

Zimbabwe GCF Proposal Preparation – Agricultural Value Chain Identification and Analysis (D10)

**Project Short
Name:**

Feasibility study: Agricultural Value Chains

Project No:

6924-EE11

Date:

12th January 2017

Version #: Final

Date: 12/01/2017

Lead Author: and Elton
Mudyazvivi and Andrew
Ward

QA'd by: Alex
Elphinstone

Disclaimer

The British Government's Department for International Development (DFID) financed this work as part of the United Kingdom's aid programme. However, the views and recommendations contained in this report are those of the consultant, and DFID is not responsible for, or bound by the recommendations made.

Acknowledgements

We would like to acknowledge the major support of the VUNA, CRIDF and UNDP teams, our support from Assah Mudhefi (AGRITEX, Ministry of Agriculture), Keith Makurira (Ministry of Environment, Climate Change Management), Misheck Rupfutse (Dept. of Irrigation, Ministry of Agriculture), Tatenda Mutasa (Ministry of Environment, Climate Change Management) in planning and implementing the field work. The team are incredibly grateful to all who gave up their time to provide us with information.



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Acronyms

Acronym	Long Form
ACF	Action Contre la Faim
ACHD	Africa Centre for Holistic Development
AfDB	African Development Bank
AIDS	Acquired Immune Deficiency Syndrome
ASF	African Swine Fever
AMA	Agriculture Marketing Authority
BIZ	Bio-Innovation Zimbabwe
CA	Conservation Agriculture
COMESA	Economic Community of East and Southern Africa
CRIDF	Climate Resilient Infrastructure Development Facility
CSA	Climate Smart Agriculture
DFID	Department for International Development
DR&SS	Directorate of Research and Specialist Services
EU	European Union
FAO	Food and Agriculture Organisation (of the United Nations)
FGD	Focus Group Discussion
FMD	Foot and Mouth Disease
MFCC	Masvingo Food Commodities Cooperative Ltd
GBV	Gender Based Violence
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HIV	Human Immunodeficiency Virus
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IETC	Import Export Trading Company
IIED	International Institute for Environment and Development
ILRI	International Livestock Research Institute
LMAC	Livestock Meat Advisory Council
NRM	Natural Resources Management

PPP	Public Private Partnership
SNV	Netherlands Development Organisation
ToRs	Terms of Reference
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
ZAIP	Zimbabwe Agricultural Investment Plan
ZIMAsset	Zimbabwe Agenda for Sustainable Socio-Economic Transformation
ZIMVAC	Zimbabwe Vulnerability Assessment Report

Executive Summary

The proposed project entitled “Building climate resilience of vulnerable agricultural livelihoods in three river basins in southern Zimbabwe” is intended to build resilience through agricultural livelihoods of vulnerable communities, particularly women, in southern Zimbabwe in the face of increasing climate risks and impacts. The expected outcomes of the project are increased resilience and enhanced water and food security of the most vulnerable in the region. It is envisaged that the project will contribute to the national priorities in the National Climate Change Response Strategy.

This report identifies priority value chains in climate change-affected Southern Provinces of Zimbabwe and provides an analysis of how they could be strengthened to particularly benefit women and the vulnerable. The value chain analysis is one of six feasibility studies being conducted in order to prepare a project proposal aimed at *Building climate resilience of vulnerable agricultural livelihoods in three river basins in southern Zimbabwe* to be submitted to the Green Climate Fund (GCF). The three river basins are the Save, Umzingwane and Runde in three provinces, namely Manicaland, Masvingo and Matabeleland South. Targeted districts in each province are: Manicaland province: Buhera, Chimanimani and Chipinge Districts; Masvingo Province: Bikita, Zaka and Masvingo; and Matabeleland South Province: Beit Bridge, Gwanda and Insiza districts. This study analysed the following irrigation schemes in these districts: Shashe, Mushandike, Rozva, Chibuwe, Mutema, Nyanyadzi, Kufandada and Mhakwe.

Populations in these locations are, typically, food insecure. Land in Zimbabwe is divided into five agro-ecological regions and the majority of land in the target areas lies within Agroecological Regions IV or V experiencing low rainfall (<650mm/yr) which is often erratic and has a high likelihood of droughts. Consequently, farming systems are limited in the options available, they rely on cattle and goat production and the cultivation of maize, cotton, small grains. Irrigation has enabled the cultivation of horticultural crops but management of irrigation schemes has been an issue. Climate vulnerability in these areas, already high, is being exacerbated by climate change. Climate change is already manifest through erratic rainfall, droughts, increased temperatures and floods, all of which affect agricultural production. Other factors affecting the agricultural systems include the economic migration of men away from rural communities and the land reform which has affected value chains, especially of livestock.

The study is based on information sourced from a literature review, nine days of fieldwork based around key informant interviews and focus group discussions as well as discussions during report writing. The study was not exhaustive but does identify entry points that would need to be expanded with user-centric, value-chain strategies development during the inception phase of the proposed Green Climate Fund (GCF). It recommends focussing on four value chains: irrigated crops, sesame, small grains and livestock. The rain-fed commodities (including livestock) have higher levels of drought and heat tolerance than other crops. Sorghum and millet (small grains) are traditional drought and heat tolerant crops, which offer excellent nutrition and good storage. FAO recommend their cultivation in Agroecological Regions IV and V. Government policies and farmer preferences have

historically favoured maize but with the effects of climate change, and market linkages for grain (and even stover) being developed, these cereals provide an opportunity to develop climate resilient and equitable staple crop value chains. Sesame is a drought resistant crop which has started to be commercialised by smallholder farmers in dry regions in partnerships with the private sector and driven by export markets mainly in Asia. Sesame is widely known as a traditional subsistence crop, but is increasingly replacing cotton as a commercial crop which reduces the burden of farm labour on women. There are challenges of input supply, production management and market linkages. However, support to private sector and farmer associations that are championing the commercialisation of sesame can improve scale, productivity and incomes. There will also be benefits of working with a crop which does not have pre-existing negative gender norms.

Irrigation schemes have been problematic but they do provide the reliability of water supply and enable out of season cultivation although irrigation does not address problems caused by heat or flooding. Currently, irrigation schemes are functioning well below their potential, which requires a focus both on improved management and improved market linkages. There is some good practice from the Savi and Runde watersheds that should be built on¹. Women comprise a significant number of farmers engaged in the schemes. Horticultural crops have a higher value per acre and have significant potential for value addition for both internal and external markets. Livestock value chains have thoroughly changed in the wake of the land reform programme. Livestock production interacts with crop production, and livestock play a multi-faceted role towards increasing resilience of smallholder farming systems through labour, soil management, fodder, nutrition and income. Livestock are not enclosed during the day, when adverse weather affects the vegetation and they travel greater distances in the search for food, as long as water is still available. With an increasing number of female-headed households and changes to inheritance laws, gender norms that previously constrained women's engagement in livestock management, ownership and decision making in the value chain, are starting to change, allowing women greater involvement.

The study also identified a number of cross cutting issues, consideration of which will be critical to the achievement of the proposed GCF project. Two key areas were gender and climate resilience. Activities to address social power imbalances and engage value chain actors in responding to climate change (particularly drought, heat and floods) will be core to the proposed interventions. Related to these is the cross-cutting issue of behaviour change, which is often assumed but not so commonly achieved by projects. The proposed project will need to work with all partners to ensure that behaviour change is acceptable and is given sufficient support, e.g. in terms of knowledge increase, access to inputs etc. Agriculture depends on balance with the natural environment, and bringing Natural Resources Management (NRM) in farm management practices into the project will help to address factors that can exacerbate the impact of climate change.

¹ http://www.fao.org/nr/water/aquastat/countries_regions/ZWE/index.stm

A key issue for the team was how, through deploying a value chain approach, sustainable and scalable change could take place which would improve the livelihoods of poor (amongst others) actors in agricultural commodity value chains. The GCF project needs to avoid the fate of other projects, which have not achieved sustainable success, e.g. have required additional projects to rehabilitate infrastructure. There are some programmes underway which are already showing positive outcomes in terms of value chain development, these include the DFID funded Livelihoods and Food Security Programme, the USAID funded Amalima² ENSURE³ and Feed the Future Livestock Development project⁴, and the UNDP Zimbabwe Resilience Building Fund⁵, as well as the activities of organisations like Bio-Innovation Zimbabwe. The study recommends that the GCF proposal link with these programmes to identify scale up those aspects that have been successful (including those identified here-in) and synergies and implement coordinated and cohesive activities to strengthen value chains in the target areas.

The study recommends that the GCF proposal incorporate a participatory approach with a broad vision to address agriculture in the three river basins (at scale). The complexity of the agricultural systems is being partly addressed through the six feasibility studies and at least initially this breadth of vision should be maintained to ensure the key issues are addressed.

² <https://www.cnfa.org/program/amalima/>

³ <http://www.wvi.org/food-assistance/ensure-zimbabwe>

⁴ <http://www.fintrac.com/projects>

⁵ <http://reliefweb.int/report/zimbabwe/zimbabwe-overview-technical-analysis-zimbabwe-resilience-building-fund-april-2016>

Table 1: Recommended GCF Investments

Value Chain with Climate risk and resilience	Project Goal for Value Chain	Biggest Value Chain Constraints	Recommended Activities to Overcome Constraints	Key Partners (identified to date)	Key beneficiaries	Recommended Budget (estimate)
<p>Irrigated Horticulture</p> <p>Drought and dry dekads</p> <p>Flooding and heat risks.</p> <p>Flooding will be addressed through NRM</p> <p>Heat will be addressed through heat tolerant varieties</p>	Develop smallholder capacity to exploit market opportunities in the horticulture sector	<p>1. Limited capacity to produce to market requirements.</p> <p>2. Smallholders disconnected with formal market, and confined to inefficient informal markets with limited market information</p> <p>3. Lack cold chain</p> <p>4. Limited management capacity (production and logistics)</p>	<p>1. Expand irrigation capacity, reliability and cost efficiency (reliable and energy efficient water pumping systems).</p> <p>2. Build production capacity of farmers on horticulture for higher productivity (include start-up input packages for 0.2ha/farmer at US\$250 each)</p> <p>3. In-depth market linkage assessment and facilitation</p> <p>4. Provide market</p>	<p>Private sector: Matanuska, MFCC, Best Fruit Processors, Cairns Foods⁶.</p> <p>Beitbridge Juicing Company</p> <p>Government: AMA, AGRITEX training department,</p> <p>Development organisations: SNV, CESVI (citrus development)</p> <p>FAO Smallholder Irrigation</p>	<p>2,000 women⁷ and men irrigators by participating in high value markets</p> <p>4,000 women and men irrigators by participating in formal markets</p> <p>2,000 non-irrigators adjacent to irrigation schemes and small informal traders (mostly women)</p> <p>100 young women and men horticulture company workers</p>	<p>Irrigation rehabilitation - to be determined (Not including irrigation infrastructure)</p> <p>-Revolving credit for inputs starter packs (at US\$ 250 for a 0.2 ha) US\$ 500,000</p> <p>Training irrigators, non-irrigators and extension agents, marketing committees US\$120,000</p> <p>PPP investments in marketing</p>

⁶ The Cairns Mutare Factory Manager and Buyer requested their inputs to be regarded as unofficial. The consultants were unable to meet the CEO despite efforts to do so.

⁷ Note that these figures are for the ten irrigation schemes originally mentioned at inception of this study. Number of households per schemes, benefitting from irrigated horticulture, was estimated at 200 households per scheme on average.

			<p>information service to farmers.</p> <p>5. Develop a competitive matching grant facility for stimulating private sector investment in supply chain management infrastructure e.g. refrigerated trucks</p> <p>6. Establish a special plantation crops facility (loan) to fund to setting up of smallholder banana and citrus plantations</p>	Programme,		<p>infrastructure- US\$2.3M as follows:</p> <p>-10 Competitive matching stimulus investments US\$ 500,000</p> <p>-Enabling infrastructure (pack and storage shades, crates, tables for vendors) at schemes US\$100,000</p> <p>Development of Management information system, US\$200,000</p> <p>Special sectors development investment(Banana and citrus development) \$ US1.5M</p> <p>Total horticulture: US \$2.92M</p>
Sesame	Scale up the commercialisation of sesame for the local and export market	<p>Productivity is still below long term viability</p> <p>Market linkages are still thin on the ground with small, isolated pockets</p>	1. Facilitate delivery of extension training on best practices to farmers (using both public and private extension)	<p>Private sector: Export Trading Group and Sidella Trading.</p> <p>Farmer associations:</p>	<p>15,000 women and men dryland farmers</p> <p>Baking industry companies/sesame</p>	<p>Investment in start-up inputs for contract farming at US\$100/farmer per ha, US\$500,000</p> <p>Producer services</p>

		<p>of production and contract schemes</p> <p>Seed is not available outside contract farming</p>	<p>2. Partner sesame buyers to mobilise and link new sesame producers in the project area based on contract farming investment concessionary facility</p> <p>3. Strengthen producer coordination through associations</p>	<p>Sesame Association, ZFU</p> <p>Government: AGRITEX, DR&SS</p> <p>NGOs: SNV, Financial Services: ZADT, CABS microfinance</p>	<p>importers</p> <p>Small scale sesame graders</p>	<p>support through training of 600 groups in form of allowances for sesame extension staff at <u>USD100,000</u></p> <p>Producer group managed grading machines US\$ 300,000 Total sesame: US\$0.9M</p>
Small Grains	Establish partnerships for improved production and market linkages for small grains	<p>1. Focus on maize</p> <p>2. Poorly established markets</p> <p>3. Lack of value addition</p>	<p>1. In-depth niche analysis</p> <p>2. Analyse input, output markets and value addition and support clear opportunities for strengthening</p> <p>3. Machine thrashing and</p>	<p>BIZ, ICRISAT, Ministry of Women's Affairs, Paul Muchineripi (independent), CARE, CAFOD, CRS. World Vision, Save the Children (UK), Action Contre la Faim (ACF),</p>	<p>20,000 women and men dryland farmers</p> <p>200 dehullers</p> <p>Millers, bakers, consumers</p>	<p>Market linkage strengthening US\$1M. This includes introducing commercial sorghum/multi-crop thrashers and dehullers through local entrepreneurs [on hire purchase arrangement] at</p>

			dehulling to reduce soil particles in the grain 4. Introduce improved storage technology such as PICS ⁸ bags (locally available)	Christian Aid and Concern Worldwide, seed companies, Delta		US\$5,000/Machin and PICS bags at \$3.50 per bag. Total small grains, US\$1M
Livestock	Develop more equitable relations in the improved management and marketing of livestock	1. Stock levels higher than carrying capacity due to degeneration of veldt 2. Lack of fodder available 3. Market linkage inefficiencies	1. In-depth niche analysis. 2. Commercialisation of feed production 3. Improved livestock management 4. Facilitate scaling up of community managed feedlots (US\$50,000/Feedlot that takes 50 cattle at a time) 5 Build capacity of community to manage feedlots	LMAC, Heifer International, DR&SS, ICRISAT, ILRI, Bulawayo Leather Cluster, Bulawayo Abattoirs, M&C meats	10,000 women and men cattle and goat keepers Consumers Leather workers, farmers growing fodder	Improved livestock management training of livestock groups and paravet system to serve 600 groups, including para-vet starter kits US\$ 300,000 10 Community grants for community managed feedlots, US\$500,000 Training on market linkages and feedlot management US\$200,000

⁸ PICS (Purdue Improved Crop Storage) bags are a simple low-cost storage bag meant to reduce post-harvest losses due to bruchid infestations.

			and strengthen linkage with abattoirs			Total livestock, US\$1M
Cross cutting issues: Gender	Gender equitable benefits from the project	Gender inequalities restrict household efficiency	Gender mainstreaming and gender and youth transformative approaches. This is targeted at children of irrigators who have no access to land but are living in and around irrigation schemes	Ministry of Women's Affairs, consultants, NGOs	100,000 women and household members who can't depend on the limited irrigated landholding and would like to venture into other enterprises like trading and micro-processing	Specific training targeted on women and youth entrepreneurship US\$500,00
Behaviour Change	Project achieves behaviour change and understands how it is achieved	Many projects fail, post funding, as true behaviour change has not been achieved	Building on past success in terms of behaviour change	Paul Muchineripi Programme Management	All project beneficiaries	Learning and monitoring: US\$300,000
Scale	Maximising the scale at which outcomes are achieved	There are many who need support but a limited number of actors and number of direct beneficiaries	Building on current or previous change dynamics requiring an understanding of these	Programme Management, Ministry of Environment	Indirect beneficiaries	Learning and facilitating scaling out: US\$200,000
NRM	Building environmental sustainability	Environmental shocks such as floods and droughts can	Land use management, deforestation, water	Programme Management, Ministry of Environment	All project	Training and consultancy to address issues, particularly around irrigation schemes: US\$300,000

Financial Services	(irrigation water) and flood avoidance into the project Ensuring that beneficiaries are able to access and manage finances	exacerbate the effects of climate change (such as rising temperatures) on farmland. Lack of access for those who most need financial services	management Actively linking farmers and value chain actors with financial service providers	including NGOs, Quest	beneficiaries Actors throughout value chain	Investing in enabling Financial Service providers to support entrepreneurial beneficiaries trained above: US\$200,000
Cross cutting market linkages and market information organisations	Timely availability of right market information for quality decision- making by farmers	Current production and supply are not informed by market demand trends	Partner with a market information service provider to serve targeted value chain actors	Not spoken to but key actors are Esoko, Eco-Farmer, BIZ, Fintrac, SNV, Heartland Global,	150,000 farmers and processors	Total cross cutting issues, US\$1.5M
Total						US\$8.32M

The proposed project will be managed by the public sector but requires a high level of engagement with the private sector for its success. Therefore, it is recommended that investments are made in strengthening the relationship between the public and private sectors at the beginning of this project. It is also recommended that an inception phase be implemented in which start-up activities are planned in a participatory manner, taking into account the experience of other initiatives. Activities will need to address production, marketing and value addition elements of the value chain.

Climate resilience will be incorporated through consideration of Climate Smart Agriculture (CSA), including Conservation Agriculture, Land and Water Management, heat and drought tolerant varieties and breeds, and fodder production. Improved storage should be considered, particularly where high temperatures affect perishable crops in storage. Women face gender constraints which affect their ability to invest in productive activities, make decisions in productive activities and control assets and incomes. It is recommended that all value chains are underpinned by gender analysis and participatory engagement conducted to review negative gender norms and alternative behaviours.

In addition to CSA, improved production also requires improved management (irrigated horticulture and livestock), improved input supply (all value chains) and improved information flows (all value chains). Marketing will be based on the strengthening of linkages between formal private sector purchasers and small scale producers, building on successful models to establish effective and equitable market chains. Value addition will explore current and potential opportunities and link with ongoing initiatives to bring equitable benefits for those engaging in the value chain.

The cross-cutting issues underpin the success of the proposed project, particularly in terms of scale and sustainability. Genuine behaviour change is required to ensure that benefits are ongoing. Too often once a project ends farmers return to traditional practices. To avoid this the project will work closely with farmers (and other actors) to understand behaviour change and what needs to be in place to enable farmers to adopt new practices. Financial services are highlighted as a factor that enables farmers and value chain actors to adopt new approaches. Behaviour change will need to include those behaviours focused on achieving sustainable natural resources management such as water utilisation, which would undermine the viability of the value chains, particularly irrigated horticulture. The project will need to focus on pilot sites which should include Mushandike, Rozwa, Chibuwe, Mutema and Shashe. But from the its beginning there should be a plan developed for achieving impact at scale.

The Save, Umzingwane and Runde river basins provide the geographical focus for the proposed project. Farming systems in the river basins are similar, with livestock and small grain production being suited to all areas. As sesame is a new crop in many areas, its ability to be cultivated will need to be tested. Irrigated horticulture will be focussed on irrigation schemes. To achieve project successes, it is advised that initial activities focus where there are partners who, it is felt, have a good chance of achieving success (e.g. based on track record, future plans etc). Locations which only receive support from organisations that have a poor record of achieving agricultural development should not be ignored, rather focussed on later when successes from initial areas can be brought for replication.

1 Introduction

1.1 Purpose

The purpose of this study is to undertake value chain strategic preparation for the proposed project, *“Building climate resilience of vulnerable agricultural livelihoods in three river basins in southern Zimbabwe”*. The specific objectives of the study are fourfold:

- To identify and select 3-4 value chains that can be viable, inclusive (women and youths) and resilient in the face of climate change.
- To analyse the selected value chains from commercial, climate change, gender, youth and livelihoods considerations.
- Determine the value chain and enabling environment opportunities and constraints.
- Identify and recommend development strategies for building resilient and equitable value chains for improved livelihood security of the poor in Southern Zimbabwe.

1.2 Context

Map 1: The Main Rivers of Zimbabwe



Map 2: Districts of Zimbabwe



The proposed GCF project will focus on three river basins in Southern Zimbabwe, namely the Save, Umzingwane and Runde. The project will work across 50 schemes across three provinces: Manicaland province, Masvingo Province Matebeleland South Province. These targets areas were selected based on the level of vulnerability to climate variability and climate change.

Map 3 shows that the proposed project will predominantly lie in natural areas IV and V. These are described thus⁹:

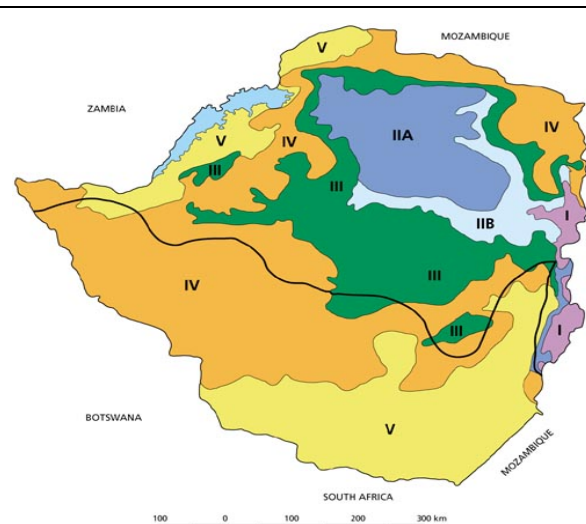
Agroecological Region IV (semi-arid) is located in the low-lying areas in the north and south of the country. The characteristics of the region are: annual rainfall of 450-650 mm, severe dry spells during the rainy season, and frequent seasonal droughts. Although NR IV is considered unsuitable for dryland cropping, smallholder farmers grow drought-tolerant varieties of maize, sorghum, pearl millet (mhunga) and finger millet (rapoko). NR IV is ideally suitable for cattle production under extensive production systems and for wildlife production.

Agroecological Region V (arid) covers the lowland areas below 900 m above sea level in both the north and south of the country. The rainfall is less than 650 mm/year and highly erratic. Although NR V receives reasonable rainfall in the northern part of Zimbabwe along the Zambezi River, its uneven topography and poor soils make it unsuitable for crop production. Generally, NR V is suitable for extensive cattle production and game-ranching.

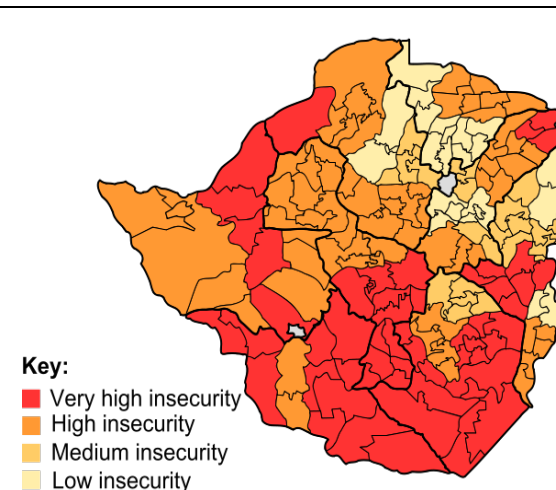
The targeted provinces largely lie in NR IV and V agro-ecological zones. Although these regions are too dry for crop production, households on the communal lands in these regions grow grain crops (maize and millet) for their food security and some cash crops such as cotton. There are also numerous irrigation schemes which were developed in the past as a strategy to ameliorate the low rainfall. Outside irrigation schemes, crop yields are extremely low and the risk of crop failure is high in one out of three years. Cattle and goat production are major sources of cash income.

⁹ <http://www.fao.org/docrep/009/a0395e/a0395e06.htm>

Map 3: Agroecological Regions in Zimbabwe



Map 4: FAO map (2008¹⁰) of food insecurity in Zimbabwe.



Over 70% of the Zimbabwean population is directly or indirectly dependent on agriculture for their livelihoods. There has been a fundamental change in Zimbabwean rural value chains over the last sixteen years. The Fast Track Land Reform Programme¹¹ has led to a significant shift to many more, smaller-scale farms focussing on mixed farming with low levels of capitalisation. In Masvingo Province, the new resettlements cover 28% of the land area, with 1.2 million hectares being small-scale A1 settlements (average size 37 hectares), while a further 371,500 hectares are devoted to A2 farms (average size 318 hectares)¹². In addition, hyperinflation, capital constraints and government controls on markets for some commodities have led to sharp falls in production and a collapse of the rural market economy. Most the households, especially in the targeted region, are excluded from the formal value chains and participate in inefficient informal markets, reducing their viability and resilience. This is against a backdrop of a decline in Zimbabwe's real GDP by more than 71% between 2000 and 2008, with overall agricultural production declining by 30% over the same period. Worsening climatic conditions, attributed to climate change, will further alter the nature of agricultural value chains, particularly in the provinces chosen for the proposed GCF project.

¹⁰ https://commons.wikimedia.org/wiki/File:Food_insecurity_in_Zimbabwe.svg

¹¹ The Fast Track land Reform Programme of the Government of Zimbabwe began in 2000. Through the division of 4,500, previously commercially run large scale farms, it has allocated over 7.6 million hectares of farmland (20% of the country) to over 145,000 farm households.

¹² <http://zimbabweland.net/Zimbabwe's%20Land%20Reform%20Booklet%20Web.pdf>

With such a fundamental shift in agricultural production and marketing, coupled with the worsening negative impacts of climate change, holistic approaches, such as those offered through focussing on climate-resilient value chains, are necessary to revitalise the performance of the agriculture sector and secure livelihoods of the poor in the targeted areas. The value chain vision needs to be broad to consider issues of equality – particularly against a background of unequal gender relations and social structures, issues of natural resource management (NRM) and drivers of behaviour change in farmers and other actors within the system (e.g. incentives for farmers to adopt different practices, for the private sector to target different populations etc.). Climate resilience is essential and needs to reflect that there is going to be a permanent change in climate and farmers need to be empowered to respond to this through the provision of knowledge and appropriate services. Related to this is the issue of sustainability, particularly in terms of irrigation with community schemes requiring rehabilitation and financial support. Sustainability of irrigation investment is hinged upon the viability of the agricultural production and marketing activities that the irrigation schemes will give rise to.

1.3 Climate Risks and Impacts

2016 was the hottest year on record, the third consecutive year in which a new record was set (UN). Drought, heat and floods are the major climate risks in the project area. *‘Climate records demonstrate that Zimbabwe is already beginning to experience the effects of climate change, notably rainfall variability and extreme events. These conditions, combined with warming trends, are expected to render land increasingly marginal for agriculture, which poses a major threat to the economy and the livelihoods of the poor due to Zimbabwe’s heavy dependence on rain-fed agriculture and climate sensitive resources. It is expected that farmers, who represent approximately 62 per cent of the total population, will bear disproportionate impacts due to their limited adaptive capacity. Consequently, climate change poses a major threat to sustainable development at the micro and macro levels’ (IIED 2012)¹³.* As agricultural systems stand, climate change could devastate the rural economy, but such adversity can be used as a catalyst for change and strengthening agricultural value chains.

1.4 Previous Work and Baseline

During the fieldwork, it became clear that there are a number of current projects which are operating in similar geographies and subject matter (climate change, market linkages etc.) to the proposed GCF project. Such a situation presents significant opportunities for cost savings in terms of baseline data collection and experience sharing so as to swiftly move to effective implementation approaches. However, multiple projects can stretch the resources of partners and can cause confusion where different approaches are implemented. Therefore, it is strongly recommended that the implementation team invest in understanding the niche currently occupied by other projects and, working with the managers of these projects, to agree on the proposed GCF project niche that will maximise the synergies

¹³ IIED (2012) Climate change impacts, vulnerability and adaptation in Zimbabwe <http://pubs.iied.org/pdfs/10034IIED.pdf>

between the projects and in doing so maximise impact. Such projects and studies are set out below. What is omitted are the relevant strategic documents of the Government of Zimbabwe.

Projects with agricultural productivity and access to market objectives

The **Livelihoods and Food Security Programme** (DFID funded, FAO implemented), (2014-2018) focuses on poverty reduction, through addressing specific constraints that smallholder farmers, particularly women, face in boosting agricultural productivity and gaining full access to market systems. It focuses on three Provinces, one of which is Manicaland. Its key objectives are:

1. Boosting short-term employment opportunities through safety-net programmes that will help women and men improve nutrition and invest in their farms;
2. Improving irrigation infrastructure;
3. Linking smallholder farmers with markets;
4. Providing enabling environments through policy support and encouraging public and private investments; and,
5. Increasing agricultural production and productivity of nutritious foods.

This project also works on small grains and livestock.

Zimbabwe Agricultural Income and Employment Development (2010-2015) provided seeds, plants, fertilisers, affordable loans and training on a cost recovery basis to help farmers commercialise their production. The program also provides training and technical assistance to improve food security and increase household incomes of small-scale farmers throughout Zimbabwe. Through its four agricultural and market hubs, Zim-AIED focused on increasing productivity and market access for maize, paprika, bananas, sugar beans, export horticulture, processed products and livestock. Its work with the commercial banana company, Matanuska, is described in this report

Irrigation projects

Smallholder Irrigation Support Programme (FAO) (2013-17)

Smallholder Irrigation Revitalisation Programme – IFAD, approval achieved late 2016. Activity details not yet clear.

Rural Agriculture Revitalisation Program (SNV) – horticulture, reports incorporated into this study.

Livestock Projects

COMESA funded a leather goods value chain study in Zimbabwe led by Mr Jacob Nyathi. This provided an excellent basis for the COMESA, working with the African Development Bank to plan improvements in this often-neglected element of livestock value chains.

Zimbabwe Livestock Development Program (Fintrac)- Since July 2015, more than 2,000 farmers have received training and technical assistance on good animal husbandry practices, including fodder production. As a result, farmers have been better able to adapt

to the severe drought currently affecting much of the country. Farmers have learned to prepare nutritious feed rations for their livestock using locally available resources such as cactus, velvet beans, molasses, and maize stover. Such levels of fodder production are still low and huge demand remains unmet. This demand needs to be quantified for the different times in the year, and potential investors in fodder production need information on the potential returns on investment in this activity.

CHANGES IN THE LIVESTOCK SECTOR IN ZIMBABWE FOLLOWING LAND REFORM: THE CASE OF MASVINGO PROVINCE (IDS) work which updates knowledge on livestock value chains in Zimbabwe

Social Projects

USAID Food for Peace Programme (AMALIMA) also has a climate change focus in which it is working to strengthen communities' resilience to shocks, such as drought, by enhancing nutrition and food security, improving livelihoods and helping communities plan and prepare for disasters.

Enhancing Nutrition, Stepping Up Resilience and Enterprise (ENSURE) is a five-year program designed to improve the nutrition of women of reproductive age and children under the age of five, increase and improve agricultural production and marketing, and increase communities' resilience and response to disasters and shocks. The program will target 215,000 vulnerable Zimbabweans by 2018. To increase the acceptance of the program in the communities, they engaged with men appointing male gender champions who utilised men's fora to address gender issues.

Climate Change Research

Climate change impacts, vulnerability and adaptation in Zimbabwe (IIED)

Climate Change, Agriculture and Food Security Program (CGIAR)

2 Methodology

2.1 Study assumptions

This study makes the following assumptions:

- While access to detailed information about the financial feasibility of value chains and interventions was constrained by both the study timeline and the proprietary nature of some business information (and government held information), the study team believes that the triangulation along and across the value chain is a strong basis for estimations provided and analysis drawn;
- Value chains are influenced by a very broad set of factors which are best understood by those engaged in the value chain or experts in the disciplines involved in the value chain. The study team assumes that the reader of this report will understand that there could be additional issues, which due to time pressures were not identified and that the report will need to be validated during project inception.
- Deeper engagement with the value chain actors, mainly buyers and farmers considered within the study, will be conducted by the proposed project as part of participatory, value-

chain and market strategies development during implementation in order to be able to propose and appraise localized, specific project interventions to upgrade the proposed value chains in different areas;

- This report has been written assuming that there will be no political economy issues arising from a project led by the government effectively working with the private sector. This has not always been the case in the past and is something the implementation team will need to consider.

2.2 Value chain selection

The value chain selection commenced with establishment of criteria for value chain prioritisation, emphasising potential for commercialisation, being climate-smart, gender empowerment and poverty reduction.

A long list of fifteen value chains was made from which four priorities were selected. These were irrigated horticulture, livestock, sesame, and sorghum. The key factors for the selection and non-selection of commodities for value chain development are presented in table 2. To complement and validate the desk value chain selection, study famers and AGRITEX extension staff¹⁴ took part in a value-chain priority test of commodity priorities. More justification for the selected value chains is presented in table 3.

Table 2 Long List of potential value chain commodities

Number	Commodity	Brief justification for inclusion or exclusion
1	Dryland maize	Not selected due to low tolerance for droughts and very low potential on dryland, while low value on irrigated plots. Prices are often government controlled which limits the crop's potential for further commercialisation.
2	Sorghum	Selected for high drought tolerance as well as high food security and nutrition potential. There is also high potential for scaling up innovations in processing. The crop requires low initial investments and there is existing production capability among farmers which makes the value chain easier to develop.
3	Groundnuts	Not analysed in this report but is an oilseed crop/ livestock fodder with high potential for value chain development. There is high unmet demand locally and ready export market. New varieties of seed responding to market demand are coming on the market which gives the crop high potential for

¹⁴ Commodity priority tests were carried out with AGRITEX Director and Deputy directors in the training department at Nyanyadzi AGRITEX office and at Rozva irrigation scheme.

		future development.
4	Sesame	Selected for comparatively high drought tolerance and huge opportunities for scaling-up commercial production building on current momentum with private sector and ready and unmet local and export market demand in Asia and Europe.
5	Tomatoes (irrigated)	Not selected for bulkiness, perishability and lack of well-defined formal market.
6	Leafy vegetables and onion	Selected for high value per ha, existing production skills and availability of formal and informal unmet market demand.
7	Beans (<i>Phaseolus vulgaris</i>)	Selected but only dry beans on the basis of existing capability to produce and low levels of perishability and lower technical harvest and post-harvest management requirements. There is a ready local community (mainly institutions) and urban market demand.
8	Green mealies (irrigated)	Selected for high value and ready market in the informal sector. Crop offers opportunities for young women and men in trading and roasting with positive margins. Excess production strategically comes on to the mealie meal market during a high deficit period (January and February).
9	Citrus: oranges	Selected for future development
10	Bananas	Selected for immediate development. The crop offers high levels of profitability and ready market in the formal market, with informal market also a vibrant option. The crop represents long term investment in smallholder farming as plantations remain productive for over 15 years.
11	Potatoes; irrigated	Not selected for high cost of production required at each production cycle and high investments in technical and management capability at farmer level. There are contradictory views on the suitability of production in climatic conditions, particularly heat.
12	Sweet potatoes, dryland	Not selected. Despite being nutritious, bulkiness and perishability coupled with a fragmented marketing system increase the investments required to develop a viable and sustainable value chain are not currently present.
13	Cassava	Not selected for lack of developed market demand (both household and commercial markets).
14	Beef Cattle	Selected for its cross-cutting role (beyond a

		narrow focus on beef to include draught animal power, manure production and dairy). There are innovations to improve resilience of large livestock in dry regions such as fodder and feedlots being promoted by commercial partners.
15	Goats	Selected as a focus commodity despite undeveloped markets. Goats will be expected to ride on the back of the marketing system of large stock.
16	Poultry	Not selected for high level of investment required to build viable supply chain in remote areas and low capacity for scalability.

The final result led to the selection of the following commodities for value chain analysis:

Table 3 Justification for choice of commodity

Name of key commodity in value chain	Justification for choice of commodity
Irrigated Horticulture (vegetables, fruit, beans, green mealies, maize)	<p>Climate and Climate Change factors: In light of the increasing risks to rain-fed agriculture from climate change, irrigated crop production permits farmers to increase their food security by augmenting overall annual harvest tonnage and/or diversifying and increasing their incomes from a wider variety of crops and through the sale of crops of higher value. With increased income from non-staple, high value products, farmers are able to purchase the rain-fed staples (maize, small grains) whose production may otherwise be considered too risky given increasing droughts and dry spells.</p> <p>Irrigated horticulture offers higher returns per ha than most agricultural commodities due to higher market value and shorter cropping cycles. Horticulture is also backed by a diversified market base ranging from high value export, formal and informal urban markets, rural markets and a processing sector facing unmet demand. Seed production on irrigated lands can benefit from low prevailing pest densities enabling smallholders to act as certified seed producers (certified seed is sold at a premium). At household level, horticulture production contributes immensely to household nutrition. In terms of job creation, studies show that for every ha planted, 0.77 jobs are created (compared to 0.4 jobs per ha for the second labour intensive crop - soya beans)¹⁵ There is also potential for women's economic empowerment, for example, women were found to be active participants in irrigated horticulture at production and marketing levels. Fruit production not only presents commercial potential but from a climate mitigation angle, the trees can act as a carbon sink.</p> <p>Since annual rainfall in the target region (mainly Agro-Ecological Regions IV and V) is below 650mm and often erratic - including severe dry spells ("dry dekads") during the rainy season and almost no rains during the dry season - horticulture production has to be irrigated. Irrigation allows for year-round cultivation and compensates for drought in the rain season. However, heavy floods can damage dams and other key irrigation infrastructure. Excessive heat increases evaporation of water and prevents pollen setting as well as affecting the durability of the harvested products. Climate Smart Agriculture addresses these through focussing on innovative agro-ecological practices, natural resources management (particularly land and water) and varietal selection.</p>

¹⁵ Di Matteo, F.; Schoneveld, G.C. 2016 "Agricultural investments in Mozambique: An analysis of investment trends, business models and social and environmental conduct" CIFOR Working Paper no. 201

<p>Small grains: Sorghum (and millets)</p>	<p>Climate and Climate Change factors: Small grains are well adapted to low rainfall, and some millets have shown good recovery when rains have been so sparse that other crops e.g. maize have died. They are relatively heat tolerant and depending on their growth stage can be resilient to flooding. They can be incorporated into Climate Smart Agriculture, which offers yield and labour saving advantages over traditional agricultural techniques.</p> <p>Small grains have several advantages, particularly in comparison with maize: they are superior in terms of nutrition, require few inputs and are less dominated by male ownership (compared to maize). The value chain comprises already existing large purchasers in the brewers and to some extent the Cereal Marketing Board and at smaller scale restaurants and food vendors. The sorghum waste from brewing is nutritious for cattle as animal fodder. Also, new foods are being developed and introduced that utilise flour from small grains. The Eastern and Southern Africa Programme of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), with a mandate for small grain research, is located in Zimbabwe.</p>
<p>Oilseeds (sesame)</p>	<p>Climate and Climate Change factors: Sesame is a drought tolerant crop that requires less water than other crops such as maize and has high adaptability in different geographical sites. It is primarily a cash crop that can be intercropped with other crops including food crops like pigeon pea. In doing so, a farmer spreads her or his risks by diversifying crop production and sources of income that can be used to purchase staples like maize that are poorly adapted to increasing climate uncertainty.</p> <p>Farmers in the targeted region are familiar with sesame, albeit as a subsistence crop. The crop has comparatively lower input costs (seed, fertilisers, pest management and labour) and higher commercial value per ha than cotton. Commercialisation of sesame, mainly through the contract farming model with the private sector, though still isolated, is on the rise, buoyed by strong market demand. There is an increasingly significant export market to Europe and Asia, which offers opportunities for expansion. Zimbabwe imports some sesame for the local confectionary industry, a market for which import substitution is realistic. In addition, sesame offers highly nutritious butter and high value oil, value-added products which are still to be fully explored in Zimbabwe. Lastly, as sesame is rapidly replacing cotton, it is viewed as demanding much less labour, thus reducing the labour burden on women.</p>

Livestock: Cattle and goats

Climate and Climate Change factors: Traditionally mixed crop-livestock systems have provided a coping strategy for semi-arid rural areas in Zimbabwe and are well adapted to climatic conditions characterised by erratic rainfall patterns. However, increasing climatic variability in semi-arid areas poses major threats to natural processes that sustain fodder production for livestock. It is predicted that climate change will reduce the carrying capacity of Zimbabwean rangelands for both livestock and wildlife.

Livestock is culturally integral to life in these provinces. Livestock can survive off rangeland though they are considerable producers of GHGs which can be reduced through improved nutrition and pasture management. Fodder can be grown under irrigation, and manure can be used as fertiliser. Draught animal power is critical in agricultural systems. There are spin-off value chains, e.g. leather. Livestock sales were often reported to provide capital for investments in irrigated production, especially if there is a known market. There are multiple gender issues for which change has commenced, e.g. decision making, inheritance. Heat as well as drought is a major effect of climate change.

2.3 Data collection

The study utilised both secondary and primary data. Secondary data were largely collected during the inception phase, from various sources including Vuna and UNDP, internet, past research by development organisations, industry publications and policy documents. The inception phase also developed data collection tools and an interview form for capturing responses of key informants and Focus Group Discussions (FGDs).

The data collection methods used was as follows:

- Desk studies
- Market assessments
- Focus Group Discussions (FGDs)
- Key informant interviews for in-depth interviews.

These methods were applied to stakeholders across the value chain and supporting environment as follows:

Table 4 Summary breakdown of study participants

Category	Number of female participants	Number of male participants	Total number of participants
Input suppliers	2	6	8
Irrigation scheme plot holders	64	47	111
Dryland farmers	19	11	30
Informal market actors	6	14	20
Formal buyers	5	8	13
Government agencies	17	33	48
Industry Associations	0	4	4
Development programmes			2
NGOs	4	6	10
Researchers	6	16	22
Commercial Producers	0	3	3
Total	123 (45%)	148 (55%)	271

2.4 Data analysis

In this study, value chain analysis departs from the traditional focus on commercial relationships that bring a product from conception to the consumer. Rather, the analysis takes a market systems approach which also includes 'business environment', gender and climate change that impact the functioning of agricultural value chains. The approach included the following important analyses:

Market analyses: these were conducted through the development of sub-sector/value chain maps and descriptions, presenting the key subsector actors and their relationships, products, volumes, markets and issues.

Gender analysis: assesses whether the field is level for both men and women from production, business and market levels, highlighting the "invisible" contributions of women critical for value chain competitiveness,

Climate risk assessment: the study also infers the climate risks which the selected value chains are exposed to. The process also includes analysing the extent to which different livelihood groups and businesses are exposed to risk along the selected value chains.

This exercise sheds light on the value chain upgrading opportunities and informs formulation of recommendations.

3 Analysis/findings

3.1 Irrigated horticulture

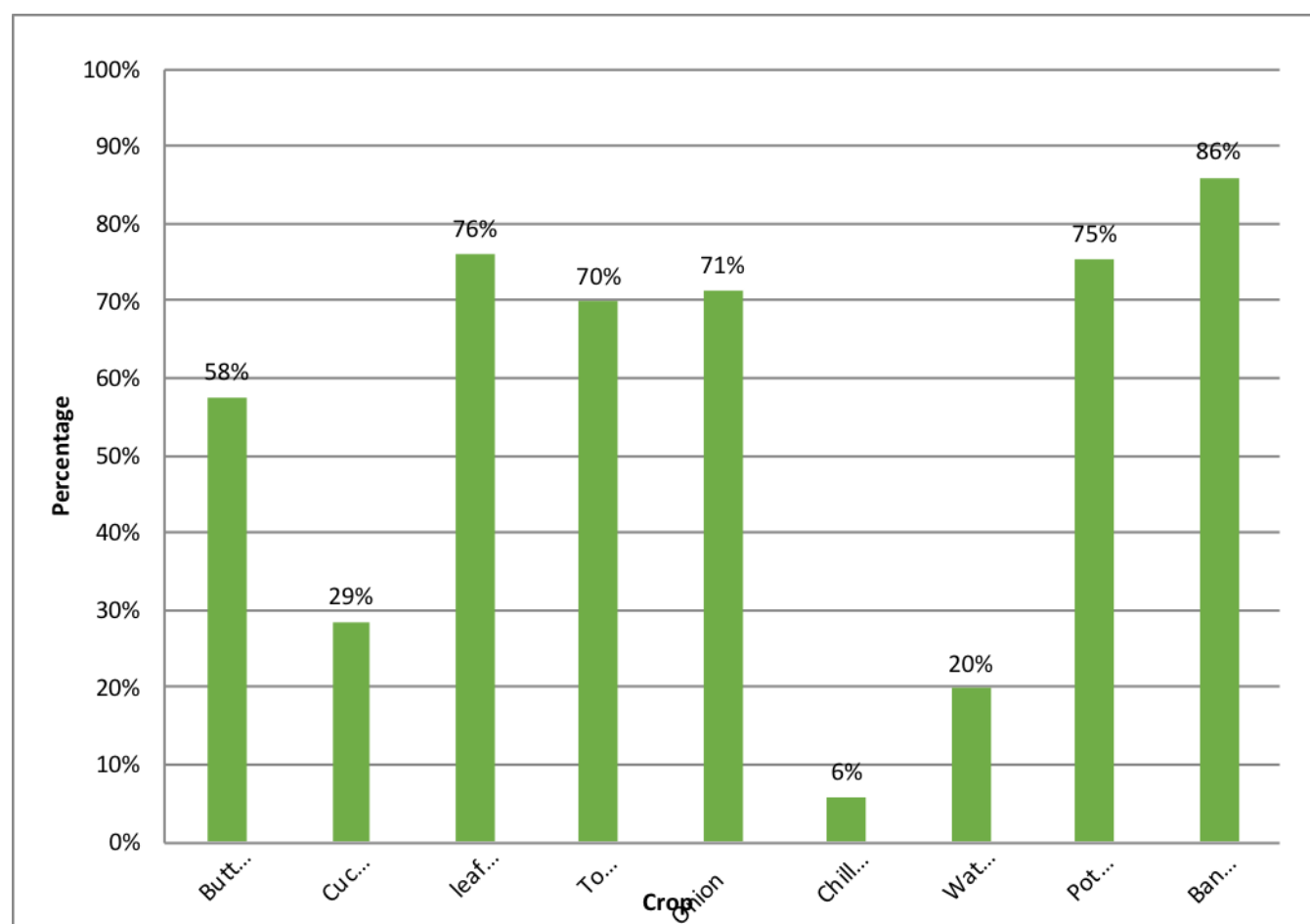
3.1.1 Justification for Selection

Well managed irrigation provides farmers with greater freedom of choice. They can cultivate in the dry season, and the reduced food supply during this time enables farmers to obtain better market prices. Irrigation also removes the risk of rain failure during the rainy season, and this risk removal is conducive to planning and investments in the land by farmers. The FAO Special Programme for Food Security¹⁶ states that 'large-scale irrigation projects are often unsustainable, but a variety of small-scale affordable techniques can increase food production'.

Costs involved in irrigation are significant and therefore irrigation schemes are economically best served through being planted with high value crops which can be cultivated in an intensive manner, i.e. horticultural crops. The profitability of horticultural products can be approximated by the following simple gross margin (which considers only revenue and variable costs) calculations:

¹⁶ <http://www.fao.org/focus/e/specpr/SPro11-e.htm>

Figure 1. Simple gross margins for selected crops in Zimbabwe. Data source: AGRITEX Agribusiness division



The horticulture subsector consists of a broad range of commodities classified as fruits, vegetables and flowers. This study focused on fruits and vegetables which smallholders cultivate and add value to. The subsector is highly dependent on irrigation, and most of the products are perishable. In terms of returns, irrigated horticulture has a shorter cropping cycle than most crops and has a higher value per square metre cultivated than other crops. Horticulture is considered to be the top employment creator in the agriculture sector on farm and downstream activities. For every four jobs created on farm, 1.5 jobs are created downstream¹⁷. Horticulture also serves a dual role at household level in the sense that horticulture products can be a source of nutritious food for the household (and local community) as well as a source of commercial income.

Out of the several potential horticulture products for value chain development, the study felt that the following should be prioritised. The selection has been based on potential for profitability (SGMs), market demand, potential for value addition, perishability, climatic suitability and existing production experience among irrigators.

¹⁷ SNV horticulture value chain study 2012.

Vegetables: Onions, butternuts, green mealies, chillies, sugar beans and leafy vegetables. There is, however, huge scope to expand and complement these products as variety is one of the key competitive advantages mentioned by buyers.

Fruits: Banana and citrus (oranges and lemons). Although these 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.

The horticulture value chain has strong interlinkages with dryland activities especially livestock production where leftovers from the scheme such as green mealie stover, vegetable leaves (among others) are fed to the animals, and manure from livestock is then utilised in the plots. There were also strong cases of barter of irrigation produce for labour or dryland crops. Local non-irrigators often capitalise on the proximity to irrigation schemes to engage in horticulture produce trading. The nutritional content of fruit and vegetables is critical for healthy living, and support to horticultural value chains which lead to increased consumption will have significant spill-over effects from improved nutrition. In addition, input market system development around the irrigation scheme can also benefit non-irrigators who alternatively struggle to access farm inputs.

3.1.2 Climate Resilience Issues

In recognition of the low and often erratic rainfall in Agro-Ecological Regions IV and V, the government of Zimbabwe has for decades supported the establishment and rehabilitation of irrigation schemes utilising ground and surface water. As the utility of rainfall for farmers worsens, irrigation removes an increasing risk to agricultural production. However, true climate resilience cannot be built on irrigation alone.

First are the practical issues concerning irrigation; with increased drought and higher temperatures (increasing evaporation) under current technologies water requirements will be higher and the danger of water salinization increased. Further exploration of this issue will be left to the irrigation feasibility study.

Secondly, other climate change impacts will affect crops growing in irrigation schemes. AGRITEX staff, met in the field, explained how even with irrigation, increased temperatures led to the prevention of pollen setting in maize with a consequent harvest failure. Some varieties are more heat tolerant, but some crops are more susceptible to higher temperatures than others. Increased temperatures were also attributed to increased spoiling of harvested crop, a factor which is particularly relevant for perishable horticultural crops. Addressing this requires improved storage and more efficient marketing processes that reduce spoilage.

In addition to heat, flooding is an additional effect of climate change which affects irrigation schemes. During the study farmers reported an increased frequency of dams being burst and canals damaged by floods. The floods are worse at the beginning of the rain season when already deforested landscapes have little vegetation to prevent overland flow which is channelled by the topography of the land. However, well managed land can increase the

percolation of water, increasing its availability to water constrained communities. Amongst others, the International Institute of Water Management has been researching improved land and water management in the Limpopo catchment¹⁸. By utilising such research information, improved natural resource management (NRM) can be used to improve the ecological sustainability of irrigation.

3.1.3 Gender Issues

In schemes visited there was often a gendered differentiation of value chain roles with more women than men providing labour in the irrigated plots (at Makwe, the proportion of women is increasing) and local sales. There is a significant cost to owning land in an irrigation scheme and paying water and electricity charges. The number of women farmers does not necessarily mean that women have ownership of the farm, since often they are cultivating it in the absence of male relatives who have migrated for economic reasons. Control of the planning of farm activities and control of the benefits received from the farm appear to be under the authority of men. FGDs also confirmed that women did most of the work in the plots. However, men oversaw the transport and sale of vegetables to town. Several women farmers raised the issue that when a man dies the ownership of his irrigation plot does not automatically go to the wife, even if she has been the person farming it.

When gender relations constrain the activities of women there is a strong case for external support. The ENSURE project has had success in addressing gender disparities through a process of social analysis and action which uses deep continuous dialogue that engages both men and women to level the playing field.

A gender study by the ENSURE project found that women's daily calendars were oversubscribed, while those of men had a lot of free time. They also found that there were high incidences of backlash from men when women generated money. To address these counterproductive gender issues, ENSURE engaged (as opposed to confronting) men. They appointed male gender champions who utilised men's fora to address gender issues identified by the community during a process of social analysis. Behaviour started to change progressively, giving positive results. For instance, in village savings and loan groups, 95% of members were female at the start. However, through this approach the ratio is now almost 50%:50%, creating a forum for influencing both men and women on gender issues to improve the efficiency and fairness of working practices.

¹⁸ <https://wle.cgiar.org/>

3.1.4 Current nature of value chain

The main value chains that define the horticulture sector in southern Zimbabwe consist of:

- Smallholder production at irrigation schemes and small gardens for informal market¹⁹. The informal market consists of localised consumption, local institutions (including boarding schools and hospitals) and informal and municipal markets in towns (Mutare, Masvingo, Gwanda and growth points). There is a high level of intermediation by micro-traders and vendors. Volumes are hard to estimate due to high level of fragmentation of this segment. However, data collected by eMkambo for April 2015²⁰ at Mbare, the biggest municipal market in Zimbabwe, showed that a total of 2,022 tons of horticulture produce was traded in that month, with earned profit value of above US\$1.4M. This demonstrates the value that these markets can have. Products in this category mainly include tomato, potato, leafy vegetables and green mealies.
- Domestic formal market-focused chain. Produce finds its way to the market through restaurants and catering companies, tourist establishments, and supermarkets. For farmers in southern Zimbabwe, the only example encountered was Best Fruit Processors which uses an **intermediary contract farming model** (by sourcing butternuts through an agent called Masvingo Food Commodities Cooperative Company). The agent also sources for other buyers such as horticulture wholesalers of products like onions and butternuts. Other potential products in this chain include butternuts, chilies and peppers, cucumber and carrots.
- Smallholder producers producing under contract arrangement with a key buyer (company) for fresh market produce or processing. This is mainly in fruits – citrus and banana. These schemes use a multi-partite model where other partners are involved in addition to farmers and main buyer. The examples encountered in the field were Matanuska which is in operation at Chibuwe, and Mutema irrigation schemes involving contract farming. The project was initiated with the support of FINTRAC (under a USAID supported project called ZIMAIED²¹) and CABS. Another model encountered is the **Nucleus estate model** for sweet orange production and supply where a company (Beit Bridge Juicing Private limited) is represented locally through a central estate or plantation called Nottingham Estate in Beitbridge. The core estate is in close proximity to the contracted farmers. Therefore, it can provide significant material and management resources.

Prior to the 2000 land reforms, the horticulture subsector experienced strong growth driven by rising export competitiveness. In 1999 horticulture exports reached US\$144M, second to tobacco as a leading export. Anchoring this subsector competitiveness was a vibrant commercial sector, with a growing smallholder sector contribution mostly as out-growers.

¹⁹ Informal markets in this study refer to those markets where agents do not require formal registration or tax payments. They may however pay some user-fees for trading sites such as at municipal markets and designated vending sites.

²⁰ <https://emkambo.wordpress.com/2015/04/>

²¹ ZIMAIED (Zimbabwe Agriculture Income and Employment Development) was a 5-year programme managed by FINTRAC and funded by USAID in Zimbabwe between 2010 and 2015.

However, in the aftermath of land reforms (in the early 2000s), the subsector has been on a consistent downward spiral, as the smallholder sector which replaced large commercial farms could not meet demand gaps created by a collapsed commercial farming sector. As a result, overall horticulture production declined under a myriad of challenges which include lack of technical knowhow, lack of organised market linkages and inability to finance operations. In the same vein, exports also fell, giving way to imports which have been on the rise. By 2014, horticulture exports were only US\$49M. Despite this shrinkage, there are positive signs that the sector is on a rebound. For example, in 2015 exports rose (from 2014 levels) to US\$72.1M, about half of the country's peak exports (US\$144M in the 1999/2000 season). The local formal market which was increasingly relying on imports to meet demand is now turning to sourcing from local production after government (Ministry of Agriculture Mechanisation and Irrigation Development) cancelled import permits for horticulture produce in 2014. This move is believed to have contributed to improvements in sector competitiveness.

Figure 2: Selected case studies of horticulture models encountered in the field

Matanuska a banana producer and distributor (local and export) faced with high local demand is willing to consolidate its initial investments at Mutema and Chibuwe. In total, the projects have 124 ha with each farmer running about 0.2 ha. Inadequate water supply at Chibuwe often reduces yields drastically in the dry season, while the model at Mutema can be expanded. Investments envisaged include two boreholes and overhead irrigation for the 40 ha under banana at Chibuwe, costing a total of US\$190,000. Expansion of Mutema irrigation's successful model will benefit more farmers at a cost of US\$14,000/ha. The company is also willing to engage with newly established irrigation schemes as they think these have manageable political issues. Although not quantifying the market demand, the company confirmed an unmet local and export demand.

An emerging smallholder production management model

Experiences shared with Matanuska's Mutema and Shashi citrus schemes point to strong management of the production operation. At Shashi, the management of the scheme is supported by a project manager from an NGO (CESVI). At Mutema, Matanuska plays that role. This model promises to transform the fortunes of long-term investments such as banana and citrus. Farmers supported the concept of a model where farmers contribute part of their plot (e.g. 0.25ha) for 8 years to form a collective block to be put under commercial production. There would be an independent project manager, and farmers would receive a dividend/profit share. Farmers could choose to work as hired labour.

Processing: Best Fruit Processors, a processor of fruit and vegetables (juices and purees) located in Norton near Harare currently has 3,000 smallholder suppliers of tomato and butternut. Company projects its demand as follows: 21,000 tons of tomato yearly; 29,000 tons of citrus; 1,000 tons of mango; 2,000 tons of guava; 2,000 of butternut. New and relevant innovations that could further increase demand for produce are drying of fruits and production of resins.

Input supply: Seed multiplication partnerships

Consultants met with Zimbabwe Super Seeds and East West Seeds which are currently partnering with smallholder farmers in the multiplication of seed at irrigation schemes. Zimbabwe Super Seeds is contracting farmers for maize seed multiplication. Another company - East West seeds - is looking to multiply butternut, pumpkin and vegetable seed at Shashi irrigation in Beitbridge. Seedco (a seed producing company) is sourcing sugar bean seeds at US\$1200/MT and also sorghum and butternut from smallholder irrigation schemes. For project implementation, more in-depth investment plans would need to be agreed with these companies. Other seed companies, e.g. Seedco are also active in the project areas.

Intermediation

A small company called Masvingo Food Commodities Cooperative Company Ltd is into contract farming and aggregating agricultural produce, then selling to bigger companies like Brands Fresh and Better Fruit Processors in Harare. The company expressed willingness to contract for onions and other horticulture products, for which a market is available.

Figure 2. Current nature of the horticulture value chains for Agroecological Regions IV and V in southern Zimbabwe

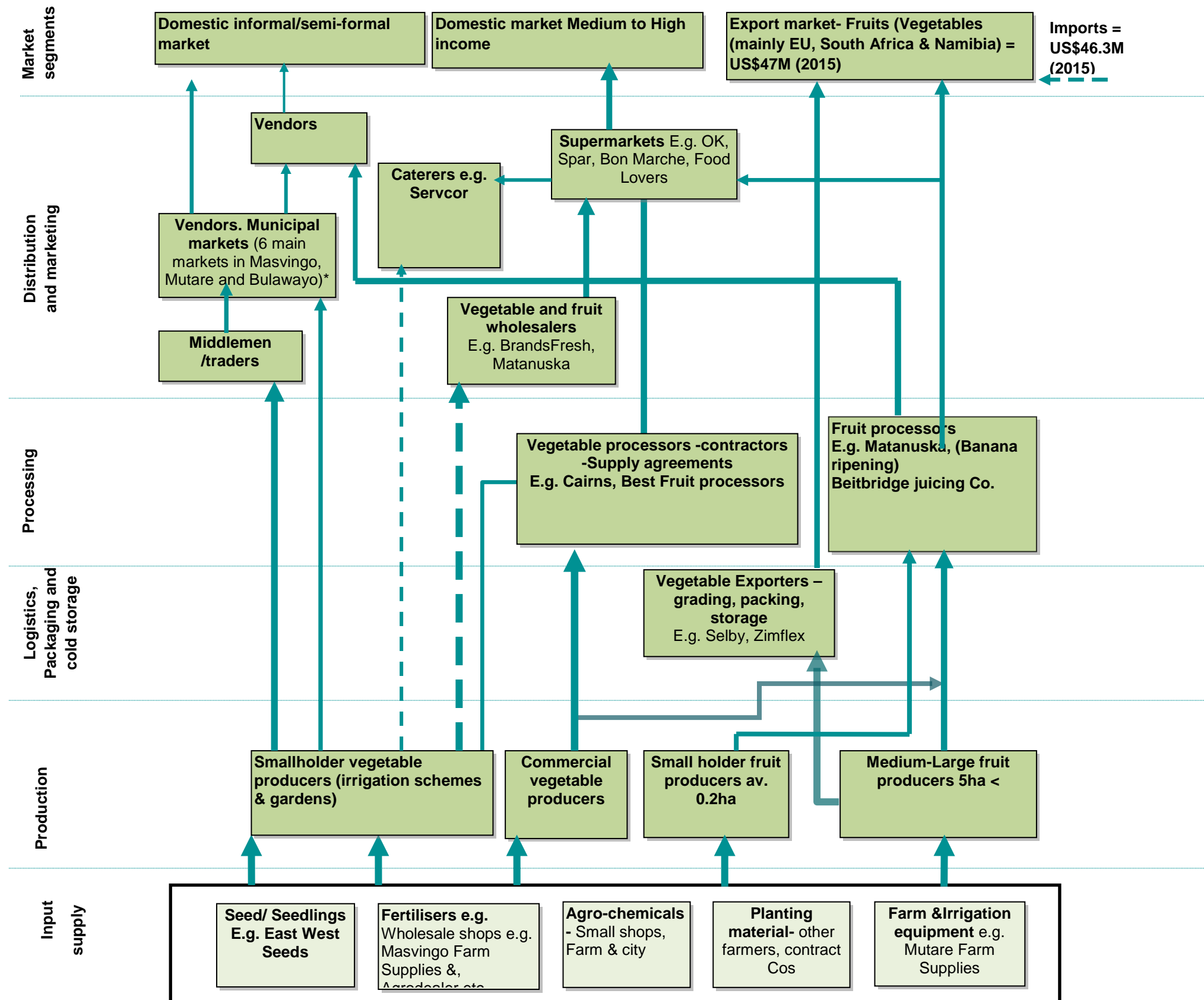
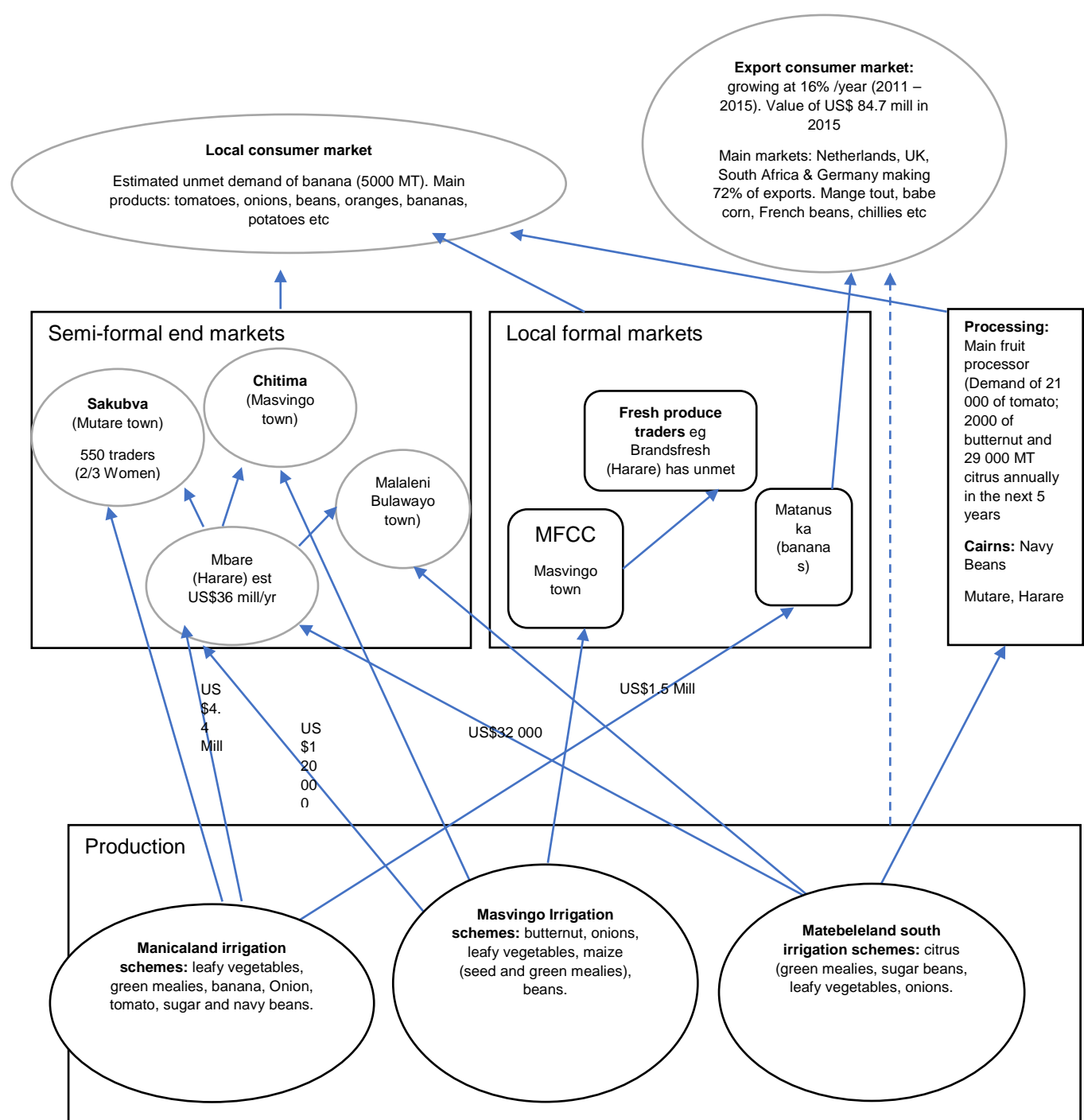


Figure 3. Territorial map of the horticulture markets for Agroecological Regions IV and V in southern Zimbabwe



Demand by end market

Semi-formal markets: Mbare market, which is the largest informal market was estimated to transact an average of US\$36Million per year²². Data for the other key semi-formal markets that serve the proposed project area could not be found as there is no one tracking smallholder supply into these markets. However, the fact that the urban markets in the proposed region rely on Mbare market for most of their supply and not the other way around signifies the inability of local supply to currently meet demand.

Formal domestic market: The local formal market is in a state of disconnect. While there is a recovering private sector that is being spurred by a ban on fresh produce imports, there is insufficient supply to meet this growing demand. Interviews with Best Fruit Processors indicated unmet demand for guava, mangoes, butternut and tomatoes. Very few formal linkages exist either with intermediaries such as MFCC or direct linkages with big buyers such as Matanuska for banana. The consultants could not find a source of data on aggregate demand by the formal market as this is not available, and individual companies did not want to disclose their business data (the extreme case being Cairns foods).

Exports of horticulture have been on a consistent growth from total exported value of just above US\$54 Million in 2011 to US\$94.7Million in 2015. Presently, the smallholder sector in the project area are not participating in this chain.

Demand by type of product

Vegetables: The vegetable market is very competitive in terms of pricing which responds to supply and demand of the product. The project area has an advantage of being able to supply cucurbits (such as butternuts and cucumber) during the deficit period (June to Sept) to both the private companies and municipal markets. As per above, Best Fruit Processors has unmet demand for butternut.

²² Knowledge Transfer Africa 2014

Sugarbeans: One of the most widely-produced crops in irrigation schemes, sugarbeans are generally in extreme short supply. For example, in the 204/15 agricultural season the national production of sugarbeans was only 12,772 MT against a national demand of 92,826 MT²³

Banana: Demand is at its peak in September–November when banana production reaches its peak, which points to price premiums. Rough estimates of demand are at 10,000 MT (about 250 ha of banana plantation) through the formal market.

Citrus: Exports of citrus fruits [fresh and dried] for 2011 to 2015 was US\$3.27 Million. The demand for citrus fruit for processing is not included in this value. Demand for processing (although not quantified as of now) is rising very fast with two main companies, Best Fruit Processors (BFP) and Beit Bridge Juicing company competing for produce from southern parts of Zimbabwe). BFP indicated that they secured funds through the Reserve Bank of Zimbabwe to set up a processing plant in Esigodini for citrus and tomato.

Table 5 The Horticulture Value Chain

Activity	Description	Issues
Production	<p>Vegetables in the southern regions of Zimbabwe are predominantly grown by smallholder farmers at irrigation schemes (about 0.25ha land allocation), in small gardens, and on company owned commercial farms, and some A2²⁴ horticulture famers were reported to be mainly around towns. There is an emerging cadre of peri-urban growers utilising backyards of residential properties, mainly for home consumption.</p> <p>Fruits: Citrus is grown by big estates & large scale commercial farmers in Chiredzi and Beitbridge areas. Data on geographical production could not be accessed. There is also a community scheme, spilling over from the commercial sector in Sashe (Beitbridge) and small-scale production in Rusitu. Competing areas are Mvurwi, Guruve, Mazowe, and Chegutu areas.</p> <p>Bananas are grown by both smallholder and large scale farmers in Honde valley, Burma valley, Chipinge and Bindura areas.</p> <p>Producer Associations. Although not corroborated by information from farmers at the schemes, ZFU has a National Horticulture Producers' Association (ZNHPA) whose 5-year Horticulture Strategic Plan emphasises improving coordination of sparsely distributed producers and adoption of quality and standards that are meant to facilitate smallholder participation in high-value local and export markets. Collective marketing is presently confined to contract faming arrangements with no apparent role of ZFU.</p>	<p>Excessively high temperatures and erratic rains increase frequency of irrigation and cost of energy to pump water leading to reduced price competitiveness of products. High temperatures also limit the shelf life of particularly perishable horticulture produce.</p> <p>Three of the six visited irrigation schemes²⁵ had no running water or had severely reduced supplies after the Zimbabwe National Water Authority (ZINWA) cut supplies due to insufficient water in the reservoir. In the case of Rozva irrigation scheme, water cuts led to losses amounting to US\$63,000, against a loan of US\$29,000</p> <p>In almost all cases, farmers' crop choice was based on a cropping calendar that is supposed to be followed by the whole scheme. At Nyanyadzi irrigation scheme, famers could not remember when their calendar was developed, and concurred that it did not respond to market demand.</p> <p>Crops which are widely grown are tomatoes, beans, green mealies, dry beans, leafy vegetables. Other proposed crops such as banana, butternut and onions are currently grown in small quantities, as farmers believe they do not have a big market. Therefore, there is scope to scale up or take up new lines of crops to take advantage of market demand, which can transform smallholder horticulture in the Southern Regions.</p> <p>Banana and citrus are mainly produced under contract with large buyers and processors although Rusitu valley, where about 145,544 trees at a rate of 50 trees per farmer as of 2013/14 season²⁶, is dominated by farmers dealing with small traders.</p> <p>There was no mention in the schemes visited of ZFU's programmes such as Young Famers Clubs (supported by Barclays Bank) and horticulture standards and collective marketing. However, ZFU believes its capacity to build coordination through commodity associations delivering training on horticulture quality standards enables more smallholders to upgrade in the market.</p> <p>Variable costs per ha are on average US\$3,475²⁷. Investments in plantations are long-term investments. Citrus and banana have high establishment costs and require scale (more than 0.2ha) to be viable as a business. According to Matanuska, to establish a hectare of banana requires close to US\$14,000 which requires 5 years to repay at a rate of 65% debt repayment and 35% profits on sales from a 0.2ha plot.</p> <p>50% of all women in Zimbabwe are involved in entrepreneurial activities, mainly in agribusiness. However, they hesitate to take financial risks due to high uncertainty in the business environment (Nathan and Associates, 2016). Women have lower access to plot ownership at irrigation schemes (46%) than men (54%) (ZIMVAC 2016). Women interviewed at Chibuwe irrigation scheme lamented that although men (especially young men) are favoured by plot inheritance laws, they showed less interest in agriculture, leading to high numbers of abandoned plots.</p>
Home	The proposition of home consumption could not	AGRITEX alluded to the fact that the irrigation schemes in drier regions were erected

²³ Second round crop and livestock assessment report 2014/15 season, Ministry of Agriculture, Mechanisation and Irrigation Development, 22 April 2015

²⁴ A2 is a model of resettlement adopted by the Zimbabwe government during the Fast Track Land Resettlement programme. Model A2 is mainly small, medium and large scale Commercial Settlement schemes or Peri-Urban schemes. Sizes vary by agro-ecological regions.

²⁵ Mushandike, Rozva and Chibuwe Irrigation schemes. Other irrigation schemes assessed were Kufandada, Musikavanhu and Nyanyadzi irrigation schemes.

²⁶ Tawanda M et al (2015) "A preliminary study of the orange (*Citrus sinensis*) fruit value-chain in Chimanimani Rural District, Zimbabwe" African Journal of agricultural research. Vol. 10 (32) pp.3507-3516

²⁷ The average variable cost per ha was calculated from AGRITEX crop budgets 2016, averaged for butternut, cucumber, leafy vegetables, tomato, onion, chilies, water melon, Irish potato and banana under commercial oriented production system.

consumption	be ascertained. However, FGDs indicated that their households relied on produce from the scheme for household consumption and local sales to dryland famers	to increase food production and reduce the movement of grain from other regions. FGDs revealed that household consumption (about 10% of production) is always a priority. Sales locally (which includes to neighbours and local traders) was estimated at 15% and the rest sold outside local area or to traders coming from outside the local area. In the past, some value chain interventions did not fully account for these allocations in market planning. Matanuska reported that during drought months, an unconfirmed volume of contracted bananas is consumed locally.
Marketing	<p>Smallholder irrigators have three pathways to market. The bulk of vegetables are bought on farm by aggregators (roughly estimated at 60% by farmers) who serve mainly municipal markets and some shops. A small proportion of farmers (not specified) whose schemes are closer to town take their produce to these markets on their own. A third category is under contract farming with companies such as MFCCC (seed maize), Seedco (sugar beans) Matanuska (banana), Best Fruit Processors (butternut, tomato and citrus), Cairns (navy beans and tomato). Local sales to dryland famers are insignificant but persistent (included in 15% local sales to mainly local traders), and usually done in exchange for dryland crops or labour.</p> <p>At present, the dominant market served by smallholder irrigators is the municipal markets, with a small proportion reaching the formal urban market, through agents of restaurants and hotels.</p> <p>Women farmers reported mainly preferring to sell closer to the farm than travel to town due to time constraints and unsafe accommodation.</p>	<p>While in the past the tendency by players in the formal vegetable market was to source from producers close to Harare (within 100 kms), while supplementing deficits with imports, a combination of decline in large scale commercial production and government restrictions on imports of horticulture produce is driving sourcing from far afield. Brands Foods for instance, reported contracting a cooperative called Hunting Lane in Bulawayo (over 400kms) for supply of carrots and onions.</p> <p>Farmers at almost all the schemes visited reported that they individually look for a market for their produce, unless they are under contract farming. Constraints to collective marketing were identified as including group conflicts, lack of knowledge of where to sell in bulk and high variability of production</p> <p>Lack of trust in direct market engagement was clearly evident from the buyers as well as producers. AGRITEX officers present at meetings (Chibuwe, Musikavanhu, Nyayadzi, and Rozva) presented a negative view of private sector buyers. These views, if frequently expressed, can jeopardise market linkages.</p> <p>Currently the most significant market served by farmers is the informal urban market. However, due to lack of market intelligence, production coincides with gluts resulting in lower margins. No alternative sources of market information were mentioned besides contractors (for contract crops) and AGRITEX (for all other crops).</p> <p>Key processors and wholesalers such as Brandsfresh, Matanuska, Best Fruit Processors and Cairns report that they are not getting adequate quantity and quality of product to match market demand throughout the year. According to a USAID market assessment requirements report 2012-2013, the local formal market qualifying criteria include quality, price, reliability, and continuity of supply.</p>
Processing	There is limited value addition through processing for vegetables which is currently taking place. Women at Mushandike irrigation scheme have a building for drying vegetables from a past project which was never used. At a very small scale, women dry excess vegetables which are sold locally or in towns and at growth points	Citrus fruit processors such as Best Fruit Processors operating from Norton near Harare and sources from as far as Beitbridge (mainly from commercial citrus farmers) indicate that they have insufficient supplies of vegetables and fruits for processing as they compete with a more lucrative fresh produce market. The company has contracted for more than 1,500 tons of butternuts at irrigation schemes like Rupike and Mushandike. The company is looking for financing (about US\$ 500,000) to establish a processing plant for butternuts, tomato and citrus nearer to source.

3.1.5 Value chain upgrading opportunities

Production: *How to improve the ability of smallholder farmers to produce what the market is demanding? Irrigation schemes which were visited relied on cropping calendars which bore no reference to market demand.* Opportunities to address this lie in identification of commodities which have consistently high demand, at different times of the year, which are economically viable for farmers to produce. Using independent managers would support market orientation as well as irrigation management and crop knowledge provision. Coordinating production and marketing across irrigation schemes would exploit benefits of scale and linkages to markets. For example, Brands Fresh projected unmet demand of 120 tons per month of butternut for Harare during the off-season months of June to September. Analyse effectiveness of current extension systems and develop a knowledge sharing approach with farmers. Develop appropriate input supply e.g. heat resistant varieties of crops and drip irrigation materials.

Marketing: *Smallholder suppliers largely do not respond to market demand for quantity and quality; often they do not have adequate market information. Smallholders are largely confined to the informal market, which has low value despite low barriers to entry.* Market information (on qualities and quantities) is critical for market development. There are existing information sources such as eMkambo and ZFU weekly market bulletin. In addition, the efficiency and effectiveness of both formal and informal markets can potentially be improved. Companies met confirmed opportunities to meet gaps in the formal markets through increasing sourcing from smallholders. New models of market linkages promise to reduce the rate of failure of schemes. One of these involves farmers giving responsibility for managing commercial enterprises to a professional manager at a cost to improve efficiency of operations.

Financing: Horticulture investments per hectare are generally higher than other crops. There are a number of financial services players mentioned by contracting companies as willing to be involved in multi-partite contract arrangements, reducing the risk profile of smallholders to moderate and low category. These include CABS, CBZ microfinance and inclusive Financial Services. Most horticulture crops have a 3-4-month cropping cycle which, with moderate to low risk rates, enhances viability.

Gender: Women are constrained in both production and marketing activities. Targeting supply to the municipal markets and other regulated markets offers more opportunities to urban women traders as they dominate these markets. For example, at Chitima market (Masvingo), of the 300 agriculture traders, 75% are women. Contract or collective marketing can increase women's participation in formal markets as they do not need to travel far from the farm. Further, market linkage models that promote central and specialised management of production can benefit women who are often excluded from training and information services.

Climate Change: Tapping into alternative sources of energy such as solar powered irrigation has been demonstrated already. An example is the 29ha Kufandada irrigation scheme in Bikita. Improved management of schemes can ensure stronger collaboration with ZINWA for efficient water usage.

Investments in cold chain infrastructure can be reduced by specialising in production and marketing of less perishable products such as butternuts, onions, green mealies and sugar beans.

Development and promotion of Climate Smart Agriculture approaches, heat resistant varieties and water saving irrigation technologies, e.g. drip irrigation.

3.2 Sesame

3.2.1 Justification for Selection

Sesame (*Sesamum spp.*) is an oilseed used as a source of edible oils as well as eaten whole. The presence of polyunsaturated fatty acids raises the nutritional value of sesame. Sesame oil also has high storability and quality due to its antioxidant properties. It is reputed to have numerous health benefits.

As a crop, it is well suited to Zimbabwean agricultural systems as it has a low cost of (and a low requirement for) inputs with a good rate of return. A few isolated farmers in the target area are cultivating sesame and either selling it to the local confectionary industry or grinding into butter (like groundnut butter). Although a new crop to many farmers in the prospective project area, it grows well in rotation as it can reduce the incidence of soil borne pathogens in crops subsequently planted²⁸. Export markets in the West and in Asia have led to investments in cultivating the crop in a number of African countries, including nearby Mozambique and Tanzania. VUNA is supporting sesame and pigeon pea production in Mozambique where some producer organisations are accessing the Fair Trade market in Europe, providing farmers with higher premiums.

Engaging in sesame would facilitate development of other oilseeds, particularly groundnut. This climate resilient semi-arid crop also responds well to irrigation. Its stover provides an excellent source of fodder for livestock. Climate Resilience Issues

With its deep root system sesame is a drought tolerant crop which can produce a successful harvest even if there is a break in the rains. It is being promoted in West, East and Southern Africa as a climate-resilient crop, and although the cultivated crop is originally from Asia there are also indigenous species. At present, agronomists are not predicting that climate change will lead to a rise in pests or pathogens of sesame. It is a cash crop that can be intercropped with other crops including food crops like pigeon pea. In doing so, a farmer spreads her or his risks, which is important in adapting to climatic uncertainty.

3.2.2 Gender Issues

As a relatively new crop, there are no well-defined gender norms and practices for sesame. For instance, farmers indicated that sesame is not yet defined as a men's or women's crop as is the case with other cash crops like cotton. During FGDs, it was expressed that for those crops regarded as women's crops, women control their production and marketing. Therefore,

²⁸ <http://www.sesamegrowers.org/quick%20facts.htm>

the status of sesame offers some opportunity for women to “claim” the crop. Despite this possibility, there is a high risk that as sesame becomes commercialised, men will push women away from control of market proceeds. Despite this fear, FGDs with women viewed involvement of men in crops termed “women’s crops” as important to increase household income. Further FGDs revealed that if a crop is produced under contract farming, there is a higher chance of household transparency as the transactions are often publicised at meetings and within the local community.

Sesame production labour requirements were reported by contracting companies as much less than for cotton, which alleviates women’s burden as they provide the bulk of household farm labour.

3.2.3 Current nature of the value chain

At a global level, world production of sesame was 3.84 million tons per annum with the leading producer being Burma, leading exporter being India and biggest importer being Japan (FAO 2013). While average global productivity was 0.49 tons per ha, there are huge disparities in yields. For example, Italy achieved yields as high as 7.2 tons/ha. Ethiopia, Africa’s largest producer of sesame averages above 1 ton/ha. The market has been growing while global production has been stagnant. The uses of sesame are in confectionary, sesame chips, pharmaceutical industry, cosmetic industry, manufacture of butter, sesame oil, and seed cake (by-product of oil used in livestock such as poultry pellets and feed for dairy cows), among others.

Production quantities in Zimbabwe were not ascertained although there are estimated to be over 10,000 smallholder producers. Major players are Export Trading Group (trading as IETC), Sidella Trading, Olam and Finard Investments Pvt Ltd (trading as Southern Africa Sesame Board). IETC buys 330 tons and Sidella buys about 150 tons annually. The quantity for Olam could not be assessed. The crop has low input requirements and is relatively easy to cultivate which offers few barriers to entry, especially for women who are more constrained than men on input irrigation and access to knowledge. The crop therefore offers opportunities for scaling up through more smallholders in dry areas.

Target market: The main target markets for the exporting companies are Japan, China, Germany, South Africa, Switzerland and Turkey.

A sub-sector map with the current and emerging value chains is presented below:

Figure 4. Current nature of the value chain

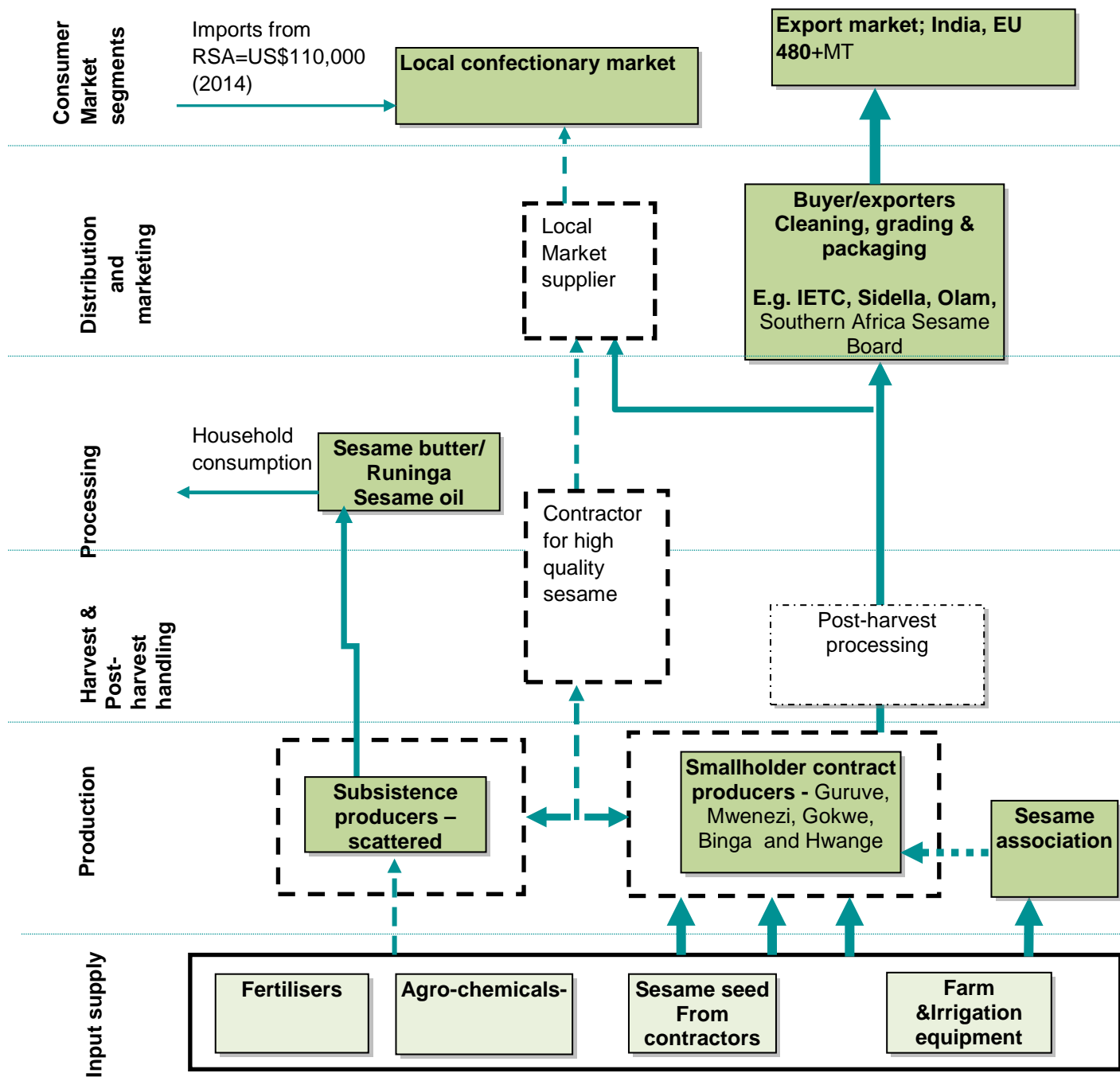


Table 6. Sesame value chain functions, actors and territorial mapping for Agroecological Regions IV and V in southern Zimbabwe

Functions	Actors						
	Village agro-shops	Input companies	Smallholder producer	Producer associations	Buyers/Traders	Exporters	Consumer
Consumption							EU, India, South Africa, Mozambique
Wholesale and retailing							Local confectionary market relies on imports
Processing						IETC, Sidella (Harare)	
Aggregation and logistics				Sesame Association - in Chiredzi	Sidella (Mwenezi, Chiredzi, Chipinge); Informal traders (Chipinge)		
Production			Chipinge – (Manzvire, Checheche) Chiredzi (Triangle) Mwenezi Potential areas: Buhera, Bikita				
Input supply	None selling sesame seed.	Contractors only- IETC and Sidella (imports seed from Australia)					

Demand of sesame

At this point in Zimbabwe, farmers' supply is below 400 MT per year yet Export Trading Group (ETG) wants as much as 50,000 MT annually for export. In 2015, Olam approached SNV requesting if their project farmers could supply 10,000 MT, which was not available. These figures point to a huge market that will require substantial scaling up of production to meet. Buyers indicate that supply can come from any part of the country if it is above 10 MT. The proposed project area is currently contributing a very small proportion (not quantified) coming from Chipinge, Mwenezi and Chiredzi. Potential areas for expansion were cited by Sidella as Buhera and Bikita among others.

Table 7 Description of the Sesame Value Chain

Activity	Description	Issues
Production	Currently sesame is grown in dry areas such as Muzarabani, Gokwe, Binga and Hwange and Chipinge districts. Farmers interviewed in Masvingo and Manicaland provinces demonstrated knowledge of sesame	Productivity is still low in areas where farmers have been contracted. However, IETC has demonstrated that with adequate knowledge and inputs, farmers can triple productivity from 0.5t to 1.5 tons with a US\$100 input package, thus indicating a management rather than a biological constraint.

	<p>as a fringe crop, grown for subsistence, intercropped with sorghum and millet. Commercial production is under contract only. Sesame is mostly replacing cotton whose profitability has collapsed of late. The crop is drought tolerant and grows under rain-fed farming.</p> <p>Stakeholders, mainly private sector and AGRITEX believe that the potential of sesame has not been fully exploited. Farmers typically rely on seed from contractors and a some from local seed recycled from their harvest.</p> <p>While farmers are producing sesame under monoculture, it can also be intercropped with maize or beans, to increase returns per ha.</p>	<p>Despite the input package being much cheaper than most other crops, women still find it hard to acquire the input package required to maximise yields</p> <p>Outside contract farming there is currently no ready supplier of sesame seed. However, there is a new sesame association (called Sesame Association) which is promoting the crop and makes available seed for cash purchases. The association also started aggregation and procurement.</p> <p>Sidella's preference areas of expansion include Chiredzi, Binga, and Buhera which are low rainfall areas.</p> <p>By diversifying from traditionally grown crops that are not climate change tolerant and moving towards sesame that is drought tolerant, accompanied with use of conservation agriculture, farmers are demonstrating desire to adopt climate smart agriculture practices.</p> <p>Harvest practices were regarded as key to improving yields as delayed harvests are leaving pods to open in the fields and shedding sesame seed.</p> <p>Low quality of product due to poor post-harvest handling, mainly threshing where seed gets mixed with soil.</p>
Home consumption	<p>Older famers are relatively familiar with sesame as a subsistence crop. The crop is consumed as either sesame butter or as oil sometimes used for cooking. Sesame is a nutritious oilseed crop, although at present household consumption is not significant</p>	<p>Sesame butter and oil seem to be popular with the aged, with the younger generations not readily accepting. FGDs attributed this to lack of familiarity with sesame products</p>
Marketing	<p>Key players in buying sesame are IETC and Sidella trading and a sesame association</p> <p>Almost all the production (over 480 tons annually) is for export. There are however some imports into the local confectionary industry</p> <p>Buyers often set up buying points during harvest period and require</p>	<p>This is an export-oriented value chain which at present has little commodity differentiation.</p> <p>Quality considerations at purchase are uniformity of colour, cleanliness, and dust particles (4-6% threshold).</p> <p>The local confectionary market absorbs very little local production due to quality issues, leaving most of them to rely on imports</p>

	consignments of 30 tons from a single collection centre. Although the sesame is highly undifferentiated, grading generally looks at colour, purity, cleanliness, and humidity. Single colour, (unmixed) sesame is preferred.	<p>Zimbabwe's sesame crop is almost entirely exported (98 percent) as graded but undifferentiated grain.</p> <p>Since most of sesame expansion is in new areas, investments for buyers are in setting up new buying points in new areas. As a relatively new crop among smallholders, weak linkages with buyers reduce the incentives for increasing productivity and quality.</p>
Processing	<p>Currently the only source of sesame seed is local processing into sesame butter in rural areas, some use in snacks and some minimal oil expressing.</p> <p>Although the domestic market for sesame use (in oil production or confectionary industry) is limited, local supply is not able to meet demand.</p>	<p>Some small-scale conversion to sesame butter or oil.</p> <p>Although sesame oil is said to have more value than other oilseeds, this value has not been exploited for the local market.</p> <p>There is yet little on-farm grading to add value despite this being a relatively simple procedure.</p> <p>Processing is again limited to cleaning, with the exception of ETG which has a dehulling machine.</p>

3.2.4 Value Chain Upgrading Opportunities

Production: (*low yields and isolated cultivation*): The lack of local access to quality seed (uniformity and treatment to control for aphids) amidst a growing drive for satisfying demand from buyers like IETC and Sidela offers opportunities for local level seed enterprises such as Zimbabwe Super Seeds in Masvingo. There is also an opportunity for working with local agro-dealers as last-mile distributors of quality seed. IETC experience has shown that women farmers can reach 1.5t/ha, which triples their revenue. To achieve this requires access to quality inputs and extension knowledge on sesame production. The knowledge is still not institutionalised in AGRITEX. This opportunity requires some effort in transforming smallholder mind-sets towards commercialising what at present is largely a subsistence crop.

- Scaling up production through engaging more producers and increasing productivity. Facilitation of access to quality seed (of uniform colour), and treated to control aphids are key building blocks. Provision of extension services to address deficiencies in harvest and post-harvest losses is key. Contract farming can promote access to an optimal input package for maximising productivity.

Marketing: (*lack of market linkages*): In most areas where cotton was a major crop, farmers are shifting to other crops as cotton has become less viable. This trend offers opportunities for the private sector to expand into new areas to boost production and improve the competitiveness of the sub-sector.

- Establish and strengthen market linkages between producers and buyers. The driver will be the establishment of trusted relationships with commercial companies mainly IETC and Sidela, among other upcoming players. However, new market relationships involving increasing risk-sharing arrangements are required to increase appetite by value chain actors. Multi-partite models such as the one used by IETC which includes farmers,

financial services providers and a producer services organisation (sesame association), have proven to be successful risk-sharing arrangements.

- Zimbabwe currently imports sesame (103MT in 2012²⁹) particularly for the local confectionary industry. Explore market diversification by local import substitution. A segment of producers can focus on producing high quality white sesame which this market requires.

Processing and value addition: (*poor supply of quality product*). There is potential to segment production to target local confectionary industry with high quality (uniform colour, no dust and clean product), substituting imports. A call to a bakery (Pemcol Bakery and confectionary) revealed that they require white sesame, cleaned and with no stones.

This can be addressed by cleaning machines which can be community based.

Gender: (*cost of inputs*). Contract farming is the main model in operation and has so far enabled 60% of women (for Sidella) and 45% of women (for IETC) to participate.

3.3 Sorghum and Small Grains

3.3.1 Justification for Selection

Communities in the proposed target areas face major cereal deficits. Seven of the districts studied only produce sufficient cereal for up to six month's consumption; Insiza and Chimanimani produce enough for 7-12 months. Maize dominates the area of cereal planted but is sensitive to drought, heat and flooding; it requires the purchase of external inputs and is a crop in which decision making and often harvest is controlled by men. Despite efforts to grow maize in irrigation schemes, the target areas experience some of the lowest maize productivity in the country. Almost all stakeholders consulted questioned whether current cultivation levels of maize were sustainable for the three provinces in a climate change scenario.

Table 8 Zimbabwe Maize Production (tons per ha) by Province³⁰

Province	2014/15	2013/14	%
Mashonaland West	0.93	1.28	-27
Mashonaland Central	1.05	1.27	-17
Mashonaland East	0.55	0.89	-31
Manicaland	0.43	0.68	-60

²⁹ UNCTAD trade database 2016

³⁰ Second Round Crop and Livestock Assessment Report 2014/15 Season, Ministry of Agriculture, Mechanisation and Irrigation Development, 22 April 2015

Midlands	0.27	0.68	-60
Masvingo	0.14	0.54	-74
Matabeleland North	0.18	0.60	-70
Matabeleland South	0.11	0.62	-82
AVERAGE	0.48	0.85	-44

However, small grains like sorghum, finger millet and pearl millet provide a drought resistant alternative to maize, an alternative that was successfully farmed and fed the provinces in previous years. Small grains have evolved to flourish in semi-arid tropics and are the traditional cereals of Zimbabwe. With climate change, they represent the most reliable cropping option for carbohydrates. They also comprise excellent sources of protein, energy, vitamins and minerals for human (and animal) nutrition. They require few inputs, are grown by men and women in southern Zimbabwe and can be incorporated into CSA approaches. Although often seen as a crop which will produce a harvest even when the rains are poor, value can be added to them, currently through dehulling and milling and as an ingredient in the brewing industry. Researchers have identified options for more diverse value addition to small grains, particularly using the flour in bread and baking. Crop stover and the by-product from brewing provide valuable livestock fodder. The team was informed by AGRITEX that when there had previously been more support for small grains, Zimbabwe had exported grain to Botswana.

There are dynamic partners working with small grains including:

ICRISAT³¹ - International Crops Research Institute for the Semi-Arid Tropics – Research and development expertise on production and processing of small grains and groundnuts, crop-livestock interactions, CSA, climate modelling, food science and market linkages. Their food science researchers have identified how different varieties can be used in bread, baking and other non-traditional products as well as livestock feed. ICRISAT together with AGRITEX have piloted and assessed the effectiveness of Farmer Field Schools and Junior Farmer Field Schools.

Bio-Innovation Zimbabwe³² - BIZ transform neglected and underutilised indigenous plants into viable commercial “crops” that generate benefits for rural people and their environment. BIZ uses three main strategies for each focus species: conducting robust research, developing commercial products, and helping rural producers develop their farming and business skills to grow their enterprises. As no two plant species are the same, different steps may be required for commercialisation of the species, and hence the exact process may contain different steps (see box below).

³¹ <http://www.icrisat.org/>

³² <http://bio-innovation.org/>

Delta³³ contracts an average of 7,500 communal farmers per season to produce sorghum grain for its brewery. There are 8,456 farmers contracted for the 2016/17 season of whom 32% are women. Delta sells seeds on credit to the farmers. They intend to continue to contract smallholder farmers and are looking to increase their production.

Ingwebu Breweries contracts smallholder farmers to produce sorghum for brewing but they struggle to source sorghum as farmers are reluctant to plant it. They do currently source some sorghum from Gwanda district.

Ministry of Women Affairs, Masvingo Province believe that producers are not getting a good/fair price for their small grains, although to get a better price the farmers need to be selling good quality grains or flour. The Ministry is looking for markets for small grain products, e.g. assisting women's groups to access loans for milling machines and marketing sorghum and millet flour to Chevron and Flamboyant hotels (supermarkets only source from registered companies);

NGOs including CARE, CAFOD, CRS, World Vision, Save the Children (UK), Action Contre la Faim (ACF), Christian Aid and Concern Worldwide.

BIZ followed consumer trends to create a porridge mix but with sorghum, groundnut and baobab sourced from smallholder farmers as key ingredients. This product which is similar to an already popular fermented porridge can be targeted at the health conscious urban consumers, traditional consumers and the youth. Youth brand recognition is being built through school feeding programmes, and BIZ are building an urban profile through marketing in supermarkets. They develop the trust between key organisations in the value chain and invest time in smallholder producers so as to nurture effective supply and plan for years of difficult harvests as well as productive years.

National policy: ZimAsset has targets to institute measures for all the beneficiaries of the land reform programme to dedicate a certain quota to small grains and to increase production to 400,000 MT. The small grain strategy of ICRISAT has been developed in conjunction with the Government of Zimbabwe.

3.3.2 Climate Resilience Issues

Small grains (sorghum, finger millet and pearl millet) have a relatively low water requirement e.g. sorghum requires 380-630mm rain per season; therefore, it is considered to be relatively drought tolerant. Pearl millet can rebound from a two-month break in rains. Recently, breeding has sought to produce early maturing varieties³⁴ to reduce the farmers' hunger period. Small grains are more heat tolerant than maize but grain production will be reduced by temperatures in excess of 36-38°C³⁵, although if soil water is present seed can still set at

³³ <http://www.delta.co.zw/>

³⁴ http://www.cgiar.org/web-archives/www.cgiar-org-impact-global-des_fact2-html/

³⁵ <http://www.agronomy2015.com.au/papers/agronomy2015final00153.pdf>

43°C³⁶. There is some anecdotal evidence that small grains can have some tolerance to flooding. Climate change could also increase pest incidence.

Small grain fodder and grain are important sources of animal feed where other sources have been adversely affected by drought. Small grains respond well to CSA approaches which incorporate reduced soil disruption and fertiliser micro dosing.³⁷

3.3.3 Gender Issues

Production – Men generally perceive small grains as being less important and are therefore less insistent on making decisions on women's cultivation of small grains. However, there are cross cutting issues of women receiving poorer quality extension services and facing greater constraints in accessing credit and purchasing inputs. Draught animal power is usually controlled by men which affects women's control of land preparation. Women are less likely than men to be producing small grains for a commercial enterprise under contract.

Processing – Milling, which has a high level of drudgery, is conducted by women. De-hulling machines exist but are not widely available. Local alcohol production may be a source of income for women, but alcohol consumption also fuels GBV against women.

Consumption – Socio-cultural perceptions of small grains may be a barrier to overcome even if those preparing the food (women) are aware of small grain nutritional value. To what extent can women in male-headed households determine the food that is consumed by the household, food which has been dominated by maize.

³⁶https://books.google.co.uk/books?id=Y2n2pH4G9ocC&pg=PT626&lpg=PT626&dq=climate+change+sorghum+pests&source=bl&ots=Iwqn4-C69O&sig=1x-txc7yuXlrD0vTi_fXR5RBbnk&hl=en&sa=X&ved=0ahUKEwiX6u3769LQAhVrC8AKHeU-A9cQ6AEIKDAC#v=onepage&q=climate%20change%20sorghum%20pests&f=false

³⁷ <http://www.icrisat.org/impacts/impact-stories/icrisat-is-fertilizer-microdosing.pdf>

Figure 5. Current nature of value chain

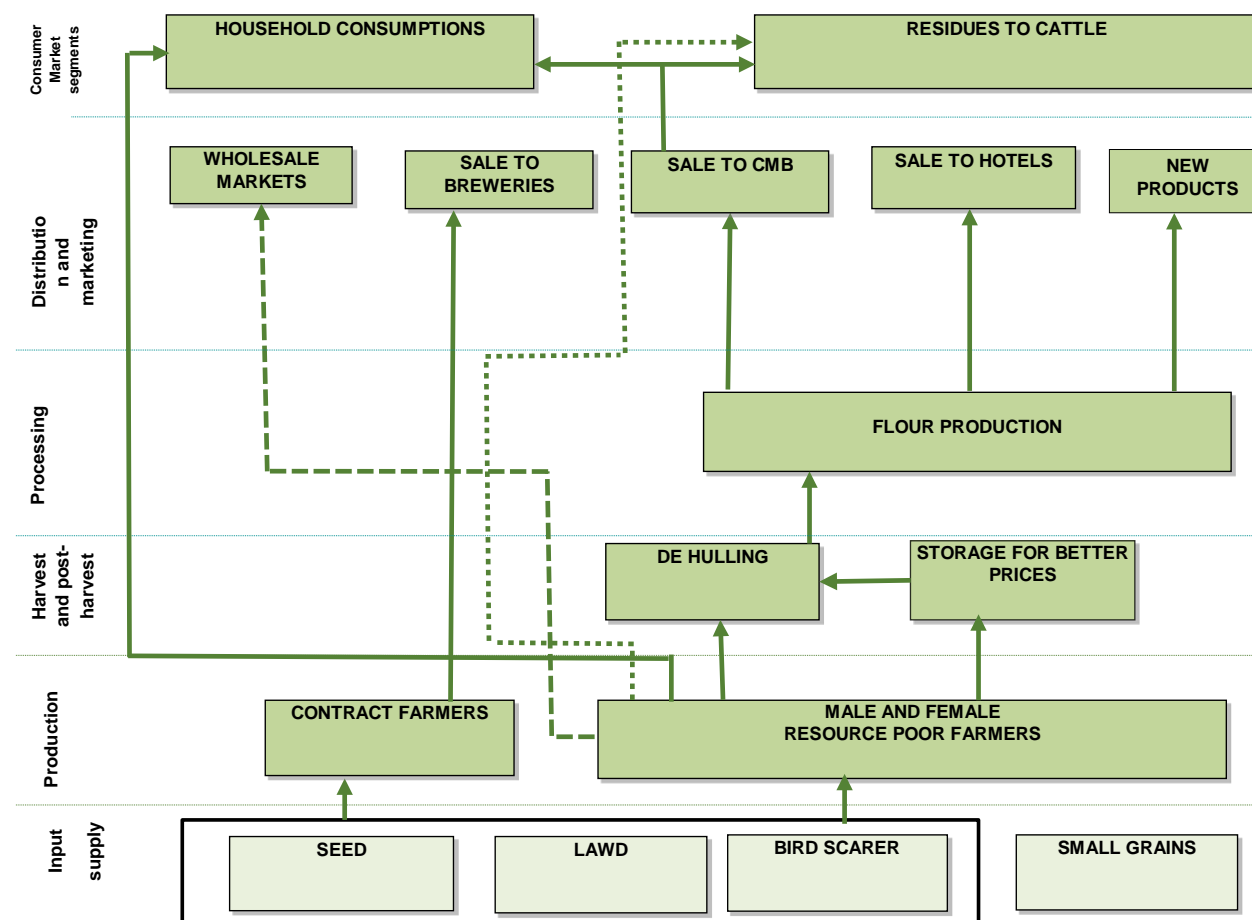


Table 9 Sorghum and Small Grains

Activity	Description	Issues
Production	Rain fed smallholder farms, grown in small plots using traditional practices, varieties, inputs etc.	<p>Reluctance to cultivate – taste/income preference for maize. Maize can be more productive, quality inputs for maize are easier to access and there is a higher market price for maize.</p> <p>High quality seed unavailable reducing both the productivity and viability of seed.</p> <p>Little government support to the small grains sector.</p> <p>Bird damage can be devastating to some varieties of sorghum. FAO estimates the agricultural losses attributable to the quelea, throughout Africa to be in excess of US\$50M annually.</p> <p>Diseases can reduce yields,</p>

Processing	<p>Processing opportunities are linked to varieties and species of grain.</p> <p>Delta processes red sorghum into beer.</p> <p>Grain Marketing Board purchases small grains and mills them.</p> <p>Small-scale initiatives, local purchase of small grain flour for urban markets.</p>	<p>Processors complain of small stones being mixed in sacks of grain – some success addressing this in Uganda through taking a value chain approach³⁸.</p> <p>Geographical bias towards farmers close to Harare or Bulawayo. There is procurement from farmers in Masvingo, Manicaland and Matebeleland South but transport costs to Harare can disadvantage them.</p> <p>De-hulling machines not readily available.</p>
Home consumption	<p>The majority of grain is milled into flour by women and consumed in the household.</p> <p>Stover fed to livestock.</p>	<p>Very little promotion of small grain consumption.</p> <p>Seen as a food of the poor e.g. sorghum provided as emergency relief.</p> <p>Perceived as a traditional food.</p> <p>Stores well.</p> <p>Not currently grown as livestock feed.</p>
Marketing	<p>Farmers bring grains to local markets where there is some aggregation of grain by tradespeople who then transport to larger markets.</p> <p>Currently no significant marketing of stover as animal feed. Sorghum waste is sold as feed at a low price by Delta brewery.</p>	<p>Sales conducted in an ad hoc manner, poor market price information, low margins (anecdotal suggestion of food price distortions from emergency food relief?)</p> <p>Some purchase of small grains which are then milled by the GMB.</p> <p>In Masvingo Province Ministry of Women Affairs conducting small scale market linkages for small grain flour.</p>

3.3.4 Value chain opportunities

Mukarumbwa and Mushunje (2010) recognise the logic of replacing maize with small grains in the drier areas of Zimbabwe³⁹. The populations of the three southern Provinces are Masvingo 1,533,497, Matabeleland South 691,915 and Manicaland 1,793,827⁴⁰; if as earlier stated at least 70% of inhabitants are involved in agriculture, and the vast majority of these will be cultivating cereals, the potential scale of change across the provinces runs into millions of rural dwellers. However, many organisations are working on this issue but finding

³⁸ J.M. Lenné, J.P. Takan, M.A. Mgonja, E.O. Manyasa, P. Kaloki, N. Wanyera, J. Okwadi, S. Muthumeenakshi, A.E. Brown, M. Tamale and S. Sreenivasaprasad (2007). Finger millet blast disease management A key entry point for fighting malnutrition and poverty in East Africa. Outlook on AGRICULTURE Vol 36, No 2, pp 101–10

³⁹ <file:///C:/2016/forwards%20development/CSAP/zim/lit%20rev/175.%20Sorghum%20and%20millet%20in%20Zimbabwe.pdf>

⁴⁰ <http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp275316.pdf>

farmers persisting with planting maize. However, there has been some success at bringing about a change from maize to small grains as is illustrated in the following case study:

On a visit to his home community in Masvingo Province, Dr Paul Muchineripi considered the fact that his community suffered from hunger, an affliction they hadn't had in the past. He raised this in community discussions and the consensus was that one difference was that in the past the farmers had grown small grains, not maize. One old farmer still cultivated finger millet and he shared five bags of finger millet seed with other farmers in the community. Finger millet food is enjoyed by the community members, the seed stores well and finger millet plants, unlike maize can regenerate and produce a harvest if rains return after a month or two of drought. After the first harvest the community members shared information on finger millet food preparation. The success of the finger millet cultivation was such that its cultivation expanded and also (re-) commenced in 44 nearby wards. These communities had a food surplus in the El Nino season of 2015-16 and the community believe that they are benefitting from improved nutrition as well as the income they received from marketing the surplus crop.

The key factor appears to be a local champion who facilitated rather than imposed discussions on small grains. The study team spoke to Dr Muchineripi and he believes it would be possible to enable others to fulfil a similar facilitating role to the one he played in his community. Where possible, community members who have the respect of the community should be facilitating this process as a champion. Champions can have a dynamic role to play in bringing about rural change. Dr Muchineripi could provide advice on identifying local champions, conducting participatory learning and bringing communities together. This would enable similar approaches to be stimulated across the project area at a low financial cost. It would provide foundations for future further transformative changes.

Marketability of small grains was posited as a key issue which would influence household level crop decision making, with acceptable market prices and tangible markets required. Even where small grains are currently purchased from smallholder farmers, farmers (rightly or wrongly) have some negative experience of small grain marketing which is not as transparent as that of maize.

The project should focus on stimulating demand for consumption of small grains. A significant focus on this area should provide the incentive for a sectoral change. BIZ are currently working to stimulate demand amongst the youth, rural and urban consumers. Opportunities for using small grain flour in bread, biscuits, confectionary as well as porridge (see above) have been identified. There is the opportunity to learn from successes in similar areas in Uganda⁴¹. Seed companies have suggested that they would be open to using smallholder farmers to multiply certified small grain seed and market the seed to smallholder farmers. The potential for stover and grains from small grains to provide animal feed is not

⁴¹ J.M. Lenné, J.P. Takan, M.A. Mgonja, E.O. Manyasa, P. Kaloki, N. Wanyera, J. Okwadi, S. Muthumeenakshi, A.E. Brown, M. Tamale and S. Sreenivasaprasad (2007). Finger millet blast disease management A key entry point for fighting malnutrition and poverty in East Africa. Outlook on AGRICULTURE Vol 36, No 2, pp 101–10

clear in Zimbabwe (unlike in other countries such as India). Together there are several 'push points' to work towards stimulating demand.

3.4 Cattle and goats

3.4.1 Justification for Selection

Livestock are a critical element of farming systems in the three provinces. As well as being a socio-cultural priority in the area 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. It is a value chain in which there are obvious gender inequalities but opportunities to challenge these inequalities were identified e.g. migration leading to more female headed households, changes in inheritance law, etc.

Cattle provide draught animal power and manure, cattle and donkeys provide transport, small stock provide 'bankable assets' (that can be sold for immediate cash needs e.g. health fees), cattle as stored wealth, dairy, meat and leather goods as well as being a cherished status symbol. Goats and sheep have high multiplication rates and provide valuable assets for farmers. Competition between goats and cattle for feed is less than might be expected as goats are able to feed on palatable acacia species; by nature, 70% of their food comes from browsing.

Livestock value chains are adjusting to a new way of functioning following the land reform process. The value chain is now dominated by many smallholder producers, keeping small numbers of livestock in an extensive manner. Climate change is affecting a system which is already in a state of flux. In the same vein as changes to inheritance law and demographic trends, livestock related gender norms are being challenged on a number of fronts. Working with livestock provides an opportunity not just to build climate resilience but also mitigation. Key organisations include:

Livestock Meat Advisory Council⁴² (LMAC) aims to protect, promote and further the interests of those persons engaged in the livestock and meat industry in Zimbabwe and ensure the economic viability of the sector. LMAC has consolidated national market sales data on livestock slaughters of cattle, pigs and on poultry broilers and on sales of day old chicks by province and supply of eggs to the market. These can be disaggregated by province but it should be noted that the market for livestock meat, milk and eggs is heavily concentrated in Harare and other large cities.

Heifer International⁴³ are working on a range of issues including: gender (e.g. transformative work on cattle ownership within the household), fodder (production, processing and storage), HIV/AIDS prevention and awareness, nutrition (nutrition gardens and milking goats) establishing internal saving and lending groups and linking them to banks and microfinance institutes, negotiating concessionary interest rates which are affordable to

⁴² <http://www.livestockzimbabwe.com/>

⁴³ <https://www.heifer.org/ending-hunger/our-work/countries/africa/zimbabwe.html>

farmers, and market linkages (establishing farmer co-operatives, establishment of aggregation points for livestock auctions and linking livestock input providers to remote farmers). The abundance of the Matabele goat with its high fecundity and twinning ability makes these provinces a good choice for considering goats. Heifer International Zimbabwe (HIZ), continuing the gift programme in these provinces, has focussed on the Matabele goat.

DR&SS has two livestock research centres in or close to the project areas: Makoholi Research Station and Matophos Research Station. These stations are working on maintaining, researching and multiplying climate change resilient indigenous breeds. In addition, they are also researching improvements in livestock feed.

ILRI⁴⁴ (and ICRISAT) is working in project districts on climate resilience with small stock and livestock including work on improved fodder

The Ministry of Women Affairs amongst other activities is conducting awareness raising of the new family law.

COMESA funded an investigation, led by Jacob Nyathi, into the rehabilitation of the leather value chain. The previously economically powerful leather manufacturing industry, centred on Bulawayo, is currently depressed. Leather workers struggle to access adequate quantity or quality of hides. But hope is returning as a result of bringing together value chain actors to address their constraints in a holistic manner. This has led to the development of a project which will be funded by the African Development Bank.

A GCF focus on livestock would not be isolated as there have been several livestock value chain studies^{45, 46} and livestock development programme concept notes development for WB, USAID⁴⁷, DFID, and EU as well as for FAO and AfDB. Specific NGOs (SNV, WV, Care Zimbabwe, CNFA and Fintrac) have also produced some regional reports on their ongoing (or recently completed) livestock development projects. The FAO/LFSP project funded by DFID, USAID funded Feed the Future Livestock program and ENSURE projects are major active livestock projects being implemented in 18 districts of Midlands, Manicaland, Masvingo, Matabeleland South and North.

3.4.2 Climate Resilience Issues

Livestock, particularly indigenous livestock, are drought resilient. Access to rangeland enables herders and animals to seek out food rather than being dependent on rainfall within a plot (as with crop production). However, livestock require water to drink and if potable water is limited this will limit the range of the livestock. It was reported that in some cases the search for fodder has resulted in livestock moving closer than normal to national parks where they suffer increased predation from wild animals. This increases the likelihood of human-wildlife conflicts.

⁴⁴ <https://www.ilri.org/>

⁴⁵ <https://www.ids.ac.uk/files/dmfile/Masvingoresearchreport.pdf>

⁴⁶ <http://www.fao.org/wairdocs/ilri/x5472b/x5472b09.htm>

⁴⁷ <http://www.fintrac.com/projects>

Livestock, particularly cattle are major emitters of GHGs. Mitigation against this can be implemented through the use of improved fodders and feed management. Improved rangeland management has been developed and is being implemented in Hwange District⁴⁸ in Matabeleland North by the Africa Centre for Holistic Development (ACHD). De-stocking has been promoted as a method for addressing drought but the team could not identify evidence of its effectiveness.

Heat affects the productivity of livestock, especially exotic breeds. It can cause premature deaths of broiler chickens, reduce the production of milk as well as the quality of hides.

3.4.3 Gender Issues

Gender issues vary with the different types of livestock and the local socio-cultural norms. Decisions over livestock can be made by a male household head, but the decision might reflect consensus which has been developed between male and female household members.

A male head of household is generally in charge of the cattle herd as the "store of family wealth" and source of marketable and non-marketable cattle flow products. If the male household head is absent, the tradition is that he is consulted over important decisions by the woman managing the cattle. The new family law allows women to inherit cattle, however these laws are not always applied within the communities. Sometimes, in mature households with married daughters, the female head of the family receives "one cow for the mother of the bride" from the marriage of each one of her daughters. These cows and the progeny are considered sacred protected assets that belong to the woman head of the family and traditionally will be transferred to her parental family in the event of her death. Thus, contrary to popular misconceptions, there is social structure to cattle ownership which reserves and protects some cattle for women heads of the family. Afrocentric models of livestock development can strategically focus on "women's cows" with cattle breeding and husbandry interventions to reduce cattle asset poverty of women in smallholder agriculture.

Women generally have control in goat rearing and goat buying/selling decisions without the need to inform their husbands. Heifer International have shown that women are empowered (economically/ socially) through goat keeping. Goats give a swift return on investments and have a comparatively high multiplication rate. Women heads of families often use their surpluses from their 'savings and loans clubs', profits from beer parties and from sale of women-controlled groundnuts/bambara nuts/garden crops to buy additional breeding goats from other women farmers in the village. In cattle-poor households (44% of rural families lack cattle), goats are the most valuable assets used as family store of wealth, and thus in these extremely poor cattle-less farm households we often observe men having much greater say on goat rearing and marketing decisions than in cattle-rich families where women are empowered to manage the goat enterprise.

Poultry (indigenous chickens and turkeys): These are generally considered to be the lowest valued assets in a family livestock portfolio. They can be slaughtered at short notice to offer

⁴⁸ <http://www.chronicle.co.zw/achm-leaders-in-land-water-and-wildlife-restoration/>

respected guests a special meal or sold at short notice to pay for grinding meal, transporting an ill relative to the district clinic or other immediate cash needs. No apparent hierarchy in decision making regarding poultry with women heads of the family enjoying more decisionmaking powers over poultry enterprise management including marketing and slaughter decisions. When it comes to commercially oriented poultry projects - raising layers or broiler chickens – women’s groups are more actively involved than men’s groups.

3.4.4 Current Nature of the overall Value Chain

Before the land reform programme, Zimbabwean veterinary services and livestock market development were geared towards a commercialised, export-oriented industry with a strict regime in place to minimise Foot and Mouth Disease (FMD) and safeguard exports to the EU (e.g. fencing, zonation, vaccination and movement controls). In the project area FMD is now out of control and livestock production is almost entirely for local markets. Given current conditions, the re-imposition of a strict veterinary regime (including a massive fencing and vaccination programme, movement controls, culling of buffalo etc.), together with an export-oriented marketing system, does not appear to be either feasible or desirable⁴⁹

⁴⁹ Mavedzenge, B.Z., Mahenehene, J., Murimbarimba, F., Scoones, I and Wolmer, W. (2006) Changes in the livestock sector in Zimbabwe following land reform: The case of Masvingo Province.

Figure 6. Livestock value chain

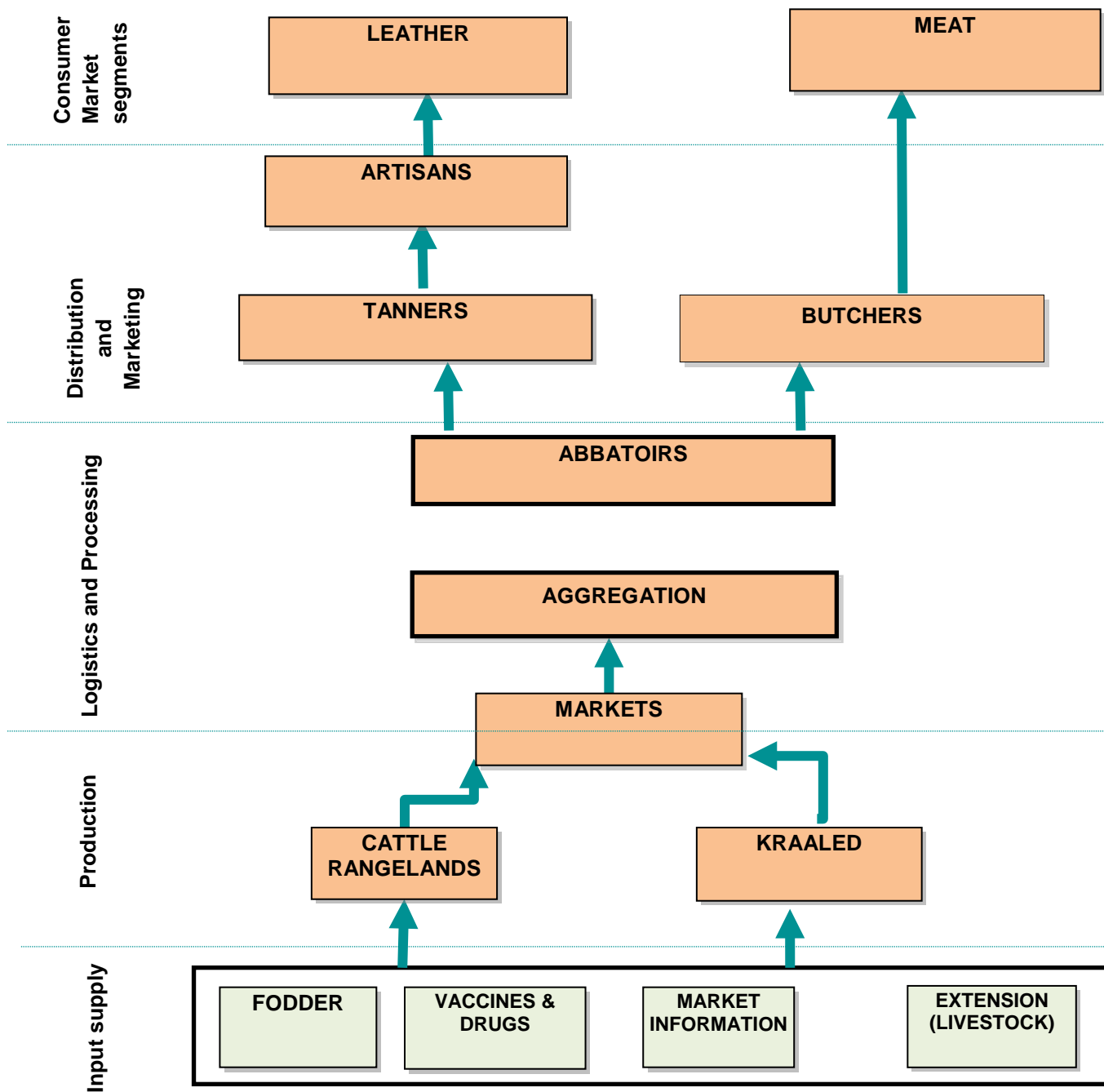
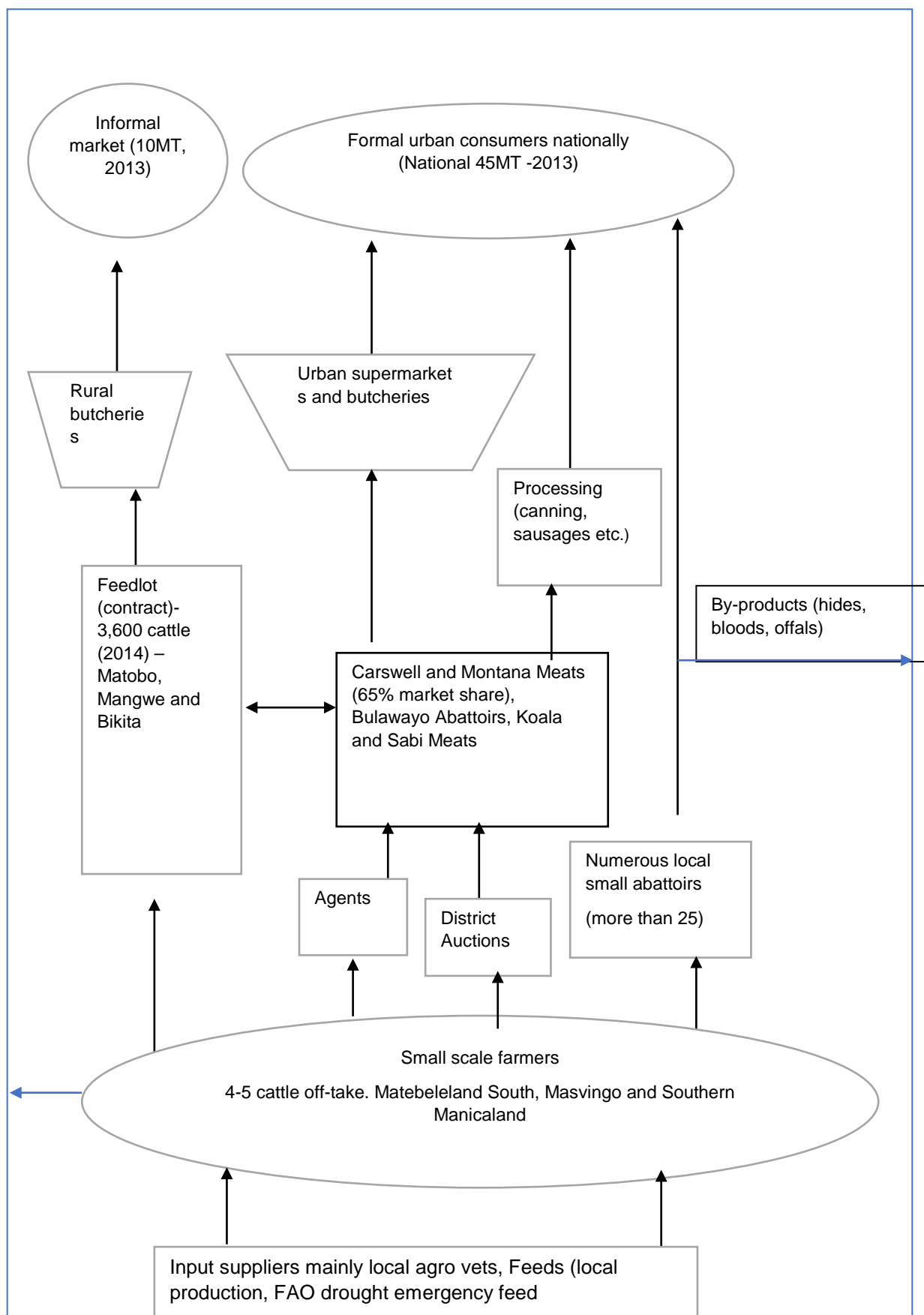


Figure 7. Territorial map of the cattle markets for southern Zimbabwe



Demand for livestock:

Despite significant growth at 14% p.a. between 2008 and 2014, cattle slaughter levels remained below capacity utilization at a mere 18% of the 1.5 Million head installed capacity of the industry.⁵⁰ Per Capita beef consumption in 2013 was 3.3 kg per annum⁵¹. Beef consumption is under pressure from cheaper competitors mainly chicken. However, demand for good quality meat remains high signified by occasional imports to meet gaps in the market. There are some frozen beef imports which often peak in April-May and August-September due to dry season drought. For example, in 2014 between January and October 1,984MT (live-weight of cattle) worth US\$2.68 million, was imported. However, the opportunities for growth in beef are not in domestic market, which is depressed by low economic growth, but in the rapid growth of international market demand such as in East Asia and Pacific and China and regional markets among others. This global demand is expected to be growing at 3% per annum⁵². Currently the country's exports are quite insignificant, if at all due to mainly foot and mouth disease⁵³.

The major buyers in the proposed project area are demonstrating demand for better grade beef through supporting feedlots (for example M&C meats in Bikita, Chipinge and Chiredzi which are proposed project districts). The abattoirs also provide transport for more than 25 cattle or more than 75 goats. Buying through agents, mostly uncontracted, is the predominant model through which the big abattoirs access slaughter stock. However, that channel offers lowest margins to farmers as aggregators want to maximise their margins by pushing down purchase prices

Supply of livestock:

At national level, annual meat production was 87,000MT (comprising 44,000MT beef, 32000MT Poultry and 11000MT Pork)⁵⁴ The provinces where the proposed project is envisaged had the following total cattle numbers: Manicaland (660,899); Masvingo (1,007,165); Matebeleland South (615,359)⁵⁵. Generally, super and choice grades - about 25% of the market - currently can earn as much as 50% more than earnings on economy and commercial grades. For the largest abattoir, Montana and Carswell Meats, 95% of the beef comes from smallholder farmers. However, off-take is quite low across the three provinces ranging between 4 and 6 animals per farmer. This is owing to a number of challenges including a calving rate that is at 45% versus an ideal target of 85%⁵⁶.

Table 10 Cattle and goats

Activity	Description	Issues
Cattle	Dominated by	Animal genetics have been weakened through years of

⁵⁰ TechnoServe Inc 2014, beef Cattle Industry in Zimbabwe, a strategic Program for Future Growth

⁵¹ FAO supply and demand to 2030.

⁵² Beef Cattle Industry in Zimbabwe, a strategic Program for Future Growth, TechnoServe 2014

⁵³ Ibid.

⁵⁴ TechnoServe Inc 2014, beef Cattle Industry in Zimbabwe, a strategic Program for Future Growth

⁵⁵ Collected from Office of Department of Livestock Production and Development

⁵⁶ Agricultural Policy Draft, MAMID 2012 , LMAC CIBER Report, 2012; Policy options for improving and enhancing beef production Zhuwao 2012

rearing	smallholder farmers grazing their cattle	<p>inbreeding.</p> <p>Stocking levels: As livestock are bankable assets smallholder agricultural families may carry more livestock units for longer periods than dictated by profit motive. This increases pressure on the already diminishing carrying capacity of rangelands. The result is increased stress and higher risk of losses of livestock.</p> <p>Feed: Shortage, and accessibility – there is high demand but lack of supply to remote areas. The by-product of the brewing industry provides a good feed but supply is limited.</p> <p>Water Shortage and accessibility – A lack of access to water limits the area across which cattle can graze.</p> <p>Isolated feedlots, not well plugged into the commercial value chain.</p> <p>Few farmers growing improved fodder crops.</p> <p>Over-stretched veterinary services.</p> <p>Scientific knowledge on improved feed and disease management is not being applied.</p> <p>A lack of specialisation e.g. few farmers specialise in breeding.</p> <p>A lack of record keeping prohibits access to export markets.</p> <p>Big demand but lack of supply of dairy products.</p>
Goat rearing		<p>Goats grow quickly and have a relatively high multiplication rate.</p> <p>Can damage grassland.</p> <p>Goats are harder than cattle to herd and maintain within a set area.</p> <p>Extension staff lack knowledge in small stock management.</p>
Marketing	Bought by middlemen who sell to abattoirs who then sell the meat to butchers and the hides to tanners. The slaughter and marketing function is fragmented with many small abattoirs. Over 150 small registered abattoirs take up 50% of the market while the remaining 50% is occupied by 11 medium to large abattoirs. Matebeleland South has 7%, Masvingo 16% and Manicaland 7% of the	<p>Limited number of buying agents active in any village market at any one time. This means the buyer has tremendous market power in setting a buying price.</p> <p>District auctions have failed to attract the critical mass of buyers to render such auctions truly competitive. Online cattle auctioneering is a novel idea being piloted with donor funds but is yet to seriously target smallholders and offer a credible alternative market for rural Zimbabwe.</p> <p>VAT introduced on meat products and market levies, reduces the ability of the poor to purchase.</p> <p>Poorly developed livestock marketing systems.</p> <p>Selling decisions are seldom based on optimality considerations of profit maximizing, selling age of cattle, goats, poultry etc.</p> <p>A lack of access to financial capital for investments in production.</p> <p>Marketing infrastructure for goats is particularly poor.</p>

	registered abattoirs. There is no over-arching marketing strategy and selling is typically local and at farm gate prices.	
Cattle value addition	Abattoirs shifting from specialisation to broad product range e.g. from beef to include goat, chicken to be more competitive Lack of investment in adding value	SMEs looking for short-term returns. Market response to the packaging of different cuts (particularly of goats needs to be explored) Weaknesses in the leather value chain start with the majority of herders exhibiting a lack of care over the quality of animal hides (including branding marks), goats not being sent to abattoirs with their hides not entering the value chain.
Crop cattle interactions	Cattle significantly contribute to crop production on rainfed and irrigated farms	Draught animal power, transport, manure (fertiliser), crop stover as animal feed

3.4.5 Value Chain Upgrading Opportunities

Feed: Cultivating fodder to sell (e.g. from farmers on irrigation schemes to farmers on communal lands) for self-sufficiency and for feedlots to add value to livestock pre-slaughter. Anecdotal successes in these areas were identified during the fieldwork, e.g. USAID Feed the Future Zimbabwe Livestock Development Program (implemented by Fintrac). Since July 2015, more than 2,000 farmers have received training and technical assistance on good animal husbandry practices, including fodder production. As a result, farmers have been better able to adapt to the severe drought currently affecting much of the country. Farmers have learned to prepare nutritious feed rations for their livestock using locally available resources such as cactus, velvet beans, molasses, and maize stover. Such levels of fodder production are still low and huge demand remains unmet. This demand needs to be quantified for the different times in the year and potential investors in fodder production need information on the potential returns on investment in this activity.

Livestock Management: Entrepreneurship training or coaching to develop a more agribusiness-based approach amongst livestock producers would support livestock development on a number of fronts. It would support livestock keepers in terms of making decisions over stock numbers, would influence the consideration of using additional fodder, lead to more effective deployment of draught animal power and more effective utilisation of access to credit etc.

Genetic improvement: Smallholder livestock genetic potential has been eroded by years of inbreeding reducing the frame size, weight gain rate and calving rate. Genetic upgrading of the indigenous herd of cattle and goats by replacing bulls with purebred indigenous bulls and also breeding for quality of milk and meat would significantly increase yield per unit animal and reduce environmental impact. Researchers and NGOs e.g. Heifer International with the required skills are based in or close to the project provinces.

Markets: Improving the effectiveness of the linkages between producers, aggregators, abattoirs and processors would increase quality, quantity and remuneration within the value

chain. LMAC, Heifer International, ILRI & ICRISAT etc., are already working in this area. The COMESA review has shown what can be done within the leather value chain but a review of market linkages across the livestock value chain followed by the establishment of an innovation platform based on successful models would create a base for improving market linkages. Investments in market infrastructure by the GCF project will add value to improved market linkages.

Livestock watering facilities: A specific infrastructure requirement whose provision would lead to improved rangeland management. Their presence would support additional activities e.g. the production of biogas. However, before construction, plans for their management and maintenance should be developed in collaboration with the water users. This should be linked to hydrological support on irrigation schemes.

Knowledge: Currently science and technology are way ahead of current husbandry practices, the new knowledge is not being diffused to the farmers and value chain actors fast enough. Agricultural innovation systems, including innovation platforms provide the scope for increasing returns and reducing environmental damage from livestock through establishing relationships which lead to knowledge flowing from knowledge generators to knowledge users. In addition, currently, an isolated outbreak of a notifiable disease like FMD in cattle or ASF in pigs forces authorities to shut down an entire province from supplying cattle to the national market because of limited information management system to enable authorities to identify and isolate specific farms where disease outbreaks are sited.

Livestock herd management infometrics system: Presently, neither the government nor the private sector are adequately monitoring smallholder cattle and livestock herd dynamics nor generating diagnostic analytics on herd composition and structural transformations to ensure maximum growth and sustainability of slaughter stock supplies, address regional disparities between rangeland supply of feeds (carrying capacity) and herd sizes (demand for natural feeds). The national department of Livestock and Veterinary Services is keen to reintroduce a livestock information recording and traceability system, not to ensure compliance with EU export market as before, but one tailored to service the national marketing requirements for biosafety and disease control as well as for strategic growth and development of the domestic livestock industry.

3.5 Cross cutting issues

3.5.1 Gender

Unequal gender relations, particularly in terms of access and control are not only unfair but also reduce the functioning and the wellbeing of the household. The 2012 IIED review⁵⁷ reports that it is widely recognised that climate change will exacerbate the gender dimensions of vulnerability, which arise from existing social inequalities and gendered

⁵⁷ <http://pubs.iied.org/pdfs/10034IIED.pdf>

divisions of labour. In addition to the disproportionate effects of disasters on women's mortality and morbidity, climate change is expected to jeopardise women's livelihoods by reducing economic opportunities, especially for female-headed households. In Zimbabwe, 70 per cent of women are smallholder farmers dependent on rain-fed agriculture and climate-sensitive resources. Women are therefore particularly vulnerable to the effects of climate change and also seek alternative income generating activities. For example, women in some areas of Shurugwi reported a shift in livelihood strategies to beer brewing, which led to higher alcoholism and an increase in domestic violence and abuse against women. In other cases, the impacts of drought and extreme weather have resulted in changes to women's and men's responsibilities, e.g. increasing the time taken by women in collecting water.

With men often engaged in work off farm, leaving de facto female-headed households, women farmers are even more important in terms of their roles in Zimbabwean agricultural production. Promotion of the inheritance laws by the Ministry of Women Affairs (allowing women to inherit from close male relations) provide opportunities to challenge negative gender norms. The team were advised that even where the ultimate decision making resides with men, the decision can be based on a consensus of points of view from women and men. This consensus building approach provides an opportunity for the GCF project to introduce gender transformative approaches (building agency and transforming social cultural structures), in which negative gender norms (e.g. allocation of roles, GBV, education) are analysed, at a household or a community level in a manner that engages women and men in constructive dialogue on the issues. Further gender issues to consider include men and women's distinctive roles and responsibilities in the farm and their families (e.g. nutrition), as well as wider issues relating to labour demands, technology use and market access.

Although women (and children) are expected to be disproportionately affected by climate change, they remain largely absent from decision-making processes on climate change adaptation and disaster risk reduction. This is demonstrated by the absence of gender in policy frameworks involving the management and protection of environment and natural resources in Zimbabwe (also from IIED 2012).

3.5.2 Changes in Attitudes and Behaviour

Throughout the study the issue of behaviour change or a lack of behaviour change and the underlining mind-sets behind these were brought up in relation to different elements of value chain strengthening. Behaviour change is critical for project success and therefore needs to be considered throughout project planning and implementation.

An ongoing behaviour change issue is that of reducing maize cultivation in areas too dry for its successful cultivation. There have been a number of initiatives that have sought to reduce the farmers' reliance on maize production. However, despite the projects and recent maize harvest failures farmers continue to plant maize and are reluctant to invest in the alternatives. Dr Paul Muchineripi encouraged his community in Gutu District, Masvingo, to ask themselves why there is a shortage of food these days where there had not been in the past. One old man responded that in the past they grew finger millet and they had enough harvest to sell even when the rains were not good. Maize had been

brought by outsiders and with it had come shortages. Finger millet seed stores well, finger millet plants, unlike maize can regenerate and produce a harvest if rains return after a month or two of drought. Further, indigenous knowledge on the food preparation front showed community members the delicious meals that could be prepared from finger millet. In response, the community members sought out the old farmer and received 5 bags of finger millet seed which allowed them to begin growing millet again over the last ten years. As a result, the community is healthier and there is a food surplus. Other communities in the district have visited to find answers to their food security problems, and to date at least 44 wards have taken to growing small grains instead of maize.

It should be noted that this is not taken from a project, it is a community led initiative. Champions can have a dynamic role to play in bringing about rural change. Dr Muchineripi could provide advice on identifying local champions, conducting participatory learning and bringing communities together. This would enable similar approaches to be stimulated across the project area at a low financial cost. It would provide foundations for future further transformative changes.

Zimbabwe is in a new era of agriculture and a new era of relationships within the value chain. History has shown us that simply bringing together researchers, extension workers and farmers does not lead to effective agricultural research and development. There need to be effective working relationships (or institutions) between value chain organisations. The study team were informed that these institutional linkages are weak with a lack of trust between key groups including the public sector, private sector, NGO, Financial Service Providers and farmers. Institutional linkages take time to develop but provide a cornerstone for sustained development. Even with these linkages in place, adoption of new technologies and approaches by value chain actors is not automatic, care needs to be taken to incentivise people to a new way of working, men and women have different technological needs. Ongoing reflection will facilitate the progress.

The report has picked up stakeholders believing that farmers need to develop an agribusiness mentality but there are further mind-set changes required for effective value chains, e.g. private sector actors understanding how to engage with smallholder farmers could well catalyse effective market linkages with the private sector. There is no fool-proof guide to influencing mind-sets but a process of social analysis and action has huge potential.

3.5.3 Impact at Scale

To achieve impact at scale it is critical to learn from the experience of others. Throughout this report there has been a lack of focus on maize. However, maize has been an incredible success story from its widespread cultivation and integral role in the Zimbabwean diet. Indeed, with the efforts of CIMMYT in breeding for drought and heat stress this success is likely to continue in many parts of the country. The maize experience should have valuable lessons, particularly for the crop value chains, e.g. in the marketing of seeds.

Other successful initiatives should be reviewed, e.g. Dr Paul Muchineripi's community led action research in Gutu District. The irrigated banana at Mutema, the work of BIZ, the work of Jacob Ngathi with the Bulawayo Leather Cluster all provide examples of small scale initiatives with replication potential.

Links with other projects and programmes will allow the proposed GCF project to build on already established momentum on climate change, market linkages, gender transformations

etc. which will allow the proposed project to move forward swiftly and generate its own change momentum. It will ensure that dynamic partners are supported by projects, not over-stretched by demands of different projects. Effective cross-project collaboration can lead to impact greater than the sum of the individual projects, and this should be a desired objective.

3.5.4 Natural Resources Management (NRM)

Good NRM can mitigate against the effects of climate change. Ignoring NRM increases risks to the investment in this project and will reduce the positive impacts from the project. NRM covers a range of different issues which will affect one, some or all of the value chains, the specific details were not the focus of this study but NRM issues arising included:

- Land management to manage floods which can damage crop stands and irrigation infrastructure;
- Water management to ensure sustained water quantities and quality;
- Forest management to control erosion and provide shade (heat management);
- Rangeland management for effective grazing of livestock; and
- Soil management to enable sustainable cropping.

3.5.5 Financial Services

Access to financial services was raised as a constraint by producers in different locations, either as a lack of financial service provision or unaffordable interest rates. CABS, CBZ microfinance and inclusive Financial Services and Quest were named as FSP engaged with smallholder farmers. Financial service requirements of processors and private sector partners was not explored. Two NGOs providing financial services were emailed (CARE and CRS) but responses were not received. The Value Chain analysis team engaged in a Skype discussion with the leader of the Inclusive Finance Assessment. Her report will focus on these issues.

3.5.6 Other Cross Cutting Issues

Additional cross cutting issues include:

Provision of information on climate change: including weather forecasting to support farmer decision making and decision making by those involved in farm input provision. Climate change information will also enable planners in their assessment of plausible future scenarios.

Market information systems: In support of market linkages so as to support value chains through the more effective marketing of inputs and purchasing of products.

Effective precision input supplies: Appropriate inputs to the farmer and her/his farm need to be effectively provided in a timely fashion to support increases in production.

Supportive enabling policy environment: The recommendations in section 3 need to inform and be supported by the policy environment. The GCF project will need to ensure that there is an ongoing dialogue on the policy implications of project activities, outputs and outcomes to ensure synergy with the policy environment.

4 Recommendations and Conclusions

4.1 Implementation of a climate resilient value chain approach

The study has identified a complex set of factors, with different levels of interaction that influence, and will influence value chains. The study provides a snapshot of value chains as of 2016 but the agricultural systems are dynamic and change continues with climate change and the evolution of the national economy, two clear drivers which will challenge and change value chains in the near future.

However, the four value chains prioritised: irrigated horticulture, sesame, small grains and livestock represent commodities with climate resilient production that can be further enhanced, marketing that needs to be improved and adding value which is possible and should be further explored. The four value chains should not be seen as separate entities as they interact and share similar issues, not just responding to climate change and the issues presented in 3.5 but also these presented in Table 11. It is therefore recommended that this cross cutting structure is reflected in programme management with the four value chains providing the key management areas but with themes cutting across them.

Table 11 Common issues across the four prioritised value chains

Issue	Value chain
Quality produced not related to market demand	All Value Chains
Lack of collective marketing	All Value Chains
Inefficient marketing	All Value Chains
Lack of engagement in formal markets	All Value Chains
Product development opportunities exist	All Value Chains
Lack of knowledge in improved production (farmers and extension)	All Value Chains
Poor seed/ input availability/ poor seed quality	Small grains, sesame & livestock
Production not related to market demand	Irrigated horticulture, small grains & livestock
Contract farming offered	Irrigated horticulture, sesame, small grains
Perishability of produce	Irrigated horticulture & livestock
Export options	Sesame and irrigated horticulture, other value chains once developed
Use of animal traction and manure	Small grains, irrigated horticulture, sesame

This will allow synergies and efficiencies between activities on different value chains and lesson learning across the project.

A recurring theme in the report narrative is the engagement of the private sector and market driven approaches. The authors believe that sustained development impacts are most likely to be achieved through an approach which works with and is often driven by the private sector. This presents a major challenge for a project to be managed by the public sector. Even in the short length of time in the field it was clear that, in general, the public and private sector do not currently have a relationship which would lead to effective project intervention.

It is recommended that an inception phase be implemented. In addition to the usual elements of refining activities, defining roles and agreeing *modus operandi* (including internal communications) a critical element will be building an understanding and working relationship between implementing partners. This will be particularly important with regards to public-private sector relationships.

4.1.1 Location of Activities

The four value chains represent commodities which should be able to be produced throughout the project area. As sesame is a new crop in many areas, its ability to be cultivated will need to be tested. Irrigated horticulture will be focussed on irrigation schemes, but livestock and small grains can be produced by most farmers. To achieve project success, it is advised that initial activities focus where there are partners who, it is felt, have a good chance of achieving success (e.g. based on track record, future plans etc.). Locations which only receive support from organisations that have a poor record of achieving agricultural development should not be ignored, rather focussed on later when successes from initial areas can be brought for replication.

4.2 Irrigated Horticulture Value Chains

Recommendations:

This is a high-value sector with a lot of opportunities offered by a combination of high diversity in horticulture products (implying more value chain opportunities), differentiated climatic conditions in the target region (which allows off-season production of summer crops in winter) and product deficit in both the formal and informal markets.

The priority for interventions should be on developing the formal market which offers more value and sustainability. The driver should be the private sector. Although the private sector are keen to expand, local sourcing, costs of setting up and maintaining new supply sources in the project area are beyond their capacity under the prevailing challenging operating environment. Therefore, the project should provide incentives through co-investments in logistical infrastructure to reduce the costs of sourcing from far afield.

Although the informal market offers lower value, this is an important market that allows thousands of farmers, entry into horticulture. What is missing is access to market information and capacity which can be used to ensure profitability in the market. The recommendation is therefore to invest in market information system support and market research, working in partnerships with existing service providers.

Strengthening smallholder coordination is recommended as it will be key to responding to the quantity, quality and timing of supply to the market with efficiency. Working with the right partners, investment should be directed to building capacity of producers to coordinate through producer associations.

4.2.1 Development of a Public Private Partnership within project planning

Strengthening this value chain will require the public sector understanding the value that the private sector can bring and being proactive in partnering with the private sector. To be successful, such an approach requires mutual understanding and respect between the public and private sectors to develop these participatory activities, in order to develop an understanding of the functioning, roles, incentives and recognise each other's strengths and

weaknesses. This needs to take place before broader stakeholder planning takes place so that NGOs and other partners can understand how the public-private partnership will work.

4.2.2 Strengthen Production

Multi-stakeholder workshops will verify and adapt the prioritised areas for this work:

1. Improve reliability of water supply and reduce cost of irrigation;
2. Develop production and organisational capacities for smallholder farmers;

Irrigation strengthening planning should be conducted with a consideration of natural resource management – water use efficiency and land and water management so as to ensure the environmental sustainability of the irrigation scheme. Financial sustainability should also be sought with plans for the maintenance of the irrigation scheme developed, in a participatory manner, from the beginning of the project. In parallel to the irrigation planning multi-stakeholder planning will also take place to develop the production and organisation capacities for smallholder farmers. Cross-irrigation scheme learning and analysis should take place to develop and implement plans with particular consideration on gender issues, scheme management, land use planning and input supply.

4.2.3 Market Linkages and Value Addition

The project teams should visit and experience successful market linkage initiatives in the sector, e.g. Matanuska, seed outgrowers to explore the factors behind the success of these initiatives so that plans can be developed to:

1. Develop and strengthen market linkages based on trust and business-orientation;
2. Facilitate provision of market information;
3. Undertake PPP investments in marketing infrastructure and
4. Support the addition of value to horticultural produce.

The project will need to seek out and engage the private sector and provide an enabling environment for new horticultural enterprises to become established. Activities should be planned and implemented that will lead to effective marketing (quality and quantity) by producers to the private sector, improved postharvest handling and storage and increased value addition.

Profitability:

Horticulture offers the highest crop returns per ha and therefore justifies high upfront investments in irrigation infrastructure. Simple average gross margins for a number of crops were found to be 54% (based on AGRITEX budgets of nine crops). Horticulture also 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. A total of 6,000 farmers and at least 2,000 indirect beneficiaries can potentially benefit from this project.⁵⁸

Key groups to work with include:

1. **Private sector:** Fruit and vegetables wholesalers and processors
2. Development partners: CESVI (citrus)
3. **Public sector:** Agricultural Marketing Authority, Ministry of Small and Medium Enterprises, Municipal markets management and AGRITEX
4. **Producer organisations:** ZFU's National Horticulture Producers Association
5. **Other projects operating in the same area:** FAO's Small Holder Irrigation Programme, ENSURE (World Vision) and AMALIMA (CNFA)

Investments Required: Building production and organizational capacities, US\$1.5M; market information service, US\$0.5M; PPP infrastructure investments, US\$2M; Banana and citrus developments, US\$1.5M. Total – US\$5.5M

4.2. Sesame

Recommendations:

The sesame subsector is still in a growth and development stage. The main value chain ripe for investment is export-oriented with production mainly taking place under contract farming. Demand is not a concern at present as destination countries are demanding more products. Developing a more specialised value chain that produces differentiated quality products to meet the local confectionary industry is a realistic opportunity. Strengthening the sesame value chain would provide an opportunity for communities to be supported in other livelihood activities i.e. activities supported by government agents.

The GCF project should focus on how it can support the activities of the private sector, whilst ensuring that producers are treated fairly and the environment is respected. The private sector support for sesame cultivation should also be an opportunity for AGRITEX and government services to 'piggy-back' on the activities of the private sector which would reduce costs and lead to more balanced development.

Expansion of sesame should be private sector-driven while support should focus on building the organisational capability of farmers, incentivising stronger linkages between private sector and producers by putting in place basic infrastructure (such as service hubs). While expanding scale, another key area is investing in improving technical capacity of farmers to improve productivity up to three times its current levels. The multi-partite model of contract farming can support provision of a full-service package of inputs, technical knowledge and market information and access required to achieve higher levels of viability (1.5 tons of good quality). The sesame interventions have the capacity to surpass current sesame smallholder outreach of 10,000 to add another 15,000 direct beneficiaries. Income ranges of US\$200 to

⁵⁸ Note that these numbers are for the originally scoped nine districts. These numbers can be expected to rise given that the number of districts has increased.

US\$750 are expected per ha, per annum are expected from sesame which, with the low risk involved, offer smallholders a more sustainable source of income. Thousands of farmers are anticipated to join once input supply is addressed due to low cost of external inputs per ha (US\$100 /ha).

4.2.1. Development of a Public Private Partnership

This value chain is driven by the private sector but the public sector has a key role to play e.g. in ensuring sustainable practices are implemented and that vulnerable people are not marginalised. Such a public-private partnership has the potential for conflict but without it the value chain is unlikely to develop in a manner which brings equitable and sustainable benefits to rural communities. Therefore, participatory activities will be required to generate a mutual understanding between public and private sectors and what each other see as important in the programme and sharing concerns with methods devised for overcoming them so that the public sector can effectively support the private sector in the implementation of this value chain.

4.2.2. Development of infrastructure to support private sector investment in sesame value chains

The public sector can help to reduce the risk for private sector engagement. It should therefore identify areas where the private sector would not otherwise engage and support private sector engagement through:

1. Testing the productivity of sesame varieties in areas where it has not previously been cultivated;
2. Testing the cultivation of sesame using Climate Smart Agriculture approaches
3. Supporting provision of inputs and extension services to farmers from both public and private sources;
4. Co-investing with the private sector on required infrastructure, such as buying stations and processing facilities;
5. Promoting scaling up of market linkages in new geographical areas; and
6. Improving coordination of farmers through producer organisations.

4.2.3. Piggyback on private sector value chain development

Those ministries with a remit for rural development should work together with private sector actors to identify and implement activities that would use structures e.g. farmer groups, input supply chains developed by the private sector to bring other services which would accelerate rural development.

Projected investments for these main interventions are US\$3M mainly focused on co-investments with private sector for necessary infrastructure (US\$1M) and producers support services (US\$2M).

Key groups to work with include:

Key groups to work with include private sector (e.g. IETC and Sidella Trading, suppliers of confectionary sesame), farmer associations (Sesame association), extension (AGRITEX and private company extension), research services (on seed improvement), selected and willing input suppliers (e.g. Zimbabwe Super Seeds).

Private sector: IETC, Sidella and Southern Africa Sesame Board. Zimbabwe Super Seeds can play a role in seed multiplication and distribution.

Producer organisations: ZFU and Sesame Association⁵⁹

Government: AGRITEX (for extension and support seed multiplication)

NGOs: SNV among others

Financial Services: ZADT, CABS microfinance

Investment required: Private sector co-investments US\$1M, producer services support US\$2M.

Budget Estimate: US\$3M

4.3. Small Grains

Recommendations:

This is a value chain which has a clear logic but to date, despite significant investments, remains under-developed. The value chain should be developed in an iterative manner but recommendations for the initial activities can be provided. It is recommended that the project focus on three specific but interacting areas:

4.3.1. Improved and climate resilient production

The project should commence by collating information on climate resilient small grain production e.g. small grain production using CSA, small grains for animal feed, gender roles and gender-based constraints in small grain production. Strong partnerships already exist on the generating knowledge element (e.g. ICRISAT, DR&SS, ILRI), and workshops with these groups and their partners should be used to identify critical knowledge that the project should consider in supporting improved and climate resilient small grain production.

4.3.2. Improved farmer uptake

The project team should conduct reflection workshops to identify how successes have been achieved in changing the behaviour of farmers. These workshops should include a range of stakeholders including farmers. It is recommended that Dr Paul Muchineripi be invited to present his experience. The outputs from these workshops would be used to plan the promotion of small grains to smallholder farmers in the target areas, both what activities should be conducted and who would be the most appropriate to conduct them.

4.3.3. Improved marketing and value addition

This element needs to review both current marketing and value addition arrangements (e.g. to the brewing industry) and potential new markets e.g. through small grain flour replacement of other cereals. This review will lead to decisions on the priority areas for support in the system. Decisions on the marketing and value addition will need to have a

⁵⁹ Although the consultants could not meet the Sesame Association, IETC confirmed working with this organisation which provides inputs to farmers and also buys from farmers on behalf of IETC.

financial basis and the project will need to ensure that they have this information available so as opportunities with good returns on investment can be identified. Gender roles in the value chain need to be identified and measures taken to ensure that benefits accrue equitably to women and men.

These three elements should be addressed together to build a common vision for small grain development addressing availability of seed, technical support, marketing, aggregation and processing as well as attitudes towards production and consumption so that a holistic approach to value chain development can be implemented. The approach to implementation will be critical; it should be done in a manner which builds effective working relationships between different value chain actors. Care will need to be taken to ensure that women's power relations are enhanced rather than degraded through strengthening the value chain.

Key groups to work with include: BIZ, ICRISAT, Ministry of Agriculture, Ministry of Women Affairs, Ministry of Small and Medium Enterprises and Dr Paul Muchineripi. Also, there is a need to identify millers and bakers willing to engage in working with the project to produce processed products using small grain flour.

Investment required: What is required is the bringing together of current knowledge, filling knowledge gaps and then using current organisations and institutions to take this forward.

Budget Estimate: US\$1.5M to be divided between the three areas of work outlined above.

Profitability: This value chain is at a very early stage of development. Investments in it will provide the changes needed for millions of farmers and consumers to further invest in small grains. Without it, project returns on investment will be low and semi-arid Zimbabwe will continue to struggle to produce significant levels of cereal.

Potential impact: Very high.

4.4. Livestock

We recommend to begin with cattle and goats as the main focus of this value chain although there should be flexibility to include other species if opportunities arise. Cattle and goats, particularly indigenous breeds, offer a higher level of climate resilience than other species, and as there is formal marketing of them they provide opportunities for value chain support. The work will sub-divide thus:

4.4.1. Livestock Production

Two clear livestock production priorities with clear reference to climate resilience are stocking levels and fodder production. Significant developments are being made in terms of fodder by the Livelihoods and Food Security Programme and the Zimbabwe Livestock Development Program. Inception work should learn from the fodder production experiences of these programmes and use them to design an appropriate fodder development approach in the target areas. Both projects should also be consulted for guidance on stocking rates, with the Veterinary Department also providing input. The aim of these discussions should be to identify how, in a participatory manner, to improve knowledge and support for improving stocking rates. Although not met during this study the experience of the African Centre for Holistic Management in Hwange should be incorporated into planning for this area of work.

4.4.2. Improved Market Linkages

Such is the importance of livestock that this value chain is likely to be a focus in all project sites. IDS (livestock) and COMESA (leather) have recently conducted value chain analyses which should be used to guide planning on issues to address to improve livestock market linkages. ICRISAT and ILRI have been conducting research on livestock marketing which should be considered for its use in this project. The project itself should focus on strengthening existing marketing approaches for live animals including information systems on prices and quality together with improving the physical markets. Opportunities to strengthen activities of the abattoirs and processing of livestock products, as well as advocacy for an improved policy environment should be addressed.

Key groups to work with: LMAC, Heifer International, MoA Veterinary Department, DR&SS, ILRI, ICRISAT, Ministry of Women Affairs, Bulawayo Leather Cluster, Jacob Ngathi, NGOs, and FSPs.

Investment required: The investment would need to bring together other projects on livestock value chains and gender to agree the niche for the proposed project. At this stage, it would appear that investment would be required to provide cost benefit guidance on fodder production and marketing (different types of fodder, farm type and farm locations) to guide investments in fodder production. Stakeholder engagement would also be required to identify factors that have led to mind-set change amongst livestock farmers so as to support planning for entrepreneurship capacity development. Again, a model for scaling will need to be developed and mentoring needs as well as training planned and implemented. This should link to support given to building market linkages through a bottom up approach, again building on the experience of others.

Estimate: US\$3M

Profitability: This value chain is functioning but it could be a lot more effective in serving the domestic market and even more so if exports can be resumed.

Potential impact: High.

4.5. Cross Cutting Issues

Recommendations on gender: Gender was not a main focus of most of the stakeholders that we met. Therefore, an initial assessment of women's and girls' roles in the chosen value chains and gender constraints should be conducted with the Ministry of Women Affairs and NGOs active in the project focus areas. Awareness of these issues should be shared throughout the project and support for activities to address gender constraints sought from across the project. Activity leaders should be included in, at least initial activities, to plan and implement the mainstreaming of gender within the project, particularly through community level transformation of negative gender norms and to closely monitor household level benefits; this evidence could be used in further transformative work. The activities should be conducted in all communities where the project is working so as to ensure that project benefits are equitable to women and men. The project should support women's engagement in value addition activities in the value chain addressing gendered constraints e.g. access to credit. It should also work with women so that they can take active leadership roles, also actively engage with climate change adaptation and disaster risk reduction decision-making bodies so as to ensure appropriate representation of women.

Budget: US\$2M (for baseline studies, community level activities, experience sharing and application activities, M&E throughout the duration of the project and across its activities)

Recommendation on behaviour change: The methodology for the implementation of the project will be critical to the long-term success of the investments supported. As a behaviour-influencing focus will be new to some of those implementing the project, it will be critical that the project team are given support in their planning and are mentored in their implementation by those who have experience of this approach, e.g. Dr Muchineripi on work with producers and representatives from some of the market linkages projects in the country.

Ring fencing a budget for this focus will enable a behaviour change focal point to be recruited and to have resources to work across the value chains supporting activities on behaviour change and sharing positive experiences and lessons learned.

Budget: US\$300,000

Recommendation on impact at scale: This report provides some excellent examples of change momentum that is already underway. We recommend that in project implementation an inception activity is a follow-up meeting with these organisations and projects (and any others that come to light) to develop a scaling strategy for the whole project so that all relevant activities are conducted with a view to scaling positive outcomes.

Budget: US\$200,000

Recommendation on NRM: NRM is a genuine cross cutting issue and should be integrated as a consideration in all activities, and monitoring of activities rather than having its own discreet budget line. A particular focus should be on how improved NRM can make irrigation schemes more climate resilient through land and water management, building on the work of IWMI in the Limpopo as well the work of the Forestry Department in Beitbridge. Lessons learned can be shared with the other value chains.

Recommendation on Financial Services: It is recommended that FSPs and Social Protection initiatives are incorporated into inception workshops and invited to join any innovation platforms (or similar) arising from multi-stakeholder interactions.

These crosscutting issues should consider using additional expertise. For example, expertise on Participatory Social Analysis (including gender) and action – from consultants working with the Ministry of Women Affairs, organisations involved in Market information platform e.g. ESOKO; ECO-FARMER and companies with successful experiences in market linkages - Fintrac, SNV, Heartland-Global etc.

To ensure that the above issues are considered and well managed within the project it is recommended that an advisory panel be established that can guide the project implementation unit. The panel should include expertise on gender, CSA, NRM, private sector development, public sector, research (with links to the international knowledge base), market linkages and the media.

4.6. Conclusions

Almost all of the rural producers in the three project provinces will have household members involved in one of the four chosen value chains, with small grains being cultivated more widely. This will certainly be the case by the end of the project. This presents a massive number of potential beneficiaries. However, to bring about sustained and equitable value

chain strengthening at scale the project will need to be implemented in an exceptional manner, which considers the breadth of issues affecting the value chains, the factors behind social change, economic change and change in value chain processes and scaling of successes beyond specific intervention sites.

In a very short period this study was able to demonstrate that there are considerable opportunities for well managed value chain strengthening to bring about successful adaptation to climate change. This work should be built on during project inception to address the issues in a greater breadth and depth than have been possible within this study.

Annex 1: People Met

Name	Gender	Organisation	Contact
Mr. Bernard Mache and Mr Mudhefi	Male	AGRITEX	+263775777188 (Mr. Mudhefi)
Irrigators (29 farmers)	Male and Female	Chibuwe and Musikavanhu irrigation schemes	Dhliwayo (lead farmer-0773828097),
Acquilina Zivanai and 5 others	3 Male, 3 Female	Chitima farmers market-Masvingo	Acquilina Zivanai (0777460945)
Masvingo AGRITEX Extension Officers' Meeting	15 Male, 5 Female	AGRITEX	David Kaunda 0773003662
Silent Taurayi	Male	Managing Director, Masvingo Food Commodities	Silent.taurayi@masvingofoodcommodities.co.zw 0777565384
Xolani Donga	Female	Finance Manager, Zim Super Seeds	xolani@zimsuperseeds.co.zw 0772996928
Blessing Chimwai	Female	Zim Super Seeds	beechimwai@gmail.com
Isabel Shutu	Female	Masvingo Food Commodities	Isabel.shutu@masvingofoodcommodities.co.zw
Macumise Mark	Male	National Tested Seeds	0773742438
Kwea Francis	Male	National Tested Seeds	0772363358
Nyoka Stanley	Male	Seedco Masvingo	077903752
Dewis Dube	Male	National Foods	0731787068
Vingai E Chiringa	Female	Farm Produce Seller	0773050419
Chisambiro Richman	Male	Depot Manager, GMB	chisambiror@gmbdura.co.zw
10 Chibuwe dryland farmers	1 Male 9 Female	Farmers drawn from 4 villages in Chibuwe	Simango Shellie (0782073342)
7 Nyanyadzi dryland farmers	2 Men, 5 Women	Nyanyadzi dryland farmers	Mr. Simon Mubako 0774091022
Mr Chinounye (Bikita farmer)	Male	Montana and Carswell meats contractor	N/A
Dr Vumiso	Male	Cold Storage Company Masvingo	0773233188
Mr. Richard Ndou	Male	World Vision Ensure Project	0775475214
Chair (Kasian Mujuru), Deputy Chair (Naison Chiswanda) and Administrator (J Mboko)	Male	Hamaruomba Dairy processing	P.O Box 1167 Masvingo
Mr Paradzai Thompson and Henrica Makulu	1 Male, 1 Female	IETC	+263773527831
Mr Nhamo (Chairperson)	Male	Kufandada irrigation scheme Bikita	Mr Nhamo (0773291031)
Mr. B. Siwawa and Mr. Mugweni	2 Male	Montana and Carswell Meats (MC meats)	Bekilipha Siwawa (beki@mcmeats.co.zw)

Tererai Boziwe,	Female	Livestock Research and Pastures Division of DR&SS	+263 776210249 tboziwe@yahoo.com
Richard Chiwandire and Mike Moran	2 Male	Matanuska Mutare Office	moranm@mutare.matanuska.c o.zw
FGD (Dryland farmers-Mushandike)	5 Male, 5 Female	ward 9 and 10, Masvingo district	AGRITEX, Masvingo District
FGD Mushandike irrigators	8 Male, 5 Female	Mushandike irrigation scheme	AGRITEX, Masvingo District
Mr Dube (Feeds Technical advisor)	Male	National Foods	0731787068
Mr Kwera (supervisor)	Male	National Tested seeds	+263772363358
FGD Nyanyadzi irrigation scheme	6 Male, 5 Female	Nyanyadzi irrigation scheme	Simon Mubako, AGRITEX supervisor 0774091022
Mrs Christina Mlambo (lead farmer)	11 Dryland Farmers (Gender not specified)	Dryland farmers, Rozva area	N/A
Mrs Christina Mlambo (lead farmer)	17 Farmers (Gender not specified)	Rozva irrigation scheme	N/A
Mr. Michael Mugani, Agronomy Executive	Male	Best Fruit Processors, a division of Scheweppes	+263772348463, muganimike@gmail.com or mugani@bfp.co.zw
Mr Peter Chidekwendi and 10 other traders and 1 municipal officer	7 Male, 5 Female	Sakubva municipal market	+263773053441
BEIT BRIDGE			
Mawucha Masayso	Male	DAEU, AGRITEX	0773060583
Rulistiia Mpofu	Female	Social Services, BBRDC	0773496035
Mwikwa Andrew	Male	Psychologist, Min of Education	0776015880
Nare Mike	Male	GVO, DVS	0775974106
Rwengera Neverest	Male	Technical engineer, Dept Mechanisation	0773431828
Boughton Mbedza	Male	Lew, DhPD	0773456761
Sidange L	Male	BDO, SMEs	0783334998
Siziba G	Male	DSDPO, MoSR	0774415081
Chaziya P	Female	PIO, Immigration	0772398715
Shumba N	Female	Site Coordinator	0772414797
Charamba S	Female	Beitbridge PI ZRP	0777190489
Chikwature A	Male	Beitbridge PI ZRP	0773976865
Chirume	Female	Lufuno	0774015155
Moyo Happiness	Female	Sales Person, GMB	0775390978

Maphosa Samuel	Male	Chair,BB Cluster	0772390540
Caiphaz Nguluvhe	Male	Livestock Department	0775164260
Reuben Shanga	Male	Farmer	0777615907
Andrew Mhaka	Male	Regional Manager, Bayoba	07858311797
Previous Mudau	Female	Behaviour Change Officer, World Vision	0774477120
Babonsile Myoau	Female	Behaviour Change Officer, World Vision	0772976824
Edward Mulaudzi	Male	District AIDS Coordinator, National AIDS Council	0773538377
Tashaya Nevison	Male	Resident Technician, Irrigation Department	0776088239
Nyasha	Male	Officer, President's Department	0773041089
Cilesp Madzikauda	Male	OIC, ZRP	0772668183
Freeman Morwena	Male	Health Officer, World Vision	0772964270
Makoya W	Male	DIMGR, GMB	0772194849
Wellington M	Male	GDO, WAGCD	0775209015
Sibanda Thokomle	Female	TO, Ministry of Health	0775234654
Alpha h Mahlangy	Female	AEW, AGRITEX	0773378326
Kelvin Sivago	Male	BC Intern, World Vision	0778612881
Arthur Mafenya	Male	Chairperson, Young People's Network	0778862718
Mudita Theresa W	Female	Officer, ZPCS	0772862425
Mlambo Energy	Female	DSSO, DSS	0772348599
Beloved Sitole	Male	Forest Officer, Forestry Commission	077366929
Reginald Mbulawa	Male	DHPO, MoHCC	0736607892
Kilibani Mdan	Female	PAO,Rural Development	0772284208
Kalota Chulu	Male	Section Manager, Nottingham Estates	0777085065
Albert Ndhovu	Male	Section Manager, Nottingham Estates	0777598800
Nyasha Tindfirei	Male	Packhouse and Production Manager, Nottingham Estates	+27714998549
Masofsha Muday	Male	Chair, Shashe Irrigation Scheme	+263603808528
Qediwe Sibanda	Female	Treasurer, Shashe Irrigation scheme	+2719782512
Beauty Nglokebe	Female	Committee Member, Shashe	+2781116421

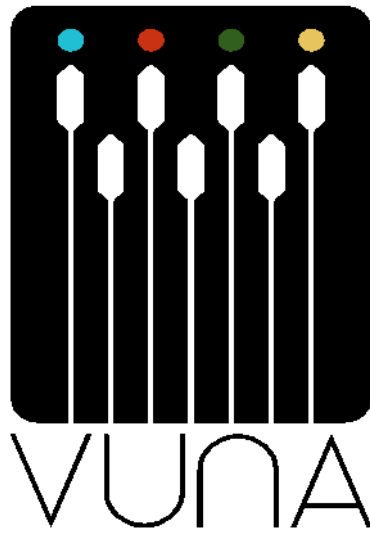
		Irrigation Scheme	
Sophia Ndou	Female	Secretary, Shashe Irrigation Scheme	+27632709823
Anhurengwi Moyo	Male	Vice Chair, Shashe Irrigation Scheme	
M Katemauntanga	Male	Co-ordinator, CESVI	+263773443073
BULAWAYO	Male		
Fungai Zvinondiramba	Male	Bulawayo Leather Cluster	0775579002
Chedphas Muciyo	Male	Bulawayo Leather Cluster	0774544435
Lonasi Magalula	Male	Bulawayo Leather Cluster	0712572756
Kizito Mazvimavi	Male	ICRISAT	0782745159
Jeffrey Michler	Male	ICRISAT	0785624643
Conrad Mwendo	Male	ICRISAT	0778198923
Pauline Chivenge	Female	ICRISAT	0712602578
Murairo Madzvamuse	Male	ICRISAT	0713761510
Shadreck Ncube	Male	Matopos Livestock Research	0774320489
Sabine Homann	Female	ICRISAT	s.homann@cgiar.org
GWANDA			
Makwe Irrigation Scheme	13 Male, 24 Female		
Gwanda District Council	1 Male, 1 Female		
Ronald Katsande	Male	ZIMTRADE	rkatsande@zimtrade.co.zw 0772 952264
Wiliam Samujanga	Male	Brand Fresh	07722356970 william@brandsfresh.co.zw
Jacob Nyathi	Male	Consultant	jacob.nyathi58@gmail.com
Michael Mungani	Male	Agronomist	+263772348463, muganimike@gmail.com or mugani@bfp.co.zw

Annex 2 Record of consultations

NB: Bulawayo was included in the visits as it provides a large market for Matabeleland South as well as other provinces.

Date	Consultations
7/11/16	ETG, Meeting at Ministry of Environment
8/11/16	Masvingo: Makoholi Research Station
8/11/16	Masvingo: Hama Ruomba Dairy
9/11/16	Team meeting, division of team into two working groups
9/11/16	Masvingo: Ministry of Women Affairs, Gender and Community Development Masvingo District: Department of Agriculture (extension meeting) Masvingo Province: AGRITEX, Provincial Livestock Officer AGRITEX head office. Consultations with Director and Deputy Directors
10/11/16	Masvingo Province: Grain Marketing Board Meeting with CRIDF & VUNA Masvingo: Zimbabwe Super Seeds
11/11/16	Matabeleland South: Beit Bridge – District Development Meeting, AGRITEX, Lutumba GMB, Lutumba Livestock Association, Bayoba Limited. Telephone call to Mark Benson working for Fintrac on Amalima project (livestock) Rozva irrigation scheme (Bikita), Kufandada irrigation scheme (Bikita)
12/11/16	Matabeleland South: Beit Bridge – Nottingham Estates, Shashe Irrigation Scheme, Mushandike irrigation scheme
14/11/16	Bulawayo: Department of Livestock, AGRITEX, Ministry of SMEs, Ingwebu breweries, National Foods, Delta Breweries, ICRISAT Musikavanhu and Chibuwe irrigation schemes, Phone meeting with Best Fruit Processors
15/11/16	Gwanda District Council, Makwe Irrigation Scheme Telephone call to Sabine Homann at ICRISAT on the potential for groundnuts Nyanyadzi Irrigation scheme, World Vision ENSURE project, SNV officers (Mutare)
16/11/16	Bulawayo Leather Cluster, ICRISAT, Matophos Research Station Matanuska, Cairns Foods, Sakubva municipal market
Post fieldwork	Jacob Nyathi (did value chain analysis for Bulawayo Leather Cluster), Jennifer Mayer (BIZ), Livestock Meat Advisory Council, Heifer International, CIMMYT. ILRI. Harvest Plus and Dr

	Paul Muchineripi
10/01/2017	Brand Fruits procurement manager Mr. William Samujanga Mr Ronald Katsande ZIMTRADE



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VUNA SOUTH AFRICA
1st Floor, Block G
Hatfield Gardens
333 Grosvenor Street, Hatfield
Pretoria, South Africa

+27 (0) 12 342 3819
southafrica@Vuna-africa.com
www.Vuna-africa.com