



OFFICE OF THE AUDITOR GENERAL

**Government Measures to address the Impact  
of Climate Change on Food Security in Zambia: A  
Focus on Main Crops**



September, 2020

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## **Abbreviations and Acronyms**

AERs	Agro-Ecological Regions
AFROSAI-E	African Organization of Supreme Audit Institution – English Speaking
CA	Conservation Agriculture
CSA	Central Statistical Agency
DACO	District Agriculture Coordinating Officer
DAO	District Administrative Officer
EWS	Early Warning Systems
FAO	Food and Agriculture Organisation
FISP	Farmer Input Support Programme
GDP	Gross Domestic Product
GRZ	Government of the Republic of Zambia
IAPRI	Indaba Agricultural Policy Research Institute
IPCC	Intergovernmental Panel on Climate Change
ISSAI	International Standards for Supreme Audit Institutions
MDG	Millennium Development Goals
MoA	Ministry of Agriculture
NCCRS	National Climate Change Response Strategy
NAESS	National Agricultural Extension and Advisory Services Strategy
NAIP	National Agricultural Investment Plan
NAPA	National Adaptation Programme of Action on Climate Change
NPCC	National Policy on Climate Change
OAGZ	Office of the Auditor General Zambia
PACO	Provincial Agriculture Coordinating Officer
PPCR	Pilot Programme on Climate Resilience
SDG	Strategic Development Goals
SNAP	Second National Agriculture Policy
7NDP	Seventh National Development Plan
ZMD	Zambia Meteorological Department

## Definition of Key Terms

**Agricultural Development** – Means providing assistance to crop producers with the help of various agricultural resources<sup>1</sup>.

**Adaptation** – Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.<sup>2</sup>

**Climate Change** – Refers to any significant change in the measures of climate lasting for an extended period of time<sup>3</sup>.

**Climate change adaptation** – Is any adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects which moderates harm or exploits beneficial opportunities<sup>4</sup>.

**Climate change mitigation** – Refers to efforts to reduce or prevent emission of greenhouse gases<sup>5</sup>.

**Climate smart agriculture** – Is defined as sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change and reducing greenhouse gas emissions<sup>6</sup>.

**Climatological Normal** – The average value of a meteorological element computed over 30 years.<sup>7</sup>

**Crop Diversification** – Refers to the addition of new crops or cropping systems to agricultural production on a particular farm taking into account the different returns from value added crops with complementary marketing opportunities<sup>8</sup>.

**Conservation Agriculture** – It is a farming system that maintains a permanent soil cover to assure its protection, avoids soil tillage, and cultivates a diverse range of plant species to improve soil conditions, reduce land degradation and increase water and nutrient use efficiency<sup>9</sup>.

**Early Warning** – Refers to the provision of timely and effective information, through relevant institutions that follow individuals exposed to any hazard to take action to avoid or reduce their risk and prepare for effective response<sup>10</sup>.

**Food Security** – Means that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life<sup>11</sup>.

**Lead Farmer** – A farmer picked by the community who voluntarily works with extension officers in training follower farmers in their respective communities.

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<sup>1</sup> <https://www.sciencedirect.com>

<sup>2</sup> <https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms>

<sup>3</sup> United States Environmental Protection, Climate change basic information. 2017

<sup>4</sup> European Union, Adaptation Strategy: Adaptation to Climate Change. 2013

<sup>5</sup> IPCC, Assessment on measures to Mitigate Climate Change. 2014

<sup>6</sup> Climate Smart Agriculture: An approach for sustainable food security. 2015

<sup>7</sup> <https://www.weather.gov/grr/climatenormals>

<sup>8</sup> <http://icar.org>

<sup>9</sup> <http://www.fao.org/3/a-i6169e.pdf>

<sup>10</sup> National Disaster Management Policy, July 2015

<sup>11</sup> United Nations' Committee on World Food Security.

**Follower Farmer** – These are farmers that are under the mentorship of lead farmers

**Irrigation** – This is the process of applying water to soil, primarily to meet the water needs of growing plants<sup>12</sup>.

**Sustainable Development** – Development that meets the needs of the present without compromising the ability of the future generations to meet their own needs<sup>13</sup>.

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<sup>12</sup> Bjorneberg D.L, IRRIGATION Methods, Earth Systems and Environmental Science. 2013.

<sup>13</sup> United Nations General Assembly, 1987, p. 43

## EXECUTIVE SUMMARY

### 1. Mandate

In accordance with the provisions of Article 250 of the Constitution of Zambia (Amendment) Act No.2 of 2016, Public Audit Act No.13 of 1994 and Public Finance Management Act No.1 of 2018, the Office of the Auditor General is mandated to carry out performance audits in Ministries, Government Departments and Statutory Corporations and to report the results to the President and Parliament for debate. With this mandate, the Office of the Auditor General undertook the performance /value for money audit for purposes of establishing the economy, efficiency and effectiveness of government programmes and operations.

### 2. Motivation

Government has recognised the risks that climate change poses to national food security. In the Seventh National Development Plan (7NDP), climate change mitigation and adaptation measures have been mainstreamed into the plan.

The President in his opening address to the twelfth National Assembly on 13<sup>th</sup> September 2019 with the theme “Accelerating sustainable development for a better Zambia amid impacts of climate change” made various pronouncements on climate change. In his speech, he covered a number of aspects of climate change, identifying it as the number one challenge globally. He bemoaned its impact on food security and indicated that GDP growth had over the last decades fallen from over 6.4% to around 3.5%.

### 3. Main Audit Findings

The audit established that mainstreaming activities related to climate change in the agricultural sector were generally not being implemented effectively. This included Early Warning activities, agricultural research, adoption of Conservation Agriculture, extension services, monitoring and sensitization and awareness of climate change adaptation techniques and mitigation. The findings below briefly describe the problems alluded to above:

#### 3.1 Mainstreaming of Climate Change in Plans

The audit established that while documents showed that the Ministry of Agriculture had integrated climate change adaptation measures in their plans and programmes, inspections and an analysis of records revealed that programmes budgeted for to enhance mainstreaming were not implemented. There was little prioritisation by MoA of activities related to mainstreaming.

#### 3.2 Early Warning

It was established that the early warning system for the agriculture sector in the country was not effective and was not operating at full capacity. The meteorological department's observation network (both atmosphere and surface) was limited in its capacity to produce accurate information. There were only forty-one (41) manual stations and eighty-five (85) automatic stations in the whole country out of the requirement of a minimum of 116 automatic stations.

#### 3.3 Pest Management System

Most districts were prone to frequent pest attacks on their crops. All farmers interviewed, stated that they had continuous pest invasions in the 2017/2018 and the 2018/2019 farming seasons owing to high recorded temperatures. The main prevalent pests alluded to, were stalk bora and the fall army worm (FAW).

In further interviews with staff at the MoA, it was established that there was no integrated pest management system operated by the Ministry. There was also no effective early warning/forecasting system for pests.

### **3.4 Adoption of Conservation Agriculture**

The audit established that there was low adoption of conservation agriculture despite Government having promoted it for over two (2) decades. The following were the reasons for low adoption of CA:

- Non-Institutionalisation of Conservation Agriculture.
- Conflicting Information on Conservation Agriculture.
- Duplication of Targeting and Operational Areas by CA providers.
- Inadequate Planning of Conservation Agriculture Activities.
- Lack of Capacity of Farmers to Adopt Conservation Agriculture.

### **3.5 Crop Diversification**

The Ministry had not achieved the desired level of diversification as “area planted” has remained typically mono-cropped with maize dominating agricultural production.

The following factors were cited as important for farmers when faced with decisions on whether or not to engage in crop diversification.<sup>14</sup>

- Targeting of Input Subsidy Programmes.
- Functioning Markets and Transport Facilities.
- Land Size and Security.
- Irrigation Development.

### **3.6 Research Prioritization**

A financial analysis of Government allocations towards research showed that agriculture research was not prioritized. The ten (10) research stations were allocated between 13% and 33% of their respective approved budgets. It was also noted that funding for research stations reduced progressively over the years from K13, 674,645 in 2016 to K9, 249,530 in 2018 and finally to nil in 2019.

### **3.7 Reassessment of Zambia’s Agro Ecological Regions (AER’s)**

Interviews held with MoA and DMMU staff revealed that Zambia’s current zoning was not effective. It was recommended that the AER’s needed to be reassessed in order to ascertain if the original mapping was still effective given the different impacts of climate change and variability on different regions. As at February 2020, the reassessment had not been done, contrary to Governments plan to redefine the boundaries by 2018.

### **3.8 Climate Change Legislation**

It was noted that there was currently no legislation to support the NPCC. Without legislation, there was no regulatory framework for enhanced response to climate change and no mechanisms and frameworks to achieve climate resilient development.

## **4. CONCLUSION**

It is an indisputable fact that climate change is real. It is one of the biggest challenges facing the agriculture sector and threatens the country’s food security.

According to the June 2019 IPC analysis on Zambia, the total number of people facing severe acute food insecurity (IPC Phases 3 and 4) in the October 2019 - March 2020 period was

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<sup>14</sup> Climate Smart Agriculture Investment Plan Analyses to support the climate-smart development of Zambia’s agriculture sector - 2019

estimated at 2.3 million, well above the estimated 954, 000 people in the corresponding period in 2018/2019.

The objective of the MoA to mainstream climate change into its policies and plans has been achieved to the extent of planning only. However, the Ministry has not addressed and facilitated the implementation of the mainstreamed activities as can be seen in the findings chapter.

The aspiration of the Ministry to implement climate smart agriculture technologies that would help with improving agriculture productivity and enhance food security has not been achieved. While the Ministry planned and budgeted for activities such as conservation agriculture promotion, irrigation development, research, crop diversification promotion and farm mechanization, the activities were not prioritized in the budget.

The Early Warning component which is key in helping farmers plan and avoid hazards has not been effective. In as much as ZMD had made strides in providing climate data to different stakeholders on a timely basis using different platforms, ZMD could not provide localized early warning information for the agricultural sector as observation networks, both atmospheric and surface, were limited.

The Ministry had not developed a regulatory framework or a coordination mechanism through which the private players such as CFU and other stakeholders can operate effectively. This would in turn allow for effective and economical implementation of conservation agriculture, harmonization of information to farmers and to ensure accountability and continuity of programmes in the event that the private player exits.

## **5. RECOMMENDATIONS**

- a) The MoA should demonstrate commitment to its plans by prioritising support to activities that are intended to increase food security in the face of climate change. The Ministry must further prioritise activities that will ensure smooth mainstreaming of climate change.
- b) Government must also consider using FISP to enable more farmers affected by climate change to scale up the adoption of conservation agriculture technologies.
- c) Irrigation development must be supported and enhanced. Government must devise and promote a mechanism through which irrigation will be promoted especially among small scale farmers.
- d) Early warning information dissemination must be supported through the dedicated use of lead farmers. The early warning unit at the Ministry must also be seen to be active in providing and disseminating various parameters of early warning information including crop disease, flood and low rainfall alerts to farmers in conjunction with ZMD.
- e) Research must be accorded the material and financial support that it needs. The Ministry must ensure that research activities that are not funded by the donors but are of equal importance are carried out. This will help to develop more productive and sustainable agriculture practices according to prevailing conditions.
- f) Additionally, a regulatory framework or effective coordination mechanism through which private operators should operate must be developed as a matter of urgency.

# CHAPTER ONE

## INTRODUCTION

### 1.0 Overview

The performance audit was a case study entitled “Government Measures to Address the Impact of Climate Change on Food Security with a Focus on Main Crops.” Climate change is real and shows no signs of abating and is expected to bring about long term effects in the agricultural sector.<sup>15</sup> It has become a major threat to sustainable development in Zambia and is particularly a challenge to rural people who have low adaptive capacities. The report is therefore aimed at assessing and highlighting the measures that Government has put in place to address the impacts of climate change on food security.

### 1.1 Mandate

In accordance with the provisions of Article 250 of the Constitution of Zambia (Amendment) Act No.2 of 2016, Public Audit Act No.13 of 1994 and Public Finance Management Act No.1 of 2018, the Office of the Auditor General is mandated to carry out performance audits in Ministries, Government Departments and Statutory Corporations and to report the results to the President and Parliament for debate. With this mandate, the Office of the Auditor General undertook a performance/value for money audit for purposes of establishing the economy, efficiency and effectiveness of government programmes and operations.

### 1.2 Background

Climate change is defined as a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and /or the variability of its properties that persist for an extended period, decades or longer. Climate change is expected to pose a significant challenge to the agricultural sector thereby undermining food security, poverty reduction (SDG 1 and 2) and other development objectives.

Food security, as defined by the United Nations Committee on World Food Security, means that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life. Resources needed for sustainable food security such as fresh water, productive soils, key nutrients and genetic diversity are becoming increasingly scarce and climate change is making the choices more complicated.<sup>16</sup>

In addition, the World Bank report on Food Security in Zambia - Beyond the MDGs reported that while Zambia was undergoing rapid development, it still faced food security challenges. Further, policies such as the Farmer Input Support Programme (FISP) encourage heavy reliance on one, or very few crops, making agriculture vulnerable to changes in weather conditions and climate change.<sup>17</sup>

As mentioned above, Climate change shows no signs of abating and is expected to bring about long term impacts in the agricultural sector.<sup>18</sup> It has become a major threat to both economic and human sustainable development in Zambia and it is particularly a challenge to rural people who have low adaptive capacities. The country is already experiencing climate induced hazards which include drought and dry spells, seasonal and flash floods and extreme temperatures. Some of these hazards, especially droughts and floods, have increased in frequency and

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<sup>15</sup> Climate change and Food Security – FAO ,2019

<sup>16</sup> Bereuter and Glickman 2014

<sup>17</sup> <https://www.irforum.org/food-security-zambia-beyond-mdgs>

<sup>18</sup> Climate change and Food Security – FAO ,2019

intensity over the past few decades and have adversely impacted food and water security, water quality and livelihoods of the people especially rural communities.<sup>19</sup> An assessment of potential climate impacts shows that they will seriously undermine the efforts to improve the livelihoods of Zambians if left unchecked.<sup>20</sup> A high proportion of rural and urban households are particularly vulnerable to food insecurity. For rural households, food entitlement is linked to agriculture while crop failure is a primary determinant of food insecurity. Figure 1 below shows the major effects of climate change on Zambia's agricultural sector. As can be seen below in the 2017/2018 farming season there was a marked reduction of 16% in maize production due to climate variability. There was also an increase in crop diseases.

**Figure 1: Climate Change Threat affecting Zambia**



- 16% reduction in maize production due to decreased rainfall and temperature variability.
- Increases in crop and livestock diseases.
- Rain fed agriculture exposes the sector and makes farmers vulnerable to climate shocks

*Source: Indaba Agriculture Policy and Research Institute (IAPRI)-2019*

#### **a. Food Security Status**

The National Food Balance Sheet for the 2018/2019 marketing season, registered a deficit of 354,930 Mt maize equivalent for both human and industrial consumption compared to a surplus of 153,639 Mt registered in the previous marketing season. This was mainly on account of a decrease in the output of crops during the 2018/2019 agricultural season owing to dry spells<sup>21</sup>. According to the National Food Balance Sheet for the 2017/18 marketing season, the country produced sufficient food for national consumption with a total surplus (maize equivalent) of 153,639 Mt. The surplus was, however, less by 86 percent compared to 1,101,061 Mt achieved in the 2016/17 marketing season<sup>22</sup>. This was also attributed to the drought experienced during the farming season of 2017/2018.

The country produced sufficient food surplus (maize equivalent) for both human consumption and industrial use which increased by 76.9 percent from 625,255 Mt in the 2015/16 season to 1,101,061 Mt in the 2016/17 marketing season. Other crops for which a surplus was recorded were paddy rice, wheat, and cassava flour<sup>23</sup>.

<sup>19</sup> Impacts of Climate Change Zambia, NAPA 2007

<sup>20</sup> MTNER 2007- NAPA

<sup>21</sup> 2019 Annual Economic Report – Ministry of Finance

<sup>22</sup> 2018 Annual Economic Report – Ministry of Finance

<sup>23</sup> 2017 Annual Economic Report – Ministry of Finance

**Table 1: Maize Deficit and Surplus (2015 to 2019)**

Farming Season	Mt Maize Deficit	Mt Maize Surplus
2015/16	0	625,255
2016/17	0	1,101,061
2017/18	0	153,639
2018/19	354,930	0

*Source: IAPRI Food Security Status Report 2016 to 2019*

As can be seen in **table 1** above the production of maize has significantly reduced over the past three (3) to four (4) years with a deficit being registered in the 2018/2019 farming season. Much of the decline has been attributed to factors related to climate change, including rainfall variability, flash floods and seasonal pest invasions on crops.<sup>24</sup>

#### **b. Agriculture's Contribution to GDP**

The agriculture sector in Zambia comprises farmers that are heavily reliant on rain to produce one major crop, maize. Although the sector is Zambia's largest employer, approximately making 70% of the labour force, the sector's current contribution to GDP is just over 16%. The reliance on rain by farmers has exposed the agriculture sector to the effects of climate change which has significantly reduced agricultural produce<sup>25</sup> and ultimately lowering the sectors' contribution to GDP. The influence of climate variability and change coupled with largely rain fed agriculture prevalent in the country has contributed to fluctuations in agriculture's contribution to GDP. Evidently, sharp drops in GDP can be seen in years where the country suffered dry spells and/or other extreme climate events. GDP from Agriculture in Zambia averaged 2377.03 ZMK Million from 2010 until 2019, reaching an all-time high of 3477.80 ZMK Million in the first quarter of 2017 and a record low of 1323 ZMK Million in the third quarter of 2019. The graph below shows how agriculture's contribution to GDP has fluctuated between January 2017 and January 2020.

<sup>24</sup> 2019 Agriculture Status Report - IAPRI

<sup>25</sup> IAPRI Presentation – 2020 Indaba on CA

**Graph 1: Agriculture Contribution GDP 2017-2019**

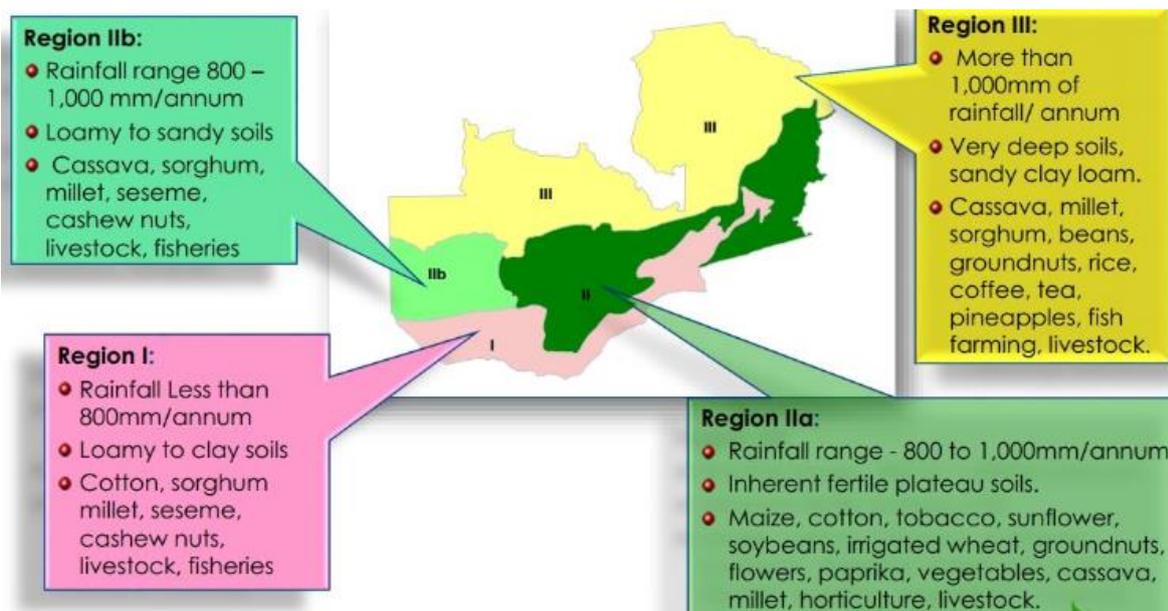


*Source: Zambia Trading Economics*

**c. Geographical Zoning**

Zambia is divided into three Agro Ecological Regions (AER's). Studies have shown evidence of climatic risks peculiar to Zambia's AER's. Region I (Much of Southern, Eastern and Western Zambia) is characterized with extreme temperatures and floods, while Region II (Much of Central Zambia) experiences excessive heat, particularly in the valley areas, coupled with flooding and dry spells or droughts. Region III (Much of Northern, Luapula, Copperbelt and North western provinces) has droughts, floods and unpredictable weather patterns. The map below shows the boundaries and characteristics of the three agro ecological regions I, II and III.

**Figure 2: Agro Ecological Regions of Zambia**



*Source- IAPRI 2020*

### 1.3 Motivation

Zambia has not been spared from the effects of climate change. There has been an increase in the frequency and severity of droughts (2017/2018 drought), occasional dry spells, and increased temperatures in valleys, flash floods (2019/2020 rain season) and changes in crop growing season<sup>26</sup>

Food insecurity poses a risk to the social and economic status of Zambia and undoubtedly to sustainable development. Government has recognised the risks that climate change poses to national food security. In the Seventh National Development Plan (7NDP), climate change mitigation and adaptation measures have been mainstreamed in the plan. Government will, through the Ministry of Agriculture, promote the adoption of agricultural environment-friendly practices (climate smart and organic techniques,) such as conservation farming, crop rotation, less use of chemical fertilizer. Government also recognises the importance of creating public awareness on the adverse effects of climate change.

The President in an address on “The Progress Made in the Application of National Values and Principals” in March, 2020 underscored the importance of mitigating the effects of climate change. He also emphasised the importance of supporting agricultural research in order to develop resilient seed varieties. The importance of Conservation Agriculture (CA) particularly in drought prone areas of the country was also emphasised by the President.

Furthermore, the President in his opening address to the 12<sup>th</sup> National Assembly on 13<sup>th</sup> September 2019 with the theme “Accelerating sustainable development for a better Zambia amid impacts of climate change” made various pronouncements on climate change. In his speech, he covered a number of aspects of climate change, identifying it as the number one challenge globally. He bemoaned its impact on food security and indicated that the contribution of agriculture to GDP had over the last decades fallen from over 6.4% to around 3.5%. He also raised concern on the inadequacy of early warning systems in the country. The President also made a clarion call to address climate change in order to ensure sustained economic growth.

In an earlier address, the President also alluded to the presence of imminent food security threats stating “we cannot take climate change lightly as it is threatening the livelihoods of farmers and national food security.”<sup>27</sup> To address the effects of climate change and increase food security thus ensuring sustainable development, the President stated that Government would promote interventions such as afforestation and reforestation, conservation farming and promotion of green energy. He also stated that Government was promoting agricultural research to mitigate the impact of climate change on small scale farmers through development, adoption and adaptation of appropriate technologies.<sup>28</sup> In 2019, Government allocated and released K 457,574,620 towards climate change in order to mitigate and adapt to the adverse effects of climate change. This included the Pilot Project for Climate Change Resilience (PPCR) currently being implemented in Western, Southern and Central provinces.<sup>29</sup>

The Office of the Auditor General also recognises the importance of increasing its audit coverage to include environmental audits. Therefore, in its Strategic Plan for the period 2017 to 2021, it was highlighted that the approval and launch of the National Policy on Climate Change (NPCC) had given the office the impetus to increase its audit coverage so as to include environmental concerns such as climate change.

From the foregoing, it is evident that it is necessary to strengthen the resilience of rural people and to help them adapt to this new additional threat to food security. The audit, therefore,

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<sup>26</sup> [www.adaptation-undp.org](http://www.adaptation-undp.org)

<sup>27</sup> Zambia Daily Mail – Wednesday August 14<sup>th</sup> 2019

<sup>28</sup> Address By His Excellency The President Of The Republic Of Zambia, Mr. Edgar Chagwa Lungu, on The Progress Made In The Application Of National Values And Principles Delivered To The Second Meeting Of The Second Session Of The Twelfth National Assembly, 16<sup>th</sup> March 2018 (paragraph 75, 76 77 and 79)

<sup>29</sup> 2019 Budget Address By Honourable Margaret D. Mwanakatwe, MP, Minister Of Finance, Delivered To The National Assembly On Friday 28<sup>th</sup> September, 2018

intends to assess the effectiveness of the measures developed by Government in order to ensure that the country is food secure by adapting to effects of climate change. It is against this background that the Office of the Auditor General found it necessary to conduct a performance audit on the Impact of Climate Change on Food Security, with a focus on Crops.

## CHAPTER TWO

### DESCRIPTION OF THE AUDIT AREA

#### **2.0 Introduction**

This chapter describes the legal framework of the MoA, its mandate, organisational structure, funding details and its stakeholders. It also briefly describes how systems at the Ministry are intended to operate.

#### **2.1 Mandate and Legal Framework**

The MoA is responsible for ensuring that the nation is food secure. It derives its mandate from the Government Gazette Notice No. 183 of 2012. The agricultural sector is guided by the National Agricultural Policy which aims “to promote development of an efficient, competitive and sustainable agricultural sector, which assures food security and increased income.” In addition, the sector has a number of pieces of legislation and policies, some of which are outdated such as the Zambia National Agriculture Implementation Plan 2018 (ZNAIP) and the Strategic Plan (2010).

#### **2.2 Roles and Responsibilities**

The Ministry is mandated to carry out the portfolio functions as detailed below:

- Food Security;
- Agricultural Development;
- Agricultural Policy;
- Agricultural Research and Specialised Services;
- Agriculture Extension;
- Field Services;
- Irrigation Development; and
- Seeds, Standards and Grades.

The Ministry has roles and responsibilities which include:

- To effectively provide appropriate policies and legal framework that will guide the development of a sustainable, competitive and diversified agricultural sector.
- To effectively provide appropriate agricultural information in order to increase awareness.
- To effectively manage and provide financial, administrative and logistical support services in order to ensure smooth operations of the Ministry.
- To effectively plan, monitor and evaluate the implementation of Ministerial and sector policies and programmes in order to ensure attainment of set objectives.
- To prevent, control and contain diseases, vectors and pests in order to enhance agricultural production and productivity.
- To promote the development of sustainable domestic and foreign markets for agricultural commodities in order to enhance access and generation of income.
- To effectively provide training in agriculture and related disciplines in order to meet the labour demands of the sector.
- To promote and strengthen efficient and effective management of agricultural production and productivity in order to ensure sustainable household and national food and nutrition security and increased incomes.
- To promote the development and utilisation of appropriate agricultural practices in order to improve and sustain the natural resource base.
- To promote agricultural diversification in order to ensure availability of a wide range of agricultural commodities.

## 2.3 Organisational Structure

The Ministry has seven (7) departments each headed by a Director and reporting to the Permanent Secretary. These include Department of Agriculture, Department of Human Resources, National Agriculture Information Services, Department of Policy and Planning, Department of Agribusiness and Marketing, Department of Seed control and Certification and Zambia Agriculture Research Institute. Key to this audit is the Department of Agriculture, under which food security falls.

## 2.4 Activities carried out by Department of Agriculture

The Department of Agriculture is directly responsible for ensuring national food security. It is a critical department in the Ministry that coordinates all the agricultural activities including those that relate to climate change. The department has three (3) operational branches which include Technical Service Branch (TSB), Agricultural Advisory Service Branch (AASB) and Crops Production Branch (CPB). Its pivotal role is to provide agricultural extension services in order to promote adoption of improved farming technology, to achieve high production, productivity and to maintain and improve the agriculture resource base.

The Department of Agriculture is mandated to:

- Disseminate technical and other information to the farming community.
- Provide technical services in irrigation, farm power, mechanization and land husbandry.
- Provide technical information and extension services in crop production, horticultural production, nutrition, crop protection and soil fertility.<sup>30</sup>

There are also ten (10) Provincial Agriculture Coordinators (PACO) that head the provincial offices and are supervised by the Permanent Secretary. The PACO's directly supervise the District Agriculture Coordinators (DACO'S).

## 2.5 Funding Details

The Ministry of Agriculture receives funding from Government and cooperating partners through direct budget support. Below is the GRZ budget for the period from 2016 to 2020.

**Table 2: GRZ budget 2016 to 2020**

Year	Budget	Releases	% Increase / Decrease
2016	2,382,266,379	3,357,161,635.66	70%
2017	5,435,167,917	4,590,176,083.34	(15%)
2018	4,701,301,090	2,697,486,022.72	(43%)
2019	4,213,714,551	1,865,970,074.49	(56%)
2020	3,484,785,858	Ongoing	

*Source: GRZ Estimates of Revenue and Expenditure 2016 to 2020*

As can be seen above, there was supplementary funding of 70% of the budget in 2016 while budget cuts consistently grew from 15% to 56% between 2017 and 2019.

<sup>30</sup> [http://www.agriculture.gov.zm/?page\\_id=4808](http://www.agriculture.gov.zm/?page_id=4808)

## 2.6 Key Stakeholders

The Ministry of Agriculture collaborates with different stakeholders in ensuring the country is food secure amid the impacts of climate change as shown below in **Table 3** below. A detailed list of stakeholders is at **Appendix 1**

**Table 3: List and Roles of Stakeholders**

Stakeholder	Stakeholder Role (s)
Zambia Statistical Agency	To provide statistical information relating to the agricultural sector.
Ministry of National Planning Development	The Ministry plays a role of securing funding for climate change interventions which include projects that help mitigate and adapt to the effects of climate change. This is done in the agricultural sector through the Pilot Project on Climate Resilience (PPCR) which is now called the National Project Coordinating Unit (NPCU).
Zambia Meteorological Department	The department is key to providing climate information which is critical for planning in the agricultural sector.
The Disaster Management and Mitigation Unit (DMMU)	The unit has the role of putting in place appropriate preparedness measures in order to manage disasters effectively and efficiently.
Cooperating Partners (Climate Invest Fund -CIF), African Development Bank (AFDB), United Nations Development Program, Global Environmental Fund (GEF) and United Nations programme on Reducing Emissions from Deforestation and Forest Degradation (UN REDD)	To provide financing for climate adaptation and mitigation projects.
Indaba for Agriculture Policy Research Institute (IAPRI)	To conduct agriculture research, impact studies and works in collaboration with the Ministry of Agriculture.
Department of Climate Change and Natural Resources	To coordinate and evaluate natural resources management and climate change programmes and projects in order to ensure their effective implementation. To conduct education and public awareness programmes in order to foster community participation in natural resources management and climate change adaptability programmes.
Conservation Farming Unit (CFU)	Supplements Government effort in promotion of Conservation agriculture
FAO	Supplements Government effort in promotion of Conservation agriculture and other agriculture activities.

## CHAPTER THREE

### AUDIT OBJECTIVE AND AUDIT QUESTIONS

#### 3.0 Introduction

This chapter highlights the overall audit objective, specific audit objectives, scope and questions that are intended to ensure that the audit objective is achieved.

#### 3.1 Main Audit Objective

The overall objective of the audit was to assess whether the measures developed to adapt to climate change were effective in ensuring that Zambia was food secure.

#### 3.2 Specific Objectives

- To determine the extent of adaptation programmes /strategies that Government has put in place to address climate change effects that have an impact on food security.
- To ascertain how key stakeholders coordinate to ensure that the nation is food secure despite climate change conditions.

#### 3.3 Audit Scope

The audit client was the Ministry of Agriculture. The audit examined whether the measures put in place by the Ministry were effective in ensuring that the country is food secure in terms of crops despite the challenges presented by climate change conditions. The audit also focused on Zambia Meteorological Department (ZMD), a stakeholder with a role of providing early warning information to the agricultural sector. The period covered by the audit was from January 2016 to December 2019.

#### 3.4 Audit Questions and Sub Questions

##### 3.4.1 To what extent is the Ministry of Agriculture implementing effective measures that address climate change and its impact on food security?

- a) How has climate change been mainstreamed into the Agricultural sector in order to address food security?
- b) To what extent has Government devised effective early warning (EWS) systems that ensure relevant and accurate data on climatic and other conditions that may affect food security, captured and disseminated in time for decision making?
- c) What mechanisms exist to ensure that accurate metrological data is made available by the MoA to farmers in good time in order for the farmers to plan ahead and avert possible crop losses especially in areas that are most prone to the effects of climate change?
- d) To what extent do farmers adopt and implement adaptation technologies in order to achieve food security?
- e) Do farmers have the capacity to adopt the technologies?
- f) To what extent are extension services by the Ministry capacitated to effectively deliver adaptive technologies to farmers?
- g) Are farmers sensitized on the need and importance of increasing their food security status by adapting to the effects of climate change?
- h) Are farmers aware of crop insurance and benefiting from it?
- i) To what extent has Government promoted adaptive research on climate change in the context of food security?
- j) Has the Ministry, in conjunction with other stakeholders, redefined the Agro Ecological Regions (AERs) in order to ensure crop suitability per agro ecological region?
- k) What monitoring mechanism has the Ministry devised and is it working as it should?
- l) How does Government address gaps that are identified during monitoring?

**3.4.2 How does the Ministry coordinate with stakeholders who are conducting activities related to climate change and food security?**

- a) To what extent is the regulatory framework for climate change adequate with regards to coordination?
- b) To what extent are actors coordinating effectively to ensure that there are no duplication of roles?
- c) How are departments within the MoA coordinating within the Ministry to ensure effective implementation of adaptation strategies?
- d) What mechanisms has Government put in place to ensure there is coordination among stakeholders to ensure effective implementation of climate change activities in the agriculture sector?

## CHAPTER FOUR

### METHODOLOGY

#### 4.0 Methodology

This chapter describes the methodology that was used to achieve the objective of the audit. The methodology includes an explanation and justification of the research design. It further explains the sample population, sample size, sampling techniques, instruments for data collection and methods of data analysis.

The audit was conducted in accordance with the International Organisation of Supreme Audit Institutions (INTOSAI) audit standards and guidelines in the OAG Performance Audit Manual. The Standards require that the audit is planned in a manner which ensures that an audit of high quality is carried out in an economic, efficient and effective manner.

#### 4.1 Research Design

The study utilized a case study research design, adopting a mixed method that was inclusive of qualitative and quantitative approaches. The two approaches were used because of the relevance to the study as they provided a basis for data analysis by comparing interpretations in the audit. Whilst the research was designed to be qualitative and quantitative in nature, it also adopted a descriptive approach so as to simplify data interpretation.

#### 4.2 Sampling

The audit used a three-tiered sampling method. The Ministry headquarters and all Provincial and District Agriculture Offices were selected for audit.

##### 4.2.1 Sample Population and Size

Purposive sampling of 13 out of the 116 districts in Zambia was done, this was because the 13 districts represented critical districts that had experienced the hardest effects of climate change. Two (2) out of the three (3) Agro Ecological Regions (AER) were selected to be part of the sample frame. The two regions being AER I and II were selected on the basis that they reflected the most vulnerable regions in terms of food security because they generally experienced low rainfall patterns. In addition, the regions had the lowest adaptive capacities. Furthermore, the audit sample comprised parts of Southern and Western provinces falling under AER I and II respectively. Of the thirteen (13) out of 116 districts that were purposively sampled, eleven (11) districts namely, Mongu, Senanga, Sesheke, Kazungula, Choma, Monze, Mazabuka, Kafue, Namwala, Lusaka and Chongwe fell between AER I and II while two (2) districts namely Itezhi and Mumbwa fell in AER II. The districts were also selected based on the presence of Pilot Programme for Climate Resilience projects (PPCR). Agricultural camps within the PPCR project areas were then purposively selected in Western province while the agriculture camps in Southern province were selected at random.

Further, officials were selected for interviews from the National Project Coordinating Unit (NPCU) project, Ministry, sampled Provinces, Districts and camps. A total of 18 out of 1745 agricultural camps were selected, out of which 22 PPCR projects were visited from which a total of 57 farmers were interviewed. In western province all farmers interviewed were both PPCR project beneficiaries and members of agricultural camps. Farmers under both the PPCR projects and agricultural camps were selected at random based on availability of farmers at the time of field inspection. Farmers selected were drawn from within agricultural camps and NPCU project beneficiaries. Key stakeholders such as NPCU, CFU, ZCCN and CARITAS that participate in climate smart agricultural projects were also sampled. **Appendix 2 Refers**

### **4.3 Data Collection Techniques**

The tools used in this audit were:

#### **4.3.1 Primary Data Tools**

- a) Structured Questionnaire
- b) Focus Group Discussions and Open-Ended Discussions
- c) Field Observations
- d) Interviews

##### **a) Structured Questionnaire**

A total number of 83 officials and farmers were interviewed. A structured questionnaire was administered to various Ministry officials and stakeholders, including farmers in order to gather relevant data. The information collected included the food security status of the country, implementation of different adaptation strategies in the camps (but not limited to; tillage methods employed, crops grown, proximity to water sources), climatic hazards in different agro ecological zones, agriculture research activities and other early warning information. Furthermore, the questionnaire incorporated aspects of PPCR project implementation, frequency of contact between farmer and extension officer, extension methodologies, coordination among different stakeholders, pest invasion experienced by farmers and awareness by farmers about climate change among others. A sample of the questionnaires and list of interviewees are attached. **Appendix 3 and 4 refers**

##### **b) Focus Group Discussions and Open Ended Discussions**

Focus group discussions of between 9 and 12 members per group were held with the PACO, DACO, PPCR project managers, Senior Agricultural Officers (MoA) and farmers in order to capture perceptions regarding various topics in line with climate smart agriculture. The audit team also attended the 2020 National Indaba on Conservation Agriculture which consisted various stakeholders involved in conservation agriculture and Government. These discussions sought to bring out information such as climate change mainstreaming, registration of farmers, delivery of extension services, implementation of adaptation of climate smart agriculture techniques, reporting mechanisms, training and workshops in Climate smart agriculture, pest invasions, transmission of early warning information and coordination with stakeholders as well as challenges faced in the implementation of and coordination with other stakeholders. Focus groups were also engaged in open-ended discussions in order to establish and appreciate matters surrounding the adoption of conservation agriculture.

##### **c) Field Observations**

Actual observations of the crops in farmers' fields as at November 2019 were made. PPCR Projects that were running as at November 2019 were also inspected. In this regard, general observations on the condition of the crops, tillage methods employed and available irrigation infrastructure were made. The field visits also enabled the corroboration of data collected in the field.

##### **d) Interviews**

Interviews were conducted throughout the audit with various Ministry staff. This was done when it was not possible to have face to face interviews for purposes of confirming information provided by the Ministry.

### **4.3.2 Secondary Data**

Secondary data was obtained from extensive review of various documentation generated by the Ministry, subject matter experts, renowned researchers and other identified stakeholders so as to obtain audit evidence and substantiate the audit findings. **Appendix 5 Refers**

### **4.3.3 Data Analysis**

Policies on Agriculture, Ministerial Annual Reports, Provincial Annual Reports, Expert Reports on Agriculture, and ZSA data were obtained and an analysis was done using both Microsoft Excel and Word. This was done in accordance with the requirement for treating qualitative and quantitative data, and this served as the standard benchmark against which the data was analysed. Data was collected on mainstreaming, sensitisations, early warning, and conservation agriculture, crop diversification and monitoring in order to inform the audit. Further, the collected data was condensed and structured in terms of themes, patterns and interrelationships. The analysis was done in order to substantiate the audit findings, make comparisons of findings by different studies conducted, also determine the trend of resources and activities implemented.

### **4.4 Limitation of Scope**

As will be expected for any study, the audit faced some challenges such as limited funding towards the audit activity, as a result the sample size was adversely affected. Consequently, the audit focused on crops only. Another challenge faced was that of accessibility to individual farmers due to a rough terrain. In addition, the absence of farmer registers in the camps made the selection of farmers difficult. The final challenge encountered was the delayed provision of information by the Ministry officials. Despite the challenges encountered, it suffices to note that none of them had any significant impact on the results of the audit as a desk review was conducted on areas not visited.

## CHAPTER FIVE

### AUDIT CRITERIA

#### 5.0 Introduction

The Chapter introduces the criteria that were used to assess the performance of the Ministry with respect to its set targets and objectives.

#### 5.1 Sources of Criteria

The audit criteria for which the Ministry was examined was drawn from the 7NDP, documents produced by the Ministry of Agriculture such as the Second National Agriculture Policy 2016-2020, the Strategic Plan 2016-2020, National Agricultural Extension and Advisory Services Strategy (NAESS), Second National Agricultural Policy –Implementation Plan 2016-2020 and the National Agricultural Investment Plan (NAIP).

Other documents external to the Ministry of Agriculture included the Zambian National Adaptation Programme of Action on Climate Change (NAPA 2007), National Policy on Climate Change (NPCC 2016), FAO guidelines, National Climate Change Response Strategy (NCCRS 2012), 2015 – 2018 and other guidelines. Below are the detailed criteria that was used during the main study.

#### 5.2 Criteria

##### 5.2.1 Effective measures to address climate change and its impact on food security.

#### Mainstreaming

According to the Second National Agricultural Policy: The Ministry shall mainstream environmental and climate change in the agricultural sector through the following:

- Integrating climate change adaptation measures in plans and programmes.
- Promotion of environmentally friendly and climate smart farming systems.
- Strengthening early warning systems.
- Building local and national institutional capacity to carry out climate change risk assessments.
- Promotion of awareness of climate change impacts on agriculture and promotion of weather based insurance schemes through awareness especially among smallholder farmers.

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#### Conservation Agriculture

Government will promote the adoption of agricultural environment-friendly practices (climate smart and organic techniques,) such as conservation farming and crop rotation as a way to adapt and mitigate the effects of climate change in the agricultural sector.<sup>32</sup>In that regard, the Ministry intends to train 78,750 farmers in CA annually.<sup>33</sup>

Furthermore, objective six (6) of the MoA Strategic Plan 2016-2020 states that in order to ensure food security, systems must be developed that promote and strengthen efficient and effective management of agricultural production and productivity. This must be done by:

- Developing and promoting appropriate technologies in various areas such as conservation agriculture;
- Designing and conducting appropriate research for development;
- Promotion of Climate Smart agriculture technologies (Conservation Agriculture); and
- Strengthening the provision of farmer training.

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<sup>31</sup> Second National Agricultural Policy February 2016 section 2.2.1 and The National Policy on Climate Change, 2016 page 11

<sup>32</sup> 7NDP p66

<sup>33</sup> Ibid

## **Crop Diversification**

Diversification within the agricultural sector will be central in improving productivity, providing inputs to agro-processing and the manufacturing sector.<sup>34</sup> In order to improve food and nutrition security the Ministry of Agriculture will promote diversification of agricultural production by increasing Crop Diversification with a target Index (Area planted to 12 major crops/ Area planted to Maize) of 1.25 by 2020 through cultivation of crops other than maize such as rice, soya beans and groundnuts and reduce over dependence on maize.<sup>35</sup> In addition, agricultural advisory services and skills development on a very wide range of crops and extension services tailored to agro ecological regions are key drivers for diversification.<sup>36</sup>

## **Provision of Extension Services**

Effective delivery of agricultural extension services is key to increased agricultural production and productivity especially among small scale farmers as recognized by the 7NDP. Extension officers are expected to visit as many farmers as possible with a recommended two hour visit every month or routinely. Government will also enhance extension service delivery in partnership with the private sector.<sup>37</sup>

## **Irrigation**

One of the objectives of the Second National Agricultural Policy (SNAP) is to increase agricultural production and productivity through promoting the use of irrigation. In that regard the Ministry will promote investment in appropriate, affordable and cost effective irrigation technology and infrastructure suitable for different agro ecological regions. It was expected that the total area to be brought under irrigation will be at least 3000ha out of a potential 2.75 million ha<sup>38</sup> by 2016.

## **Early Warning.**

According to the 7NDP, agricultural production and productivity is to be improved through research and development and early warning systems development.<sup>39</sup> The NAPA further states that in order to strengthen early warning systems to improve preparedness and adaptation to climate change, systematic observations of meteorological and hydrological services, and capacity building, education and public awareness must be strengthened.<sup>40</sup>

Government is to mainstream environment and climate change in the agricultural sector by strengthening capacity at camp, district and provincial levels to regularly collect and transmit early warning information, building local and national institutional capacity to carry out climate risk assessments, conduct twelve (12) annual awareness and mitigations campaigns on climate change adaptation and awareness, annual training of two hundred (200) district level and extension staff in early warning systems, establishment of a national early warning centre by the end of 2018 and develop a country wide information management system by 2020.<sup>41</sup>

One of the ways that the Government will adapt to climate change is through the enhancement of EWS and increased capacity to interpret climate change information.<sup>42</sup>

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<sup>34</sup> Seventh National Development plan P65

<sup>35</sup> Second National Agricultural Policy p12 And Second National Agricultural Policy Implementation Plan 2016 – 2020 p13

<sup>36</sup> Climate Smart agriculture Investment Plan

<sup>37</sup> Extension management guide – MoA and 2018 Budget Speech – Ministry of Finance

<sup>38</sup> Irrigation Development for Climate Resilience in Zambia, IAPRI, August 2019.

<sup>39</sup> 7NDP Page 61

<sup>40</sup> Formulation of the National Adaptation Programme of Action on Climate Change, September 2007, United Nations Environment Programme (UNEP)-Early Warning Systems: State-of-Art Analysis and Future Direction (2012).

<sup>41</sup> SNAP Implementation Plan Policy objective No 9

<sup>42</sup> 2019 budget speech- Ministry of Finance

## **Research**

The Ministry will improve efficiency and effectiveness in agricultural research and development by strengthening the institutional capacity of ZARI to undertake research and incorporate the effects of climate change. This will be done by purchasing research equipment and the construction and rehabilitation of research centres and other activities.<sup>43</sup>

## **Awareness**

One of the policy objectives of the Second National Agricultural Policy-Implementation Plan is to promote climate change awareness by carrying out awareness campaigns on climate change, mitigation and adaptation.

## **Monitoring**

The implementation of the SNAP will be monitored and evaluated by the Ministries responsible for agriculture, livestock and fisheries in partnership with the Ministry of Finance, Development Partners and other stakeholders. This will involve the establishment of agreed base-line benchmarks and sector indicators by the two Ministries in collaboration with other key stakeholders. Furthermore, the Policy will be monitored and evaluated by other stakeholders through annual reports and quarterly review meetings. Government shall support data collection, analysis and dissemination of Monitoring and Evaluation results.

### **5.2.2 Coordination by the Ministry with stakeholders conducting activities related to climate change and food security**

#### **Coordination among Stakeholders**

The NPCC provides a framework for coordinating climate change programmes in order to ensure climate resilience development pathways for sustainable development towards attainment of Zambia's vision 2030.<sup>44</sup> Furthermore, there should be a coordinated national response to climate change among all stakeholders.<sup>45</sup>

In order to adapt to the effects of climate change successfully, there must be active and sustained engagement of stakeholders, including national, regional, multilateral and international organisations, the public and private sectors, civil society and other relevant stakeholders.<sup>46</sup> The effective implementation of the National Policy on Climate Change will be achieved through collaborative efforts by all stakeholders.<sup>47</sup>

There is also need to promote stakeholders participation and partnerships that integrate climate change in natural resources management at all levels.<sup>48</sup> In the same vein, the Department of Climate Change and Natural Resources under the Ministry of Lands and Natural Resources will provide overall oversight, coordination, and mainstreaming of climate change in national development planning processes and will closely collaborate with the Ministry responsible for National Development Planning.<sup>49</sup>

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<sup>43</sup> NAP –Implementation Plan and MOA Strategic Plan 2016-2020

<sup>44</sup> NPCC 2016 pg11

<sup>45</sup> The National Policy on Climate Change, 2016

<sup>46</sup> UNFCC -Guidelines

<sup>47</sup> The National Policy on Climate Change, 2016.

<sup>48</sup> ibid

<sup>49</sup> The National Policy on Climate Change, 2016.

## CHAPTER SIX

### AUDIT FINDINGS

#### 6 Introduction

The chapter highlights all the major findings generated by the audit in reference to the set out audit objectives.

#### **Question 1 - To what extent is the Ministry of Agriculture implementing effective measures that addresses climate change and its impact on food security?**

##### **6.1 Mainstreaming of Climate Change in Plans**

A review of the SNAP showed that the Ministry was supposed to mainstream climate change activities in the agriculture sector through promotion and strengthening of agricultural production methods that are resilient to climate change, promotion of climate change awareness, promotion of environmentally friendly and climate smart farming systems (conservation agriculture), promotion of weather based insurance schemes especially among smallholder farmers, integrate climate change adaptation measures in plans and programmes and build local and national institutional capacity to carry out climate change risk assessments.<sup>50</sup>

The audit however, established that while documents showed that the Ministry had integrated climate change adaptation measures in their plans and programmes, document review and inspections showed that programmes budgeted for to enhance mainstreaming were not implemented. There was also little prioritisation by MoA of activities related to mainstreaming. All the findings as detailed below relate to programmes and activities that encompass mainstreaming. The findings therefore show the performance problems that were encountered during mainstreaming of climate change into the agriculture sector.

##### **6.1.1 Early Warning**

Early warning refers to the provision of timely and effective information, through relevant institutions that follow individuals exposed to any hazard to take action to avoid or reduce their risk and prepare for effective response<sup>51</sup>.

To increase Zambia's capacity to adapt to the impacts of climate change particularly in the agricultural sector, it is necessary to strengthen the generation of appropriate climate information to monitor and predict slow-onset climate hazards such as droughts and increased temperatures, as well as rapid-onset hazards such as river floods, including flash-floods. This information needs to be disseminated to end-users through an appropriate Early Warning System (EWS).<sup>52</sup>

Zambia Meteorological Department (ZMD) is the country's primary provider of meteorology services, which includes the provision of early warning information. Some of the early warning information provided by ZMD includes flood and rainfall alerts, temperature information and wind speeds. In addition, the Ministry of Agriculture also has an early warning unit housed at its headquarters.

##### **6.1.1.1 Capacity of the EWS**

The audit recognized the strides that have been made by ZMD to make early warning information available to all stakeholders timeously.

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<sup>50</sup> SNAP – February 2016

<sup>51</sup> National Disaster Management Policy, July 2015

<sup>52</sup> Terminal report – Climate Information and Early Warning Systems Project

It was however established that the early warning system for the agriculture sector in the country was not effective and was not operating at full capacity. The meteorological department's observation network (both atmosphere and surface) was limited in its capacity to produce accurate information. There were only forty-one (41) manual stations and eighty-five (85) automatic stations in the whole country as opposed to minimum of 116 automatic stations i.e. one per district. It was further noted that some districts were geographically vast and needed more than one weather station in order to localize weather information that would aid farmers. According to the World Meteorological organization, the required spacing between monitoring stations is 10 kilometres or 9000 square miles<sup>53</sup>. Currently, Zambia's monitoring stations are thousands of kilometres apart. According to ZMD staff, it would be preferable if at least each agricultural camp had at least one rain gauge. This would greatly aid the accuracy of data obtained and would facilitate timely decision making.

In addition, in areas where automatic weather stations were installed, vandalism was said to have been rampant due to lack of security around the installations.

Further contributing to inadequate access by farmers to reliable and timely climate data was inadequate staffing at camp, district and provincial levels<sup>54</sup>. Despite the Ministry employing an additional 600 camp extension officers in 2018, the vast nature of most agricultural camps meant that extension staff were still not able to reach farmers on time, particularly in the absence of motorbikes. The lack of adequate staffing at all levels had led to inadequate and delayed transmission of early warning information<sup>55</sup>. The Ministry had still not devised effective measures that would ensure that farmers were reached using means that did not necessarily require the Camp Extension Officer (CEO) to travel. Failure to reach farmers on time with information on early warning affected the ability of the Ministry and farmers to plan and avert possible crop losses.

It was further noted that some district staff who had no prior training in EWS were expected to collect, analyse and disseminate early warning information<sup>56</sup>. This contributed to late dissemination of early warning information to stakeholders in that the process of collecting and analysing data took considerably longer.

#### **6.1.1.2 Mode of Transmission of Early Warning**

In as much as the MoA in conjunction with ZMD used platforms such as WhatsApp, Facebook, YouTube, SMS and local television to disseminate early warning information, it was noted that most rural farmers in the country did not have access to these platforms. Their main source of climate data was provided by camp extension officers. However, as alluded to above, camp extension officers were limited in terms of mobility and were not able to reach many farmers within their respective camps on time. Delayed receipt of early warning information by farmers affected farmers in many ways such as early or late planting, use of wrong seed varieties, failure to avert possible pest invasions among others. This resulted in lack of confidence in the system by farmers. The audit also established that the early warning call centre that should have been operational at the end of 2018, had not been created as at February 2020.

#### **6.1.2 Pest Management System**

Pests are a major cause of crop yield loss. According to FAO, twenty (20) to forty (40) % of global crop yields are reduced each year due to damage by pests. Global warming has given rise to raising temperatures and this in turn has increased pest incidences worldwide. Therefore,

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<sup>53</sup> Extracts from World meteorological organisation web page: <https://public.wmo.int/en>

<sup>54</sup> Performance audit report of the Auditor General on the provision of extension services ,2017 and interviews with Ministry staff

<sup>55</sup> Minutes of Interviews with various staff

<sup>56</sup> Minutes of field interviews 2019

maintenance of crop health is essential for successful farming for both yield and quality of produce. This in turn requires long-term strategies for the minimisation of pest and disease occurrence. Early detection of various pests is also cardinal in containing outbreaks and averting full-fledged pest attack<sup>57</sup>

Interviews with provincial and district office staff in Western and Southern provinces revealed that the districts were not spared from frequent pest attacks on their crops. All farmers interviewed stated also that they had continuous pest invasions in the 2017/2018 and the 2018/2019 farming seasons owing to high recorded temperatures. The main prevalent pests alluded to were stalk bora and the fall army worm (FAW).

In further interviews with staff at the MoA, it was established that there was no integrated pest management system operated by the Ministry. There was also no effective early warning/forecasting system for pests. The early warning unit at the Ministry was primarily focused on food security forecasts, as such no effective early warning systems for pests had been designed. In addition, the early warning unit did not transmit early warning information on flooding, drought and other parameters that require early warning to various districts. The districts received early warning information primarily from the MET department. From the foregoing, it was concluded that the EW unit at the Ministry was not playing a proactive role in terms of providing and transmitting EW information to farmers in various districts.

It was further noted that the Ministry was slow to respond to reports of pest invasions as evidenced by the late receipt of pesticides in many cases. In Choma, for instance, it was established that despite reports being made timeously in February 2019 on the pest attacks, pesticides were only made available by the Ministry headquarters a month later in March 2019<sup>58</sup>. The provincial office responded a month later and dispatched expired pesticides to the district office. According to district staff, the pesticides were used in their expired form without much success at controlling the pests. The office was however unable to avail records of the expired pesticides. Further, district staff indicated that pesticides were stored in Lusaka at HQ and that there was no back up store in the districts. This further increased the lead time for receiving the drugs. The delay in making pesticides available to farmers meant that pests rapidly multiplied, and therefore a higher dose of pesticides would be required than if the pests were contained earlier. The Ministry therefore risks spending considerably more resources to fight pest invasions than they would if measures to control pests were taken soon after reports were received. Whilst pests are an occurrence that cannot be totally eliminated, the severity of crop attacks by pests every farming season was evidence that the Ministry was not doing enough to contain the invasions.

The application of pesticides also appeared to be haphazard and not based on environmental implications. Some camp extension officers were reportedly unable to distinguish between the various types of pests and would recommend wrong pesticides resulting from the wrong identification. It was further noted, in the field, that there was limited advocacy of crop rotation as an alternative cropping system that would help to control pests.<sup>59</sup> Promotion of crop rotation is important as crop rotation disturbs the life cycle of the pest and therefore can be used as another strategy to control pests. All the crop fields inspected in the agricultural camps showed evidence of pest attacks.

Furthermore, despite the introduction of the e-voucher system by the Government under FISP which enabled farmers to redeem farming implements as well as pesticides, farmers were reluctant to do so. According to a study undertaken by IAPRI, the over emphasis by Government on the provision of free pesticides to farmers had also resulted in the reluctance by

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<sup>57</sup> Fall army worm detection in Zambia – IAPRI January 2018

<sup>58</sup> Minutes of meeting with Southern Province PACO

<sup>59</sup> Minutes of interviews - Farmers

farmers to procure their own pesticides or indeed take preventative measures to minimise the impact of pests on their crop.<sup>60</sup>

In Luapula province, the fall army worm was the prevalent pest in 165 out of 199 camps. All eleven (11) districts of the province were affected by the FAW in the 2017/2018 farming season. The infestation coverage in the said period stood at 30.4% while it stood at between 15 -70% in 2016/2017<sup>61</sup>.

On the Copperbelt, the prevalent pests in the 2016/2017 and 2017/2018 farming season were the FAW which had affected up to 8% of the maize crop cultivated. The Tuta Absoluta (Tomato pest) was also prevalent though to a lesser degree.

In Western province, all sixteen (16) districts were invaded by the stalk borer and the FAW, resulting in lower crop yields. The invasion affected all the districts and was largely attributed to use of recycled seed and of non pest resistant seeds. The FAW was said to have been contained in the 2017/2018 farming season while the Tuta Absoluta wreaked havoc on the crops, with famers losing most of their crop.

In Lusaka province, all eight (8) districts were invaded by the FAW Tuta Absoluta and aphids during the period under review, resulting in crop loss. The outbreaks were, however, said to have been contained in the 2017/2018 farming season.<sup>62</sup>

The major pests recorded in Southern province were the fall army worm, aphids, red spider mite, Tuta Absoluta, among others. The province saw a reduction in pest invasions during the 2017/2018 farming season primarily due to increased awareness by farmers to take early corrective measures. Particularly, the farmers reportedly controlled the pests through crop rotation.<sup>63</sup> Below is a picture of fields invaded by pests during the 2019 field visit.

**Figure 3: Field invaded by pests-Mongu (cabbage) and Chongwe (maize and Okra)**



*Source: Field Visit 2019*

## **6.2 Promotion of Conservation Agriculture (CA) as an Adaptation Technique**

Conservation Agriculture (CA) is a farming system that maintains a permanent soil cover to assure its protection, avoids soil tillage, and cultivates a diverse range of plant species to improve soil conditions, reduce land degradation and increase water and nutrient uptake by crops. It enhances biodiversity and natural biological processes above and below the ground

<sup>60</sup> FAW outbreak in Zambia –January 2018,IAPRI

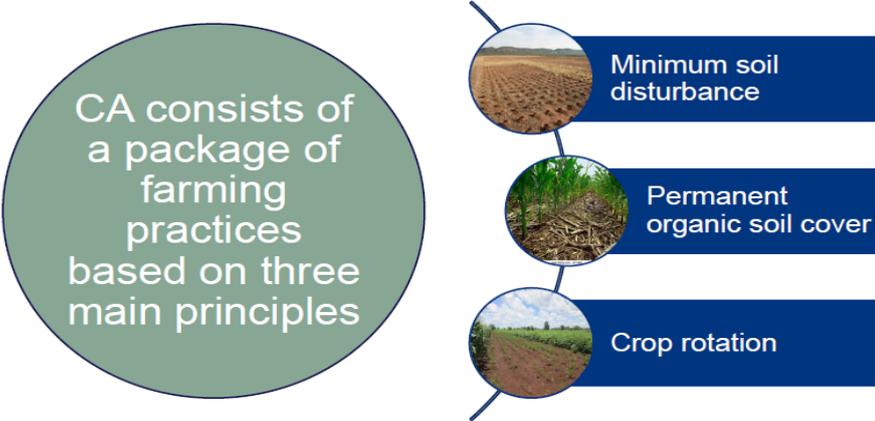
<sup>61</sup> Luapula Annual progress report 2017 and 2018

<sup>62</sup> Lusaka Province annual report – 2016,17 and 18

<sup>63</sup> Southern Province 2018 annual report

surface for improved and sustained crop productivity. It is a response to sustainable land management, environmental protection and climate change adaptation and mitigation. CA is based on three main principles; minimum mechanical soil disturbance, permanent soil organic cover and species diversification for a minimum of three years.<sup>64</sup> The figure below shows, in summary, the benefits of adopting Conservation Agriculture.

**Figure 4: Benefits of Adopting Conservation Agriculture**



*Source: IAPRI 2016*

Adoption of conservation agriculture is defined by the tillage practices used to carry out land preparation.<sup>65</sup> Minimum land tillage (thus ensuring minimum soil disturbance) practice is what defines and separates an adopter of conservation agriculture from conventional farmers.<sup>66</sup> Some tillage methods employed in Zambia include; Zero tillage, ploughing, ripping, basin, ridges, bunding and conventional hand hoeing. The tillage methods that support CA are zero tillage, ripping and basins while the rest are conventional methods. Full adoption of conservation agriculture entails implementing all the principles i.e. minimum tillage, maintenance of crop residue (not burning), and cereal-legume crop rotation while partial CA entails implementing either CA partial adoption Minimum tillage with either cereal-legume crop rotation or maintenance of crop residue (not burning).<sup>67</sup>

Conservation Agriculture does not only foster natural ecological processes to increase agricultural yields and sustainability through the minimisation of soil, maintenance of soil cover, crop diversification. It also encompasses natural resource management at farm and village landscape scale. This is intended to increase synergies between food production and the conservation and use of ecosystem services.<sup>68</sup> Figure 2 below shows the benefits of CA

<sup>64</sup> <http://www.fao.org/3/a-i6169e.pdf>

<sup>65</sup> DFID CSAZ Adoption Survey Report 2016/2017 By the CFU RM, M&E Team

<sup>66</sup> DFID CSAZ ADOPTION SURVEY REPORT 2018/2019 By the CFU RM, M&E Team P24

<sup>67</sup> IAPRI Conservation Agriculture Adoption in Zambia: Summary of Study Findings

<sup>68</sup>Conservation Agriculture Project: Biodiversity protection through climate-adapted agriculture for sustainable development in the KAZA protected area in Zambia, end of project evaluation ( January, 2019)

**Figure 5: Benefits of Conservation Agriculture**



Source IAPRI 2016

### 6.2.1 Adoption of Conservation Agriculture

Conservation Agriculture has been actively promoted since the early 1990s among Zambian smallholder farmers as a practice that helps improve crop productivity and better yield, improve soil fertility and mitigate against low and variable rainfall. It has been promoted through various organisations.<sup>69</sup>

The Government endorsed the promotion of CA as a national priority and included it in the Zambian National Agricultural Policy in 2004. The focus on CA was echoed and supported by a number of initiatives and projects supported and implemented by various NGOs, as well as international agencies and organizations including FAO, Caritas Zambia, Conservation Farming Unit and the World Bank.

The Government further committed to promoting CA in the 7NDP. One of the Government's strategy to mainstream climate change in the agriculture sector was by integrating climate change adaptation measures in plans and programmes, promote and strengthen production methods that are resilient to climate change, environmentally friendly and the introduction of climate smart farming systems.<sup>70</sup> Government reiterated its commitment to the promotion of climate smart agriculture technologies practices such as CA in order to improve productivity and mitigate crop failure under rain fed cropping which small scale farmers are accustomed to.<sup>71</sup>

Research has shown that despite the numerous benefits that CA has, the adoption of the practice is still low in the country with most people using conventional farming methods.<sup>72</sup>

In carrying out the analysis, the audit examined the total number of fields that were subjected to various tillage methods, particularly those belonging to small scale farmers countrywide, for the farming seasons 2017/2018 to 2018/2019. **Figure 6** refers

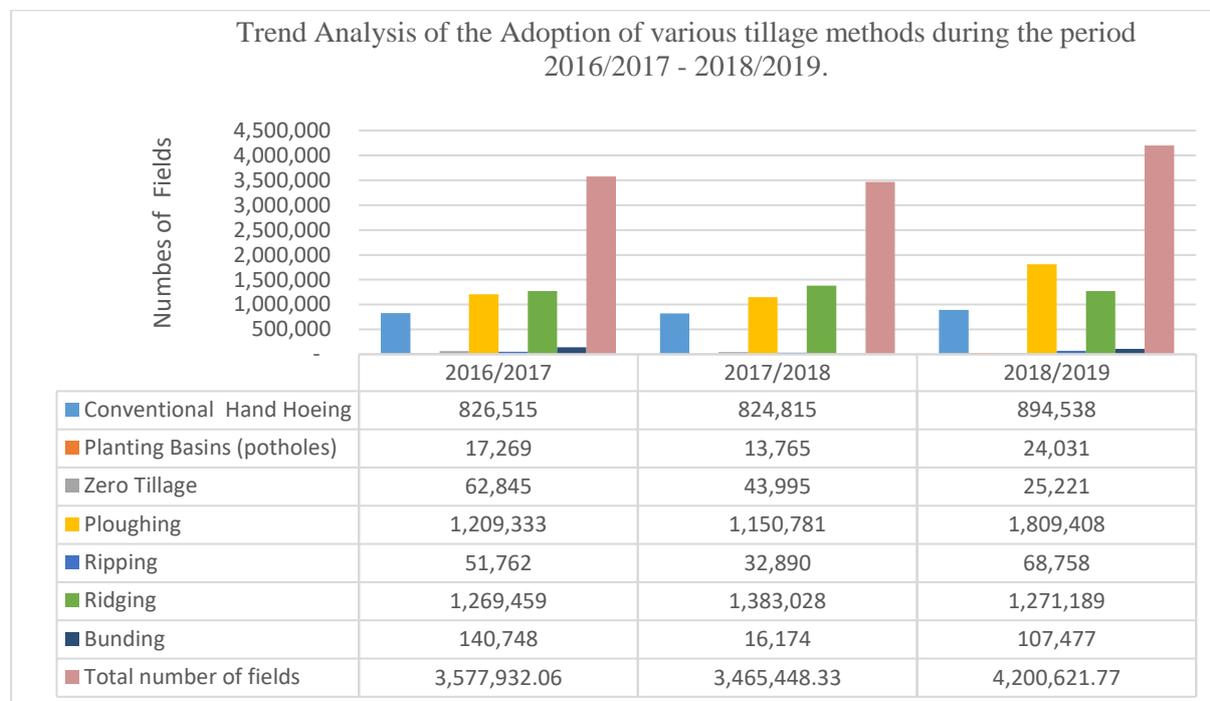
<sup>69</sup> WWF Zambia Conservation Advocacy Project Scoping Study 2017

<sup>70</sup> Seventh National Development Plan p65, National Agriculture Investment Plan p59, Second National Agriculture Policy p13

<sup>71</sup> WWF Advocacy Terminal Report November 2018 p8, p9

<sup>72</sup> Conservation Agriculture Project End of Project Evaluation Final Report ( January, 2018)

**Figure 6: Adoption of Tillage Methods**



*Source: Performance Audit –Office of the Auditor General 2020*

In the 2016/2017 farming season 17,269 out of 3, 577,932 fields adopted the use of planting basins as a tillage method while the figure reduced to 13,765 out of 3,465,448 fields in 2017/2018. There was an increase of an additional 10,266 fields adopting the use of planting basins in 2018/2019 farming season bringing the total to 24,031 out of 4,200,621 fields. The adoption of Zero tillage was at 62,845 out of 3,577,932 fields in the 2016/2017 farming season and it began a downward spiral to 43,995 fields in 2017/2018 and finally to 25,221 fields in the 2018/2019 farming season representing a drop in adoption of 42%. In the 2016/2017 farming season 51,762 fields adopted the use of ripping as a tillage method while the figure reduced to 32,890 fields in 2018/2019. There was also a marked increase of 35,868 fields adopting the use of ripping in 2018/2019 farming season bringing the total number of fields adopting the ripping method to 68,758 farmers.

Despite seemingly increasing rates of adopting ripping and plant basins, at national level, it shows that the proportion of those adopting CA tillage methods compared to those adopting conventional tillage methods was still low. The audit established that the following were the reasons for low adoption of CA.

### 6.2.1.1 Promotion of Conservation Agriculture

According to key Ministry staff, despite the Ministry having institutionalised CA nationally and it was not given the prominence that would foster its implementation.<sup>73</sup> It was further established that CA was mainly project driven with non-state actors taking the lead in its

<sup>73</sup> Minutes of meetings with the department of agriculture, presentations by the stakeholders at the INDABA on CA -2020

promotion. The non-institutionalisation of CA by the Ministry resulted in the Ministry not mapping out which CA approach should be implemented to ensure its effective and sustainable promotion.

Studies have shown that increased resource allocation to CA had inherent benefits to practicing farmers and the nation at large in terms of; increased farm system resilience, productivity and ultimately improved household nutrition and dietary diversity, especially in low rainfall prone areas.<sup>74</sup> However, annual plans showed that CA was positioned under land husbandry as a sub activity and as such allocations towards CA activities were not prioritised. The low prioritisation was confirmed in the Provincial Annual Reports for MOA which reported limited impact of extension services programmes. One of the reasons cited for low impact was the failure to carry out most budgeted activities related to conservation agriculture. For example 12% of the amount budgeted for conservation agriculture activities was released on the Copperbelt while Luapula received 11% of the budgeted figure in 2018. A review of annual reports also revealed that there was no consistency in reporting on CA activities. Therefore, it was not possible to report on funding to CA in other provinces. Table 4 below shows the funding and releases for CA activities for the period 2017 to 2019. As can be seen in table 4, prioritisation of CA activities was low. It was further observed that the funding towards CA activities continued to reduce yearly. *See table 4 below for funding details relating to CA.*

**Table 4: CA Activity Based Budget Allocation**

<b>Parameter</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
	<b>K</b>	<b>K</b>	<b>K</b>
Budget	178,662.00	150,000.00	500,000.00
Releases	156,311.08	49,233.35	0

*Source: MoA 2019*

### **6.2.1.2 Conflicting Information on Conservation Agriculture**

The audit established that the Ministry did not oversee and coordinate the packaging of CA information among the different stakeholders. However, the different non-state actors disseminated messages with varying differences, in terms of crop spacing, ideal basin depth, and time of planting among others. It was established that, there was no standard format of packaging the message on CA activities and as a result farmers tended to adopt practices promoted by private actors that had monetary or other resource advantages. It was further reported that most farmers only practised conservation agriculture for as long as the project was running. This was cited as one of the leading causes of low adoption and high disadoption of CA by farmers. In turn, this affected sustainability of continued provision of extension services to farmers once the project ended.<sup>75</sup>

### **6.2.1.3 Targeting and Operating Areas**

In interviews with staff and focus groups that included non-state actors, it was revealed that the Ministry did not maintain a record of the stakeholders that promoted CA. As a result, the Ministry was unable to propose areas of operation for CA promotional activities for private sector stakeholders. It was also quite common to find different CA promoters targeting farmers in the same areas at the same time or one after another with varying promotional messages relating to CA.<sup>76</sup> Resulting from that, certain areas had been left out in the campaign to promote

<sup>74</sup> WWF Advocacy Terminal Report 2019 p 21

<sup>75</sup> WWF Zambia Conservation Agriculture Advocacy project scoping study 2017 p31, p43; IAPRI Tailor-making Conservation Agriculture Extension Messages in Zambia. Does one size Fit All?; IAPRI National Stakeholders Workshop on Conservation Agriculture October 2016; National Indaba on CA 2020 and Minutes from stakeholder meeting 2019

<sup>76</sup> WWF Zambia Conservation Agriculture Advocacy Project Scoping Study Final Report 2017 P12

CA while other areas had two or more stakeholders duplicating efforts by targeting the same farmers. **Appendix 6e refers.**

Consequently, farmers outside the areas targeted by private extension service providers were at risk of not receiving technology transfer and therefore CA adoption continued to be low.

#### **6.2.1.4 Planning of Conservation Agriculture Activities**

The audit established that the Ministry had planned to undertake promotion of CA in the period under review. However, the Ministry was not efficient in the coverage of their planning for CA activities as set targets were too low. For instance the Ministry had planned to train about 78,750 small scale farmers annually, a mere 3% of small scale farmers. Meanwhile, the Ministry had camp extension officers in excess of 2,000 country wide that could carry out targeted training with the use of lead farmers. The audit also established that the Ministry planned to undertake promotion of CA in the period under review, however the Ministry was not efficient in the coverage of their planning for CA activities as the targeted number of farmers were too low.

A further review of all the provincial annual reports confirmed that the Ministry did not highlight the targeted number of farmers they planned to train in CA nor did they show the number of farmers to be monitored. It was therefore difficult for the audit to determine the extent of implementation of CA activities and also to assess how they were fairing towards achieving their set target of training 78,750 farmers in CA annually. See analysis of annual reports for details in **Appendices 6 a, b, c, d.**

#### **6.2.1.5 Agricultural Extension Service Provision**

Effective delivery of agricultural extension services is key to increased agricultural production and productivity especially among small scale farmers as recognized by 7NDP. Extension officers are expected to visit as many farmers as possible with a recommended two hour visit every month or routinely.<sup>77</sup> Extension and access to information remains a critical component in achieving a broad-based adoption of CA. In areas where farmers had information on the benefits and the knowledge of implementing CA practices, adoption rates were higher.<sup>78</sup> Extension is a means of proactively changing voluntary behavior in the form of the adoption of externally developed, tested or proven technology or management practice. This is achieved by convincing people of the value of adoption through the use of agricultural shows, field demonstrations, field days, extension materials and presentations.

The audit established that the average number of agricultural camps in the country ranged from 100 to 239 per province with a country total of 1, 842 camps. However provincial plans showed low targets for CA activities such as agriculture demonstrations, conservation farming techniques training and monitoring of CA fields among other CA activities in the camps. Despite the Ministry setting low targets, they were still unable to meet them. For instance, in 2016, Copperbelt Province planned to promote CA in quarters 2, 3 and 4 with a target of twenty (20) demos but none was implemented while the targeted figure was 44 demos in 2017 with only ten (10) being conducted. Luapula province had planned to conduct thirty seven (37) demos but did not conduct any demos while in 2017 and 2018 they had planned 300 demos on CA and they conducted 234 demos. Western province planned to conduct twenty four (24) demos for the year 2016 while only twelve (12) demos were conducted. In Southern province under the CASU project, the Ministry planned to undertake 84 demos in CA specifically crop diversification but implemented 30 demos while in 2017 through the Agriculture Productivity and Market Enhancement Project (APMEP) they had planned to train 10 farmers on CA but exceeded the target by training 15 farmers. The limited number of demonstrations further

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<sup>77</sup> Extension management guide - MoA

<sup>78</sup> IAPRI Determinants of Conservation Agriculture Adoption among Zambian Smallholder Farmers By Olipa Zulu-Mbata, Antony Chapoto and Munguzwe Hichaambwa Working Paper 114, November 2016 P22

slowed the rate at which farmers adopted CA technology. In addition, there was no continuous monitoring of farmers by the extension officers as indicated by farmers and extension officers spoken to. The reason for non-monitoring was attributed to low or non-release of funding by the treasury. Stakeholders also indicated that extension officers were mainly seen to be busy during the crop marketing season as opposed to the non-marketing season. **Appendices 6 a, b, c, d.**

Further, the Ministry consistently alluded to inadequate extension staff as a major reason for weak extension services in the country. The audit however, established that the Ministry had employed an additional 600 extension officers in 2018 bringing the total number of extension officers to above 2000. The audit also established that the lead farmer approach for extension services as a strategy to reach more farmers was not fully utilised by the Ministry. With the Ministry’s lead farmer system, the target was set at one extension worker training twelve (12) lead farmers in a camp while each lead farmer training between fourteen (14) to nineteen (19) follower farmers. In contrast, one of the main private extension service providers that worked closely with Government, the Conservation Farming Unit (CFU) that only had a handful of field officers, had one extension officer training at least forty-four (44) lead farmers while each lead farmer trained at least 120 farmers.

The above lead farmer approach used by CFU maximized the total number of farmers that could be reached at any given time. The CFU’s approach described above coupled with frequent monitoring of lead farmers showed increased adoption of CA in its targeted areas of operation. **Figure 7** below shows adoption trends by farmers under the mentorship of CFU.

**Figure 7: Adoption Trends – CFU/CSAZ Experiences**



*Source: CFU 2020*

The figure above shows a marked increase in the number of farmers adopting CA for the first time and also those continuing to adopt CA. CFU attributed this increase to consistent promotion as the longer promoters of CA stayed and trained farmers in an area, the higher the proportion of adopters. This was attributed to dependence of farmers on observing the progress from others before deciding to adopt. Further, the larger the pool of local success stories, the more such farmers are inclined to adopt.<sup>79</sup>

#### **6.2.1.6 Lack of Capacity by Farmers to Adopt Conservation Agriculture**

Zambian farmers also lacked the capacity and resources to adapt to and overcome worsening climatic conditions. Adoption of CA by smallholder farmers has been generally low and characterized by partial adoption as well as high dis-adoption rates of up to 95% of farmers in some locations. Reports showed that the use of low and laborious technologies (such as hand hoes), limited availability of labour-saving equipment (such as cattle, tractor and rippers) and limited knowledge and capacity of farmers to maintain the practices after initial support, are

<sup>79</sup> The Effects of Climate Change on Food Production, Case Study -Adoption Rates of CA – Experiences from Conservation Farming Unit, 2020

some of the drivers of low adoption and high dis-adoption rates. Additionally, farmers usually have to wait for multiple seasons to reap the benefits of the practice, and in some land holdings, crop residues are valued more for animal feed rather than for soil cover, making the investment less attractive to smallholders. Majority of the small holder farmers depend on less than two hectares of land. With very little infrastructure for water collection, many farms also lacked irrigation systems and relied solely on rain-fed agriculture, rendering them particularly vulnerable to variations in climatic conditions and to predicted climate change.<sup>80</sup>

In interviews with farmers, low adoption was also attributed to lack of tools to use in CA such as oxen and rippers. The labour intensive nature of cultivating the fields shortly after harvesting and the use of specialised hoes (A requirement under CA) was another factor alluded to by farmers. Further, farmers stated that they lacked certified seed and chemicals for weed management, which was a requirement for successful adoption of CA. Farmers therefore preferred to use traditional and unsustainable methods of farming. Further those under the farmer input support programme cited delays in the supply of input by Government considering CA requires early planting.

### **6.3 Crop Diversification**

Crop diversification is mostly considered a risk management strategy of cultivating more than one crop. It is a proven strategy to stabilize, diversify and enhance farm households' income, food and nutrition security. Household crop diversification is viewed as key for achieving food and nutrition security as well as for mitigating market uncertainty and the risk of crop failure and crop yield fluctuations especially with the variations of climate (prolonged droughts and flash floods). The key drivers of crop diversification include access to more competitive private output markets, increasing land size, and exposure to adverse weather conditions. Government has therefore prioritized crop diversification through national policies such as the Seventh National Development Plan (7NDP) and Second National Agricultural Policy as one of the key essentials for achieving food and nutrition security and ultimately agricultural transformation among smallholder farm households.<sup>81</sup>

The audit established that the Ministry had not achieved the desired level of diversification as most of the land remained typically mono-cropped with maize dominating agricultural production as can be seen in the **Table 5 below:**

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<sup>80</sup> Zambia Country Climate Risk Assessment Report Irish Aid, Resilience and Economic Inclusion Team, Policy Unit February, 2018 p 17

<sup>81</sup> Climate Smart Agriculture Investment Plan Analyses to support the climate-smart development of Zambia's agriculture sector

**Table 5: Crop Forecasting Survey Results for Selected Variables**

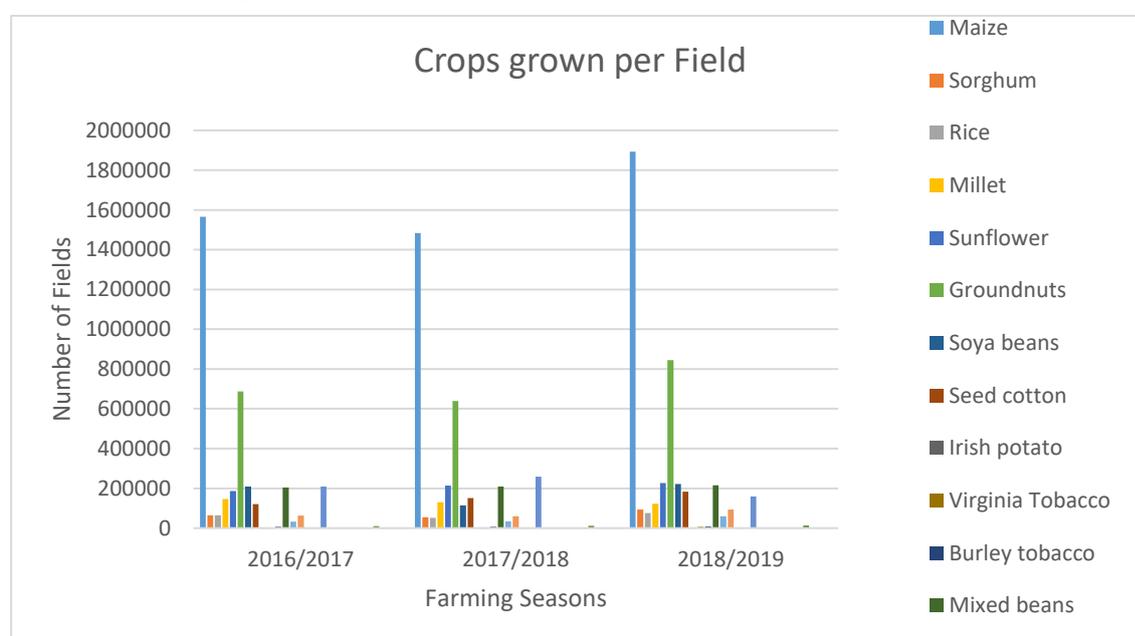
**A Comparison of the Crop Forecasting Survey Results for Selected Variables, 2017/2018 and 2018 /2019 Agricultural Seasons**

Crop	Area planted (ha)			Expected production (MT)			Yield Rate (MT/ha)		
	2017/2018	2018/2019	% Change	2017/2018	2018/2019	% Change	2017/2018	2018/2019	% Change
Maize	1,392,546	1,557,314	11.83	2,394,907	2,004,389	(16.31)	1.72	1.29	(25.16)
Sorghum	32,308	37,830	17.09	13,130	6,684	(49.09)	0.41	0.18	(56.52)
Rice	34,217	48,893	42.89	43,063	29,584	(31.30)	1.26	0.61	(51.92)
Millet	49,105	45,206	(7.94)	32,278	24,843	(23.04)	0.66	0.55	(16.40)
Sunflower	97,851	105,662	7.98	47,594	34,208	(28.13)	0.49	0.32	(33.44)
Groundnuts	284,708	276,383	(2.92)	181,772	130,825	(28.03)	0.64	0.47	(25.86)
Soya beans	205,508	237,601	15.62	302,720	281,389	(7.05)	1.47	1.18	(19.60)
Seed cotton	118,763	139,966	17.85	88,219	72,508	(17.81)	0.74	0.52	(30.26)
Irish potato	1,867	2,048	9.69	13,546	38,786	186.34	7.26	18.94	161.05
Virginia Tobacco	6,273	6,629	5.68	13,382	12,839	(4.06)	2.13	1.94	(9.22)
Burley tobacco	7,787	7,191	(7.65)	11,512	9,176	(20.29)	1.48	1.28	(13.69)
Mixed beans	84,566	100,279	18.58	52,351	58,705	12.14	0.62	0.59	(5.43)
Bambara nuts	7,253	10,657	46.92	7,039	5,457	(22.48)	0.97	0.51	(47.24)
Cowpeas	14,022	17,992	28.32	6,824	3,566	(47.75)	0.49	0.20	(59.28)
Sweet potatoes	60,325	34,209	(43.29)	183,280	109,336	(40.34)	3.04	3.20	5.20
Barley	936	1,064	13.70	5,102	8,417	65.00	5.45	7.91	45.12
Popcorn	11,190	9,053	(19.09)	9,459	5,915	(37.46)	0.85	0.65	(22.71)

Source: CSO, 2018/2019 Crop Forecasting Survey

The Figure above shows that maize has the largest area planted at 1,557,314 hectares in the 2018 /2019 farming season with the next largest area being cultivated being 276,383 hectares for groundnuts. It was clear that maize still monopolized Zambia’s crop production. Further, not only was the area planted high but also the number of fields that maize was grown in was also high covering over 1,800,000 out of 2,000,000 fields as could be seen in **Chart 1** below. A further analysis of the crops grown showed a stagnation of other crops with crops being planted in less than 200,000 out of a potential 2,000,000 fields.

**Chart 1: Showing Crops Grown in the Country**



Source: Performance Audit – Office of the Auditor General 2020

As can be seen in **Chart 1** above, maize was still grown in much higher quantities than other crops. For instance in the 2018/2019 farming season maize area planted exceeded that of groundnuts by 55% while the soya beans area planted was exceeded by over 85%. The gap

between maize and the other crops was still wide. This was despite crop diversification targets being prominent in almost all development objectives.<sup>82</sup>

The Second National Agriculture Policy also showed that according to the Simpson's Diversity Index, Zambia had exhibited one of the lowest levels of crop diversification in Africa with about 48 percent of smallholder farmers cultivating three or more crops while 14 percent growing maize in mono crop (Maggio et al. 2018). Low crop diversification resulted in most of the farmers, particularly smallholders depending on maize for their food and nutrition security as well as income generation at the expense of other equally important crops, this is despite the vulnerability of the maize crop to shock<sup>83</sup>.

This was also seen in the FAO report on Zambia which showed consistently across all the specifications that being exposed to the shock negatively and significantly affected maize yields, resulting in a decrease in yield by around 20 percent. Considering that around 70 percent of total income comes from crop income and maize income makes up 80 percent of crop income, yield decreases at this level could result in serious welfare implications for smallholders.<sup>84</sup>

Provinces in the north and northeast (agro ecological region III) had the highest crop diversification while south and central regions (agro ecological I and II) of Zambia were the least diversified<sup>85</sup>. For example all farmers interviewed in Western and Southern provinces indicated that they grew a minimum of three (3) types of crops which included beans and pumpkin. However, it was reported that beans and pumpkin were grown at a much smaller scale compared to maize.

Various modifications to FISP have been introduced over the years to address the importance of and the need for crop diversification, for example, the distribution of rice, sorghum, cotton and groundnuts was added to hybrid maize seed within the FISP. Despite this, quantities of seeds for these alternative crops has remained relatively low. A number of factors attributed to decision of whether to diversify or not by farmers.<sup>86</sup>

### **6.3.1 Targeting of Input Subsidy Programmes**

Policy measures aimed at promoting national food security, productivity enhancement, and commercialization, as well as regulatory condition for market access are key institutional drivers of agricultural specialization. In Zambia, the Farmer Input Support Programme (FISP) provided input subsidies targeted at providing fertilizer and seed inputs for specific crops, with maize dominating the inputs. Under the FISP, limited choices in terms of seed were provided to farmers.<sup>87</sup>

Government started reforming the conventional FISP to implement a flexible electronic voucher (e-voucher) which is intended to address the challenges that the conventional FISP encountered. One of the objectives of the e-voucher was to provide farmers with freedom to choose inputs of their choice thereby promoting agriculture diversification. The E-voucher system had also been proven effective for distributing input subsidies. The Ministry had made efforts in implementing the E-voucher, however, the rate of crop diversification was still low. In addition, the Ministry has not leveraged the opportunity that e-voucher offers to foster crop diversification through

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<sup>82</sup> Indaba Agricultural Policy Research Institute Policy Brief Number 82 Lusaka, Zambia August 2016, What Factors Drive Smallholder Crop Diversification in Zambia?

<sup>83</sup> Second National Agriculture Policy, P4

<sup>84</sup> FAO Agricultural Development Economics Working Paper February 2019 on "Climate-change vulnerability in rural Zambia: the impact of an El Niño-induced shock on income and productivity

<sup>85</sup> Productive Diversification in African Agriculture and its Effects on Resilience and Nutrition World Bank Group 2019

<sup>86</sup> Climate Smart Agriculture Investment Plan Analyses to support the climate-smart development of Zambia's agriculture sector - 2019

<sup>87</sup> Zambia National Agriculture Investment Plan (NAIP) 2014-2018 Under the Comprehensive Africa Agriculture Development Programme (CAADP) p41

provision of a wide range of input subsidies suitable for each agro ecological region.<sup>88</sup> It was further revealed that agro dealers predominantly stocked more maize seeds than other crops. The audit also established that the FISP system contributed towards overdependence on maize production despite the vulnerability of the maize crop to shock of climatic changes.<sup>89</sup>

### **6.3.2 Market and Transport Facilities**

Well-functioning markets can support diversification and farmers response to demand for a diverse range of agricultural products. It was, therefore, key for farmers to have predictable access to markets to sell their produce. Transport connectivity was also a key factor underpinning efficient agricultural markets.<sup>90</sup> However, the audit established that farmers did not have a guaranteed market for other crops compared to maize. The maize market was readily available with the Food Reserve Agency (FRA) in some years purchasing as much as 80 percent of the maize sold by farmers. This factor contributed to about 80 percent of Zambian smallholder farmers predominantly producing maize.<sup>91</sup>

Field inspections in Kazungula and Senanga districts also revealed that farmers were discouraged from diversifying due to lack of market for their other produce.<sup>92</sup> At one of the PPCR project sites in Senanga, some beneficiaries that grew vegetables explained that their produce went to waste in 2019 due to lack of transport facilities to take the produce to the market. District staff also bemoaned the lack of market and transport facilities for farmers in the area. Another case was cited in Sesheke in which the district staff stated that farmers were encouraged to grow Sorghum crop for cash sale to UNICEF for a school feeding programme in 2016/2017. However, immediately the programme ended, farmers were stuck with their produce as there was no other available market. As a result, farmers immediately halted the production of sorghum in the area. In addition, a case was reported in Kazungula district, where extension officers also revealed that they had encouraged their farmers to grow sorghum and cow peas for export in the 2017/2018 season to neighbouring countries. Despite farmers having a good harvest, the sale did not materialise and farmers were once again stuck with the produce and incurred financial loss. As a result, farmers were reluctant to grow crops other than maize at a large scale.

The scenarios above show that when infrastructure is poor and markets are imperfect or missing, farmers tend not to diversify to better manage their risks and to ensure basic food security.<sup>93</sup>

### **6.3.3 Extension Provision**

The Ministry of Agriculture's extension messages promotion has a direct bearing on enhancing smallholder crop diversification. A robust and well-functioning agricultural extension system which disseminates appropriate production and access to crop diversification related extension advice has a positive significant effect on crop diversification. In addition, access to such advice was reported to increase the probability for smallholder farm households to diversify their cropping by 1.7 percentage points all other factors kept constant.<sup>94</sup>

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<sup>88</sup>Zambia National Agriculture Investment Plan (NAIP) 2014-2018 Under the Comprehensive Africa Agriculture Development Programme (CAADP) P22

<sup>89</sup> FAO Agricultural Development Economics Working Paper February 2019 on "Climate-change vulnerability in rural Zambia: the impact of an El Niño-induced shock on income and productivity

<sup>90</sup> Indaba Agricultural Policy Research Institute POLICY BRIEF Number 82, August 2016

<sup>91</sup> Climate Smart Agriculture Investment Plan Analyses to support the climate-smart development of Zambia's agriculture sector -2019

<sup>92</sup> Minutes of field visit 2019

<sup>93</sup> Mofya-Mukuka and Hichaambwa 2016

<sup>94</sup> Indaba Agricultural Policy Research Institute POLICY BRIEF Number 82 Lusaka, Zambia August 2016 What Factors Drive Smallholder Crop Diversification in Zambia?

The Ministry also revealed that they were working towards achieving the Crop Diversification Index of 1.25 by 2020 with an annual rate of increase of 0.13. They also stated that they had identified and budgeted for eleven (11) other crops under diversification. However, in as much as the Ministry had planned to promote crop diversification in their activities, a review of the provincial annual reports for (2016 to 2018) showed that the Ministry had either partially implemented or not implemented the crop diversification activities that they had planned and budgeted for. According to the Ministry staff this was as a result of the Ministry not prioritizing implementation activities. There is therefore a risk of not achieving the set targets if activities which include farmer training are not implemented<sup>95</sup>.

#### **6.3.4 Irrigation Development**

Irrigation is one of the methods used to mitigate the impacts of climate change. It is also used as a vessel to foster crop diversification. When there are floods, water can be captured in dams as well as a form of water harvesting at household level. A lot of water is lost when it is not channeled into a dam. When water is put in a dam it has two major benefits:

- i. It develops an artificial discharge of ground water, this increases the level of ground water thereby helping boreholes have good yield.
- ii. Water in dams can also be used for growing crops in times of droughts.

During a drought, irrigation systems help to convey water to where it can be used. Irrigation is important because it provides crops with the right amount of water at the right time and in the right quantities. This means that there is little wastage of water and crops are not stressed by lack of water. The crop yield of irrigated crops may be five (5) times higher than the rain fed crops and such superior yields increases income and food security.

Rainfall comes once a year which usually means one crop for rain fed agriculture, if that crop fails it means there would be hunger. With irrigation, water for crops is available throughout the year.

According to the Ministry of Agriculture, Zambia only has 258,000 hectares under irrigation out of a potential 2.75 million hectares. Of this 258, 000 hectares, only 4,400 hectares is under small scale irrigation while 253,600 hectares is under private large-scale farmers. From these statistics it is clear that there is little investment in irrigation. In addition, the Climate Risk report on Zambia notes that, with very little infrastructure for water collection, many farms lacked irrigation systems and relied solely on rain fed agriculture, rendering them particularly vulnerable to variations in climatic conditions and to predicted climate change.<sup>96</sup>

Despite holding about 40% of the water in the SADC region, Zambia has not taken advantage of the status quo to promote irrigation. The southern part of Zambia is drought-prone especially Region 1 of the Agro-ecological Region of Zambia and thus the country has suffered severe droughts, becoming more pronounced and acute since the 1980's<sup>97</sup>

With the variations in rainfall caused by climate change, many small scale farmers have remained food insecure as was seen in places visited in agro ecological zones I and II which were hard hit by drought especially in the 2018/2019 farming season.

Further interviews revealed that the Ministry solely relied on cooperating partners to implement irrigation projects as there was no irrigation activity at district level being implemented by Government. Prioritisation and project focus was therefore biased towards the funder's objectives.

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<sup>95</sup> Climate Smart Agriculture Investment Plan Analyses to support the climate-smart development of Zambia's agriculture sector 2019

<sup>96</sup> Zambia Country Climate Risk Assessment Report Irish Aid, Resilience and Economic Inclusion Team, Policy Unit February, 2018 p 17

<sup>97</sup> Zambian NAPA 2007

Another challenge noted was the appraisal of agricultural projects by the local council in each respective district. Despite the incorporation of agriculture staff in council sub committees, project appraisals normally took too long to have positive impacts on the community especially given that agriculture activities were time bound. There was, therefore, a risk of financial loss arising from project implementation delays. For instance, one of the components of the PPCR project in Sesheke was the promotion of drip irrigation. The irrigation project was intended for farmers to cultivate their crops before the onset of rains and harvest soon after the rains. However, due to delays by the council in implementing the project, the irrigation project was partially completed in the rain season when farmers that practiced rain fed agriculture were also planting their crops. This was despite the system having been approved in the first quarter of 2018.

The benefits that were supposed to accrue to the farmers during the dry season were therefore not realised at the time they should have. According to staff at the MoA, the delay resulted from non-agricultural experts on the committee not appreciating the time bound aspect of agriculture. Further examination of records revealed that despite Luapula and Northern provinces being endowed with an abundance of water (River flooding occurs almost every rain season), irrigation was at minimum. Luapula province has a total land area of 306km<sup>2</sup> while Northern Province has a land area of 77,650 km<sup>2</sup> with only less than 1% of total land area under irrigation. The overdependence on rain fed agriculture was not sustainable given the unpredictable rainfall patterns arising from climate change.

#### **6.4 Climate Change Awareness**

The phenomenon of climate change is real and adverse. There is need for citizens of the country to be well abreast with information on climate change, its effects on food security, methods of mitigation and adaptation thus enhancing food security.

Zambia is a party to the United Nations Framework Convention on Climate Change (UNFCCC) Zambia, along with 195 other countries joined the convention in 1992 in order to cooperatively consider what they could do to limit average global warming and the resulting climate change and to cope with its inevitable impacts. According to the UNFCC Adaptation Committee, capacity gaps exist at national and sub national levels in the public and in the private sectors to understand climate change risks, impacts and the subsequent need for adaptation. Highly industrialized member countries are expected to make financial contributions to third world countries in order to help them adapt to the effects of climate change. This is done after submissions of national communications.<sup>98</sup> Without the necessary awareness being raised among relevant decision makers and farmers on the importance and priority of adaptation, accessing and allocation of adaptation funds remains difficult.<sup>99</sup>

In interviews with the officials at the MoA and the Climate Change and Natural Resources Management Department (The department under the Ministry of Lands through which national communications are made) it was revealed that there was limited advocacy of climate change awareness due to inadequate sensitization of communities on the effects of climate change in the country.

It was further observed that the few awareness activities were mainly conducted in areas where there were climate change related projects being implemented. For instance, PPCR project staff sensitized community members in their respective project sites (Barotse and Kafue sub basins) on climate change, its effects and adaptation measures particularly with regard to food security. However, in areas where there were no projects, the Ministry of Agriculture did not take a proactive role to deliberately sensitize people on climate change. Lack of prioritization of camp activities also meant that monitoring of activities in the camps was not done as scheduled.

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<sup>98</sup> Minutes of meeting held on 2<sup>nd</sup> October, 2019 at the Ministry of Lands and Natural Resources

<sup>99</sup> UNFCC Adaptation committee, capacity gaps in accessing adaptation funding. 2019

The Ministry of Agriculture recently introduced an insurance scheme alongside the E voucher system. The scheme is intended to provide cover to farmers and improve their food security status in the event of crop loss resulting from climate variability and other extreme events. It was, however, noted that the Ministry had not carried out any sensitisation on weather-based insurance to farmers in Western province. All farmers that had been interviewed were not aware of crop insurance which was part of the FISP programme. As was the case in Western province, where farmers were not aware of the scheme, it was doubtful that the farmers would benefit from the cover that the insurance was intended to provide.

### **6.5 Monitoring and Feedback on Activities that Affect Food Security**

Monitoring of activities that ensure food security is done by the Ministry of Agriculture in various ways one of which is through the generation of provincial annual reports<sup>100</sup>

Annual reports can thus be checked to ascertain whether agreed baseline indicators and other sector indicators are being achieved.

As of January 2020, the latest Ministerial Annual Report generated by the Ministry was for the year 2016. Annual reports for 2017, 2018 and 2019 were yet to be compiled. According to the Ministry, failure to produce annual reports on time resulted from late and/or non-submission of reports by the provincial offices. However, when the audit team requested for provincial reports directly from the provinces, the reports were availed for scrutiny. The failure by the Ministry to obtain provincial annual reports directly from the provincial offices showed that the monitoring mechanism between headquarters and provincial offices was not effective. It also showed that the Ministry was reluctant to request timely submission of provincial reports. It is also questionable how monitoring was done in the different AER's given that physical inspections from headquarters to the provinces were few and far in-between.

### **6.6 Research Prioritization**

Increasing agricultural productivity remains a central concern of developing countries especially in the light of the negative impacts of climate change. This is because it is a major factor determining food security. Agricultural research has an important role to play in meeting food security targets, since many of the new technologies, inputs, and techniques of production that increase agricultural productivity are developed through agricultural research.<sup>101</sup> Research also plays a crucial role in agriculture and rural development and can help address most challenges facing the agriculture sector<sup>102</sup>

A financial analysis of Government allocations towards research showed that agriculture research was not prioritized. In 2017 funding increased by 85 % from the previous year while in 2018 it increased by 74 %. However, there was no funding allocated towards research stations in 2019. It was also observed that during the period under review there was no allocation for research infrastructure development.<sup>103</sup>

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<sup>100</sup> SNAP -IP

<sup>101</sup> African Journals Online (AJOL)

<sup>102</sup> FAO

<sup>103</sup>ZARI annual reports for 2016,2017 and 2018

**Table 6 shows funding to research activities**

	2016	2017	2018	2019	% Increase/Reduction in 2019
<b>Funding to Research Stations</b>	785,000	1,470,921	2,564,648.69	0	-100%
<b>Research infrastructure development</b>	0	0	0	0	0

*Source: ZARI Annual Reports 2016-2019*

As a result of underfunding and non-funding, some projects that had started were either discontinued or abandoned, particularly for the research stations that relied solely on Government funding.

A further analysis of financial reports showed that while the releases for personal emoluments was growing at an average rate of 45% during the period under review, funding for research stations remained very low for the stations to carry out any meaningful research activities.

Research infrastructure development was not funded at all during the period under review despite having approved budgets.

Currently ZARI receives less than 3% of the total agricultural budget yet the required standard by Comprehensive Africa Agriculture Development Programme (CAADP) is 15 % of the total agricultural budget.<sup>104</sup> This was also noted in the country Action Agendas on the African green revolution agenda forum 2018 that Zambia was not on track to achieving the Malabo declaration commitments on research and development promotion in agriculture which falls under improved access to agriculture inputs and technologies.<sup>105</sup>

Despite the financial challenges alluded to above, the institute leveraged on support from donors and collaborating partners such as the APPSA (Agriculture Productivity Programme for Southern Africa).

The APPSA, whose project development objective was to increase availability of improved agricultural technologies in the participating countries of Mozambique, Malawi and Zambia was a six-year regional programme. It started in 2013 and ended in 2019. The thrust of the project was the strengthening of research capacity in participating countries and enhance collaboration in agricultural research and development.

As was the case with many donor funded projects, the project came with conditions and there were several projects that ZARI could not undertake using APPSA project funds as they were deemed ineligible. Most of the research & development activities or projects aimed at developing technologies to adapt agriculture to climate change could not be undertaken because they were not covered under APPSA and other projects.

The following activities, which were considered as ineligible, focused on research for adapting agriculture to climate change included the following:

- Rehabilitation of irrigation system at Nanga Research station in Mazabuka. This was the main research facility under ZARI for conducting water management and was used for crop production. Despite the need to undertake the project and enhance ZARI's capacity to

<sup>104</sup>ZARI annual reports for 2016,2017 and 2018

<sup>105</sup> Ibid

undertake irrigation and water use research, it was not permissible to use APPSA funding. This was because Nanga was not one of the research stations covered under this project.

- Vegetable and Tree Crops Research- In as much as these commodities are considered strategic from the point of view of promoting crop and dietary diversification, it was not possible to fund research activities covering these commodities under APPSA. This led to ZARI's failure to adequately make available to the Zambian farming communities' technologies to increase production and productivity of these commodities.
- Agroforestry technological options for addressing effects of climate change. ZARI has not been able to explore the technological options of agroforestry to address climate change effects on agricultural production and productivity. These technological options addressed some of cropping system challenges brought about by deforestation, resulting in land degradation, decreased soil fertility and increase erosion, which have adversely contributed to reduced crop production and productivity. Research aimed at promoting agroforestry technologies was key to minimizing these challenges.
- Sweet potato, which is considered one of the climate resilient and food security crops, especially among smallholder farming communities was not one of the commodities covered under APPSA and was therefore not supported under APPSA.

In general, the lack of Prioritisation for research activities resulted in ZARI lagging behind in the development of appropriate technologies to adapt agriculture to effects of climate change and contribute to sustainable and increased crop production and productivity.

### **6.6.1 Crop Suitability**

Crop suitability refers to the compatibility between crops grown and the region in which they are grown. Depending on soil types, rainfall patterns, temperatures and other parameters, certain crops may not be grown in areas that have conditions that will not ensure the maximum crop yield. Most soils in Zambia are inherently poor and degraded and have a low potential to supply and retain nutrients. Zambia Agriculture Research Institute (ZARI) was mandated to develop a crop suitability map whose research results showed suitable crops to be grown per agro ecological region. In order to ensure high yields, it is important that crops are only grown in areas that are suitable for their growth. This is particularly important given that climate change has been shown to influence soil properties.

The crop suitability map as reflected in the Second National Agriculture Policy, shows that agro ecological Region I, which covers parts of Southern, Eastern and Western Provinces is suitable for the production of crops such as cotton, sesame, sorghum, groundnuts, beans, sweet potatoes, cassava, rice and millet and has potential for the production of various irrigated crops including fruits and vegetables while Agro Ecological Region II a which covers the Central, Lusaka and parts of Southern and Eastern provinces has inherent fertile soils with a variety of crops grown which include maize, cotton, tobacco, sunflower, soya beans, irrigated wheat, groundnuts and other arable crops with some suitable for flowers, paprika and vegetable production and the agro ecological Region II b covers part of Western Province and consists of sandy soils and is suitable for production of cashew nut, rice, cassava, millet and vegetables.<sup>106</sup>

Interviews with officials at Zambia Agriculture Research Institute revealed that the country had not implemented the crop suitability map to help farmers grow crops that were suitable for the different identified areas. As a result, there was low productivity and yield as some crops do not do well in certain regions. The suitability analysis also showed that maize was not part of the crops indicated as suitable in region I and region II b but was still widely grown in these regions. In addition, the Ministry did not put in place a deliberate strategy to ensure inputs were supplied as per area suitable crop. For example even though maize was not suitable to be grown in region

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<sup>106</sup> Second National Agriculture Policy 2016 P3Finding

I, the maize seed was still widely supplied in the region via FISP. The FISP which is a key tool that Government uses to supply inputs does not consider crop suitability per region but uses a blanket supply of inputs which is mainly dominated by the maize seed.

### **6.6.2 Reassessment of Zambia's AER's**

Agro-ecological zoning (AEZ), as applied in FAO studies, defines zones on the basis of combinations of soil, landform and climatic characteristics. The particular parameters used in the definition focus attention on the climatic and soil requirements of crops and on the management systems under which the crops are grown. Each ecological zone has a similar combination of constraints and potentials for land use, and serves as a focus for the targeting of recommendations designed to improve the existing land-use situation, either through increasing production or by limiting land degradation.

ZARI in conjunction with other stakeholders such as ZMD, UNZA and Ministry of Fisheries and Livestock (MFL) were mandated to promote adaptive research by redefining the boundaries of the three agro ecological regions by 2018. Zambia's AERs were developed in the late 1970's and did not incorporate climate change at the time, a phenomenon that will likely affect the AER's climatological and non-climatological parameters such as farming systems (Niggol Seo et al., 2008)

Zambia has three major Agro-Ecological Regions (AERs); Regions I, II and III. These regions are classified largely based on climatic, geo-physical, soil types, land use, farming systems and socio-economic parameters. Each AER has distinct features such as thermal regimes, rainfall amounts and patterns, length of growing period (LGP), cropping systems, soil types and farming systems including crops and livestock or farm animals and biodiversity. Since the creation of the AERs, there has been a review of climatic parameters but not the soils. Over the years, the climatological data that was used in the 1970s and 1980s shows a changed trend in temperature and rainfall in the AER's.<sup>107</sup>

The AER's have been used for policy making and as an adaptive management tool in agriculture planning and food security. For each AER suitable and recommended crops are listed and mapped. Although most of the morphological and physical features of Zambia's plateau soils, are similar across the country, the effects of climate change have made their chemical properties and distribution different (Mwale et al., 2007). This implies that climate change exerts influence on soil physic-chemical properties over time and monitoring of these changes just as climatological variables are monitored is advisable in understanding the integrity of AERs.<sup>108</sup>

According to recent studies, climate change influenced trends have been observed and the trends include; changes in the start of rainy seasons, increased or decreased average precipitation and increasing average and maximum temperatures (Ziervogel et al., 2008). A similar trend has also been observed in Zambia (NAPA, 2007) where the start of the rainy season has changed generally tending towards late start and early ending resulting in shortened crop growing season. As a result of some observed shifts in rainfall patterns and the increasing temperatures, questions have arisen about the effectiveness and current geographical boundaries of Zambia's Agro-Ecological Regions.

There have also been suggestions that the current AERs geographical boundaries and climatological characteristics could have in fact changed (Neubert et al., 2011).

According to the data provided by the Zambia Meteorology Department (ZMD 2013), the three (3) climatological normal since 1950 to 2010 show a reduction trend in amounts of rainfall and increasing temperatures across all the agro-ecological regions. A similar trend has been reported

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<sup>107</sup> Adaptation of Zambia's agriculture to climate change- A comprehensive review of the utilization of AER's JS Phiri E Moonga et al -2013

<sup>108</sup> Ibid

for the period 1970-2000 (NAPA, 2007). This trend could mean that some variable parameters (climatic, geological, soils, agro-climatic and farming systems) that were used in the zoning of Zambia's agro-ecological regions could have changed.

Anecdotal evidence being the observation that some farming systems have tended to shift northwards to the wetter agro-ecological region III which has highly leached and acidic soils and therefore less suitable and less fertile for crop production compared to the most agricultural productive areas of much of the Southern and some parts of Eastern Zambia in agro-regions I and II. Therefore, it is inferred here that climate change is influencing and changing the characteristics of AERs over time and that it is necessary on this basis that AERs are reviewed accordingly over a set time period depending on established speed of change of key parameters<sup>109</sup>

The changes in key climatological parameters in different AERs are consistent with many model projections by many scientists that climate change would impact AERs but in varying ways and magnitude. Therefore, although the current AERs landscape zoning is still useful, it may not be as effective for supporting policy as well as be used as an effective adaptation tool in agriculture.<sup>110</sup>

In addition it was recommended by MoA staff, that the Zambia's AER's needed to be reassessed in order to ascertain if the original mapping was still effective given the different impacts of climate change and variability on the different regions. DMMU officials also echoed the same view while ZMD stated that despite calls for the reassessment, they thought the parameters as indicated in the original AER mapping had not changed much to warrant a reassessment as at 2019. As of February 2020, the reassessment had not been done, contrary to Government's plan to redefine the boundaries by 2018. Further interviews with ZMD also revealed that a study was done by a consultant hired by Government in which it was recommended that the AER's be redefined. However, the study was not available for audit scrutiny.

The current zoning is therefore inadequate as it does not take into account the effects that climate change has had on the three agro ecological regions. This has the potential to reduce food security in that some crops may still be grown in areas that are not suitable, thereby significantly reducing crop yields.

## **Question 2 - How does the Ministry of Agriculture coordinate with other stakeholders who are conducting activities related to climate change and food security?**

Climate change is a phenomenon whose impacts are cross cutting in all sectors. It is therefore expected that Government and indeed other stakeholders should coordinate effectively to ensure that the nation is food secure in the midst of climate change, this can be achieved if there is strong climate change institutional coordination.

### **6.7 Climate Change Legislation**

Climate change legislation helps in presenting an analysis of institutional, political, social and economic factor that has led to the formation of the laws. Every individual needs to understand climate change legislation in order to reduce carbon emissions and keep the climatic change from happening.<sup>111</sup>

The audit established that there was currently no legislation to support the National Policy on Climate Change (NPCC), and in this regard, there was no regulatory framework for enhanced response to climate change; and no mechanisms and frameworks to achieve climate resilient development. There was also no institutional arrangement devised by the MOA for the

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<sup>109</sup> Adaptation of Zambia's agriculture to climate change- A comprehensive review of the utilization of AER's JS Phiri E Moonga et al -2013

<sup>110</sup> Ibid

<sup>111</sup> <http://www.justscience.in/articles/important-climate-change-legislation/2017/11/28>

coordination of climate change interventions in the country. Without adequate legislation, there is no assurance that Zambia will achieve its development goals related to food security as outlined in Vision 2030 and the 7NDP. Legislation would also ensure compliance of players to the requirements of the law.

### **6.8 Institutional Coordination between Actors**

Some of the stakeholders that coordinated with the MoA included the Climate Change and Natural Resources Management Department (Ministry of Lands), the Ministry of National Development Planning (MNDP), Disaster Management and Mitigation Unit (DMMU), Zambia Metrological Department (ZMD) and Water Resources Management Authority (WARMA). According to the National Policy on Climate Change the role of the Climate Change and Natural Resources Management Department was to facilitate the implementation of all climate change projects in all sectors in collaboration with all sectors.<sup>112</sup> The role of MNDP was to facilitate mainstreaming and integration of climate change activities in all sectors including private sectors and all state actors<sup>113</sup>.

It was observed that there was duplication of roles between the two institutions. A case in point was the implementation of climate change projects by MNDP, particularly, the Pilot Programme for Climate Change Resilience (PPCR) project. MNDP was not mandated to facilitate the implementation of climate change projects but to coordinate, provide oversight and to mainstream climate change in national developmental planning processes. The Climate Change and Natural Resources Management Department (Ministry of Lands and Natural Resources) was supposed to facilitate the implementation of all climate change programmes and projects in all sectors in collaboration with relevant stakeholders. However, it was established that for the PPCR project, the implementation was facilitated by MNDP. This duplication of roles affects the aspects of economy in the management of climate change projects thereby causing double expenditure and delays in project implementation.

Further, the PPCR project was under the auspices of the MNDP at national level and was being implemented through the Councils at district level arising from the decentralisation policy of 2002. Interviews at the Ministry of Agriculture revealed that while they appreciated the objectives of the decentralisation policy, the PPCR projects with an agriculture focus were not being run smoothly under the Council as many of the officers in the council did not have a background in agriculture. In addition, the officers at the council had other duties related to their substantive positions therefore agricultural projects were not prioritised.

Furthermore, in interviews with district staff, it was established that there were delays in project implementation. Some of the delays arose from failure by council staff to take heed of advice from the experts from Ministry of Agriculture who understood the timeliness of agricultural activities. For instance, in Kafue district, it was reported that PPCR project commencement delayed by over three (3) months. According to interviews at the Ministry of Agriculture in Sesheke, out of fifty-five (55) project proposals submitted in 2018, only one (1) was approved as of November 2019.

ZMD is the country's primary provider of meteorological services. The department is charged with monitoring, predicting, analysing, and providing weather and climate change-related data and information.<sup>114</sup> DMMU is the country's sole agency that has the mandate to develop, coordinate and monitor disaster management programmes. The DMMU is also expected to put in place appropriate measures to respond to climate change and this includes the coordination of early warning information. On the other hand WARMA is in charge of the management of

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<sup>112</sup> National Policy on Climate Change, 2016

<sup>113</sup> *ibid*

<sup>114</sup> [www.climatelinks.org/sites/default/files/asset/document/zambia\\_adaptation\\_fact...](http://www.climatelinks.org/sites/default/files/asset/document/zambia_adaptation_fact...)

the effects that climate change has on water resources. Climate change has had a serious negative impact on Zambia's water resources availability, mainly due to inadequate water resources infrastructure and management. As a result, the country continues to experience low water levels causing load shedding of electricity, consequently adversely affecting crop production.<sup>115</sup> It was, however, noted that there was no documented information sharing among the different stakeholders and this in turn affected the production of water and agricultural-related information which could be used to plan for anticipated risks related to food security and climate change impacts.

Furthermore, in interviews with Disaster Management and Mitigation Unit (DMMU) officials, it was further confirmed that there was poor inter-sectoral coordination at both departmental and ministerial level<sup>116</sup>.

There was also no climate change data base initiated and maintained by the Ministry of Agriculture that would enable stakeholders to input climate information that could then be easily and widely shared. Consequently, there were no synergies and lessons learnt on projects done which resulted in projects still being done in silos. Further, agriculture and environmental data and information was not being adequately combined and/or translated for it to be easily understood by decision makers and end users in the agricultural and other relevant sectors.<sup>117</sup>

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<sup>115</sup> [www.warma.org.zm](http://www.warma.org.zm) Assessed on 01/06/2020 at 13:44 hours

<sup>116</sup> Minutes of Interviews with DMMU staff - 2019

<sup>117</sup> NAPA 2007

## CHAPTER SEVEN

### CONCLUSION

This chapter presents the audit conclusions that were drawn upon completion of the audit.

It is an indisputable fact that climate change is real. It is one of the biggest challenges facing the agriculture sector and threatens the country's food security. At the rate at which climate change effects have spread, there is need to prioritise the use of technologies that will help farmers to adapt to the changing climate.

Food security conditions worsened significantly in 2019, particularly in Southern and Western provinces. The main cause of the deterioration has been crop production declines caused by the effects of climate change in 2019.

According to the June 2019 IPC analysis on Zambia, the total number of people facing severe acute food insecurity (IPC Phases 3 and 4) in the October 2019 - March 2020 period is estimated at 2.3 million, well above the estimated 954, 000 people in the corresponding period in 2018/2019. The districts with the highest prevalence of food insecurity are located in the south and west, where households are expected to experience large food consumption gaps and engage in negative coping strategies, such as selling essential livelihood assets.

It is commendable that the Government, through the Ministry of Agriculture has recognized the risks posed by climate change to its food security and has created a policy framework that is intended to support the adaptation to climate change.

The objective of the MOA to mainstream climate change into its policies and plans has been met to the extent of planning only without adequately addressing and facilitating the implementation of mainstreamed activities.

The aspiration of the Ministry to implement climate smart agriculture technologies that would help with improving agriculture productivity and enhance food security has not been achieved. While the Ministry planned and budgeted for activities such as conservation agriculture promotion, irrigation development, research, crop diversification promotion and farm mechanization, the Ministry did not prioritise these budgeted activities logistically ( i.e. Fuel, transportation and staffing), materially (tools for training such demonstration kits) and financially. Conservation Agriculture for instance has been actively promoted in Zambia for over three decades now. However, adoption of the technology by farmers remains low. Government has not adequately addressed the reasons for low adoption such as inadequate training and monitoring of farmers in Conservation Agriculture, inadequate stakeholder coordination, high cost of inputs and herbicides. Other factors such as attitude of farmers and traditional beliefs are outside the control of the Ministry. Low funding towards climate smart activities also contributed to low uptake of technologies as associated activities were not carried out. In many cases funding releases to Conservation Agriculture was below 20% of the budgeted figure.

Prioritised resource allocation to Conservation Agriculture has an inherent benefit to practicing farmers and the nation at large in terms of increased productivity and farm system resilience and ultimately improved household nutrition and dietary diversity, especially in low rainfall prone areas.<sup>118</sup>

Therefore, considering promotion of Conservation Agriculture boosts adoption especially with continued information and extension provision, the inability by Government to consistently deliver extension services makes it difficult for farmers to adopt new practices. The low levels of activities being undertaken do not translate into an impact which can convince farmers to adopt since they have no basis to see the benefits of Conservation Agriculture. If training provided does not yield impact, Government risks losing resources through resources provided

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<sup>118</sup> WWF Advocacy Terminal Report 2019 p 21

for training which could have been used elsewhere and also in providing relief food for farmers who may not be food secure.

Crop diversification was also at an all-time low. Farmers benefiting from the FISP were also not compelled to diversify their crops and to adopt conservation agriculture, which could be a condition that Government can attach to being on the FISP programme. Further the Ministry has not explored the use of the Farmer Input Support Programme (FISP) to its advantage in the promotion of climate smart techniques. In as much as the electronic voucher was available to provide farmer input supplies, its implementation showed some weaknesses as most agro dealers engaged did not have capacity to provide a wide variety of seed that would foster the diversification agenda of Government.

In addition, crop diversification was not widely adopted as could be evidenced from the still high production of maize in comparison to other crops. Low irrigation development is another factor that has contributed to low diversification. However, Government has not leveraged the use of irrigation despite the country holding ample amounts of water.

Generally, the provision of extension services was not well managed. Government has not taken full advantage to use the lead farmer approach as a means of wide scale information dissemination and farmer training. This is so especially given the current challenges that extension services face such as immobility of staff, low funding, poor monitoring and inadequate numbers of extension officers.

The Early Warning component which is key in helping farmers plan and avoid hazards has not been effective. In as much as ZMD had made strides in providing climate data to different stakeholders on a timely basis using different platforms. ZMD could not provide localized early warning information for the agricultural sector as observation networks both atmospheric and surface were limited. Further, the early warning unit at the Ministry did not provide any meaningful early warning information to farmers other than crop forecasts and therefore their role in the provision of early warning information was not clear.

Adaptation to climate change falls in a very difficult policy area as it affects multiple players, both public and private. Currently, stakeholder coordination is not well managed and as such the response to the threats posed by climate change, particularly in the agriculture sector may not be as effective as it should be. Duplication of roles between the MNDP and the Department of climate change and natural resources is an example of coordination challenges in the management of climate change. Two (2) Government institutions carrying out similar roles is bound to lead to wasteful expenditure.

The Ministry had not developed a regulatory framework in form of legislation or a coordination mechanism through which the private players could operate to allow for effective and economical implementation, harmonization of information to farmers and to ensure accountability and continuity of programmes in the event the private player exits. The MoA together with stakeholders such as WARMA, ZMD, DMMU, ZSA and others have not designed an effective regulatory framework that will ensure that information sharing on climate change is widespread and easily available for all stakeholders in the agricultural sector.

In addition, projects that have an agricultural focus have not been managed in the most effective manner to ensure that the timeliness factor of agricultural activities is adhered to. Failure by the district offices to appraise and implement projects on time shows that council staff have not appreciated the timeliness of the agricultural activities.

Despite private players coming on board and funding various climate change activities, their interests and priorities were in many cases different from Government priority areas. A case in point was research projects that were donor funded but still did not look at aspects that the Ministry deemed critical.

## CHAPTER EIGHT

### RECOMMENDATIONS

- a) The MoA should demonstrate commitment to its plans by prioritising support to activities that are intended to increase food security in the face of climate change. The Ministry must further prioritise activities that will ensure smooth mainstreaming of climate change which includes implementation of sustainable and climate smart agriculture techniques that guarantee food security. Activities such as farmer training through a capacitated extension system must be given priority, particularly in Conservation Agriculture. This will increase the attractiveness of CA to farmers.
- b) Government must also consider using FISP to enable more farmers affected by climate change to scale up the adoption of Conservation Agriculture technologies. There may be need to conduct a feasibility study to assess the possibility of attaching productivity-enhancing technologies such as adoption of Conservation Agriculture to the Government subsidy programme. Adoption of Conservation Agriculture can be used as a prerequisite to accessing FISP. This will increase rates of adoption of Conservation Agriculture almost immediately. FISP can also be used as a means to ensure that area suitable seeds are supplied only to suitable areas that support the growth of the crops. Ultimately this approach will increase crop yields.
- c) Irrigation development must be supported and enhanced. Government must promote and devise a mechanism through which irrigation will be promoted especially among small scale farmers. Irrigation development will ensure that farmers remain food secure in periods of reduced rainfall. Developed irrigation systems will also help Government to foster the crop diversification agenda.
- d) Early warning information dissemination must be supported through the dedicated use of lead farmers. The early warning unit at the Ministry must also be seen to be active in providing and disseminating various parameters of early warning information including crop disease, flood and low rainfall alerts to farmers in conjunction with ZMD. This will ensure that the number of farmers that have timely access to this information increases and ultimately it will help farmers to plan ahead to avert crop losses.
- e) Research must be accorded the support that it needs. The Ministry must ensure that research activities that are not funded by the donors but are of equal importance are carried out. The AERs in their current form may not be as effective for supporting policy and climate change adaptation in agriculture. Therefore, they should be revised to reflect current and future scenarios under climate change. This will help to develop more productive and sustainable agricultural practices according to prevailing conditions.
- f) Additionally, a regulatory framework or effective coordination mechanism through which private operators that have an interest in how food security and climate adaptation projects should operate must be developed as a matter of urgency. The MoA as a regulator must coordinate all players and ensure that private players are spread around the country as opposed to targeting the same areas at the same time. This will ensure that more farmers are reached and increase uptake of technologies. A robust monitoring mechanism for all climate change agricultural activities to enhance implementation by other extension providers must be developed.
- g) There is also need for the Ministry in collaboration with other stakeholders to develop a comprehensive homogenous information sharing platform. The platform will help provide a central reservoir of climate change information which will be useful for planning purposes and address challenges such as duplication of efforts and conflicts in extension messages.

- h) The Ministry should consider prioritising available funds towards Climate Smart Agriculture technologies, improve timeliness and the rate of delivery of Conservation Agriculture activities if they have to improve food security.

## Appendix 1: Stakeholder List

Stakeholder	Stakeholder Role (s)
Zambia Statistical Agency	To provide statistical information relating to the agriculture sector.
Ministry of National Planning Development	The Ministry plays a role of securing funding for climate change interventions which include projects that help mitigate and adapt to the effects of climate change. This is done in the agriculture sector through the Pilot Project on Climate Resilience (PPCR) which is now called the National Project Coordinating Unit (NPCU).
Zambia Meteorological Department	The department is key to providing climate information which is critical for planning in the agriculture sector.
The Disaster Management and Mitigation Unit (DMMU)	The unit has the role of putting in place appropriate preparedness measures in order to manage disasters effectively and efficiently.
Cooperating Partners (Climate Invest Fund - CIF), African Development Bank (AFDB), United Nations Development Program, Global Environmental Fund (GEF) and United Nations programme on Reducing Emissions from Deforestation and Forest Degradation (UN REDD)	To provide financing for climate adaptation and mitigation projects.
Zambia Climate Change Network	Climate change advocacy and also supplements Government effort in adaptation o climate change.
CARITAS	Supplements Government effort in promotion of Conservation agriculture.
National Food and Nutrition Commission	To advise Government on matters concerning food, nutrition and to promote and oversee nutrition activities in the country, primarily focusing on vulnerable groups such as children and women.
Indaba for Agriculture Policy Research Institute (IAPRI)	To conduct agriculture research, impact studies and works in collaboration the Ministry of Agriculture.
Department of Climate Change and Natural Resources	<p>To coordinate and evaluate natural resources management and climate change programmes and projects in order to ensure their effective implementation.</p> <p>To conduct education and public awareness programmes in order to foster community participation in natural</p>

	resources management and climate change adaptability programmes.
Water Resources Management Authority	Provides water permits to farmers for irrigation.
Conservation Farming Unit (CFU)	Supplements Government effort in promotion of Conservation agriculture
World Wide Fund	Supplements Government effort in promotion of Conservation agriculture
FAO	Supplements Government effort in promotion of Conservation agriculture and other agriculture activities.

## Appendix 2: Population and Sample Size

<i>Sample sizes (provinces and Districts) Region</i>	<b>District</b>	<b>Title</b>	<b>Total interviewed</b>
<b>Lusaka Province</b>	Lusaka, Chongwe, Kafue	PACO	1
		DACO	1
		Director –DOA	1
		Assistant Director Department of Agriculture	1
		Assistant Director-Technical Services Branch	1
		Principal- Crop Husbandry	1
		Provincial -Agricultural officer	1
		Technical Advisor	1
		Assistant Director	1
		Agriculture Officer Crop Assistant	1
		<b>Southern Province</b>	Choma, Kazungula, Namwala,, Mazabuka, Monze,
DACO	2		
Principal- Crop Husbandry	2		
Provincial -Agricultural officer	1		
Camp Extension Officer	4		
ZARI – Acting Programme Officer	1		
Senior Agricultural Officer	1		

<b>Western Province</b>	Mongu, Sesheke, Senanga,	PACO	1
		DACO	3
		Principal- Crop Husbandry	3
		Provincial -Agricultural Officer	1
		Senior Agricultural Officer	3
		PPCR –District Administrative Officer	3
		PPCR -Participatory Adaptation Trainee	3
<b>Central Province</b>	Mumbwa, Itezhi itezhi	PPCR –District Administrative Officer	2
		PPCR -Participatory Adaptation Trainee	2

## **Appendix 3: Sample of Questions**

Interview guide

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**Date:** 6<sup>th</sup> January, 2020

**Where:** Ministry of Agriculture

**Present from the interview object:**

**Present from OAG:** Almakia B Sibutu – Senior Auditor, Thandiwe Kapotwe – Acting Senior Auditor and Lubinda Lisimba – Acting Senior Auditor

**Topic:** Impact of Climate Change on Food Security

### **Farmer registration**

1. What is the current number of registered farmers both at provincial and country level
  - What is the importance of farmer registration?
  - How does non-registration of farmers affect agriculture activities?

### **Agricultural Technologies**

2. In 1999 the Zambian Government endorsed the promotion of Conservation Agriculture as a national priority, is Conservation Agriculture a major adaptation strategy for climate change and enhancing agricultural productivity by the ministry?
3. What was the goal in promoting Conservation Agriculture among small scale farmers?
4. The Ministry planned to train 78,750 farmers annually according to the NAIP. Is this figure just for agriculture or includes targets for other stakeholders?
5. How did the ministry arrive at the 78,750 number of farmers to be trained annually?
6. Does the Ministry have a strategy of how much hectorage of land should be under CA
7. What is the basis for selecting those to be trained in CA?
8. How many farmers does the Ministry train on an annual basis?
9. For targets not met what was the cause?
10. For targets met what contributed to you achieving the target?
11. What field evidence is existing to show that CA is working for small scale farmers?
12. How has this evidence been documented and is it disseminated in coherent manner?
13. Are farm level adaptive research relative to agro-ecological zones
14. CA has 3 aspects minimum disturbance of the soils, retention of residues and crop rotation, how is the ministry ensuring that all aspects of CA are implemented?

15. Field visits indicated low adoption of CA, what would you say as they Ministry are the reasons for low adoption?
16. Studies have shown that some of the causes to low adoption include the high upfront and labor costs how the ministry has tackled this factor?
17. Reports have also shown partial adoption and his disadoption of CA what could be the cause for this?
  - What strategies has the Ministry put in place to ensure continuous use of CA
18. Has any research been conducted to assess the impact the trainings on CA conducted on the farmers and on agriculture?
19. How does the ministry coordinate with other players dealing with CA i.e FAO and Conservation Agriculture unit?
20. Crop diversification is another strategy for nutrition improvement that the government planned to increase in the NAP implementation plan, which set out to increases the crop diversification other than just maize to 1.25 by 2020
  - How did the ministry come up with the rate of increase?
  - How does the ministry plan to achieve this?
  - What is planned the annual rate of increase?
  - How far has the ministry gone in terms of achieving this rate?

### **Extension Provision**

21. Do extension messages vary in different agro ecological regions? Show evidence
22. The extension to farmer ratio is still low with most places visited and your reports above showing 1:1200, what other strategies is the ministry using to ensure that farmers are adequately trained and monitored.
23. What mechanisms are in place to capture and disseminate evidence into extension messages?

### **Pest Management**

24. What pest early warning system does the Ministry operate? Is it effective? Give examples. ( Use of pheromone traps and hormones)
25. Why are pest attacks on crops chronic in the country? What can be done to avert crop losses?
26. Do you have any data showing how much it has cost the country to fight pest invasions over the last three years?
27. How serious are pest invasions on the food security status of the country?
28. Would you say Government response to attacks is proactive? Explain (Logistics ,mobilization, sufficient chemical quantities etc)
29. Have camp officers been trained in differentiating between the FAW and stalk borers?
30. To what extent and how frequently are farmers trained in the use of pesticides?

31. What purpose do plant clinics serve? Does the Ministry currently have plant clinics? If not, explain why
32. Are farmers encouraged to redeem pesticides in order to fight pests? Are they doing so?
33. What is your opinion on Governments over publication of free chemicals to farmers? How is it affecting pest management?
34. Does the Ministry now have proper laboratories in place for carrying out research activities on the army worm pests? What is the impact on service delivery on the use of makeshift laboratories?
35. To what extent are farmers sensitized to use pest resistant seeds and to what extent have the farmers adopted this as a strategy to fight pests?

## Interview guide

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**Date:**

**Location DACO/PACO:**

**Name:**

**Present from OAG:** Almakia B Sibutu –Acting Principal Auditor, Thandiwe Kapotwe – Acting Senior Auditor and Lubinda Lisimba – Acting Senior Auditor

### Introduction

- Short introduction of the audit team
- Agree that the interview/meeting will be led by Office of the Auditor General
- Clarify the objectives of the interview:
  - To collect relevant data on climate change particularly its relationship with food security. Currently looking at it from a wide perspective as we are still at pre study stage (Information gathering in order to assess feasibility) and are yet to choose a particular focus area.
  - To obtain background information on the projects we are scheduled to inspect
- Inform the interviewee that the audit report will be addressed to the MOA being the lead Ministry in this audit. The interviewee will have an opportunity to have a look at the PA report once it is published.
- Agree on time ; Interview is scheduled for no more than 1hr
- Inform that the interviewer from OAG may in the interest of time, interrupt the auditee while answering a question. Please do not feel personally offended by that.

## Questions

1. How have you mainstreamed Climate change in your activities as a province / district?

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2. How many farmers are under your catchment?

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3. How has climate change affected agriculture in your area.....

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4. How do you plan for extension services?(provide plans) b

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5. How often do you report on your activities in your area?

i. is there a set guideline for reporting to HQ (Provide details)

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ii. Do you get any feedback on the reporting that you make and in what form does it come? ( establishing coordination with HQ)

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6. Have you received any trainings or workshops in the past three years? (Climate smart agriculture/ conservation agriculture/ early warning.

Yes ..... (List them) No.....

- i. ....
- ii. ....  
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- iii. ....  
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- iv. ....  
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- v. ....  
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- vi. ....  
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If training was not received on climate change how do you keep abreast to current issues in order to transfer relevant technologies to farmers?

7. How many external extension service providers do you have in your catchment

- i. What activities are they involved?.....  
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8. What technologies are you teaching farmers in order for them to maximise production in this time of climate change? List them (Conservation agriculture, climate smart agriculture, mixed cropping)

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- i. What is the adoption rate of the technologies you are teaching farmers?  
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9. The farmer/extension officer ratio is high, how many farmers are within your catchment?

i. What strategy have you developed to ensure you capture all of them? (programme for inspection, lead farmer technique, dissemination of early warning)

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ii. How many have you trained in smart agriculture?

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iii. How do you select those you provide training? (establish planning for roll out of whatever interventions or training?)

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iv. How many are using the technologies you taught them?

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10. Do you know of other farmer supporters on climate change present in the your province (At inception of project, through monitoring,consultation).....

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i. What projects are being implemented that relate to climate change in your province / district?

ii. What is your role as Ministry of Agriculture in these projects.....

iii. How do you coordinate with the projects?

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iv. Do you have statistics of how many farmers each project is targeting in your area?

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v. Has there been a situation where you have the same target farmers as the other extension providers (say in terms of training on conservation agriculture).....

vi. What do you do in those circumstances  
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11. How many incidences of pests has your District / province attacked crops during the period 2016, 2017, 2018)? What pests? Which farming season?

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12. Do you have a standard procedure for reporting any agriculture hazards that may occur in your area (provide guideline for reporting ) ( establish early warning system).....

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13. What mode of communication do you use to receive early warning messages? ( tablets bought by HQ) How effective is it?

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i. What mode do you use to share DACO /extension staff?  
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ii. How long does it take you to disseminate information to DACO/Extension officer when received?  
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14. What responsive initiative are you packaging for your area in terms of climate change?  
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15. What Challenges you face in conducting your mandate?  
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**NOTE**

16. Observations – flooding, outlook of crops, damage to agriculture infrastructure? (Add brief note)  
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**Other questions arising from the responses received above can be asked**

**Ending the interview**

- Clarify other knowledgeable persons and documentation needed, and agree on how it shall be handed over.
- Agree to possibly contact the interviewee again.
- Say thanks to the auditee for the interview.

**Date:**

**Location:**

**Name of Camp / Block extension officer:**

**Name of Camp / block manned:**

**Present from OAG:** Almakia B Sibutu –Acting Principal Auditor, Thandiwe Kapotwe – Acting Senior Auditor and Lubinda Lisimba – Acting Senior Auditor

**Introduction**

- Short introduction of the audit team
- Agree that the interview/meeting will be led by Office of the Auditor General
- Clarify the objectives of the interview:
  - To collect relevant data on climate change particularly its relationship with food security. Currently looking at it from a wide perspective as we are still at pre study stage (Information gathering in order to assess feasibility) and are yet to choose a particular focus area.
  - To obtain background information on the projects we are scheduled to inspect
- Inform the interviewee that the audit report will be addressed to the MOA being the lead Ministry in this audit. The interviewee will have an opportunity to have a look at the PA report once it is published.
- Agree on time ; Interview is scheduled for no more than 1hr
- Inform that the interviewer from OAG may in the interest of time, interrupt the auditee while answering a question. Please do not feel personally offended by that.

**Questions**

1. Which areas do you man?

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2. How many farmers are under your catchment?

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3. Do you have standardised methodology on extension service yes .....  
No.....

4. How do you plan for extension services?(provide plans)

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5. How often do you report on your activities in your area?

iii. is there a set guideline for reporting to HQ (Provide details)

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iv. Do you get any feedback on the reporting that you make and in what form does it come? ( establishing coordination with HQ)

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6. How have you mainstreamed climate change in your activities?

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7. Have you received any trainings or workshops in the past three? (Climate smart agriculture/ conservation agriculture/ early warning.

Yes ..... (List them) No.....

- i. ....  
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- ii. ....  
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- iii. ....  
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- iv. ....  
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- v. ....  
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If training was not received on climate change how do you keep abreast to current issues in order to transfer relevant technologies to farmers?

8. How many external extension service providers do you have in your catchment

- ii. What activities are they involved?.....  
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9. What technologies are you teaching farmers in order for them to maximise production in this time of climate change? List them (Conservation agriculture, climate smart agriculture, mixed cropping)

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ii. What is the adoption rate of the technologies you are teaching farmers?

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10. The farmer/extension officer ratio is high, how many farmers are within your catchment?

v. What strategy have you developed to ensure you capture all of them? (programme for inspection, lead farmer technique)

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vi. How many have you trained in climate smart agriculture?

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vii. How do you select those you provide training?

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viii. How many are using the technologies you taught them?

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11. Do you know of other farmer supporters on climate change present in the you catchment (At inception of project, through monitoring,consultation).....

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vii. How is you coordinate with them? .....

viii. What activities are they involved in? .....

ix. Would you have statistics of how many farmers they are targeting in your area?

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- x. Has there been a situation where you target farmers as the other extension providers (say on agriculture technology trainings).....  
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- xi. What do you do in those circumstances  
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12. How many incidences of pests has your catchment attacking crops during the period 2016, 2017, 2018)? What pests? Which farming season?

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13. Do you have a standard procedure for reporting any agriculture hazards that may occur in your area (provide guideline for reporting ) ( establish early warning system).....

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14. What mode of communication do you use to receive extension messages? ( tablets bought by HQ) How effective is it?

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iii. What mode do you use to share with farmers?

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iv. How long does it take you to disseminate information to farmers when received?

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15. What responsive initiate are you packaging for your area in terms of climate change?

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16. What Challenges you face in conducting your mandate?

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17. Major challenges have you faced as a small-scale farmer due to climate change?

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**NOTE**

18. Observations – flooding, outlook of crops, damage to agriculture infrastructure?  
(Add brief note)

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## **Other questions arising from the responses received above can be asked**

### **Ending the interview**

- Clarify other knowledgeable persons and documentation needed, and agree on how it shall be handed over.
- Agree to possibly contact the interviewee again.
- Say thanks to the auditee for the interview.

**Date:**

**Where:**

**Name of farmer:**

**Name of Project:**

**Present from OAG:** Almakia B Sibutu –Acting Principal Auditor, Thandiwe Kapotwe – Acting Senior Auditor and Lubinda Lisimba – Acting Senior Auditor

### **Introduction**

- Short introduction of the audit team
- Agree that the interview/meeting will be led by Office of the Auditor General
- Clarify the objectives of the interview:
  - To collect relevant data on climate change particularly its relationship with food security. Currently looking at it from a wide perspective as we are still at pre study stage (Information gathering in order to assess feasibility) and are yet to choose a particular focus area.
  - To obtain background information on the projects we are scheduled to inspect
- Inform the interviewee that the audit report will be addressed to the MOA being the lead Ministry in this audit. The interviewee will have an opportunity to have a look at the PA report once it is published.
- Agree on time ; Interview is scheduled for no more than 1hr
- Inform that the interviewer from OAG may in the interest of time, interrupt the auditee while answering a question. Please do not feel personally offended by that.

## Questions

1. Do you know what Climate Change is?

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2. How did you know about it?

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3. Which of the following climate change impacts have you experienced in your community?

Impact	Effects of Impacts	Adaption Measure (What to do - Conservation Agriculture, Climate Smart Agriculture.)
Flooding		
Drought		

High Temperature		
Pest Inventions		
Changing Rainfall Patterns		

Reduced Fertility	soil		

3.1 Are you aware of some of the causes of these impacts?

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4. Have you had any problems with new pests attacking your crops?

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a. What pests?

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b. In the last farming season how many times have you been attacked?

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c. If yes, how did the Ministry of Agriculture assist you in this?

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5. Do you have any climate change project in your community?

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6. What is the project about and has the project improved your food security status?

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6.1 What was your crop yield before and after interventions?

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7. How do you receive extension information related to climate change?

- Lead farmer .....
- Radio .....
- Television .....
- Mobile phone .....
- Extension Officer .....
- Community meetings .....
- Farmer Field Schools .....

8.1 Do you understand the information?

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8. Do you have any farming implements that help with conservation Agriculture?

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9. Are you aware that you can insurance your crops against effects of climate change?

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10. Have you been sensitized on the use of climate resilient seeds?

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11. What type of seed varieties do you use? (Tick the answer)

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|---------------------|-------|----------------------|-------|----|
| ➤ Drought resistant | ..... | Early maturing - Yes | ..... | No |
| .....               |       |                      |       |    |
| ➤ Drought tolerant  | ..... | Early maturing - Yes | ..... | No |
| .....               |       |                      |       |    |
| ➤ Heat tolerant     | ..... | Early maturing - Yes | ..... | No |
| .....               |       |                      |       |    |
| ➤ Flood tolerant    | ..... | Early maturing - Yes | ..... | No |
| .....               |       |                      |       |    |
| ➤ Other             | ..... | (Add detail)         |       |    |

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Early maturing - Yes ..... No .....

12. Which three main crops did you grow over the past two farming seasons? Why is maize predominant (assuming it is said to be)?

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13. What quantities of maize did you harvested in the last three farming seasons (2016,2017,2018) and also what is expected this farming season?

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a. What factors caused the decline or increase in your yield?(droughts, pest invasion, high temps, floods)

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14. Do you have access to water for gardening?

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15. What is the Distance to boreholes/water source?

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16. Do you receive early warning information? (flood alert, delayed or early onset of rain, weekly rain forecast)

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17. Early warning information.

Did you receive early warning Information?	What early warning Information did you receive?	How often?

18. Major challenges have you faced as a small-scale farmer due to climate change?

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**NOTE**

19. Observations – flooding, outlook of crops, damage to agriculture infrastructure? (Add brief note)

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**Other questions arising from the responses received above can be asked**

**Ending the interview**

- Clarify other knowledgeable persons and documentation needed, and agree on how it shall be handed over.
- Agree to possibly contact the interviewee again.
- Say thanks to the auditee for the interview.

## Appendix 4: List of Interviewees

### List of Interviewees

No	Institution	Designation	Purpose
1	MOA	<ul style="list-style-type: none"> <li>• Director- Agriculture</li> <li>• Assistant Directors ( Technical services, SCCI)</li> <li>• Researchers (ZARI)</li> <li>• Camp Extension Officers</li> <li>• Crop Husbandry Officers</li> <li>• Chief Extension Officer</li> <li>• PACO's</li> <li>• DACO's</li> <li>• CEO's</li> </ul>	To obtain data on how the various departments in the Ministry have mainstreamed climate change and how they have addressed food security in the time of climate change through the set measures and to ascertain what challenges are faced in implementing measures set.
9	Local Authorities- Councils	District Administration Officers	To obtain data on implementation of climate projects addressing food security and challenges.
10	Farmers	Various farmers and project beneficiaries	To obtain information on whether they obtain early warning information and how they use the information, what farming practices they use and challenges in ensuring they are food secure.
11	MNDP	Various Ministry Officials	To obtain information on mainstreaming of climate change activities that address food security.
12	DMMU	Various Staff	Obtain information and understand their role and how they collaborate with various stakeholders on early warning.
13	PPCR	Various Project Staff	Obtain information on the projects being implemented.
14	SCRALA	Project Manager	Obtain information on how the project is addressing food security.
15	ZSA	Assistant Director	To obtain information on the early warning in the agriculture sector and how they disseminate information and challenges.

16	IAPRI	Researchers	Obtain information on studies conducted pertaining to food security, Conservation Agriculture, crop diversification and climate change.
17	CFU CARITAS ZCCN FAO	CEO Project Staff Project Staff Various Staff	To obtain data on Conservation Agriculture adoption in the country and challenges in implementation of Conservation Agriculture programmes.
20	WARMA	Various Staff	To get information on their role in irrigation, climate change and early warning.

## Appendix 5: Documents Reviewed and Purpose

Name of Document	Purpose of Review
National Policy on Climate Change 2016	To gain an understanding into the policies the Ministry is putting in place in striving towards meeting SDG 13 (Climate Action)  To establish possible assessment criteria.
Ministry of Agriculture- Budgets 2016-2019	To establish budget allocation for climate change activities and programmes so as to form judgement on the adequacy of funding to the sector
Ministry of Agriculture- Second National Agricultural Policy February, 2016	To familiarise ourselves with its contents in particular on matters related to food security
Revised Nationally Appropriate Mitigation Action 30 <sup>th</sup> May,2016	Appreciate sustainable agricultural practices
Ministry of Lands Strategic Plan 2016-2020	To familiarise ourselves with its contents in particular on matters related to climate change action
National Climate Change Response Strategy December 2010	To appreciate Governments response to climate change matters
Proposal document on strengthening climate resilience of agricultural livelihood in agro ecological regions I and II, November 2017	To have a broader understanding of climate change impacts on the agriculture sector
Briefing Notes for the Secretary to Cabinet February ,2019	To familiarise ourselves with its contents
National Adaptation Programme of Action on Climate Change September 2007	To understand the strategies and overall plans of the Nation in the adaption of Climate Change.
National Climate Change communication and advocacy strategy January 2012	To gain an understanding of the various challenges/constraints faced by various players and decisions made to try and address them.
Climate-change vulnerability in rural Zambia: the impact of an El Niño-induced shock on income and productivity- FAO Agricultural Development Economics Working Paper 19-02 February 2019	To understand the effect of El Niño in on agriculture in Zambia
Report on the 2011 Climate Investment Funds Partnership forum meetings 20 <sup>th</sup> -30 <sup>th</sup> June 2011	To have an understanding of the Nations investment plans and partnerships in Climate Change.

<p>Final Report-Study on Information Needs Assessment and Identification of information Gap on Climate Change in Zambia. November 2010</p>	<p>To gain an understanding of activities, needs and achievements.</p>
<p>The Economics of Climate Change in Zambia February 2011</p>	<p>To understand the effects of Climate change on the economy and measures taken to address them.</p>
<ul style="list-style-type: none"> <li>• Agriculture in Zambia IAPRI - 2015</li> <li>• Sustainable Agriculture Research; Vol. 8, No. 2; 2019</li> <li>• The Role of Strategic Food Reserves in Enhancing Food Security in Developing Countries: The Case of Zambia March 2019</li> </ul>	<p>To gain an understanding into Zambia’s agricultural sector</p>
<ul style="list-style-type: none"> <li>• Second National Communication to the UNFCC –MTNER 2014</li> </ul>	<p>To appreciate the strides that Government has made in addressing climate related matters</p>
<p>Various climate change project reports e.g. Pilot Program for Climate Resilience (PPCR)</p> <p>Promoting climate resilient community based regeneration of indigenous forests in Zambia’s Central Province and Zambia integrated forest landscape project. November 2012</p>	<p>To gain an understanding of the objectives of the projects, successes, failures, achievements and lessons learnt. A select sample of projects will also be physically inspected during the pre- study.</p>

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## Appendix 6 (a) Showing activities planned for under CA for period 2016 to 2018

Impact of Climate Change on Food Security 2016 to 2019						
Planning of CA activities						
Copperbelt	Activity	Objective	Location	Activity target	Activity Actual	Remarks
2016	Promotion of Conservation Agriculture			20 Demos	0	Not funded
2016	Promotion of Conservation Agriculture			47 Field Schools	20 Field School	Not funded
2016	Promotion of Conservation Agriculture		2,3,4	2,3	None	Not Funded
2016	Promotion of Conservation Agriculture		2,3,4	2,3,4	None	Not Funded
2017	Promotion of Conservation Agriculture	Awareness Campaign		44 District Demos	10 District Demos	Low conservation agriculture awareness
2018	Targets weere not stated					
Southern Province						
	Activity	Objective	Location	Activity target	Activity Actual	Remarks
2016	Conservation Agriculture training	Promotion of sustainable soil fertility improvements and conservation of natural resources.		Facilitation of tree seedling nursery management.	Farmers adapt to climate change by using new farming technologies	Below target due to inadequate funding. Farmers in Monze, Mazabuka, Choma, Kazungula, Sinazongwe and Kalomo were trained through CASU project
2017	Farm power and mechanisation enhancement	Training on use of Conservation Agriculture implements		10 trainings	15 trainings were done	APMEP
2018	No CA activity was budgeted for					

**Appendix 6 (b) Showing Activities Planned for under Conservation Agriculture for period 2016 to 20**

Western Province						
	Activity	Objective	Location	Activity target	Activity Actual	Remarks
2016	Setting crop demos	To facilitate CA demo setting in order to promote conservation agriculture.	2 demo/camp x 12	Nkeyema	1 demo/ camp x 12	These CA demos will be hosted as field days in march.
2016	Conservation farming techniques training	To impart knowledge to CEOs on conservation farming practices to enhance production and productivity	2 days	Limulunga	1 day	Failure to meet target was due to limited funding.
2016	Farmer Training in Conservation Agriculture (CASU), seed selection & Plant Nutrition	To train farmers on various CA technologies, selection of OPV seed, Plant nutrition & identification of nutrient deficiencies	Machile, Mulobezi, Sichili Camps in Mulobezi	9 trainings	6	Basin making, herbicide use and sprayer use promoted during the CA training.
	Training in soil and water conservation	For sustainable agriculture.	Kanja , mutomena sioma	3 trainings/ 400 farmers	3 trainings/325 Farmers	Trainings done in collaboration with WWF.
2017	Monitoring of Conservation Agriculture practices CASU	To establish the extent and impact of CASU programs.	Kaoma, Mulobezi, Mwandi and Sesheke districts	4 monitoring visits	4 monitoring visits	1.This activity was done jointly with the Land Husbandry Section.2.The activity was funded by CASU.
2017	Conservation farming techniques training	To train farmers on basic concept of CA	Limulung, Mulobezi	7 days/58	3days/32	More funding is required
		To facilitate farmer training in: land preparation, planting	All camps in Nkeyema District	780 Farmers	600 Farmers	The trainings were a success.
	Conservation Agriculture Scaling Up (CASU)		Luampa, Kaoma, Sesheke	Promotion of Conservation agriculture		Technical assistance to TSB
	Zambia National Farmers Union (ZNFU)	Conservation agriculture	Nkeyema, Kaoma			Farmer mobilization and training

18-continued

### Appendix 6 (c) Showing activities planned for under CA for period 2016 to 2018-contin

Western Province						
	Activity	Objective	Location	Activity target	Activity Actual	Remarks
2018	Monitoring of CA fields.	To monitor and provide technical guidance on management of CA fields	Nkeyema	50 farmers	28	The monitoring exercise involved all farmers practicing CA whether CASU or
	Distribution of cowpeas to CASU farmers	Promote climate smart agriculture	Luampa	168	168	
	Training in soil and water conservation	For sustainable agriculture.	Kaanja , mutomena sioma	400	325	Trainings done in collaboration with WWF.
	Conservation farming techniques training	To train farmers on basic concept of CA	Limulung, Mulobezi	58	32	More funding is required
	Musangu tree seedling distribution and planting	To promote Musangu tree growing in the field	Machile, Mulobezi, Sichili	15 sites	15	375 seedlings distributed to lead farmers in CASU
	Farmer Training; Soil improvement	To train farmers on low cost soil improvement	Mulobezi	337	285	Conservation of soil borne
	Ripping Demo	To Promote Conservation and environmentally friendly technologies	Mwandi (Mabumbu & Lusinina)	8 Ripping demo 40 farmers	0	Inadequate funding
		To facilitate farmer training in: land preparation, planting	All camps in Nkeyema District	780 Farmers	600 Farmers	The trainings were a success.
	Conservation Agriculture Scaling Up (CASU)		Luampa, Kaoma, Sesheke	Promotion of Conservation agriculture		Technical assistance to TSB
	Zambia National Farmers Union (ZNFU)		Nkeyema, Kaoma	Conservation agriculture		Farmer mobilization and training
	Zambia National Farmers Union (ZNFU)		Nkeyema, Kaoma	Conservation agriculture		Farmer mobilization and training
2018	Training in conservation agriculture	To enhance food security and crop production through production and productivity	6 camps in Sioma	300	284	some farmers are actually practicing CA technologies, therefore adoption rate is good.
2018	Promotion of Conservation Farming	To promote the use of conservation approaches in land preparation.	Lombelombe Farm Block in Nkehema District	1 Promotion Meeting	1 Meeting	The activity was funded by ministry through the RDC .
	World Wildlife Foundation (WWF) KAZA	Promotion of climate adaptive agriculture, post harvest technology and seed multiplication Food security and chilies production as a remedy to human-elephants conflict	Mwandi, Sesheke and Sioma			Provide training in farmers in climate smart agriculture (Conservation agriculture) and improved storage bin are built in the community
	Conservation Agriculture Scaling Up (CASU)	Promotion of Conservation agriculture	Luampa, Kaoma, Sesheke			Technical assistance to TSB
	Zambia National Farmers Union (ZNFU)	Conservation agriculture	Nkeyema, Kaoma			Farmer mobilization and training

**Appendix 6 (d): Showing activities Planned for under Conservation Agriculture for period 2016 to 2018 continued**

<b>Impact of Climate Change on Food Security 2016 to 2019</b>						
<b>Planning of CA activities Continued</b>						
<b>Luapula Province</b>						
	<b>Activity</b>	<b>Objective</b>	<b>Location</b>	<b>Activity target</b>	<b>Activity Actual</b>	<b>Remarks</b>
2016	Land Management and Conservation			37 demonstrations	0	Not funded
2017	Demonstrations on Conservation Agriculture	A diversified and export oriented agriculture sector		300	234	Conservation Agriculture Scaling Up (CASU)
2018	Training on Conservation Agriculture	Productivity enhancing technology development		100	190	Smallholder Productivity Programme (S3P)
	Demonstrations on Conservation Agriculture	Productivity enhancing technology development		300	234	Smallholder Productivity Programme (S3P)

**Appendix 6e: Showing Collaborating Conservation Agriculture Providers as per Provincial Annual Reports 2016 to 2018**

<u>Collaborating CA providers</u>	<u>Coverage</u>	<u>Areas of collaboration</u>	<u>Services Provided</u>
<b><u>Western Province 2016</u></b>			
<u>Zambia National Farmers Union (ZNFU)</u>	<u>Nkeyema, Kaoma</u>	<u>Conservation agriculture</u>	<u>ZNFU</u>
<u>Land O'Lakes</u>	<u>Sesheke</u>	<u>Fodder production and conservation agriculture</u>	<u>Land oLakes</u>
<u>Conservation Agriculture Scaling Up (CASU)</u>	<u>Luampa, Kaoma,</u>	<u>Conservation agriculture</u>	<u>CASU</u>
<b><u>Western province 2017</u></b>			
<u>Conservation Agriculture Scaling Up (CASU)</u>	<u>Luampa, Kaoma, Sesheke</u>	<u>Promotion of Conservation agriculture</u>	<u>Technical assistance to TSB</u>
<u>Zambia National Farmers Union (ZNFU)</u>	<u>Nkeyema, Kaoma</u>	<u>Conservation agriculture</u>	<u>Farmer mobilization and training</u>
<u>New Apostolic Church relief Organization (NACRO)</u>	<u>Nalolo, Sioma</u>	<u>Climate change adaptation through climate smart agriculture.</u>	<u>Provision of farming inputs to farmers and Trainings in agricultural diversification, C.A.</u>
<u>World Wildlife Foundation (WWF) KAZA</u>	<u>Mwandi, Sesheke and Sioma</u>	<u>Promotion of climate adaptive agriculture, post harvest technology and seed multiplication</u>	<u>Provide training in farmers in climate smart agriculture (Conservation agriculture) and</u>
<b><u>Copperbelt 2016</u></b>			
<u>Conservation agriculture scaling up project- (CASU)is funded by the European Union.</u>	<u>Mpongwe district covered 5 blocks and 12 camps or 7.7 percent coverage of the Province.</u>	<u>contribute to reduced hunger, improved food security, nutrition and income while promoting sustainable use of natural resources in Zambia</u>	<u>11,440 farmers or 99.9 percent of its target for purposes of mentoring in land management</u>
<b><u>Copperbelt 2017</u></b>			
<u>Conservation agriculture scaling up project- (CASU)is funded by the European Union.</u>	<u>Mpongwe district covered 5 blocks and 12 camps or 7.7 percent coverage of the Province.</u>	<u>contribute to reduced hunger, improved food security, nutrition and income while promoting sustainable use of natural resources in Zambia</u>	<u>project registered 11,440 farmers or 99.9 percent of its target for purposes of mentoring in land management</u>
<b><u>Cooperbelt 2018</u></b>			
<u>No cooperating partners on CA</u>			

### Appendix 7: Funding to Research

	2016	2017	2018	2019	% Increase/Reduction in 2019
<b>Funding to Research Stations</b>	785,000	1,470,921	2,564,648.69	0	-100%
<b>Research infrastructure development</b>	0	0	0	0	0