	Phase out		
Type of platform	**Location**		**Considerations**	**Y1**	**Y 2**	**Y 3**	**Y 4**	**Y 5**	**Y 6**	**Y7**
Small Grains and Livestock platform	Matobo or Insiza	Matobo is a typical small grains and livestock area. Insiza has good potentials for small grains-livestock combination. Alternatively the platform may be setup in Beitbridge where a ZRBF consortia intervention is currently present.	May build on / continue ICRISAT work in Gwanda, Matobo and Insiza. Feed the Future is active on livestock development in Masvingo, Chipinge, Chimanimani, Insiza and Umzingwane until 2020, need to explore potentials for collaboration / complementarities. ZRBF consortia is present in Insiza.		Full funding	Full funding	Full funding	Phase out		
	Buhera	Buhera has good potentials for small grains-livestock combination	Potentials to build on Scaling Up Adaptation work on goat value chain. Explore potentials for collaboration with FTFZ-LD in Chimanimani, Chipinge		Full funding	Full funding	Full funding	Phase out		

Conclusion and recommendations

It is recommended that the project at the inception carry out an in-depth participatory targeting and selection of beneficiaries, based on representative communities/wards for each target area and an assessment of baseline investments and presence of other projects to ensure complementarities and avoid overlaps. The targeting exercise will also establish how links and synergies with local authorities, CSOs operating in the areas and government partners may best be leveraged. A ranking and selection system for targeting districts and wards may include:

- **Most climate vulnerable wards:** Application of climate vulnerability analysis in selection of wards to target most climate vulnerable districts, mainly in relation to risk of mid-season dry spells, droughts and other extreme weather phenomena.
- **Potentials for synergies:** Analysis of potentials for synergies and complementarities with similar project interventions and avoidance of overlaps and doubling efforts. Both large scale projects and local community initiatives should be taken into account.
- **Ownership:** Analysis of target populations' social and economic vulnerabilities and capabilities, their level of organization and ability and willingness to engage actively in project interventions, based on the expectation that ownership of and investment of time and resources in interventions is key to ensure sustainability.
- **Market and value chain development potentials:** Assessment of potential for entry into value chains / strengthened value chains, incl. access to market infrastructure, suitability of suggested value chains, local market actors.

Preliminary targeting has been done in this study based on the above criteria for climate vulnerability, synergies and market and value chain development potentials in consultation with relevant national, provincial and district level stakeholders. This should however be updated by the start of the project taking into account new developments in each district and ward.

A **model for climate smart agriculture packages** has been developed informed by analysis of **baseline and past experiences** in introducing climate-smart agriculture in Zimbabwe, the **proposed high-impact crop-livestock combinations** identified in the value chain study for the project, other **high-impact crop-livestock combinations and CSA practices** identified through desk study and conversations with key actors, the **proposed number and location of irrigation** schemes as per the sub assessment for the project, the **business challenges** faced by farmers and **possible solutions for linking up with markets** and a number of ad hoc **consultations with key stakeholders**. On this basis, the study provides a set of **recommendations** and **costed CSA package options** for the project to consider.

It is recommended that the final decision on **CSA package options is informed by the most updated evidence and good practices** – ideally it should allow for f**lexibility in the choice of crops and practices** based on the are of implementation, farmers interests and prefences and options for market linkages and value chain development at the time of project inception.

The introduction of climate smart agriculture practices and climate resilient crop and livestock breeds hinges on **effective models for learning and uptake** among small holder farmers as well as **effective and inclusive value chain development** to ensure that small holder farmers are integrated in the agricultural economy. The Farmer Field School methodology is a well-known, tried and tested tool for introducing new methods and crops to farmers as was demonstrated in the case of promotion of conservation farming in Zimbabwe. Research institutions such as ICRISAT, ILRI and CIMMYT in collaboration with DR&SS and AGRITEX have demonstrated that FFS coupled with Innovation Platforms provide farmers and market players with an effective interface for co-developing value chains in an inclusive manner. Innovation Platforms, market linkage platforms, market price data bases and similar initiatives have been useful and effective to improve links between value chain stakeholders. Stronger linkages between value chain actors, based on mutual interests, are key to sustain impacts of the intervention over time. It is therefore recommended that the project employs a mix of Farmer Field Schools and Innovation Platforms to further climate resilient development of value chains.

Innovation platforms and FFS are interventions that needs to be used strategically to produce sustainable outcomes that can be **scaled out and up in a cost-effective manner.** It is recommended that the project aims

to increase the probability of **sustainability** of the CSA interventions by scaling up successful practices, by providing evidence based input and influence development of policies and regulatory framework in the agricultural sector to support promotion of CSA practices with a focus on smallholder farmers as well as inclusion of smallholder farmers in key value chains. Likewise it is recommended to scale out successful CSA promotion approaches through public and private extension services[141], based on experiences and strategies developed through Innovation Platforms.

The innovation platforms may function as a space for learning platforms for **adaptive management of farming practices and value chains** - this allows for continual monitoring of success of approaches, adjustments if needed and continual engagement across the value chain to support links between producers and buyers. In order to institutionalise the adaptive management of farming practices and value chains it is recommended that Innovation Platforms are hosted with the DR&SS and AGRITEX institutions in the relevant districts/provinces. This implies a stronger focus on improved knowledge management within key government institutions to make sure that the most successful agricultural practices are replicated at scale and that there is a continual adaption of practices according to the changing climate. The strengthening of knowledge management systems and practices should be supported through the project management unit.

A commercial take on smallholder farming is key to both food security, more secure and profitable livelihoods, and successful adoption of climate-smart agriculture practices, crops and livestock. The sutyd identified contract farming as a viable way of integrating smallholder farmers in the formal economy and guaranteeing markets and profits. To support this integration, the study identified a need for the project to include elements of capacity building of farming as a business for both AGRITEX extension officers, smallholder farmers organisations/groups and individual farmers in order to facilitate fair and effective links between smallholder farmers, markets and value chain stakeholders - and to sensitise private sector players on how best to deal with smallholder farmers. The capacity building of both small holder farmers and AGRITEX officers is closely linked to the sustained functioning of irrigation schemes, as it will be key to address issues of 'farming as a business', organization of the scheme according to bylaws/constitution to facilitate trust and cooperation among farmers as well as coordinated approach to linking up with markets - and the aspects around operation, maintenance and accumulation of funds to support O&M.

Barriers to implementation of CSA practices and gaps in service provision include the following. While the agricultural extension system in Zimbabwe is well structured and competently staffed from national to ward level, there are **challenges in rolling out CSA through agricultural extension services at scale**. This is both related to limited knowledge on how to integrate climate risks into agricultural planning and implementation as well as limited financial and human resources to reach out to all farmers. A combination of extension officer and farmer led extension services as well as other forms of information dissemination (e.g through radio and cell phone applications) may be used to reach out to smallholder farmers at scale. Also there is a challenge of **limited, systematic adaptive knowledge management.** While initiatives and research is ongoing to support the uptake of drought and heat tolerant seed varieties, livestock breeds and other climate smart initiatives, gaps in systematic knowledge management have been identified in and across MAMID departments. There is limited national level collection and sharing of successes, lessons learned and failures in the attempts to promote and implement climate smart smallholder agriculture. A key issue for ensuring continual relevance of promoted CSA practices, crops and livestock breeds in a changing climate is adaptive knowledge management, where approaches are continually evaluated for their appropriateness and cost-effectiveness under the prevailing and predicted climatic conditions. Improved, adaptive knowledge management would also support the gap in up- and out-scaling of successful CSA initiatives through extension services. Institutional barriers such as **limited horizontal and vertical coordination** also limits the capacity to manage and share knowledge and capitalise on synergies across departments.

The **sustainability and exit strategy** on CSA packages depends on the ability of value chain stakeholders to continue to engage on how best to adapt to changing climate conditions. Small holder farmers are expected to keep up the climate smart practices and crop production, once they are integrated in a value chain that provides sufficient incentive and income for re-investment into production. With careful support and

[141] This may include approaches such as farmer field schools, demonstration plots as well as other approaches to spreading the message – e.g. through mobile-phone based weather and farming information system – as described in the climate information sub assessment.

facilitation of FFS, a self-organized process of continual learning in the communities may be initiated. In terms of the Innovation Platforms, the work may continue in a self-organized manner with private contributions or through public facilitation and financing. If the project succeeds in establishing positive experiences of finding collective solutions, improving relationships and strengthening networks in the value chain, there will be a strong foundation for continued collaboration and learning across the value chains. The project sustainability strategy for CSA packages also depends on ensuring effective collaboration and management arrangements across Ministries, departments and public-private actors to share knowledge and build strong relationships, capitalise on synergies and complementary investments to achieve the greatest impact possible and incentivise collaboration and action beyond the project period.

Based on the above considerations, the study recommends the following **investments:**

- **Capacity building for agricultural extension workers in CSA and market linkages.** Capacity building would include in-service training on CSA practices, selected crops and facilitation of market linkages and would mainly target AGRITEX officers at ward, district and provincial level. Estimated costs are 1,3 million US$, with detailed cost breakdown in annex.

- **Capacity building of smallholder farmers in CSA through Farmer Field Schools:** Each farmer field school involves a demonstration plot of 0,5 ha and inputs for the plot. The demonstration plot and FFS is sustained for two years, during which farmers are expected to take up practices on own fields at own cost. It will be key to reach out to a sufficient number of farmers to generate critical mass and momentum to implement CSA at scale. This study therefore proposes to reach all targeted climate vulnerable wards with at least 1-2 FFS per ward in a phased approach. Through FFS and farmers representatives participating in innovation platforms, the project seeks to crowd in private finance, micro credit and contract farming options as well as provision of small scale matching investments to support farmers to get the initial productive capacity to take up CSA at scale –2 million US$

- **Faciliation of market linkages and CSA solutions through innovation platforms**: By setting up crop-livestock innovation platforms and a national level platform for upscaling best practice to the policy level, the project expects to be able to facilitate market linkages, improved CSA solutions and value chain innovations and systematically upscale and outscale best CSA practice. This will also include support to facilitate fair and transparent contract farming arrangements. Platforms will be facilitated in a partnership between the DR&SS, AGRITEX and a relevant CSO, private sector or research partner – Estimated at 1,5 million US$

- **Systematic knowledge management capacity building and sharing of best practice:** This recommendation relates to IT equipment and data analysis software for improved data collection, analysis, data storage and use mainly at institutional, provincial and national level. It also involves in service training, setup of data collection and information sharing protocols, facilitation of learning and knowledge management across departments and development of knowledge products on good practice in CSA. Estimated at 1,5 million USD

Overview of Annexes

Annex of consultations and consultation reports
Annex: Literature list
Annex: Overall project budget cost estimates
Annex: Phases of an Innovation Platform
Annex: Innovation Platform – key stakeholders, levels and phasing of interventions
Annex: Functions of Innovation Platforms
Annex: Suitability of crops and marketing options per target district
Annex: Livelihood Zones in Southern Zimbabwe
Data sets (in excel sheet) upon request

Annex of consultations and consultation reports

Date	Meeting and Objective	Participants
20 March 2017	Potentials for low cost irrigation. Provision of overview document.	Conversation with Dr. Unganai, OXFAM
27 March 2017, Phone conversation	Experiences on rehabilitating irrigation schemes with small holder farmers. Minutes.	Conversation with Simba Mandota, SAFIRE
27 March 2017. Phone conversation and follow up e-mail correspondence.	Conversation on experiences on Innovation Platforms, small grains production, integrated crop-livestock management and potential collaboration. Provision of research publications and guidance for the CSA package study.	UNDP and Sabine Homann-Kee Tui, Kizito Mazvimavi, ICRISAT
16 May 2017	Conversation on Conservation agriculture, climate smart agriculture and data collection for the CSA packages. Provision of publications.	Conversation with Sepo Lungowe, CA and CSA specialist, Agritex
18 May 2017	Conversation on research by DR&SS, innovation platforms, farmer field schools and data collection for the CSA packages. Provision of research publications.	UNDP and Freeman Gutsa, Principal Economist, Department of Research and Specialist Services
23 May 2017 and 27 June 2017	Conversation on gaps from value chain analysis, including company willingness to engage with project on small holder farmers market linkages	Phone conversation with Mr. Michael Mugani, Agronomy Executive and Ms. Ropafazwa Gwanetsa, Marketing, Best Fruit Processors
23 May 2017	Conversation on gaps from value chain analysis, including company willingness to engage with project on small holder farmers market linkages	Phone conversation with Mr. Chaphika, the marketing manager at Matanuska
25 May 2017	Conversation on focus of the GCF project proposal, coordination with FAO on irrigation schemes and upcoming FAO project proposal, experience sharing on capacity building efforts on CA and CSA.	UNDP and FAO group, incl. Constance Pepukai, Barbara Mathamera, Brian Nhlema responsible for areas related to the GCF proposal.

12 June 2017	Conversation on focus of the GCF project proposal and possible collaboration with the CIMMYT-ACIAR-University of Queensland SIDICSA project in Zimbabwe, building on the previous SIDICSA project. The conversation was followed up by a MAMID official attending the SIMLESA-SIDICSA conference in Arusha Tanzania, 19-22 June 2017.	UNDP and Mulugetta Asfaw, CIMMYT, John Dixon, ACIAR and Joe Eyre, University of Queensland
11 July 2017	Conversation on focus of the GCF project proposal, possible synergies and complementarities with USAID funded projects and lessons learnt.	UNDP and USAID – ENSURE, Feed the Future, AMALIMA project staff
2 August 2017	Conversation on the focus and work of each organisation to assess collaboration potential and access experiences on linking small holder farmers to market	Phone conversation with Michael Dawes, Agricultural Partnership Trust and Market Linkages Association
8 August 2017	Conversation of costing and design of sesame interventions	Conversation with Kudzai Nyengerai, Welt Hunger Hilfe
Various phone conversations, e-mail correspondence, workshop participation and informal conversation	Conversations on costing and experience	Plan International, ZRBF consortia members, CSA framework workshop organized by MEWC, VUNA and AGRITEX, Climate smart irrigation guidelines workshop with WB/MEWC etc.

Date and location	**Consultation focus**	**Stakeholders**
10.3.2017 Harare	First phase of CSA package development	National stakeholders: Department of Research and Specialist Services, AGRITEX, Department of Irrigation, Department of Agriculture Markets and Economics, MEWC Climate Change Management Department, Meteorological Services Department, ICRISAT
2.5.2017 Harare	Second phase of CSA package development	National stakeholders: Department of Research and Specialist Services, AGRITEX, Department of Irrigation, Department of Agriculture Markets and Economics, MEWC Climate Change Management Department, Meteorological Services Department, WFP Probincial level stakeholders: Provincial agronomists.
April – June 2017	Individual conversations with government, CSO and value chain stakeholders	DR&SS, AGRITEX, FAO, OXFAM, value chain actors, ICRISAT, CIMMYT, ACIAR

6.6.2017 Mutare, Manicaland 7.6.2017 Masvingo, Masvingo 8.6.2017 Gwanda, Mat. South	Validation of CSA packages for Manicaland – Save Catchment Validation of CSA packages for Masvingo – Runde Catchment Validation of CSA packages for Matabeleland South – Umzingwane Catchment	National stakeholders: Department of Irrigation, AGRITEX, MEWC Climate Change Management Department. Provincial stakeholders: AGRITEX incl. AGRITEX provincial agronomist, Department of Irrigation, Department of Mechanisation, Livestock department. Any other relevant provincial level stakeholders incl. NGOs and Academia District level stakeholders: incl. AGRITEX district heads/coordinators from 4-5 selected districts (districts with proposed irrigation schemes or proposed value chains), Field officers (AGRITEX, Livestock), Farmers representatives, Officials from EMA, ZINWA and MET, RDC Officials from the proposed districts Districts represented: Manicaland: Buhera, Chimanimani, Chipinge Masvingo: Mwenezi, Zaka and Masvingo Matabeleland South: Insiza, Mzingwane, Gwanda, Matobo & Beitbridge

NB: Minutes of consultations available upon request

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Annex: Overall project budget cost estimates

Costs of Innovation platforms

The costing of innovation platforms is based on cost examples from similar platforms and activities in Zimbabwe and has taken into account the following:

- Thematic focus of innovation platform, number of members and types of members as well as the level at which innovation platform is operating and costs of having participants coming from different locations to join meetings. It is estimated that 30 local persons participate per platform along with 3 external resource persons from the national level. Meeting costs include DSA and transport re-imbursement. Venue costs are kept to a minimum by using local institutions as hosts.
- Level of platform support functions required and types of functions. Time and efforts required for preparing, holding and following up on meetings and other activities. An IP management unit at national level will provide oversight, manage and support all Innovation Platforms, while a locally based facilitator and an innovation team at platform level will carry out platform activities.
- Basic meeting costs are included as it is expected that these will be relatively similar across the value chains and innovation platforms. Spin off activities that emerge as the platform starts to operate and develop solutions are not included. Farmer field schools are accounted for seperately, as a specific investments into the value chain.

The detailed costing estimates may be provided upon request.

Cost category	**Cost per platform**
Costs for 1 Upscaling platform	63072
Costs for 5 Commodity Innovation Platforms: 3 years at 100% cost and 1 year at 50% phase out cost	1397575
Total costs	1460647

Cost category		**Year 1**	**Year 2**	**Year 3**	**Year 4 (50%)**	**Total**
Human resources for facilitation	Percentage of time		Cost per year	Cost per year	Cost per year	
Innovation platform facilitator	Monthly fee per platform meeting	12000	12000	12000	6000	
Assistant to coordinator of innovation process	50%	18000	18000	18000	9000	
External thematic support	Estimated at 500 USD/month	6000	6000	6000	3000	
Total HR for facilitation costs		36000	36000	36000	18000	**126000**
Basic event costs						
Meeting costs	4 meetings a year, 30 persons, incl. DSA per person and transport	9000	9000	9000	9000	
DSA for external experts	5 persons at 225 USD each, 4 times a year	3000	3000	3000	3000	
Transport for external experts	@ 20 cents per km	480	480	480	480	
Venue hire - DR&SS facilities	100 USD / day @ 6 days per year	400	400	400	400	
Office supplies and other materials	3/ USD / person / meeting	360	360	360	360	
Inception meeting - 3 days	3 days, 30 persons incl. DSA per person and transport	4950	4950	4950	4950	

Total basic event costs						**67810**
Total costs per innovation platform						**193810**
Platform demonstration costs						
Estimated cost per platform for demo plot facilities for host institution	5000 USD					5000
Production, layout, printing, dissemination of CSA related learning materials	Per platform					30000
Demonstration of climate smart value addition and marketing facilities	Per institution					30000
Total demonstration costs per platform						**65000**
Total costs per innovation platform incl. demonstration facilities						**258810**
Total cost with 8% administration fee for executing institution						**279514.8**

Cost of Farmer Field Schools

The costing of the Farmer Field Schools are based on costs from Scaling Up Adaptation project. General features of a FFS are as follows:

- 30 Lead Farmers are chosen per FFS.
- A demonstration plot of 0,5 ha is established at a central location, where others from the community may be inspired from it. The demonstration plot forms the basis for learning.
- Farmers meet regularly to learn and discuss, when there is something new to learn or observe during a season. This is often 5-6 times with key events being land preparation, planting, monitoring of crops, flowering, harvest. The condition of the crops and field dictates meeting times and the learning topics, as training is done as a result of practical experimentation and dialogue in the field.
- In addition to the regular meetings other activities such as learning visits, community learning days etc. may be included
- A range of investments are planned for each farmer field school to support the integration for farmers into value chains. These investments are based on existing project experiences but may change with the interests, challenges and needs of each FFS/ area.

FFS investments		**Total number of farmer field schools**	**Total cost**
Type of FFS	Unit cost in USD for 2 seasons	Number	Cost in USD
FFS Small grains and livestock	3800	115	437000
FFS Horticulture	3180	21	66780
FFS Sesame	1780	115	204700
Total for FFS	2920	**251**	**708480**
Community days for dryland FFS - at least 2 open community/learning days	200	251	50,200
FFS meet the market visits and workshops	300	251	75,300
Total for community days and market visits			**125,500**

Matching investments	Unit cost	Number of FFS	Total cost
Matching investments to Lead Farmers babyplots (0,5 ha) - sesame (market actors / contract farming)	1000	115	115000
Matching input investments to lead Farmers babyplots (1 ha) - mix of small grains and fodder crops	1000	115	115000
Matching input investments to lead Farmers babyplots - irrigation (not needed due to collaboration with market actors / contract farming)	-	0	0
Total cost for lead farmers			**230000**
Matching input investment to beneficiary farmers babyplots (0,25ha) - small grains and livestock - per beneficiary farmer	30		1035000
Input support note needed for sesame and horticulture farmers			0
Total for lead and beneficiary farmers			**1265000**

Small Grains and Livestock

Costs for Small grains and livestock Farmer Field School / season	Cost in USD	Unit	Total cost
Fencing for 70mx70m small grains demo plot	300	per demo plot	300
Fencing for demo plot for agroforestry / fodder tree / fodder grass production	300	per demo plot	300
Implements (such as ripper tine (using animal draught power), hoes, direct seeder, planter) and inputs (such as seeds, seedlings, fertilizer)	500	per FFS demo plot	500
Complete soil analysis test	15	USD/test	15
Planting line, tape measure and spring balance	75	per demo plot	75
Livestock veterinary services		Per FFS	
Refreshments for meetings		Per meeting	
Refreshments for a 3 day training at the start of the season	200	per FFS	200
Training and support for local AGRITEX worker	40	per officer/ month	240
Travel for AGRITEX & DR&SS experts (average kms@20c/km)	120	per season	120
DSA for AGRITEX and DR&SS experts	150	per season	150
Total cost for 1 season			1900
Total Cost for 2 seasons			3800

Horticulture			
Costs for Horticulture Farmer Field School / season	Cost in USD	Unit	Total cost - Project
Implements (such as tractor hire, ripper tine (using animal draught power), hoes, direct seeder, planter) and inputs (such as seeds, seedlings, fertilizer)	500	per FFS	500
Horticulture crop seeds	50	per demo plot	50
Technical support per agritex officer	40	Per month /agritex officer	480
Complete soil analysis test	15	USD/test	15
Planting line, tape measure and spring balance	75	per FFS	75
Refreshments for meetings	N/A	Per meeting	
Refreshments for a 3 day training at the start of the season	200	per FFS	200
Travel for AGRITEX & DR&SS experts (average kms@20c/km)	120	per season	120
DSA for AGRITEX and DR&SS experts	150	per season	150
Total cost per season			1590
Total Cost for two seasons			3180

Sesame			
Costs for Sesame Farmer Field School / season	Cost in USD	Unit	Total cost - Project
Fencing for 70mx70m sesame demo plot		per plot	0
Implements (such as ripper tine (using animal draught power), hoes, direct seeder, planter) and inputs (such as seeds, seedlings, fertilizer)	500	per FFS	500

Sesame seeds for demo plot	30	per demo plot	30
Complete soil analysis test	15	USD/test	15
Planting line, tape measure and spring balance	75	per FFS	75
Refreshments for meetings	N/A	Per meeting	
Refreshments for a 3 day training at the start of the season	200	per FFS	
Travel for AGRITEX & DR&SS experts (average kms@20c/km)	120	per season	120
DSA for AGRITEX and DR&SS experts	150	per season	150
Total cost per season			890
Total Cost for two seasons			1780

It is proposed that each Innovation Platform builds on the work of 3-5 FFS per platform. The FFS will then function as a learning space and over time a centre of excellence for surrounding communities. This experience may be scaled up through a second phase of FFS and outscaling of experiences in the general extension system. The detailed costing estimates may be provided upon request.

Cost for Capacity building of AGRITEX extension staff

Capacity building of AGRITEX through out project period		Year / Season 1		Year 2 / Season 2		Year 3 / Season 3		Year 4/ Season 4		Year 5 / Season 5		Year 6 / Season 6		
Capacity building for AGRITEX	Unit cost in USD	No.	Cost in USD	No.	Cost in USD	No.	Cost in USD	No.	Cost in USD	No.	Cost in USD	No.	Cost in USD	**Total Cost in USD**
Training of 9 DR&SS and Agritex staff in facilitation of IP's	8500	9	76500		0		0		0		0			76500
ToT of DR&SS and AGRITEX master corps at national and provincial level on specific IP and CSA related topics.	17625	1	17625	1	17625	1	17625	1	17625	1	17625			88125
Annual review meetings for DR&SS and AGRITEX trainers at national and provincial level	8175			1	8175	1	8175	1	8175	1	8175	1	8175	40875
Training of 137 ward level, 15 district level, 3 provincial level AGRITEX staff on specific CSA related topics.	15900	5	79500	5	79500	5	79500	5	79500	5	79500	5	79500	477000
Training of 137 ward level, 15 district level, 3 provincial level AGRITEX staff on farming as a business .	15900	5	79500	5	79500	5	79500	5	79500	5	79500	5	79500	477000
District - ward level refresher trainings	6550			5	32750	5	32750	5	32750	5	32750	5	32750	163750
Total cost			**253125**		**217550**		**217550**		**217550**		**217550**		**199925**	**1323250**

The detailed costing estimates may be provided upon request to allow for calculation of other options for numbers and phasing of AGRITEX capacity building. Costs are calculated per training/review meeting per 30 persons, except the Training of Trainers for 9 persons in facilitation of IPs.

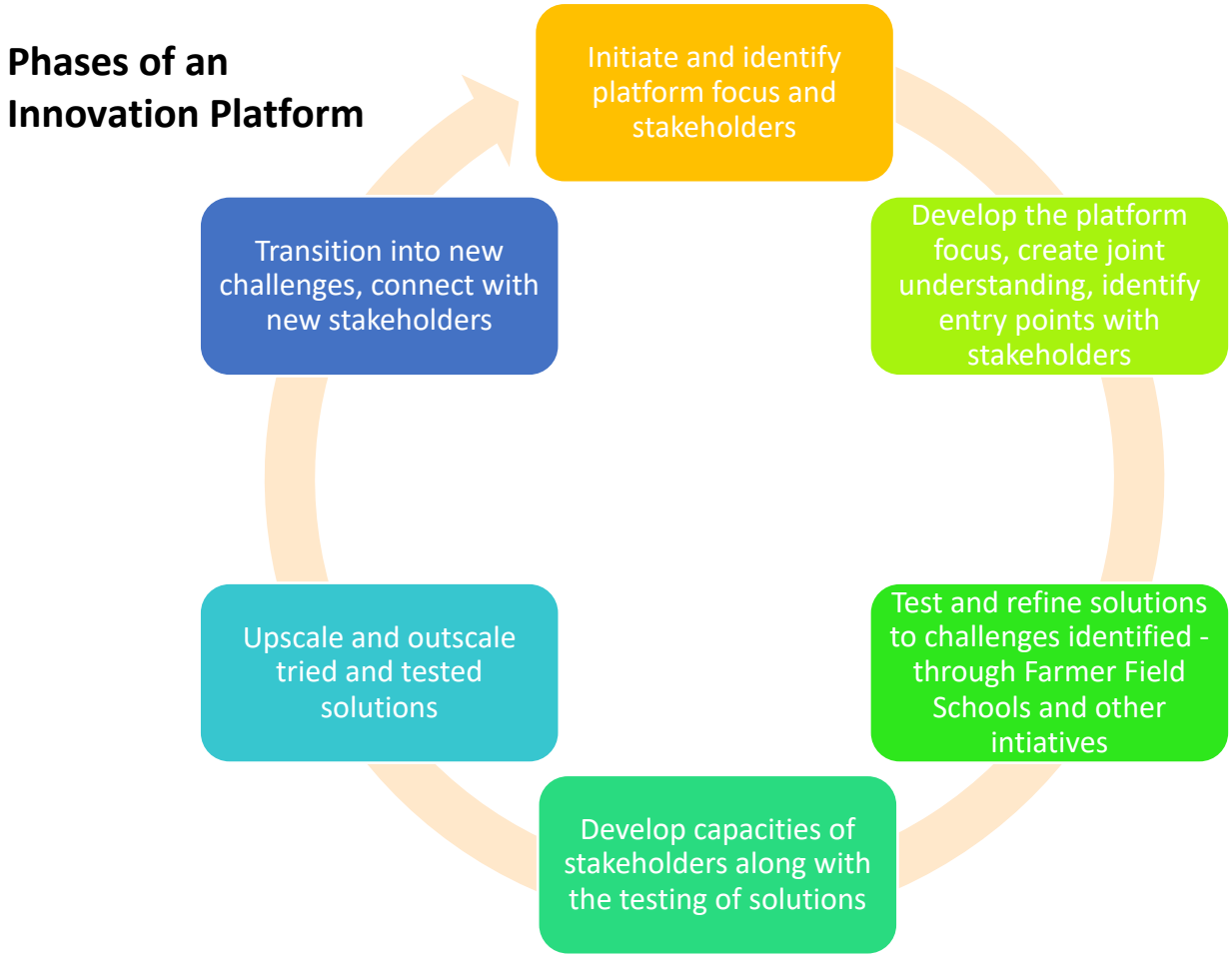

Figure 21: Source: Guidelines for Innovation Platforms in Agricultural Research and Development

Annex: Innovation Platform – key stakeholders, levels and phasing of interventions

Level	Key Institutions	Structure	Focus	Phasing of interventions						
				Y1	Y2	Y3	Y4	Y5	Y6	Y7
National and provincial level	AGRITEX DR&SS Provincial and district level stakeholders reps Private sector reps National level decision makers Farmers associations reps	Upscaling and outscaling platform	**Focus:** Integration of experiences and innovations in national level policies, in DR&SS and AGRITEX capacity building efforts, outscaling through AGRITEX extension work **Links:** Link to district level platforms.		Full funding	Full funding	Full funding	Phase out	Phase out	
District level	Research institutions (Facilitators) AGRITEX and Department of Livestock at district and provincial level AGRITEX colleges DR&SS research stations Farmers associations / groups reps Private sector players across each value chain RDC, DA and other local decision makers	Sesame IP cluster Horticulture IP Small grains-Livestock IP	**Focus:** Identify problems/challenges and find solutions to how best to integrate small holder farmers in value chains across three provinces and 3 types of climate smart value chains. The innovation platforms build on experiences from FFS and feed identified solutions into FFS practice across the three provinces. The innovation platforms may also influence district level decision making to promote solutions. **Links:** Link to FFS at ward level, other innovation platforms across districts, national level upscaling-outscaling platform.		Full funding	Full funding	Full funding	Phase out		
Ward level	AGRITEX at district and ward level Lead farmers	FFS with 30 Lead Farmers – 2 seasons per FFS	**Focus:** Train 30 Lead Farmers from 5 - 10 different communities in relevant CSA and CA practices, farming as a business related to the particular crop-livestock combination and facilitate links to markets/private sector. **Links:** Link to district level innovation platform	Full funding	Full funding	Full funding	Full funding	Full funding	Full funding	
Communities	AGRITEX at district and ward level Lead farmers Communities / beneficiary farmers	Peer learning	**Focus:** Lead farmers inspire and teach other farmers to take up climate smart agriculture practices **Links:** Link to FFS at ward level		Peer learning	Peer learning	Peer learning	Peer learning	Peer learning	Peer learning

Annex: Functions of Innovation Platforms.

Innovation platforms may support	**Relevance for the proposed project**
Knowledge generation	An Innovation Platform may function as a space for collectively identifying challenges, experimentation with solutions and development of knowledge on what works. The knowledge development happens through a participatory process, where relevant stakeholders provide a multi-facetted analysis, needs assessment and vision for solutions. In the context of small holder farmers entry into the market in Zimbabwe, there is a need engaging a variety of stakeholders to analyze the current situation, the gaps and challenges and design mechanisms to facilitate integration of small holder farmers into the market.
Facilitation of multi-stakeholder and multi-directional information flows	The Innovation platforms provide an inclusive and participatory platform for taking action and communicating with multiple stakeholders in a value chain. The platform facilitates the exchange of information, the exchange of views and allows information to spread more easily.
Creation of a momentum or increase in momentum for change	Innovation Platforms bring stakeholders to develop solutions together, on the basis of shared expectations and visions – this creates buy in from all stakeholders and legitimacy for the solutions developed. By working in a participatory and dialogical manner there is a greater chance that both private sector and smallholder farmers understand the challenges from the view point of other stakeholders, take responsibility and ownership in the process and feel motivated to take action.
Market facilitation	The Innovation Platforms may contribute to facilitate market creation, linkages and joint understanding between market stakeholders and creating trust among market agents. In the case of the ICRISAT platform on the goat value chain, the Innovation Platform helped stakeholders to find shared solutions to the bottlenecks and constraints in the goat value chain, by developing feedlots, auction spaces and improving livestock management practices.
Building entrepreneurial skills	The innovation platforms provide a space for learning and networking, deployment of new technologies, access to new markets and development of business ideas and opportunities among a wide range of stakeholders. As smallholder farmers are included in the discussions on market facilitation, meet the market players and engage in shared identification of challenges and development of solutions, individual small holder farmers and their associations are inspired and empowered to develop their farming business, rather than wait for government or NGO actors to support them with interventions.
Policy development and influencing of decision making	Innovation platforms may involve policy advocates and decision makers to sensitise decision makers on policy gaps, provide evidence for options that work and opportunities to engage with practitioners. This allows for upscaling the solutions found at local level to be integrated in policies, institutional capacity building and wider agricultural extension work.
Guidance for investment priorities	Innovation platforms engage stakeholders in prioritizing the innovation options based on preferences and expectations of stakeholders as well as cost effectiveness of interventions, contributing to that stakeholders take action and ownership of solutions and that the most resource efficient solutions are carried out.
Resources mobilization	As an innovation platform brings together a variety of stakeholders, the platform may also function as a space for diversified resource mobilization (financial, human, social and physical resources).

Annex: Suitability of crops and marketing options per target district

Suitable / known market
Unknown suitability/ Unknown market
Not suitable / No market

Overview of suitability of crops per district and identified markets[142]

	District														
Crop Horticulture	**Buhera**	**Chimanimani**	**Chipinge**	**Bikita**	**Zaka**	**Chivi**	**Chiredzi**	**Masvingo**	**Mwenezi**	**Beitbridge**	**Gwanda**	**Insiza**	**Mangwe**	**Matobo**	**Umzingwane**
Butternut															
Chilies															
Green Mealies															
Leafy veg (no cabbages)															
Cabbages															
Onions															
Sugar beans															
Tomatoes															
Seeds															
Fruits	**Buhera**	**Chimanimani**	**Chipinge**	**Bikita**	**Zaka**	**Chivi**	**Chiredzi**	**Masvingo**	**Mwenezi**	**Beitbridge**	**Gwanda**	**Insiza**	**Mangwe**	**Matobo**	**Umzingwane**
Banana	Suitable - but issues with market linkages														
Citrus															
Small grains	**Buhera**	**Chimanimani**	**Chipinge**	**Bikita**	**Zaka**	**Chivi**	**Chiredzi**	**Masvingo**	**Mwenezi**	**Beitbridge**	**Gwanda**	**Insiza**	**Mangwe**	**Matobo**	**Umzingwane**
Div. small grains															
Sesame	**Buhera**	**Chimanimani**	**Chipinge**	**Bikita**	**Zaka**	**Chivi**	**Chiredzi**	**Masvingo**	**Mwenezi**	**Beitbridge**	**Gwanda**	**Insiza**	**Mangwe**	**Matobo**	**Umzingwane**
Sesame															

[142] As validated through provincial workshops with provincial and district level AGRITEX, DoI staff, district level farmers groups and local research/academic actors, June 2017. A more detailed list of proposed market players is included in the consultation records.

Livestock	Buhera	Chimanimani	Chipinge	Bikita	Zaka	Chivi	Chiredzi	Masvingo	Mwenezi	Beitbridge	Gwanda	Insiza	Mangwe	Matobo	Umzingwane
Goat															
Cattle															

Annex: Livelihood Zones in Southern Zimbabwe

The ZIMVAC Livelihood Zones Assessment 2011 charactarized livelihood zones across Zimbabwe. See below for a brief description of livelihood zones across the proposed project target areas.

Area and color code, as per ZIMVAC 2011 assessment	**Districts covered**	**Description of livelihoods zone.** Source: ZIMVAC Livelihood Zones Assessment 2011
ZW 18 - Matabeleland Middle Veld communities.	The zone covers low lying areas and some mountainous parts of the Matobo, Gwanda, and Umguza, Bubi, Umzingwane, Insiza and Mberengwa districts.	Livelihoods in this zone are mainly characterised by animal husbandry (small and big livestock) and rain-fed cultivation of maize, sorghum, pulses and sweet potatoes. Poor farmers depend partly on their own crop production and to a larger extent on cash income earned from local and cross border employment, trade, beer brewing or gold panning on the various rivers.
ZW 24 - Southern Cattle and Cereal Farming	This livelihood zone spread across 15 districts, incl. Mangwe, Matobo, Gwanda, Beitbridge, Mwenezi	This is a predominantly mixed farming area with cereal cropping and cattle ranching. The majority of farmers are A1 and A2 farm beneficiaries, who will not be targeted by the proposed project. Production of maize, sorghum, and groundnuts, round nuts, cowpeas and sweet potatoes is moderate. This is a food secure zone.
ZW 20 - Mwenezi, Chivi and South Midland Communal	This zone covers communal lands across the districts of Mwenezi, Chivi, Southern Mberengwa and Western Masvingo.	Small holder farmers combine cereal and cash cropping with livestock production and market purchases. Casual work opportunities are found on plantations, estates and mines within the zone as well as further afield. Crop production is a precarious venture in this lowland area and the zone is an area of chronic poverty and food insecurity.
ZW 02 - Beitbridge South-Western Lowveld Communal	The zone shares the border with South Africa and Botswana in the southern parts of Beitbridge, Gwanda, Matobo, Mangwe, and Chiredzi districts	Semi-arid zone heavily dependent on livestock production as harsh climatic conditions restrict crop production activities. Employment is also a key source of food and cash income. Proximity to A2 farms, commercial estates and job markets around the border with South Africa and Botswana provides employment opportunities. Sorghum cropping, mopane worm sales and gold panning supplement wage earnings of the poor.
ZW 03 - Bikita Zaka Highlands	This zone covers communal lands in the north-east of Masvingo, Zaka north and Bikita west districts.	Semi-Intensive farming region. Maize and groundnuts provide better-off farmers with a stable source of food and cash income. Poor farmers tend to combine maize and agriculture labour opportunities with (limited) gold panning and local employment (such as in the Bikita mines). The area has fertile soils, with potential for improved crop production. High population density and small farm sizes are the biggest constraints to increased crop production.
ZW 17 - Masvingo, Manicaland Middleveld	This zone stretches across Buhera, Bikita, Zaka, Masvingo districts, among others.	Livelihoods in this zone are characterised by cereal agriculture supplemented by cash cropping (groundnuts, round nuts and cotton), animal husbandry and remittances from migratory labour. A number of other income sources help the poor make ends meet

Smallholder		including: sales of wild fruits and vegetables, gold panning, legal gold and diamond mining, sales of beer and handicrafts, cross border trade and casual labour.
ZW 23 - Save River Valley and Ndowoyo Communal	The zone is located in south-eastern Zimbabwe, covering parts of Chipinge, Chiredzi and Bikita districts.	This dry, lowland area is primarily agricultural. Households grow mainly small grains (sorghum and millet) as well as maize and groundnuts. The zone has good soils but cropping is limited by erratic rainfall. Consequently, cash income earned through seasonal casual work, petty trading and the sale of handicrafts, goats and some cotton is fundamental to the food economy. Remittances are also important.
ZW 13 - Irrigated Commercial Sugar and Fruit Farming	South-eastern Zimbabwe, mainly Chiredzi	Livelihoods for small holders in this arid zone are based on livestock and cereal production. Cereal production is primarily small grains, and legumes such as groundnuts, round nuts, and cowpeas. Maize is also widely grown, despite the harsh climatic conditions. Cotton is the main cash crop, which is supplemented by income from animal husbandry. Residents of this zone also include households who live and work permanently on the irrigated commercial sugar and fruit estates in Triangle and Hippo Valley, as well as some small-holder (A1) resettled farmers (not targeted in this project proposal). The commercial farm workers depend on wage earnings and petty trade income to secure their food needs.
ZW 07 - Eastern Highlands Commercial Farming	The zone covers parts of Nyanga, Chimanimani, Chipinge and Mutasa districts of Manicaland Province.	This high potential zone produces fruit, vegetables, flowers, tea, coffee and sugar cane for export. Timber is an important industry in this rugged, forested Highveld zone. Both the commercial farms and the saw mills offer labour opportunities to poor farmers as well as to farm-workers (who often need to pick up additional work to supplement on-farm income).
ZW 08 - Eastern Highlands Prime Communal	This livelihood zone is in Manicaland province and covers Nyanga, Mutasa, Chimanimani, and Chipinge districts.	This is a high potential zone where the greater part of available land is classified as some of the most productive communal land. It is characterized by intensively farmed small plots of mixed food and cash crops. Maize is primary but crop diversity is a key feature here (cereals, root crops, fruits, tea/coffee, tobacco). Poor farmers find wage work locally in the commercial agriculture sector.