



Farmer seed systems (FSS) in Sub-Saharan Africa

**A Case Study on Farmer Managed Seed Systems
(FMSS) in Zambia**

Implementing Organization: ZAAB



ZAAB
Zambia Alliance For Agroecology & Biodiversity

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Executive summary

This study report describes the Farmer Managed Seed Systems (FMSS) in Zambia, how they work and how they contribute to food and seed sovereignty and how they maintain and enhance proper nutrition. The report provides an overview of the main threats to FMSS in the country and how these may be counteracted. Under FMSS, farmers work at a local level to remain the custodians of local seed selection, storage and management. The purpose of the study was to understand how farmer managed seed systems work in Zambia and how it relates with other components of farmer systems and to use findings to challenge the current narrative on seed and ultimately influence policy. The study was also intended to update information on existing research and publications on seed and seed systems in Zambia. Agricultural biodiversity is critical for food security in Zambia where in the rural areas it is based on small-scale agricultural production utilizing both improved crop varieties as well as local varieties. Access to hybrid varieties is limited due to inabilities of the many marginalized farming communities to purchase seeds.

The study conducted focus group discussions (FDGs) in three rural districts of Zambia which are representative of the rural community in Zambia where FMSS are the predominant system governing access, improvements, and distribution of seed by the vast majority of the farmers. Chikankata the FGD was done with 17 farmers that included 11 women and in Rufunsa it was done with 15 farmers composed of six women while in Shibuyunji the group consisted of 18 farmers, five of whom were women. One on one interviews were held with organizations working with small scale farmers and those working on seed issues. In addition, data sources included email and phone communications with stakeholder organizations and website searches. Interviews were conducted with 15 individuals from 12 organizations that were considered important for FMSS and were a representative sample of stakeholders in the seed sector in Zambia.

Over 60% of the population live in the rural area and the majority of these are preoccupied with small scale farming as a means of livelihoods. Small scale farmers constitute the largest group of nearly one million farmer households who together cultivate about 80% of the land with farm sizes from 1 to 5 hectares, with an average area of 2 hectares. This group produces mainly maize and other staple food crops such as cassava, sorghum, millet, groundnuts, beans, cowpeas and traditional vegetables. They predominantly rely on seed of local varieties saved from previous harvests and on farmer to farmer exchanges. In addition, they also use OPVs and recycled hybrids in the case of maize.

Small scale farmers consulted reported that access to any form of seed, be it local, hybrid or open pollinated varieties (OPVs) is very difficult. Access to local seed is difficult because these are only available in very small quantities and sometimes in the hands of a few farmers. This has created a situation where farmers stop production of some crops and adopt new ones over time. Loss of genetic diversity in crops especially maize is noticeable not just in the areas visited but generally throughout the country.

The effect of years of promotion of hybrid seeds and other improved varieties that ignored the value of the diverse local varieties has resulted in the replacement of the local crop varieties with monocultures of maize.

In fact, the problem is not only limited to replacement, but also varietal contamination. Local varieties of maize are already contaminated with hybrid varieties making them lose some of the original positive attributes such as pest resistance in storage, taste and even vigour.

The study concludes that there is a need and scope for officially recognizing FMSS and providing policy and legislative support that should address increasing availability of seed of a wide range of crops and varieties. The support mechanisms must be based on the FMSS practices that allow farmers access to seed and to share and sell as they see fit.

Introduction

This study report describes the Farmer Managed Seed Systems (FMSS) in Zambia, how they work and how they contribute to food and seed sovereignty and how they maintain and enhance proper nutrition. The report provides an overview of the main threats to FMSS in the country and how these may be counteracted. The bulk of farming in Zambia is still mainly done by smallholder farmers and this study findings support those from many previous studies that FMSS are the most reliable and affordable source of seeds for the vast majority of farmers. Under FMSS, farmers work at a local level to remain the custodians of local seed selection, storage and management. This study builds on existing bodies of work by adding more insights, drawing conclusions and has offered recommendations for strengthening support around FMSS in the country.

This study has attempted to unpack and understand the farmer managed seed systems in the country, to explore the justification for support for the farmer managed seed systems, how they benefit farmer communities (food security, livelihoods, health, democracy, food sovereignty etc.), and the extent to which they are impacted by national policy and legislation. Up to 90% of smallholder farmers in Zambia use their own farm-saved seeds and up to 80% of seeds are sourced locally through farm-saved seeds, farmer-to-farmer exchanges or purchase at local markets.

A silent majority of farmers and their seed systems co-exist with the commercial sector. For centuries, smallholder farmers – especially women – have managed and created the biodiversity and seed diversity that forms the basis of global agriculture today. They have relied on traditional knowledge to continuously innovate their crops and practices within highly diverse agro-ecological systems adapted to local circumstances. These farmers' seed systems are largely ignored by governments and the formal sector, resulting in a lack of investments in smallholder production and the denial of their rights.

On the other hand only a few companies control seed in the formal sector. In 2015, the global seed market's estimated value was US\$ 48.5 billion and the three biggest companies (DowDupont, ChemChina and BASF) are estimated to control 60% of the global seed market and 71% of the agrochemical market (IPES-Food, 2017). Increasingly, they determine which crops will be bred and what food reaches our plates via international value chains.

The big agrochemical companies possess a large share of the rapidly increasing number of patents on plant genetic material, breeding methods and tools, further tightening their control over the sector. Their dominance of the seed industry is further consolidated through new technologies in gene editing, synthetic biology, data science and precision agriculture. Big data is expected to have a huge impact on the food chain, giving those in control unprecedented decision-making capabilities (Wolfert et al., 2017).

From global to national level, policies and laws on seed marketing and intellectual property rights on plant genetic resources are influenced by the interests of the big agro-industries. The role of farmers' seed systems

is insufficiently recognized and supported, and even restricted by laws and regulations. Therefore, a huge unrealized potential exists to produce high-quality seeds that can contribute to improved livelihoods, climate resilience and food security.

The FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) has recognized the important role of farmers in the conservation and use of crop diversity through the concept of Farmers' Rights. According to the ITPGRFA, it is up to national governments to promote legislation and measures that include:

- the protection of traditional knowledge relevant to plant genetic resources for food and agriculture;
- the right to equitably participate in sharing benefits arising from the utilization of plant genetic resources;
- the right to participate in making decisions on matters related to the conservation and sustainable use of plant genetic resources, and;
- the right to save, use, exchange and sell farm-saved seed.¹³ Farmers' Rights are crucial to alleviate malnutrition and poverty, conserve crop diversity and adapt to climate change.

FMSS and Smallholder agriculture in Zambia

Agricultural biodiversity is critical for food security in Zambia where in the rural areas it is based on small-scale agricultural production utilizing both improved crop varieties as well as local varieties. Access to hybrid varieties is limited due to inabilities of the many marginalized farming communities to purchase seeds. Access to local varieties is also limited due to inadequate local seed availability. As a result, many of these communities are faced with constraints of accessing both types of seed and this has now become the single most important limiting factor to small scale crop and food production. Most of the time, these farming communities plant seed of whatever is available and not necessarily because that is the best seed for their situation or indeed what they would plant if they had a choice.

It was therefore important to conduct this study to assess the problems and challenges that farmers face in their traditional farming especially about seed acquisition. This study report contains firsthand information collected from farmers on these challenges and problems. Moreover, it highlights how state and non-state institutions are involved in addressing these challenges. In line with the objectives of this study, stakeholder mapping was done to assess their involvement in matters of relevance to FMSS. This stakeholder mapping is summarized in this report and outlines the involvements and roles of different stakeholders in various activities that are relevant to FMSS.

Farmers' Rights, endorsed by FAO in 1989, recognizes that farmers and rural communities have contributed greatly -- and continue to contribute -- to the creation, conservation, exchange and enhancement of genetic resources, and that they should be recognized and strengthened in their work. The ETC Group believes that Farmers' Rights must be recognized at the international level, and that its definition should be expanded by the human rights community as part of the Right to Food. Food sovereignty has largely replaced the more limited and less empowering concept of food security. Food sovereignty refers to the rights of peoples, communities and countries to define their own agricultural labour, fishing, food and land policies which are ecologically, socially, economically and culturally appropriate to their unique circumstances.

It includes the true right to food and to produce food, which means that all people have the right to safe, nutritious and cultural appropriate food and to food producing resources and the ability to sustain themselves and their societies (www.practicalaction.org).

Lead study organization

The Zambia Alliance for Agroecology and Biodiversity (ZAAB) is a united network of concerned citizens, civil society groups and farmer-based organizations, working together to strengthen the growing movement for agroecology and food sovereignty in Zambia. ZAAB was initiated in 2010 when a few civil society and farmer focused organizations came together to defend Zambia's threatened 'NO GMO' presidential declaration of 2002. ZAAB advocates for citizens' rights to food sovereignty, embedded within an ecological and socially just Zambia. ZAAB organizational members reach a wide constituency through their own membership base and programme activities that are undertaken across the country. Much of the direct member work with farmers aims at facilitating training on agroecology and Farmer Managed Seed Systems (FMSS), supporting farmer dialogues and broad information sharing and exchange. Other members work in public research and policy advocacy and have a long history of contribution to ecological and social justice in Zambia.

ZAAB was commissioned to carry out the case study for Zambia. Community Technology Development Trust (CTDT) is a member of ZAAB and has expertise and experience on FMSS and was therefore tasked by ZAAB to take the lead in the study and report compilation. CTDT is a not for profit NGO registered in 2009 with the objective of contributing to the livelihoods of rural communities through interventions aimed at promoting biodiversity conservation and natural resources management in food production practices. CTDT promotes the management of agrobiodiversity to enhance sustainable livelihoods through intervention strategies aimed at facilitating restoration and enhancement of traditional plant varieties and animal breeds.

CTDT promotes cultivation of a wide diversity of crops and varieties in order to contribute to household food and nutrition security. This involves cultivation of crops from the different nutrition groups of starch (maize, sorghum, millet, cassava), proteins (groundnut, cowpea, Bambara nut, beans, pigeon pea), minerals and vitamins (traditional vegetables such as Amaranthus, Hibiscus, Corchorus, and various cucurbits including cucumbers, pumpkins and gourds). For many of the programs to succeed they will need to be supported by right policies. CTDT is thus actively involved in influencing policy on biodiversity through policy engagement, formulation, implementation and capacity building of relevant stakeholders. CTDT engages in policy advocacy and lobbying designed to bring the voice and experience of local communities to the attention of policy makers. This includes seed policies and laws as well as seed regulations to try and bring them in line with FMSS.

Purpose and objectives of the study

The purpose of the study was to understand how farmer managed seed systems work in Zambia and how it relates with other components of farmer systems and to use findings to challenge the current narrative on seed and ultimately influence policy. The study was also intended to update information on existing research and publications on seed and seed systems in Zambia and Africa as a whole especially that many changes that are impacting the country are being done at regional or international level as elaborated in the GRAIN/AFSA study of 2014 and suppressing FMSS (GRAIN/Via Campesina, 2015). The study also cultivated buy in for FMSS amongst CSOs, policy makers and other stakeholders in the seed sector and agriculture in the country.

Methodology of the seed study

The study conducted focus group discussions (FDGs) in three rural districts of Zambia which are representative of the rural community in Zambia where FMSS are the predominant system governing access, improvements, and distribution of seed by the vast majority of the farmers. Chikankata the FGD was done with 17 farmers that included 11 women and in Rufunsa it was done with 15 farmers composed of six women while in Shibuyunji the group consisted of 18 farmers, five of whom were women (Table 1). These were farmers who had lived in these areas all their lives. The list of farmer focus groups is given in Annex 2.

Table 1. Study Focus Groups

District	Women	Men	Total
Chikankata	11	6	17
Rufunsa	6	9	15
Shibuyunji	5	13	18
Total	22	28	50

One on one interviews were held with organizations working with small scale farmers and those working on seed issues. In addition, data sources included email and phone communications with stakeholder organizations and website searches. Interviews were conducted with 15 individuals from 12 organizations that were considered important for FMSS and were a representative sample of stakeholders in the seed sector in Zambia. The list of people met and their organizations is listed in Annex 3.

The major limitations of the adopted methodologies included time and resource constraints which led to limited number of interviews, number community meetings and literature search from internet. While this limitation implies that only a small component of the different stakeholders and farmers contributed to information used to conclude the findings, it was also quite evident that the various stakeholder categories shared similar views with others in the category. The seed companies had similar views with each other and the CSOs had similar views with other CSOs. Therefore, interviewing a larger number of organizations may not alter the findings. However, information from a larger number and wider stakeholder is crucial in validating the findings.

Seed study findings

Small Scale farmers

Over 60% of the total population of the over 13 million Zambians lives in the rural areas and the majority of these are preoccupied with small scale farming as a means of livelihoods. Farmers are classified into four groups of small-scale farmers, medium-scale or emergent farmers, large-scale farmers, and large corporate operations. Small scale farmers constitute the largest group of nearly one million farmer households who together cultivate about 80% of the land with farm sizes from 1 to 5 hectares, with an average area of 2 hectares. This group produces mainly maize and other staple food crops such as cassava, sorghum, millet, groundnuts, beans, cowpeas and traditional vegetables. They predominantly rely on seed of local varieties saved from previous harvests and on farmer to farmer exchanges. In addition, they also use OPVs and recycled hybrids in the case of maize.

Main crops grown in Zambia

Maize is the major staple food crop at national level in Zambia having replaced the original staples of sorghum and millet which were the main cereals before the introduction of maize. Farmer groups consulted listed a number of hybrid and other improved varieties of maize as being grown in their area. On the other hand, the numbers of local maize varieties that were listed were very few though it appears that there are much more local varieties than the numbers given. This is because farmers tended to refer to all local varieties as “local” without providing separate names even for distinctly different varieties. In addition to staple food crops including maize, food legumes, cash crops, plantation crops and vegetables are grown in the country (See Table 2).

Table 2. Crops grown in Zambia

Staple food crops	Food legumes	Cash crops	Plantation crops	Vegetables
Cassava	Bambara nut	Castor	Cashew	Amaranthus
Finger millet	Bean	Cotton	Coffee	Okra
Maize	Chick pea	Potato	Fruits	Cleome
Pearl millet	Cowpea	Rice	Oil palm	African eggplant
Sorghum	Groundnut	Soybean	Pineapple	Pumpkin
Sweet potato	Pigeon pea	Spices	Sugar cane	Cucumbers
		Sunflower	Tea	Rapes
		Tobacco		Cabbage
		Wheat		Tomato
				Onion

From the focus group discussions the crops listed in Table 3 were reported as the main crops being grown by the farmers. These farmers indicated that their land available for cultivation was in the range of 1-5 hectares but with a few with as much as 20 hectares as indicated in Table 4.

Table 3. List of crops grown in the communities visited

Chikankata	Rufunsa	Shibuyunji
Maize	Maize	Maize
beans	Soya beans	Soya beans
Soya beans	Groundnuts	Groundnuts
Bambara nut	Sweet Potatoes	Sweet Potatoes
Groundnuts	Sun flower	Sun flower
potato	Finger Millet	Cowpeas
Sweet Potatoes	Pumpkin	Pumpkin
Sun flower	Red sorghum	Gourd
sugarcane	Gourd	Okra
pumpkin	Sorghum	Cotton
Gourds, melons, squashes	Beans	
Okra	Cassava	
Finger millet	Cowpeas	
Sorghum	Cucumber	

Table 4. Land availability and use

District	Total land	Area cultivated	Maize cultivation	Grazing land
Chikankata	3-10ha	1-5ha	3ha	Communal
Rufunsa	5-20ha	5-20ha	1ha	Individual grazing part of total land
Shibuyunji	5-10ha	1-5ha	1ha	Communal

In Shibuyunji a bigger portion is put for cultivation of cotton and soybean for income generation. There is a cotton ginnery company in the district which purchases the cotton. In Chikankata and Shibuyunji the community shares a communal grazing area while in Rufunsa grazing is on individual household land.

The crops considered the most important for food security and for income generation were similar in all communities visited and included maize, groundnut, pumpkins, sweet potato, cowpea and beans as indicated in Table 5. Generally, all the crops are produced first and foremost for household consumption and the excess for income generation.

Table 5. Important crops

Crops grown	Chikankata		Rufunsa		Shibuyunji	
	Importance	Income Source	Importance	Income Source	Importance	Income Source
Maize	1	1	1	1	1	1
Groundnuts	2	2	2	2	3	4
Cotton					2	2
Irish Potatoes		3				
Sweet Potatoes			3	3		
Beans	3	4				
Pumpkin	4		4			
Soya beans					4	3
Cowpeas				3		
Red Sorghum				4		

Main problems and challenges facing small scale farmers in Zambia

Small scale farmers consulted reported that access to any form of seed, be it local, hybrid or open pollinated varieties (OPVs) is very difficult. Access to local seed is difficult because these are only available in very small quantities and sometimes in the hands of a few farmers. This has created a situation where farmers stop production of some crops and adopt new ones over time. Table 6 and 7 shows the crops that are more recent to the communities visited and those whose production stopped.

Table 6. Recently introduced crops

Chikankata	Rufunsa	Shibuyunji
Soya beans	Cowpea	Soya beans
Beans	Soya beans	
Potatoes	Finger millet	Pigeon pea
Finger millet	Pearl millet	
Pearl millet	Sunflower	
	Red sorghum	
	Pigeon pea	

Beans has been promoted by CTDT in Chikankata as part of introductions to build diversity in the target area. Several varieties were introduced from other parts of the country and some performed so well that farmers began to produce even for sale. Chikankata was not originally considered a bean growing area. Finger millet and pearl millet were also re-introduced by CTDT in Chikankata and Rufunsa after many years of complete displacement by maize. In Shibuyunji cowpea and groundnut have increased recently. Part of the increase in cowpea in Rufunsa has also been due to the programme of re-introductions.

Table 7. Crops that are reducing and ceased to be grown

Chikankata	Rufunsa	Shibuyunji
Sorghum	Bambara nuts	Sunflower
Sunhemp	4 varieties of white Sorghum	Millets
Velvet beans	Sesame	Bambara nut
Cotton	Local Maize	
Maize (Kafwamba)		

The reported reasons for stopping the production of some crops include difficult in selling excess produce and the changing climate not considered suitable for production by the farmers. Market availability for some crops also cause farmers to concentrate only on those few crops with a market. The government farm input support programme has led to farmers concentration on maize at the expense of other equally important food security crops. Farmers reported that decision to grow hybrid as opposed to traditional crops is due to market pressure because the grading system when selling is skewed towards hybrid.

Production trends

Farmers reported that production was decreasing because they were now forced to use money to produce anything. For example, for soil fertility they buy inputs using money instead of using crops like Sunhemp or Velvet beans. FISP was also cited as having negatively impacted on their farming due to various bottle necks including late delivery of inputs. Climate change especially rain has contributed as it has become erratic

Hybrid seeds are not easily accessible mainly due to their high cost which involves purchasing the seed every year. In addition, the cost of planting is high because of the associated expensive inputs such as chemical fertilizers and in some cases, herbicides. Currently farmers require about 10kg of hybrid maize seed and 200kg of basal chemical fertilizer and another 200Kg top dress fertilizer for planting one hectare of land. The average price of 10Kg bag of maize in 2017/2018 season was US\$30 and US\$100 for 200Kg basal fertilizer another 200Kg for top dress making a total of \$230. In addition, there are increasing efforts to promote use of herbicides by these farmers. These costs are not only beyond the reach of these farmers but are illogical because the farmer would never recover these costs at the average price of maize grain of \$5/50Kg bag. They would have to produce 50 bags just to make even yet the average they can produce is just under 40 bags.

Access to OPVs is also difficult because of inadequate availability due to the fact that they are not a priority of seed companies and even though they are cheaper than hybrids they are still way too expensive for most of the poor farmers. The available OPVs are too few to fulfill the requirements of small-scale farmers.

From the FGDs it was established that both hybrid and local maize are usually grown, the latter on a half hectare. Local maize is grown mostly for consumption because it is difficult to sell it commercially due to market restrictions such as not accepting multicolour grains. Some local varieties have high density grain and so 50Kg grain does not fill a 50Kg bag making it difficult for markets to handle. Local maize seed is exchanged with one another. Exchanges however include even hybrids. Use of hybrid seed over the past five years, was reported to be reducing because the accompanying fertilizer is expensive, and the seed cannot be recycled. Apart from hybrid and local seed, in Rufunsa farmers also significantly use recycled seed which is usually planted on a large area. In Shibuyunji farmers reported purchasing about 50% hybrid seed and the rest being recycled seed and local varieties.

Seed selection

In local varieties and even recycled seed, farmers practice conscious selection. Selecting seed from maize harvest is done by selecting cobs that look healthy and do not show any insect attack. On a maize cob, different parts of the cob are used for different purposes. The seed from the tip of the maize cob is used for early maturity, the middle part is used for medium maturity and the bottom is used for late maturity. When selecting pumpkin seed, this is based on the taste of the pumpkin. For example, if the pumpkin is sweet when cooked and consumed, seed is kept for planting next season. For groundnuts, they select the big nuts for planting while the small nuts are used for cooking. Bambara nut are left unshelled to prevent pest attack and shelled when it's time to plant.

Seed storage

Seed for next planting season is often hang in the kitchen where the smoke protects it from pests and diseases. Some like pumpkin and sorghum is placed on roof tops or stored in calabash or any available container and powder detergent added for pest control. Ash from burnt maize cobs is used in seed storage and farmers reported that this particular ash was more effective for pest control. All farmers consider themselves seed custodians with each household maintaining a diversity of seed. However, a few individuals are recognized as particularly maintaining a higher diversity of seed than generally found in households. A case in point is that of Mr. Kasamika who in Rufunsa was reported as special custodian of crop diversity and everybody in the community recognized this fact. Women are also responsible for keeping diverse seeds, but farmers explained that the youth are not interested in seed keeping because they are much more prone to purchases from seed traders. In recent years the concept of community seed banks has been introduced in some communities through CTDT programmes.

Cultural practices

Farmers reported in all communities that seed forms an integral part of all ceremonies including weddings and funerals. Groundnuts, Bambara nuts, maize and cowpeas are cooked together in a goulash and some placed on the grave yard of the deceased while the rest is consumed by mourners in the community visited in Chikankata. This is intended to show the common dish consumed by the deceased and the community. Seed is used in burials for royal households and in traditional ceremonies such as Chibwela Mushi ceremony where seed is taken to the chiefs' palace as a show of the diversity available in the community. Newly weds are often given a gift in the form of assorted seed to go and start their new home.

Soil fertility

Poor soil fertility often caused by the many years of inappropriate production systems that have involved deep ploughing and use of chemicals is another challenge mentioned by farmers consulted. Soil acidity and poor soil nutrients were among the most commonly mentioned causes of soil fertility problems.

The loss of soil fertility could be attributed to the change from sustainable production methods that was

historically practiced by these farmers to the modern monoculture system that has reduced the natural fertilization process that came from intercropping, crop rotation and use of manure. The problem seems to be worsening because many of the farmers consulted still want fertilizer and in fact rate it as the single most important limiting factor to their crop production in addition to seed.

In addition, the current Farm Input Support Programme (FISP) of government to small scale farmers includes provision of subsidized chemical fertilizer and hybrid seed. So, while soils have been damaged by long years of fertilizer use, means for increasing use of these chemicals are constantly being sought. To make matters worse, the country has a blanket recommendation regarding fertilizer application for all agro-ecological conditions, which implies that in some areas the recommended dosage may be too high for the soil conditions and therefore negatively affect crop production in addition to the damage on the soils (Teshome and Nkhoma, 2010).

Climate change

Climate change, variability and unpredictability of the weather was also cited as a major problem which led to poor harvests due to unexpected rain seasons, late commencement of rainy season, intermittent droughts, and floods. Associated with changes in climate, pests and diseases in crops were observed to be increasing including new ones such as the fall armyworm which was different from the more familiar armyworms. Small scale farmers generally have no access to early warning systems about climate and therefore will plant long maturing varieties even in a season that is projected to have short rainy season. They are however much more in control when they plant local varieties as they usually know which ones to plant based on what they observe in the environment around them.

Market support was cited as a limiting factor for increased production of local crops and traditional varieties because government investment in infrastructure has tended to focus only on maize and even here some of the local varieties such as the ones with mixed grain colour are not accepted in the formal market. A popular local maize called Gankata is dense and 50Kg of it does not fill the 50Kg bag and is therefore rejected by the formal market.

Loss of agrobiodiversity and genetic erosion

Loss of genetic diversity in crops especially maize is noticeable not just in the areas visited but generally throughout the country. The effect of years of promotion of hybrid seeds and other improved varieties that ignored the value of the diverse local varieties has resulted in the replacement of the local crop varieties with monocultures of maize. In fact, the problem is not only limited to replacement, but also varietal contamination. Local varieties of maize are already contaminated with hybrid varieties making them lose some of the original positive attributes such as pest resistance in storage, taste and even vigour (Teshome and Nkhoma, 2010).

While the communities consulted have a general understanding of the available plant genetic resources in their local areas, knowledge and skills to improve these resources in the face of climate change is hampered by external messaging and influences that portend that that only hybrids can respond to climate change. Farmers would only need support on how to improve their crop varieties for more stable characteristics of their preference through participatory methods of variety selection and improvement. Further, these farmers need support to increase access to plant genetic resources by strengthening the community seed bank systems.

Multi-stakeholder collaboration in the seed sector

Zambia Agriculture Research Institute (ZARI)

The Zambia Agriculture Research Institute (ZARI) is one of the departments in the Ministry of Agriculture whose overall objective is to provide appropriate service to farmers, generating and adapting crop, soil and plant protection technologies. ZARI acquires genetic material from farmers' fields within the country and the region through local and regional networks including from the CGIAR. Evaluation and selection of segregating populations using Participatory Variety Selection (PVS) on-farm to assess their acceptance by smallholder farmers as well as adaptability under farmer socio-economic conditions.

ZARI tries to minimize the loss of local genetic diversity of crops in the country through germplasm collection and use to broaden the genetic base of crops in crop improvement programmes to address the farmer needs for increased productivity, preference and crop resilience to changing environment. According to the Deputy Director, ZARI focuses more on strategic research targeting climate change, drought tolerance and nutrition (Iron and zinc in beans and Vit A in maize and cassava).

ZARI targets mostly smallholder farmers to develop higher performing varieties for them including OPVs for maize targeting special qualities like taste and storability. Many of the selections in legumes are made from local farmer varieties such as Kabulangeti beans variety which has now become a popular official variety initially developed by farmers.

Challenges faced by ZARI on varieties developed for smallholder farmers include the fact that there are few off takers to produce seed especially for legumes because of possibility of recycling in seed in these crops thereby reducing profits. So, ZARI encourages on farm seed development and production and welcomes emergence of small local seed companies that concentrate on smallholder crops like sorghum, millet, cowpeas, groundnuts and Bambara nuts. ZARI is also cultivating entrepreneurship at community level to improve farmer involvement in seed production and marketing.

ZARI is developing a licensing scheme for varieties that it develops for producing foundation seed. It is also strengthening the sorghum seed value chain in Kazungula, Siavonga, Kaoma and Sinazongwe districts and increase seed of certified varieties by providing basic seed to farmers to produce seed. There is also capacity development being built for farmers in seed production and demonstration plots are set up for farmer seed production of sorghum. Some of the varieties included are ZSV15, ZSV36R, Kuyuma and ZSV17 but demand for this seed has to be created such as the red sorghum for the breweries industry.

National Plant Genetic Resources Centre (NPGRC)

The National Plant Genetic Resources Programme is coordinated by the Ministry of Agriculture through ZARI. The NPGRC holds the National Genebank and shoulders the overall responsibility for the implementation of the relevant activities under the programme. The overall objective is the long-term support of agriculture in general and crop research and development to improve the yields and quality of crops that are available for the farmer. To achieve the above objective the NPGRC strives to mobilize and conserve the maximum genetic variability of the indigenous and locally adapted crops, their wild relatives and the useful weedy and wild plant species so that they are available for both present and future use.

The genebank carries out on farm characterization and multiplication of germplasm involving the participation of farmers and local extension staff but this effort is limited by lack of resources.

In the 2015/2016 season the genebank took 20 maize and 20 cowpea genebank accessions to two districts where participating farmers planted and evaluated and selected six accessions of each crop. The following year, more farmers planted these six selected types and after evaluations selected one of each of maize and cowpea. Farmers have continued to plant these two varieties and to distribute seed amongst themselves. The process involved a group of farmers who developed selection criteria that included maturity, cob and kernel size for maize and weevil infestation and growth habit for cowpea.

Zambia is party to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and currently has 9,620 accessions on the genetic resources global database, Genesys (<https://www.genesys-pgr.org/geo/ZMB>). While the national seed bank is rich in the diversity of seed, its central location in the capital city makes it costly for farmers in outlying areas of the country to access the plant genetic resources. In addition to access, inadequate support in seed production, on-farm seed conservation and seed multiplication efforts, perpetuates an underutilized local farmer seed system.

SADC Plant Genetic Resources Centre

The Southern African Development Community (SADC) Plant Genetic Resources Centre (SPGRC) was established in 1989 as a 20-year project, initially funded by Nordic donors and, later supplemented with SADC member country contributions on an increasing scale - until the end of the project in 2011 when Member States started to fully fund the organization. Located in Lusaka, Zambia, SPGRC has been entrusted and mandated with the conservation and evaluation for sustainable utilization of regional plant genetic resources for the present and future generations. SPGRC coordinates all activities through the network of National Plant Genetic Resources Centres (NPGRCs) in member countries. With the ultimate target of strengthening conservation and utilization of plant genetic resources, SPGRC strives to minimize genetic erosion of crop diversity by supporting conservation and sustainable utilization of plant genetic resources at farmer level and promotes on-farm conservation, seed restoration and access to planting materials through established farmer groups that maintain local crop diversity. (http://www.spgrc.org.zm/images/annual/Annual_2016.pdf).

The main activities of SPGRC include to:

- maintain the SPGRC base collection for the SADC Member States;
- develop and maintain the SPGRC Documentation and Information System (SDIS) to ensure the smooth running of the system at all NPGRCs;
- promote the establishment of field genebanks and in situ/on-farm conservation in the Member States; and
- provide technical backstopping to NPGRCs on germplasm collection, multiplication, regeneration, characterization and documentation.

Seed Control and Certification Institute (SCCI)

The Seed Control and Certification Institute (SCCI) is a government department under the Ministry of Agriculture and it is Zambia's seed certification Authority and is a centre for seed services in the country. This is achieved through the enforcement of the Plant Variety and Seeds Act which provides for regulation and control through variety testing and release; production and marketing of seed; import and export of seed; seed quality control, and; coordination of the seed industry.

SCCI is also Registrar of Plant Breeder's Rights (PBR) and enforces the Plant Breeder's Rights Act which provides for the protection of plant breeders rights and registration of plant varieties to safe guard and

streamline matters of plant variety ownership and use. However, this Act inhibits the exchange and sale of seed among farmers for protected varieties thereby negatively impacting on FMSS.

The new varieties that are developed by ZARI and other Breeding stations are subjected to Distinctness, Uniformity and Stability (DUS-tests) by SCCI before they are released for use by farmers and other breeders. Breeders from ZARI and private seed companies have to apply to SCCI for variety registration and testing to release their varieties.

In addition to the above functions, SCCI provides policy guidance to Government on all matters concerning seeds in Zambia and beyond. The institute has adopted the International Union for Protection of Plant Varieties (UPOV) guidelines on plant variety testing, registration and granting of Plant Breeders Rights. There are also plans for SCCI to seek membership to UPOV under the 1991 convention. ZAAB has consistently raised concern about the limitations that may be posed by these developments with regard to FMSS. ZAAB has made press briefings, released media statements and used the limited available forum to raise concerns and has developed a seed policy position paper outlining the dangers of adopting UPOV 91 style of legislation.

A two-stage variety registration procedure is applied by SCCI as follows:

1. Pre-release stage where the applicant applies to the Variety Release Committee (VRC) to have the new variety officially tested; and
2. Release stage where the applicant applies for release of the new variety after official testing to the VRC.

SCCI maintains a Variety Register of all the varieties approved by the VRC. Official variety testing consists of two tests, the National Variety Release Trials (NVRT) and DUS-tests. Application for variety testing is accompanied by fees. Seed of the variety being applied for NVRT and DUS-tests are submitted to SCCI together with the application forms. In the case of hybrids, a prescribed quantity of seed for both the female and male parents as well as the hybrid itself are submitted.

The VRC may allow exemption from full official variety testing or only seek partial testing where it is in the immediate interest of the nation's agricultural and/or economic development. Exemption may be allowed for the following categories; varieties of new crops, varieties with unique disease, pest and adverse weather tolerances, the variety is not new and is already established and widely grown e.g. local varieties, or the variety is an improved or modified genotype of an already released variety.

When varieties meet the criteria for release they are ready for seed multiplication and distribution. Seed multiplication is done by seed companies through contracted out grower commercial farmers. Seed growers are obliged to register with SCCI by providing key information regarding farm location, hectarage, rotation status of the intended seed field, isolation, eligibility of the seed, its source and certification class.

The contract between seed companies and seed growers also considers some of this information. Seed crop registration is at a fee payable at the beginning of the season.

SCCI inspects all seed fields and crops to ensure that seeds being multiplied are not exposed to contamination. The prime objective of these inspections is to ensure that the genetic integrity of varieties is maintained through the prevention of unwanted pollination, admixing, weeds and diseases. Inspections also cover ware houses and seed sale outlets in order to ensure that storage conditions are suitable for preserving

seed viability. It is done also to ensure that the test results and certification is not tempered with in storage and that only genuine seed is offered for sale and that the merchants hold legitimate seed seller's license.

Seed Licensing and registration of seed sellers, processors, and importers/exporters is a responsibility of SCCI. It is a legal requirement that any person or organization selling, processing or importing seed have appropriate documentation. SCCI also registers seed inspectors who may be from seed companies, but this begs the question of whether these inspectors will be objective in inspecting their own seed growing. SCCI however claims that these are also under their supervision. Once the inspection is done and tests passed, the seed is ready for processing, packaging, and distribution to the agro-dealers and stockists.

It is clear from the foregoing that SCCI plays a significant role in determining how the formal seed system functions and everything is done as if FMSS are completely absent. Clearly FMSS do not fit into these laws, regulations and procedures. Indeed these regulations essentially outlaws farmer seed. This is a contradiction considering as much as 90% of the crop production is not even based on these elaborate structures and rules but instead follow FMSS that are outside these regulations. It is inevitable that the country reconciles this matter by acknowledging FMSS and then developing support mechanisms that ensure that FMSS flourish.

Non-Governmental Organizations

Many NGOs work on developmental issues in the rural areas of Zambia mainly focusing on livelihoods, health and education. Many of them have food security components that involve delivering improved means of food production such as adoption of conservation farming practices and agroforestry. Others provide farming inputs which may include seed as well as fertilizers. Increasingly many NGOs are beginning to recognize and appreciate the importance and the need to recognize and support FMSS. ZAAB and its member organizations are working on FMSS and advocating for policies that are supportive of the smallholder farmers.

Participatory Ecological Land Use Management (PELUM) Zambia

PELUM Zambia is non-governmental organization that has for a period of over ten years been empowering small-scale farmers in the rural communities in Zambia. The main agendas of PELUM Zambia are poverty eradication, seed and food security and increased farmers' livelihoods. PELUM seeks to improve the living standards of vulnerable rural and peri-urban communities through capacity building, sustainable management and utilization of natural resources, networking, research, community development and evidence-based campaign advocacy and lobbying. PELUM Zambia is part of PELUM Association, which is a network of CSOs in Southern, Eastern and Central Africa. PELUM Zambia works with partners and member organizations and local seed companies on community seed multiplications and building capacity for community seed bank establishments.

We Effect

Amongst many other programmes in Zambia, We Effect is carrying out a rural development programme called Farmers Organizations Fighting Poverty and Injustice (FOFPI). The overall objective of FOFPI, is to empower farmer organizations capable of addressing needs and rights of female and male members in a sustainable way. FOFPI targets farmer-based organizations, representing smallholder farmers.

We Effect has a long history of working in Zambia which dates back to the end of the seventies – back then supporting the maize marketing cooperatives in different provinces as well as the founding of the Zambia Cooperative College. Over the years We Effect has supported the strengthening of numerous locally registered member based civil society organizations working in the agriculture, housing and cooperative

finance sectors with the aim to improve the livelihood of Zambians living in poverty; particularly those that are from rural areas and especially women.

In Zambia We Effect works with rural development, supporting local organizations whose members are small holder farmers. Through the organizations, farmers get support in negotiations with authorities and training in how to increase their production and to adopt sustainable farming methods. An important focus area is to ensure that women and smallholder farmers and other marginalized groups can save, borrow and plan their finances.

Oxfam

Oxfam has been working in Zambia since the early 1980s working with partners and stakeholders on programs that include developing sustainable livelihoods within the context of HIV and AIDS, health and education, water and sanitation, and strengthening community capacity to cope with disasters. Oxfam's program in Zambia builds on past learning and focuses on the following areas:

- improving the well-being of poor women and men, particularly those in rural areas;
- economic empowerment;
- access to essential services (education, health, and water);
- reducing the impact of disasters;
- promoting the rights of women.

Oxfam has over the years supported farmer seed enterprises as a means to improving access to quality seeds by smallholder farmers. The most recent being soya beans seed enterprises supported under the Gendered Enterprise Markets project. This initiative supported over 200 seed growers to get involved in seed production resulting in 2.5 metric tonnes of soya beans seed produced in 2016/17 farming season. Oxfam also contributed to the growth of Kamano Seed Company; an emerging seed enterprise through increased supplies of seed to smallholder farmers in drought affected areas.

International organizations

Food and Agriculture Organization (FAO)

FAO's cooperation with Zambia focuses on four priorities that resulted from a wide consultation process: Agricultural productivity, food availability, security and nutrition improvement; Support to the agriculture sector by enabling policies and investments; Improved management of natural resources (land, water, forests) at various levels; Improved livelihood resilience of targeted, vulnerable communities (<http://www.fao.org/countryprofiles/index/en/?iso3=ZMB>).

In 2012, with technical support from the FAO team in Zambia and the Economics and Policy Innovations for Climate-Smart Agriculture (EPIC) Programme, the Government developed a project to support its national priority of building the agriculture sector's resilience to climate change. One of the key achievements to date is the harmonization of the National Agricultural Policy and the Climate Change Policy. In addition, climate-smart agriculture (CSA) components have acquired a prominent role in key policy documents related to climate change, such as the Zambia REDD+ Strategy (2015), Zambia's Nationally Intended Contribution (2016) plan, and the draft Implementation Plan for Seventh National Development Plan. A strategic framework and a set of proposals for actions to upscale CSA in the country is nearing completion, and the accompanying investment plan has been initiated. Support has been provided to the NGO-led Zambia

Climate Smart Alliance in developing its capacity to plan and implement CSA practices, with CSA adaptation measures increasingly being tested at field level. In addition, the capacity of Zambian experts and institutions in Climate Downscaling and Crop Simulation Models is being developed. Using the historical climate data for Zambia, the Modelling System for Agricultural Impacts of Climate Change (MOSAIC) allows assessing the impact of climate change on agriculture. The crop simulations of the phenomenological behaviour of existing key food and cash crops in Zambia is then subjected to future climate scenarios to assess the potential effects of a changing climate on their growth and production potential (<http://www.fao.org/3/ax936e/AX936E.pdf>).

FAO supported Conservation Agriculture Scaling Up programme in the country for many years and is currently planning for a bigger programme to encompass all aspects of agriculture relating to resilience to climate change. FAO tends to respond to the desires of the country and ZAAB has recently recognized the need to engage more with FAO so that issues of seed that are pertinent to FMSS can be more appropriately addressed in the support that FAO provides to the country. While FAO has no current projects on FMSS in the country, it has a global focus on agrobiodiversity that would make the local office a natural supporter of any initiative in FMSS. FAO may provide support especially in areas dealing with the International Treat for plant Genetic Resources for Food and Agriculture (ITPGRFA) and specifically with regard to realizing Farmers Rights in Zambia.

HarvestPlus

HarvestPlus strives to improve nutrition and public health by developing and promoting biofortified food crops that are rich in vitamins and minerals. HarvestPlus supports ZARI to breed, test, and release varieties of vitamin A maize developed through partnerships with the International Maize and Wheat Improvement Center (CIMMYT) and the International Institute of Tropical Agriculture (IITA). According to WHO, 54% of Zambian children under 5 are estimated to be vitamin A deficient (<http://www.harvestplus.org/where-we-work/zambia>).

The released vitamin A maize varieties are licensed to private seed companies to produce seed for sale to farmers. This commercial seed is distributed through agro dealer networks, NGOs, and the FISP programme targeting vulnerable smallholder farmers. HarvestPlus support commercial seed and grain sales, identify and link buyers and processors to grain suppliers, and increase awareness of vitamin A maize through consumer education, advertising, and the media. Varieties so far released include GV662A (Kamano Seed), GV664A and GV671A (ZamSeed), GV665A (SeedCo), GV662A (Afriseed) and GV674A (Advanta Seed).

The core target crop is maize which is introduced in 10 strategic camps in each target district. The search for vitamin A included screening germplasm including farmer varieties to identify those that had high vitamins then crossed with advanced breeding lines. It is feasible for farmers through participatory variety selection and enhancement to develop their own varieties with high vitamin A without even biofortification

Seed Companies

Zambia boasts of a fairly mature seed industry in Southern Africa with over 60,000 metric tons of seed (mainly maize) exported annually (SCCI, 2017). This growth has largely been driven by the liberalisation of the seed industry with private seed companies such as Zamseed, Seedco, Pannar, Pionner, Monsanto among others playing a pivotal role. Government through the SCCI and ZARI provides regulation and source of genetic resources respectively. Efforts to promote the use of hybrid seed varieties that have high yielding potentials have resulted in the erosion of local seed varieties further compromising the diversity of crops grown by smallholder farmers. Worth noting is the fact that a huge proportion of seed produced by private seed companies is maize with only a few producing legumes and other small grains such as millet and sorghum. While private seed companies have attempted to produce seed varieties that respond to the changing climate in terms of early maturing and drought tolerant varieties, the loss in local seed varieties

preferred by farmers for their specific characteristics such as taste and nutritional value, and adaptation to local conditions is quite evident.

The seed sector is guided by the draft seed policy of 1999. While the seed policy recognizes both the formal and farmer led seed systems, the reality is that the formal seed system largely drives the sector. As a result, private seed companies hold increasing market share and maintain powerful positions to further shape the policy environment. There has been a concerted effort by both private sector as well as policy lobby groups within the regional economic communities (COMESA, SADC), to develop Zambia's seed market and increase exportation of high quality commercial seed. Although there are benefits of this industry development, laws related to the commercial sector relate also to smallholder use of PGRs. Concerns include but not limited to the multiple mechanisms through which current legislation can undermine the conservation, use and development of PGR for food and agriculture; critically decrease diversity in farmers' fields. This further threatens the resilience of the seed sector and the food system as a whole. Stakeholders in the seed sector observe limited consultation from government when it comes to signing some of the regional and international documents and treaties that have far reaching effects on smallholder farmers. On the other hand, while the country has signed on to the ITPGRFA, little has been done to domesticate it and to realize Farmers' Rights.

According to ZARI, there are currently 19 registered seed companies in Zambia. Of these, about five or six are most prominent but almost all deal with hybrid maize seed and have lower priorities for OPVs and other crops. These companies all compete for a market that remains small because most of the potential target (small scale farmers) cannot afford commercial seed. These companies do however benefit from the many government and NGO programmes that provide seed packs to small scale farmers because they provide the bulk of this seed. Kamano Seed Company is a Zambian initiative that has deliberately embarked on producing seed that is targeted for the small-scale farmers. In addition to maize OPVs, Kamano produces seed of a whole range of traditional crops like finger millet, sorghum, cowpeas and indigenous vegetables.

Other Stakeholders

There are many other stakeholders who impact on FMSS even when not working on specific programmes. Golden Valley Research Trust, a partnership between government and the National Farmers Union, undertakes research on sustainable production systems. GART conducts research on conservation agriculture, development of smallholder livestock systems and production systems for local crops including indigenous vegetables. All these are relevant to FMSS. The Royal Norwegian Embassy in Lusaka coordinates all NORAD programmes in the country. NORAD focuses on sustainable development and supports various initiatives in the country such as conservation agriculture through the Conservation Farming Unit (CFU). NORAD would provide the necessary linkages to ongoing programmes and projects in the country.

Summarizing data gathered and its analysis

Country maps showing agroecological regions, another can show the areas where we have FGDs

Zambia is divided into three main agro-ecological regions based on soils, climatic factors, rainfall patterns and common agricultural activities. Region I constitute about 12% of the country and covers Luangwa and Zambezi river valleys. It has low altitude and low erratic rainfall with a short growing season. Although it is hot and humid with poor soils in some places, it is suited for growing drought resistant crops. Goat rearing and fishing potential are high as is cattle rearing and cashew nut production in west of Zambezi River

in Western Province. This region was originally most suitable for production of many traditional crops but the recent deficits in rainfall amounts are moving the main national production from this region to region 2 and 3. However, even these regions are also experiencing decreasing trends in annual rainfall totals. Therefore, there is an urgent need of adaptations in agriculture to combat climate change and the resilience to do this is found in the farmer varieties.

Region II covers 48% of the country. The rainfall and growing season in this area is moderate supporting agricultural products like maize, tobacco, ground nuts, sunflower, soybeans, wheat, vegetables, sweet potatoes, cotton and the rearing of livestock such as cattle, goats and poultry. This is the area where commercial production has been concentrated because of relatively good ecological conditions and services. It presents highest potential for growth in the agricultural sector.

Region III constitutes about 42% of the total land area. It covers North-Western, Copperbelt, Northern and Luapula Provinces. It has the highest rainfall and growing season. The crops grown include cassava, rice, sweet potatoes, sunflower, soybeans, millet, sorghum, pineapples and maize.

ZAMBIA'S AGRO-ECOLOGICAL REGIONS

AER 1	AER 2 (A & B)	AER 3
17.3 m hectares	27.4 m hectares	30.6 m hectares
Less than 800 mm rainfall per year	800 mm to 1,000 mm rainfall per year	More than 1,000 mm rainfall per year
80–120 growing days	100–140 growing days	160+ growing days
Suitable for millet, sorghum, lentils, bananas, paprika, baby corn, small ruminants, cattle, dairy, aquaculture and poultry.	Suitable for maize, sorghum, cassava, millet, rice, groundnuts, cow peas, tobacco, sunflowers, irrigated wheat, soybeans, horticulture, aquaculture, cattle, dairy and poultry.	Suitable for cassava, maize, millet, sorghum, beans, groundnuts, rice, coffee, tea, pineapples, cattle, dairy, poultry, small ruminants and aquaculture.



Policy environment

The national policy on agriculture recognizes the importance of the informal seed sector and states that maintaining agrobiodiversity and promoting conservation is one of the strategies adopted to achieve its policy objectives of achieving food security. The policy also emphasizes development of partnerships between government and farmers, the private sector, NGOs and cooperating partners in the production, marketing and distribution of seed.

The national policy on agriculture further targets initiation of legislation and guidelines on the sustainable use of agrobiodiversity including regulating access to plant genetic resources and developing measures to conserve and effectively utilize agrobiodiversity as well as promotion of sustainable and environmentally sound agricultural practices including conservation farming and agroforestry. The policy strives to promote the development of the informal seed sector by providing accessibility to breeders/basic seed from research and co-ordinate the sector to build and create a sustainable rural seed industry.

The policy recognizes the need to enact the plant breeders, farmers and community rights to ensure that farmers and breeders get recognition and reward for the efforts they have made in variety development. However, the enactment of the Plant Breeders Rights Act to the exclusion of farmers and community rights is a contradiction to the policy objectives. Moreover, the Plant Breeders Rights that was enacted in 2007 is premised on UPOV 1991 which prohibits farmers from selling or exchanging seed amongst themselves. FMSS, which on one hand is espoused by the national policy on agriculture, thrives on uninhibited farmer to farmer exchange of germplasm and therefore it is a contradiction that Breeders Rights developed by the same government is now prohibiting this natural system that contributes to FMSS. ZAAB and partners have continued to address this issue as a matter of advocacy by pushing for the speedy enactment of the Farmers Rights and/or revision of the Plant Breeders Rights. It would also appear to be a policy contradiction that there are now efforts to formally join UPOV 91 and therefore make it completely difficult to use discretion to allow for farmer exchanges.

The current government policy of subsidy may be well intentioned. However, in order to ensure it is within the confines of the national policy that supports the informal seed system, the subsidy policy must ensure that seed of local varieties of maize and indeed other crops are included in the input subsidy programmes. These will be more suitable in many of the marginalized areas where hybrids are not suitable and are alien to the local farming systems. The subsidy policy can in fact be used to promote and give a higher value to traditional crops thereby guaranteeing agrobiodiversity.

A national seed policy is a statement of principles that guides government action and explains the roles of relevant stakeholders in the coordination, structure, functioning and development of the seed system comprising both formal and informal sectors. The seed policy should serve as the overall framework for regulatory instruments, such as the seed law and related legislation. The seed policy should ensure that the government's vision is adequately reflected in day-to-day operations within the seed sector. The seed policy should ensure synergy and consistency with environmental, trade and socio-economic policies at national, regional and international levels (Nkhoma, 2017).

The availability of, and access to, quality seeds of a diverse range of crop varieties is essential for achieving food and nutrition security. Strengthening both formal and informal seed systems is therefore important to address in the seed policy. The seed policy should support a regulatory framework that sufficiently reflects the needs of the formal and informal seed sectors as well as their inter-linkages. It should also provide for a clear understanding of the different needs of the large scale commercial sector and small farming seed systems.

Farm Input Support Programme (FISP)

The system of forming cooperatives and clubs which are membership based and fee paying is now being encouraged as a matter of government policy. The cooperatives and clubs are intended to optimize the government support services to the farmers. This is because working with groups of farmers rather than individuals is considered more cost effective and efficient. The current government subsidized fertilizer and hybrid seed provision to the farmers is done through these cooperatives. For this reason, farmers are encouraged to join either cooperatives or clubs. In order to join either of these farmers groups, there are requirements that one must fulfill.

These include payment of membership fees for joining cooperatives and another payment for annual subscription. In addition, a member has to buy a designated minimum number of shares. These amounts are beyond the reach of the majority of small scale farmers. Consequently, the most vulnerable groups of farmers who cannot afford to pay the fees and buy shares are left out in the provision of government subsidy for fertilizer and hybrid seeds, yet they are the most in need of assistance. If the intension of the government is to secure household food security, then how can these vulnerable groups that are left out be assisted? The government subsidy itself has many other shortcomings. For instance, the current subsidy programmes oblige a farmer to buy 4 bags (200kg) of fertilizer at a half price compared to the prices at commercial outlets. But even this half price may not be afforded by the majority when they are obliged to buy all the 4 bags of fertilizer at once.

The only option left for increasing agricultural production for the vulnerable farmer groups is therefore the use of local varieties of crops using traditional farming methods. So far only CSOs and a few government programs such as those of the Ministry of Community Development and Social Services have tried to support these vulnerable groups. Unfortunately, the CSOs seem to miss the vulnerable groups because they often select their target groups based on geographical locations where the entire target area is deemed to consist of marginalized communities. In these communities there are those who are able to benefit from subsidy because they can afford to be members of cooperatives and those who do not benefit because they are unable to pay membership and annual fees. So, the targeting should not be general for a particular area but there must be criteria followed in that particular area to select the most vulnerable farmers. Such criteria might consider the limitations outlined above in connection to government policy on subsidy.

Regional harmonization in seed laws and trade

The ongoing processes to harmonize PVPs under the regional control of the Common Market for Eastern and Southern Africa (COMESA), the Southern African Development Community (SADC) and the African Regional Intellectual Property Organization (ARIPO) are all modelling their PVPs along UPOV 1991 and therefore have restrictive provisions for farmer exceptions and for national or public interest. Therefore, ratifying the ARIPO protocol and adopting SADC or COMESA harmonized PVP laws will lead to farmers facing more restrictions about seed saving, exchange and sale. Therefore, the government would do well to suspend participation in these processes including the current PBR Act of 2007 while a broadly consultative comprehensive seed policy is being formulated.

IPR policy – seed laws (PVP) seed regulations

In Zambia, the national plant variety protection law is known as The Plant Breeders' Rights (PBR). The Plant Breeders' Rights Act was enacted in 2007 and was intended to provide for the protection of formally developed plant varieties in the country and to provide mechanisms for rewarding the plant breeder. The PBR Act however ignores the fact that traditional varieties are also a product of deliberate

actions by farmers, who are thus also breeders. In its current form, the Act cannot recognize a traditional variety as an innovation befitting reward because of the standards that are used to describe a variety. The standards used are: distinctness, uniformity and stability. Farmers varieties are necessarily diverse and change from year to year as farmers continue to improve them. The fact that farmer varieties are diverse and constantly changing is what is so critically valuable about them, particularly as they support resilience to climate change. This genetic diversity makes it possible for farmer varieties to quickly adapt to changing environments and to new pests and diseases.

The Zambian PBR Act of 2007 does however provide some room for farmers to continue their seed system practices of selecting, saving, exchange and sale with little hindrance. It is this protection and surety to Zambian farmers, as well as the provisions for protecting the national public interest, that disqualifies Zambia from becoming a member of the Union for the Protection of Varieties (UPOV) which requires more stringent restrictions for farmer use of varieties. So, Zambia cannot have it both ways. Its either it joins UPOV and abandons its farmers or stays out of UPOV and supports its farmers.

Recommendations for different actors for follow up, based on the findings and conclusions

From the consultations, interviews and meetings held with farming communities, government and nongovernmental stakeholders, there is clearly a problem of inadequate seed for small scale agricultural production that has led to food insecurity in the majority of rural households in the marginalized areas. The major cause of this situation is a combination of lack of seed and poor soil fertility. This is compounded by the fact that the small-scale farmers have over the years been conditioned to believing that the solution lies in having hybrid maize seed and chemical fertilizers. It is however evident that most of these farmers cannot afford these inputs at current prices. As shown in this report even the subsidized prices offered through the fertilizer support programme are still way beyond the reach of the majority. It is also evident that the continuous use of chemical fertilizers has continued to damage the soils leading to acidity thereby reducing fertility. We have also shown in this report that at this level of small scale farmer production, the prices of the inputs make it uneconomical for these farmers to grow hybrid maize even if they were able to purchase the inputs.

It would appear that the most sustainable alternative solution would be the use of local varieties and some improved open pollinated varieties in combination with sustainable systems that rely on nature to maintain soil fertility such as adoption of agroecological practices and use of a diverse number of crops and varieties including intercropping and rotation with legumes. The challenge here is the lack of seed of local varieties most of which have been displaced by years of promoting hybrids and the narrowing of the range of crops grown as a result of a market system that does not include local crops.

We therefore conclude that there is a need and scope officially recognizing FMSS and providing policy and legislative support that should address increasing availability of seed of a wide range of crops and varieties. The support mechanisms must be based on the FMSS practices that allow farmers access to seed and to share and sell as they see fit.

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Annexes

Annex 1: Study workplan

Date	Activity
14th March	Developing outline for study
15th March	Develop report structure
16th March	Interviews
17th March	Literature reviews
18th March	Literature reviews
19th March	University, SADC genebank, SADC seed centre, CRS, GLM, Solidaridad
20th March	Rufunsa farmers
21st March	Chikankata farmers
22nd March	SCCI, ZARI, genebank, Oxfarm, Policy Department (Mulunguishi House)
23rd March	Shibuyunji farmers, SeedCo
24th March	Literature reviews
25th March	Literature reviews
26th March	World Vision, We effect, Pelum, Self Help Africa, Harvest plus
27th March	Zamseed, Kamano, Monsanto, Pannar, MRI-Syngenta, etc
28th March	IITA, Medson Chisi, Catherine Mungoma , Watson Mwale
29th March	Data analysis
30th Mar-4th April	Drafting report

Annex 2. Focus Group Discussion participating farmers

Name	Gender	District	Camp
Sara Njobvu	F	Rufunsa	Rufunsa
Victoria Mwanza	F	Rufunsa	Rufunsa
Winfredah Chiwala	F	Rufunsa	Rufunsa
Florence Sitimela	F	Rufunsa	Rufunsa
Brenda Chakufyali	F	Rufunsa	Rufunsa
Rodah Mukombwe	F	Rufunsa	Rufunsa
Foster Mweene	M	Rufunsa	Rufunsa
Lawrence Chansa	M	Rufunsa	Rufunsa
Lyangogo Joseph	M	Rufunsa	Rufunsa
Lenard Mkandawire	M	Rufunsa	Rufunsa
John Chipamba	M	Rufunsa	Rufunsa
Moses Ndaulu	M	Rufunsa	Rufunsa
Patrick Mumba	M	Rufunsa	Rufunsa
Andrew Chakufyali	M	Rufunsa	Rufunsa
Mike Ngulube	M	Rufunsa	Rufunsa
Remody Haleka	F	Nadezwe	Chikankata
Green Haleka	M	Nadezwe	Chikankata
Malambo K Stephen	M	Nadezwe	Chikankata
Obrain Nashongo	M	Nadezwe	Chikankata
Mazambani Steven	M	Nadezwe	Chikankata
Shadreck Chikambwe	M	Nadezwe	Chikankata
Rosy Mwiinga	M	Nadezwe	Chikankata
Happiness Mweeba	F	Nadezwe	Chikankata
Matidah Haleka	F	Nadezwe	Chikankata

Shave Cheelo	F	Nadezwe	Chikankata
Sister Mwiinga	F	Nadezwe	Chikankata
Name	Gender	District	Camp
Ester Cheelo	F	Nadezwe	Chikankata
Rosemary Chiimya	F	Nadezwe	Chikankata
Liviness Mweene	F	Nadezwe	Chikankata
Bertha Mwiinga	F	Nadezwe	Chikankata
Rahab Chikambi	F	Nadezwe	Chikankata
Anna Mangala	F	Nadezwe	Chikankata
Loveness Chibuluma	F	Mamvule	Shibuyunji
Mungambata Mercy	F	Mamvule	Shibuyunji
Maggie Shilumwemwe	F	Mamvule	Shibuyunji
Sitamulawo Kabuku	F	Mamvule	Shibuyunji
Loveness Shinyimbi	F	Mamvule	Shibuyunji
Chikoko Zacks	M	Mamvule	Shibuyunji
Gift Ncube	M	Mamvule	Shibuyunji
Webster Haankombo	M	Mamvule	Shibuyunji
Cosma Magwamazi	M	Mamvule	Shibuyunji
Derry Kapotolo	M	Mamvule	Shibuyunji
Boyd Chalimbwa	M	Mamvule	Shibuyunji
Kebby Shamwele	M	Mamvule	Shibuyunji
Mumba P	M	Mamvule	Shibuyunji
Gift Chalimbwa	M	Mamvule	Shibuyunji
Ben Chikoko	M	Mamvule	Shibuyunji
Mulife Humphrey	M	Mamvule	Shibuyunji
Shinjimbu Wisdom	M	Mamvule	Shibuyunji
Alfred Tembo	M	Mamvule	Shibuyunji

Annex 3: List of people interviewed

Name	Designation	Organization	Email
Langa Tembo	Head of Plant Science Dept.	University of Zambia	langatembo@yahoo.com langa.tembo@unza.zm
Lerotholi Qhobela	Senior Program Manager	SADC Gene Bank	lqhobela@spgrc.org.zm
Wilfred Miga		PELUM Zambi	migauj@yahoo.com
Godfrey Mwila		Zambia Agricultural Research Institute	godfrey.mwila@gmail.com
Graybill Mukombwe		National Gene Bank	munkombwegraybill@gmail.com
Bruce Chuulu		SCCI	Chibru71@hotmail.com
Francisco Miti		SCCI	franciscomiti@gmail.com
Norman Chisambo	Markets Coordinator	OXFAM	nchisamo@oxfam.org.uk
Susan Chipandwe	Seed system specialist	Harvest Plus/CIAT	s.chipandwe@cigiar.org
Martin Sekeleti	Programme Coordinator	We Effect	martin.sekeleti@weeffect.org
Bridget O'Conner		KATC	bridget.oconnor8@gmail.com
Vidar Gomez		We Effect	vidar.gomez@weeffect.org
Nokutula Mulonga	Sales Manager	Kamano Seed Company	kamanoseedzambia@gmail.com
George Okech	Country Representative	FAO	George.okech@fao.org
Misael Kokwe	Climate change Coordinator	FAO	misael.kokwe@fao.org

Annex 4: Terms of Reference for collaborating organisations and lead researchers implementing country case studies

Background & rationale

GRAIN and the Alliance for Food Sovereignty in Africa (AFSA) plan to produce a report on Farmer Managed Seed Systems in Africa with the aim to provide for a better understanding how such systems work, document their advantages and challenges in the context of small-scale farmer livelihoods, and challenge the often negative narrative about them in African media and policy environments.

A concept note explaining the background, objectives, justification and outline of the proposed report is annexed to this TOR. The person coordinating the production of the report is Susan Nakacwa of GRAIN, supported by Bridget Mugambe of AFSA. These are the ‘research coordinators’ in this TOR. They will be backed up by a core group consisting of other GRAIN and AFSA staffers. In addition, the work will be supported by Patrick Mulvany, as external expert advisor, who will input into the design and implementation of the case studies and help drafting the final report.

The work includes the production of case studies from 6 countries in the region: Mali, Senegal, Zambia, Ethiopia, Uganda and Zimbabwe. These will zoom in on the situation with respect to FMSS in these countries, describe the policy environment, collect the views of farmers and rural communities, document the experiences of CSOs involved in the work in these countries, and take in the opinions of selected policy makers, academes and people from the private sector.

These TORs aim to set out the expectations that GRAIN and AFSA have for the national case studies and the collaborating organisations that carry them out.

Collaboration with organisations in the case study countries

The idea is that the 6 country case studies will be produced by CSOs in these countries that are linked to AFSA and/or GRAIN and have experience with seeds work, in order to ensure that the reports are rooted in local realities and embedded in the vision of AFSA and GRAIN. This will also help ensuring that any follow up action in these countries after the publishing of the report will find fertile ground with the organisations in question. We call these the ‘collaborating organisations’ in this TOR.

Each collaborating organisation will appoint a lead researcher to coordinate and carry out the work, and draft the country case study report in consultation with the collaborating organisation and the AFSA/GRAIN research coordinators. The GRAIN/AFSA research coordinators will work in close cooperation with the national lead researchers to ensure that the desired methodology, scope and focus of the research at the national level is well understood, and that the resulting national reports can be compared and brought into one overall report.

Scope and methodology of the country case studies

Each national case study aims to unpack and understand the farmer managed seed systems in the country in question, to explore the justification for support for the farmer managed seed systems, how they benefit farmer communities (food security, livelihoods, health, democracy, food sovereignty etc.), the extent to which they are supported / not supported by national policy and legislation, what successes and challenges they face, how they can be supported, and by whom.

With the limited time and resources available, there is no pretension to cover all socio-economic and agro-ecological situations and areas in each country. We also do not expect to be able to carry out any detailed statistical or quantitative analysis of the informal and formal seeds sectors in the case study countries. Rather, we expect the participating organisations to select a limited number of geographical areas in which local seed activities exist, and work with groups and local organisations there that have experience with seeds work. This, in order to get the best and most relevant feedback on people's perceptions and experiences, while at the same time get a qualitatively relevant picture. The number of groups and farmers to interview will depend on the situation in each country, but we think it would be reasonable to expect that in each country interviews could be held in 3 or 4 different locations involving some 10 or more farmers in each. These local views and experiences will be complemented and contrasted with feedback from academes, policy makers and others working at the national level, as well as by a review of relevant literature on the topic in the country.

Women have a central, and often leading, role in farming and FMSS in Africa. It is important that this gets documented and visualised in the national case studies. For that, it is important that a substantial part of the people to be interviewed are women, that the role of women is explicitly brought up in the interviews and conversations with farmers, CSOs and other stakeholders, and that the literature review also includes this aspect. We hope that the national reports will be able to come up with sufficient information and evidence in order to justify a special section analysing the role and contribution of women and with recommendations on how that role can be better supported and recognised.

In this context, we see four different sources of information for the study to draw from:

1. Local farmers, their families and their community organisations.

These can be selected by the collaborating organisation in each country on the basis of relevance, experience, and knowledge of the topic. Acknowledging the limitations of resources and time, the hope is that their feedback will speak to the diversity, resilience and rich traditions of different farming communities in respect to seeds work. The interviews with these farmers and their communities will be in the form of a semi structured dialogue with individuals, focus groups, etc., and based on a series of predefined questions such as the one listed in the annex.

2. CSOs and other organisations that are involved in seeds work in the country

The collaborating organisation will consult with and interview representatives of CSOs and other organisations that have been involved with seeds work in the country. This to collect feedback on their experience with farmers and seed systems in the country, with the policy environment, and with other factors that affect local seed management. These interactions will also form a useful source of existing documents and literature on the topic, produced by them or used by them.

3. Selected officials from the public sector (e.g. extension services), policy makers, academes, private (seeds) sector people and others that have experience with seeds work in the country.

The collaborating organisation will also reach out to a selection of other stakeholders mentioned above to further complement the information gathered from farmers and CSOs, and collect and analyse more literature (e.g. about national seed laws, regulations, etc.). This selection of these informants will depend on their knowledge of and experience with seeds work and policies in the country. The expectation is that this will result in more contrasting views and opinions, but also possible suggestions and proposals on how to strengthen FMSS in the country.

4. Review of literature, statistics and other relevant materials about FMSS in the country.

The lead researcher and the collaboration organisation are also expected to carry out a review of existing literature, statistics and other relevant materials about FMSS in the country to complement and contrast with the information obtained through the interviews. A full list of the collected materials will be listed in the country report and handed over to the AFSA/GRAIN research coordinators.

A list of sample questions for each of the stakeholder groups is annexed to this TOR. These are not complete nor exhaustive. We expect that the collaborating organisations and their lead researcher are in the best position to decide how to frame and focus the questions, and how to organise the interviews in their country. We don't want to be too prescriptive in this context. So, the annexed list of questions is really a guide to help the researcher.

Interviewers will use digital audio recorders to get professional sound which sound can be used for further advocacy later on (community radio programmes, etc.).

Duration and organisation of the work: time line

1. First part of February. Come to agreement with collaborating organisation and lead researcher. Meet up with the AFSA/GRAIN research coordinators (skype). Clarify any questions and agree on the timeframe. Draw up a MOU
2. Second part of February: lead researcher in each country starts organising the work, selecting the stakeholders, organising the interviews and carry out initial literature collection and analysis.
3. March: Travel to the different locations, interview stakeholders, further literature review and consultations with AFSA/GRAIN research coordinators where needed. First drafting of the case country report.
4. First part of April: Levelling off within collaborating organisation about outcome and results. Report drafting. Possibly hold a debriefing seminar with the most critical respondents and people involved in the country.
5. Mid April: submit first draft to AFSA/GRAIN research coordinators and receive feedback. Second part of April: draw up and submit final report.
6. 1 May: submission of final report to AFSA/GRAIN research coordinators. First discussion about possible in country follow-up and launch of the report.
7. Rest of May: AFSA/GRAIN research coordinators draft overall report with support from the AFSA/GRAIN core team and expert advisor. Agree on next steps, further outputs (educational materials) and in country report launches.

Possible outline of the country case study report

Executive summary: (brief project description and objectives, summary of the methodology used, presentation of results from the interviews with the different stakeholders, principle findings, conclusions and key recommendations)

Main report:

- Presentation of the authoring organisation(s), their background and history/experience with seeds work in the country.
- Purpose and objectives of the study
- Methodology used (including: rationale for the methodology and choice of stakeholders, data sources used, interview techniques, discussions of limitations of methodologies.
- Presentation of results categorised by the different informants and stakeholders consulted/interviewed and by different issues. Including any categorised findings from literature research
- Discussion and analysis of results, present findings and conclusions. (Please provide a checklist of the meta-analysis of the results of interviews at all levels plus the literature research e.g gender roles (as above); individual vs community vs external actions supporting FMSS; impacts of national policies specifically: GMOs, PVP/seed exchange, Farmers' Rights, land/water tenure, markets etc.
- Recommendations for different actors for follow up, based on the findings and conclusions

Annexes: TOR, Timetable, list of people interviewed and supporting documentation and literature reviewed, research instruments (questionnaire, etc.)

Outputs:

- Country case study report
- Audio recordings
- Access to essential documents and literature consulted.
- Pictures to accompany the text

Budget:

A total of €3000 will be provided for each collaborating organisation.

Purpose	Amount (figures in Euros)
Support for research/writing/travel by lead researcher and collaborating organisation	2000
Launch, outreach & follow up at national level	1000
Total	3000

The collaborating organisation will submit an invoice for the cost and fee mentioned here at the time of the submission of the final country report. The assumption is that the lead researcher will dedicate around one month of time to the work during the February-April project period.

The invoice will be paid upon approval of the report by AFSA and GRAIN.

Annex 5: Guiding interview questions

1. Local farmers, their families and their community organisations.

Specific questions about the farm, the source of seeds, conservation and exchange:

- How much land do you farm on? (asking to determine if they are smallholder farmers).
How much own land, how much community land. How much for crops, how much for livestock.
- Any new crops introduced into the farming system recently, any crops you stopped growing?
Why? Overall, how has farming changed in your area during the past decade(s)?
- Which crops did you grow the last cropping season? List in order of importance (income/area sown)
- What seeds you use for each crop (own, local, certified, hybrid...), where do you get the seeds from (own harvest, neighbours, family, local market, government, seed company, other (specify).
Did you have to pay for the seeds you got from elsewhere?
- In the case of the seeds conserved on your farm or in your own village: where do you store the seeds (kitchen, special store, other store (neighbour, community seed bank...)). And: do you treat/protect the seeds (drying, botanicals, chemicals, containers...)?
- In your village, are there special seed curators responsible for maintaining the local seeds (if so: who are they, do they supply the whole village, do they get paid, etc.?). Are there special rules for exchanging seeds (gifts, payment, return favours,)?
- In case of your own seeds: how do you select them at harvest time, criteria, what's important...? (different for different crops?)

General questions on the evolving situation with seeds/FMSS – context:

- Overall: how has the source and use of seeds evolved in your community over the past decades? (different for different crops?)
- What are the different roles for children, men, women play within the seed system? (different for different crops?)
- How important is seed within your cultural dynamics? What cultural practices and ceremonies do you have that are dependent on seed and what happens once these seeds disappear
- What is the situation with local seeds in your area/country? i.e seed, culture and knowledge, how are they intertwined?

Specific questions about support for FMSS:

- What are the main reasons, advantages, for using local seeds (price, availability, quality (which?), diseases, productivity, reliability, cultural and nutritional aspects...?)
- What are the main reasons for buy certified or hybrid seeds (same as above)
- What are the main problems/challenges with locally conserved seeds? What about acquired seeds from elsewhere?
- Do you think that FMSS in your village is generally considered in a positive light? By: neighbours, other community members, government officials, seed companies, the media...? What do they say about this?
- Do you receive support in maintaining your own seed on the farm, in the village? If so: which, and from whom?
- What support do farmers in your village need to improve local seed management? From whom?
- Do you feel sufficiently knowledgeable to manage your own seed supply? Would you like to have extra training? If so: in what?
- Do community organisations provide support? In which form?
- Are you aware of any seed exchange network in your region? Do they give support? Do they organise seed fairs or other activities?
- Any other thought about how FMSS in your area could be better supported and improved

2. CSOs and other organisations that are involved in FMSS seeds work in the country

Many of the questions put to the farmers can also be put to the CSOs – extrapolated to the national level. In addition:

- How has your organisation been involved in promoting FMSS in your country?
- Why do you think this work is important?
- How is the work been evolving, what has changed over the years?
- Which are the crops in which FMSS is important in your country, and in which crops not? Do you have data about how much and which seeds are being locally managed?
- What have been your main achievements in this field? Can you provide documentation of these?
- What have been your main challenges in this field? Can you provide documentation of these?
- How do you see the overall policy environment in respect to this? Can you give specifics about the impact of specific policies and legislation? (Farmers Rights, seed laws, IPRs, role of the corporations... Both positive and negative)
- What should be done to improve FMSS in your country (support, legislation, policy, capacity building,)

3. Public sector, policy makers, academes, private (seeds) sector and others

Pretty much the same questions as above under CSOs but framed differently depending on the stakeholders in question. In addition:

- Are local and indigenous seeds important for food security in your country, or are they an impediment for progress? Can you indicate what proportion of food produced in the country come from these seeds (different from different crops?)
- Are private seed companies important? If so: why, and for what? Which proportion of the seeds used in the country, for which crops. Some for seeds bred by governmental institutions.
- What position do small holder farmers play in conserving indigenous varieties?
- Do you think that farmer managed seed systems have a place in this country's agricultural sector? If so: are they currently being supported enough (with subsidies, policies, legislation, etc.)
- What are the challenges for FMSS, and how can they be overcome?
- What do you think are the solutions for increasing smallholder resilience in these days of climate change? Do FMSS contribute to this? How?