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FACULTY OF ARTS

DEPARTMENT OF DEVELOPMENT STUDIES

*The Role Of Local Authorities In Mitigating The Effects Of Climate Change: A
Case Of Chikomba Rural District Council*

By

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**Dissertation submitted in Partial fulfillment of the requirements for the
Bachelor of Arts Degree in Development Studies in the Department of
Development Studies.**

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APPROVAL FORM

The undersigned certify that they have supervised the student **Budiriro J Maponde** dissertation entitled: **The role of local authority in mitigating the effects of Climate Change :The Case of Chikomba District in Zimbabwe (2013)**, submitted in Partial fulfillment of the requirements of the Bachelor of Arts in Development Studies Honors Degree at Midlands State University.

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DECLARATION

I Budiriro J Maponde, Registration Number R10811Z do hereby declare that this entire research is a product of my own work. It is being submitted in partial fulfillment of the requirements for Honors Degree in Development Studies, in the Faculty of Arts at Midlands State University.

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DEDICATION

I would like to dedicate this project to my mum, Mary Maponde

ACKNOWLEDGEMENTS

I thank the Almighty Jesus Christ for carrying me this far. He supported and guided me from the very start to the very end of this project. I would also like to thank my family, Mrs. Maponde, brothers Jeremiah, Brain and Jephtha and my lovely sister Joylyn for giving me hope that I would make it. I would also like to thank my supervisor Dr J Matunhu who went out of his way helping me with ideas and being there all the time that I needed assistance throughout this project. I would also like to thank Mr. Madzivanyika for the inspiration and support. Last but not least, to my friend, Delight Murigo for the support and encouragement. God bless them all who have given me support.

ACRONYMS AND ABBREVIATIONS

CRDC	Chikomba Rural District Council
EMA	Environmental Management Authority
FAO	Food and Agriculture Organisation
IPCC	Intergovernmental Panel On Climate Change
NGO	Non Governmental Organizations
MDG	Millennium Development Goal
RDCA	Rural District Councils Act
RDC	Rural District Council
WCED	World Commission on Environment and Development
UNDP	United Nations Development Program
UNFCC	United Nations Framework Convention On Climate Change

ABSTRACT

The climate change issue has become a topical issue at the international, national as well as the lowest echelons of the society that is in the various districts, wards and areas. The research was conducted in Chikomba district which lies in Mashonaland East Province. The people are facing a number of challenges which includes food insecurity, water scarcity and loss of livestock which has become a major issue of concern. The main worry is that the effects are falling on people with poor adaptation and mitigation capacities as well as capabilities hence the need to ascertain the role of local authorities in mitigating the effects of climate change on the part of the local inhabitants. A qualitative approach was adopted in this study and data was gathered through interviews with Chikomba Rural District Council personnel that are the councilors and management who were sampled through judgment sampling technique. Questionnaires were also administered to members of the community who were sampled using convenient sampling technique. The study revealed that the major drivers of climate change in Chikomba District were carbon dioxide (which comes from veldfires, burning of garbage by local authorities, emissions from mining instruments as well as through deforestation), methane (which is coming from cow dung as well as garbage) and nitrous oxide (which is coming from fertilizer use). The effects of climate change in the district includes food insecurity, loss of livestock as well as the loss of wetlands. The climate change mitigation strategies that were proffered include conservation farming, water harvesting as well irrigation and the holistic land and livestock management. Therefore the conclusion made is that climate change is really taking place in the district and it is being driven by carbon dioxide, methane and nitrous oxide. The effects of it are being felt in all the spheres of life therefore the need to proffer the mitigation strategies so as to try and lessen the burden on the rural populace.

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.0 Introduction

This chapter serves to introduce the study. This includes the background of the study, the research problem, objectives, significance of the study, limitations, assumptions as well as the theoretical framework. The study seeks to bring about a deeper and better understanding of the role of local authorities in mitigating the effects of climate change in Zimbabwe.

1.1 Background of Study

Rural District Councils (RDCs) were created as government's instruments to support the decentralization policy which was meant to bring more efficiency and effectiveness in local governance. The Rural District Councils Act (1988) Chapter 29:13 established local authorities as separate and fairly autonomous legal corporate institutions (Zimbabwe Institute 2005). RDCs were created following the merger of District Councils and Rural Councils and simply started operations in 1993. There are currently 60 Rural District Councils and 30 Urban Councils in Zimbabwe (Ariel program partner, 2012)

Local authorities are partly the creation of the central government through the Ministry of Local Government, Rural and Urban Development. Through this Ministry, central government imposes controls, monitors, and intervenes with operations of local government on matters of rural land, housing, and finance. Rural council activities in Zimbabwe are also governed by the Rural District Councils Act Chapter 4. Rural District councils are supposed to provide certain services to areas under their jurisdiction ranging from the provision of utilities to ensuring some types of

economic activities. These functions can be described as the regulation and development of land and the provision of public infrastructural services.

Local authorities play a crucial role in safeguarding the environment of areas under their authority. They articulate government policy and implement government regulations and standards relating to certain aspects of the environment. The Rural District Councils Act Chapter 88:2(RDCA) empowers local authorities to formulate their own by-laws. However, these by-laws should not contravene the enabling legislation. Thus, powers of local authorities to enact regulations governing the environment are still curtailed by higher statutory and ministerial powers.

The role of local authorities and RDCs in particular is to provide service delivery which includes making and implementing development policies, formulating development plans and budgets and exercising governance among other functions. RDCs can therefore be referred to as the torch bearers or the custodians of rural development at the grassroots level. Service delivery which is of quality and effective can only be attained when residents access services on offer and the level as well as the mix of services offered must equal the effective demand of the clients (Dellinger 1993). In pursuit of their mandate, most councils have put in place strategic plans with visions, missions and values that generally reflect the centrality of service delivery to the communities they serve. The vision for Chikomba RDC for instance is “to be a centre of excellence in the delivery of local government services.” The mission for the same council is spelt-out as “The Provision of sound socio-economic services to the people of Chikomba in order to improve their standard of living.”

One of the challenges confronting local communities that need to be tackled by local authorities as a matter of urgency is climate change. Climate change has the potential to derail all the development endeavors by the global South and has become a point of academic inquiry in contemporary times because of its adverse effects on livelihoods and development in general.

Climate change involves global warming, climate variability, floods, droughts, severe temperatures etc. This new phenomenon is threatening the livelihoods of people with adverse effects on rural communities which are dependent on agricultural production and exploitation of natural resources for survival. Climate change has also caused serious problems for the development trajectory of most communities in the world particularly developing countries where adaptation and mitigation mechanisms are still very weak and fragile. The incidence of climate variability witnessed by prevalence of drought each and every season from 2006 has resulted in food insecurity at household level in Chivi District. About 98% of the households were experiencing food availability and accessibility challenges following the 2010/11 cropping season (Mapfungautsi,2013).This is a clear indication that the mitigation and adaptation capacities of the third world countries are still fragile as a lot of people with lesser entitlements are succumbing to climate change effects in the form of droughts hence loss of wealth in the form of livestock and human capital in the form of labor each and every season in Chivi district. Furthermore in Zimbabwe in Muzarabani, each and every year there are fatalities which are being influenced by climate change through floods and the government due to its lack of adequate fund has failed to deal with the problem bedeviling the rural populace in the Muzarabani region. Various devastations and cases of flooding, fierce storms and extreme heat conditions are already ravaging the citizens of Nigeria.

Disappearance of farmlands, mangroves as well as wetlands is not a new phenomenon and they have been various implications already being felt in the construction and tourism industries and many other areas (Jise, 2009). Furthermore, in Kenya where there have been disputes over territory as a result of diminishing water bodies and an upward spiral in cattle prowling and violence as inhabitants who throughout history has managed through times of food shortages and drought are being adversely affected by unprecedented famine. There has been a rise in fatalities, injuries and deaths due to the worsening of the state of affairs every now and then. These have been more adverse in the developing world were the mitigation is still at its infancy due to financial constraints.

Climate change is not a new phenomenon in the world as it has been happening over a period, but what is worrying now is the rate at which it is now occurring. It is occurring at an alarming rate as it has mostly affected countries and communities of the global south who bears the brunt of its occurrence due to the infancy of their mitigation and adaptation techniques. This is due to the fact that in the first world, climate change is also taking place as it has been evidenced by massive glacier retreat, increase in tornadoes, droughts in the southern part of Europe as well as veldt fires like that which recently took place in California, America but these countries have got strong mitigation and adaptation capacity so that climate change is not much of a threat to them because they have got the means and ways. This is due to the fact that they have the finances and technical knowhow for early warning systems and relief mechanisms.

The above situation can be evidenced by the fact that when Hurricane Katrina struck New Orleans in United States of America it had already been foreseen and there were mechanisms that were being put in place like the evacuation of the people from the area though there had

been the construction of levees along the Mississippi river. Also there is the production of genetically modified foods that will be of importance during droughts as well as the strong irrigation facilities which are sophisticated, the use of solar powered water supplies, water harvesting, dam construction among other methods which are beyond the reach of the Less developed countries given their poor governance practices as well as the debt crisis which have riddled their attempts to deal with the climate change challenge. However in the global south there has been evidence of desertification in countries like Sudan, there has been droughts in the Sahel region as well as in Zimbabwe, there has been floods in Nigeria where people are constantly threatened by floods. What is most worrying is that the developing world are poor and they have got poor mitigation and adaptation capacity therefore they are hard hit by the effects of climate change yet they have contributed little as it has been much caused by the industrialized countries who have had more than 150 years of industrializing thereby emitting a lot of carbon in the atmosphere which has resulted in climate change.

It is therefore the mandate of the local authorities to ensure rural development and climate change is one of the hurdles that they have to overcome so as to ensure sustainable development. The local authorities are vested with the power to make by laws governing their area by the Rural District Councils Act therefore they have an important role in mitigating the effects of climate change as they have got all the powers vested in them.

1.2 Statement of the problem.

Climate change has become a topical issue in the modern world. It has resulted in the reversal of the great strides that have been made by governments in the development of their countries. Climate change affects food security, women and children due to the decline in the adaptation

capacity and the ability to mitigate the effects on the poor masses of the global south in general. Therefore the local authorities as they are mandated under the decentralization policy has got the obligation to act in their jurisdiction in line with climate change mitigation and adaptation so as to lessen the impacts on the rural poor who are largely dependent on rain fed agriculture and exploitation of natural resources.

1.3 Research Objectives.

- To investigate the key drivers of climate change in Chikomba District
- To examine the consequences of climate change on the development trajectory of Chikomba District
- To proffer climate change effects mitigation strategies that can be employed by Chikomba Rural District Council

1.4 Justification of Study

There has been much said but very little paradoxically academic attention has been given to this area to come up with concrete and practical solutions to the problems. This piece of work will help local authorities, government, local communities and the academia and other stakeholders to conceptualize and accept climate change as a threat to livelihoods and development at large.

There has been tangible evidence of the negative impacts of climate on the social and economic spheres of life. Issues of climate change should be of great concern to the global world as well as the government of Zimbabwe and its people. Families and communities are directly affected by the impact of climate change.

It is notable that climate change poses a serious threat to development as it affect the socio-economic well being of individuals, communities and states at large. The reality on the ground is that climate change should be dealt with as it has now affected numerous developmental initiatives made by the developing world and Zimbabwe is not an exception. Climate change has posed a new threat to the already ailing economies in the so called Global South hence posing a huge threat to the adaptation capacity and capability of them to deal with it and yet they have contributed less to these changes in the global weather patterns. It has resulted in the decline in rainfall which in turn has lead to food insecurity yet the developing countries are largely dependent on this sector in terms of employment, food production and income earning through the sale of the agricultural yields; it has resulted in increased diseases and widened the gender disparities between man and women as well as affecting children. Therefore this research will focus on the role of local authorities in mitigating the effects of climate change on families, societies, communities and the nation at large. The research also seeks to add the growing mass of information on the climate change dilemma. It becomes vital to produce this kind of report to raise awareness on the effects of climate change as it poses a great threat to economic growth and development.

1.5 Delimitation of the study

The study will navigate the wide range of local governance terrain and pay particular attention to the role of local authorities in mitigating the effects of climate change. Chikomba RDC will be used as the unit of analysis for this research. The study will take place in Chikomba District. Chikomba District is located in Mashonaland East Province. There are 30 wards in the district which comprises of commercial farms, communal areas as well as a small township called Chivhu. The Chikomba Rural District Council is the overseer of the whole district. The

administrative offices are located along the Harare-Masvingo highway that is 141km from Harare and 147km from Masvingo. The total population in the district is around 121 162 constituting 58 000 males as well as 63 162 female(Zimstat,2013). Chikomba Rural District Council has got 6 departments which comprises of Human Resources and Administration, Internal Audit, Income generating Projects, Health and Social Services, Technical Services, Finance. These departments are serviced by their respective committees which comprise of 5 councilors per each department.

1.6 Limitations of the study

One of the major limitations of this study is that it being a case study, its results cannot be easily generalized. The other constraint is that data collection may be difficult because some geographical areas are not easily accessible due to bad roads in Chikomba District. The other limitation is that some respondents or participants may lack the ability to comprehend the subject matter due to their low levels of education. The research instruments to be used, the questionnaires and interviews are subjective and may lead to biased responses. Time and financial resources for carrying out the research are limited resulting in some important variables not being given due attention or being left out completely.

1.7 Conceptual Framework

IPCC (2007) defines climate change as any change in climate over time, whether due to natural variability or as a result of human activity. This definition points to the fact that there are two major causes of climate change, however research has shown that human activity is the major contributor to climate change. It is essential to note that the leading human activity that has an impact on the climate is burning of fossil fuel which includes gas, oil as well as coal. Some

human actions that contributes immensely are the use of fertilizers, deforestation and other chemicals (Zanawe and Okunoye, 2013)

The World Meteorological Organization defines climate change as a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (WMO, 2011). UNDP further defines climate change as involving climate variability such as increased or decreased rainfall or an increase in the average temperature of the earth's atmosphere which is better referred to as global warming (UNDP, 2008).

According to the United Nations Framework Convention on Climate (2000) change adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. The Federal Emergency Management Agency (2005) further defines mitigation as the effort to reduce loss of life and property by lessening the impact of disasters. Successful mitigation entails the understanding of local risks and addressing them as well as investing in lasting community wellbeing. This is because without mitigation endeavors, there is a high risk of endangering the self reliance, financial security as well as the safety of communities

According to Khemmarath S (2002), food security is to assure enough food and food stuffs for every person at any time, both in a material and economic aspect, with increasing demand on nutritional quality, hygiene and balance so as to improve health and enable development and efficiency. According to Food and Agricultural Organisation (FAO, 2008) food security is when all people at all times have both physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

Local government means a lower level of public administration that uses delegated powers and functions to manage local affairs and provide services through council, a body of elected or appointed representatives at local level (ACPD 2006). Rural District Council entails a body corporate or local authority that is charged with the mandate of providing service delivery for residents in a particular community or geographical setting called a district. Service delivery denotes the provision of basic services such as water, road maintenance, and sewer reticulation and refuse collection and development infrastructure.

1.8 Theoretical Framework

As a yardstick of analysis, the Sustainable development Theory developed in 1987, by the Brundtland commission, is the major theoretical framework which this research project has adopted. The term, sustainable development, was coined in “Our Common Future”, a report published by the World Commission on Environment and Development (WCED, 1987). Sustainable development was defined as the “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, p 43). Sustainable development embodies integration, and understanding and acting on the complex interconnections that exist between the environment, economy, and society, (WCED, p.46). The commission received wide acceptance from many countries and Zimbabwe is not an exception and because of this the country took the principle as a development panacea aimed to meet economic growth and development.

Therefore it is imperative to highlight that without dealing with climate change, sustainable development will be a pipe dream for Chikomba district, Zimbabwe and the world at large. Climate change has been playing an integral part on the food insecurity of the district through

sporadic rainfall and in some instances too much of it as well as high temperatures, reducing the entitlement of the general populace through loss of the most highly regarded resource in the African culture that is livestock as well as increasing the reproductive roles of women and making the attainment of the Millennium development goals elusive. This affects sustainable development in that the societal life as well as the economic life of the people will be affected since these rural people solely depend on agricultural outputs as well as the natural resource utilization for sustenance which will be depleted by climate change impacts.

Environmental regulations which are at the core of climate change mitigation were therefore crafted to ensure sustainable resource utilization since activities like deforestation and veldfire are exacerbating climate change by eliminating carbon sinks and emitting greenhouse gases into the atmosphere. It is imperative to note that climate change mitigation and sustainable use of resources is inextricably bound to sustainable development attainment.

Sustainable resource utilization is now being regarded as a development milestone since its inception in the Brundtland Commission 1987. It prohibits the maneuvers which cause environmental degradation and encourage people to refrain from environmental degradation thereby protecting environmentally sensitive areas as well as practicing measures that curb climate change and that help in the mitigation of climate related catastrophes. Sustainable resource use provides a guarantee for human security and national security at a higher level. A human being is said to be secure when he or she is not deprived of food, clothing, education, and shelter. Sustainable utilization of natural resources is furthermore against the conflicts which emanates from environmental constrains. (Patricia Mischei, undated) argues that foundation for peace is peace with the natural environment; it is not possible to provide for the survival of the earth's people if the natural environment's capacity is seriously impaired. The research would

therefore investigate the role of local authorities in mitigating the effects of climate change in Chikomba district.

Economic activities done in the district largely depend on the direct exploitation of natural resources. People are not prohibited to exploit natural resources; however, natural resources should be used in a sustainable manner. This means that deforestation, stream bank cultivation, veld fires, and use of wetlands are prohibited by the theory of sustainable development because they endanger the potential of the generations to come to meet their needs. Since it's a theory, it has got its own shortfalls which can make it inapplicable. The challenge with sustainable development paradigm is the fact that natural resources are in forthcoming danger of exhaustion pertaining to supply (Victor& David G, 2006).

Exhaustion of natural resources is caused by many factors; the colonial administrative structures fast weakened the resource base by concentrating people on fragile ecosystems. To this end, some of the fragile ecosystems today are legacies of colonialism. The approach did not consider that, thus because of such a mechanism, sustainable resource utilization is difficult to attain hence one way or another exacerbates climate change through cutting of trees as well as burning of forests and yet they have poor mitigation facilities. Also poverty in rural areas is a hindering factor towards sustainable resource utilization.

People in rural areas including Chikomba buy farm inputs like fertilizers which are detrimental to the environment as they causes eutrophication as well as a driver of climate change through its release of nitrates into the atmosphere which increases nitrous oxide gas hence global warming and others use organic manure which is a major source of methane gas. Others harvest tree for selling whilst others with the increased growing of tobacco has resorted to cutting down trees so

as to cure tobacco. According to (Feruse, 2010), rural inhabitants' sold wood during the 2008 economic crisis to raise school fees for their children. So poverty leads people to exploit the natural resources at their disposal without setting limits yet they are the ones that are mostly affected by climate change. All in all sustainable utilization of resources is difficult to attain but that does not guarantee people to use natural resource haphazardly as they will be removing carbon sinks hence the need for carbon sequestration.

It is therefore imperative to note that the local authorities as they act as a vanguard for rural development have got this mandate to ensure sustainable development. This will be through the formation and enforcement of by laws as they are supposed to do under the Rural District councils Act. Furthermore the local authorities do so as they engage with other stakeholders like EMA, The Forestry commission as well as various NGOs who are involved in food security as well as environmental protection. Also the local authority has a committee which deals with natural resource conservation which oversees all the environmental issues in the Council areas. Therefore for there to be sustainable development there is need to deal with climate change as it has the potential to outwit previous development initiatives.

The researcher has set an assumption that CRDC in Chikomba District of Zimbabwe is not effective as far as climate change mitigation and adaptation is concerned. To this end, climate change has remained the reason for failure of rural development as the rural communities are struggling to grapple with this new phenomena and a cause of concern to all development workers and the nation at large. For that reason this study sought to establish the role of the local authorities as they are the custodians of rural development in mitigating the effects of climate change based on factual findings.

1.9 Chapter Breakdown

Chapter 1 is the introduction of the study highlighting the background of the study, statement of the problem, objectives of the study; conceptual framework delimitation of the study as well as significance of the study Chapter 2 is review of relevant literature concerning the subject under study. Chap 3 comprises of the methods of research employed by the researcher in this study whilst Chapter 4 presents the data collected as well as analyzing and discussing the data. Chapter 5 provides the conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter aims at giving a clear insight of the research through review of what other authors and scholars have written on the ‘concept of climate change’ in relation to the role of local authorities the effects of climate change as well as empirical evidence concerning the research topic. This chapter explored the various literature sources which deals with climate change particularly that which goes in tandem with the outlined objectives which includes the investigation of the key drivers of climate change, examination into the consequences of climate change effects on the development trajectory as well as to proffer climate change mitigation strategies that can be employed by Chikomba Rural District Council.

2.1 Key Drivers of climate change

According to the IPCC Report (2007), climate change refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. However, the above definition differs to the one used in the United Nations Framework Convention on Climate Change (UNFCCC ,2000), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. The researcher views climate change as the unbalanced concentration of green house gases in the atmosphere which has resulted in the trapping of heat as well as the altering of weather conditions particularly over a period of time approximately 30 to 40 years.

Climate change has evolved as a major threat to the development trajectory of the developing world. According to Jise, the assistant implications or costs of climate change exposes the people

to the risk of losing the benefits of the century and subsequently pegging back human progress (Jise, 2009). The researcher however differs with this view because though climate change poses a greater risk it has resulted in the partnership of different stakeholders as well as governments in trying to combat it as well as innovations so as to deal with the climate problem and also enhancing and promoting sustainable development in the era of climate change as effective measures to address the climate problem that has faced the world.

Climate change will only be a threat to the developing countries that are vulnerable due to their weak economic status as well as institutions. Fisher (1936) echoed that development cannot be regarded as a nature law; the mileage gained by one era has the chance of being reversed or lost by the following era. Climate change leaves us near to that point unless urgent attention is channeled towards it. This is of importance because there is need for quick action to be taken if the combating of climate change is to be attained. This is because without effective action climate change if left unattended to have got the capacity and capability of crippling the endeavors done by previous generations. There is no monocausal explanation or driver for the occurrence of climate change. It has been facilitated by various drivers which are complex in outlook. These various players include man made (anthropogenic) and natural causes which will be discussed exclusively in the following paragraphs.

According to the NOAA National Weather Service (2007), some natural gases such as carbon dioxide as well as water vapour, ensnare heat in the atmosphere leading to greenhouse effect. Fossil fuel burning and combustion is increasing carbon dioxide amount in the atmosphere. The level of carbon dioxide supersedes the others in the past 650 000 years. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change concludes that much of the most of the practical rise in the average temperatures globally since the mid 20th century is closely linked

with the continued rise of human induced concentration of green house gases in the atmosphere Jise (2009) also laments that humans are significantly increasing the amount of carbon dioxide released to the atmosphere through the burning of fossil fuels (such as coal, oil, and natural gas), solid wastes, and wood and wood products to heat buildings, drive vehicles, and generate electricity.

Camil (2010) also reiterated that worldwide, fossil fuel (oil, coal, and natural gas) lead the energy utilization, measuring to approximately 85% of the energy being used. The quick increase of fossil fuel is a new phenomena, which developed in the nineteenth century following the oil discoveries and economies industrializing and expanding rapidly with the increase in economic growth and increases in population and prosperity. These are clear indications that population increase is detrimental to the environment as it results in the increase in the burning of fossil fuels which in turn results in the occurrence of the global changes in the weather patterns. Also population increases leads to the unsustainable overutilization of the natural endowments that is the ecosystem which does not conform to sustainable development. Therefore it is imperative to note that burning of fossil fuel is a major driver of climate change as it destabilizes the natural concentration of green house gases in the atmosphere.

Furthermore, (Camil ,2010) propounded that fossil fuel burning leads to about 8.5 billion tons of carbon dioxide being released in the atmosphere each year, leading to their concentration to elapse as well strengthening greenhouse warming which results in temperature increases. From the 1880s, global temperatures averagely have increased by approximately 0.9 degrees celcius. It must be elaborated that burning of fossil fuels though it has been more significant and profound in the first world countries, developing countries have a fair share of the contribution. In Chikomba District it has been evidenced by the ESSAR mining activities in Ward 7 in the

Manhize Mountains which are along the Great Dyke. ESSAR has been involved in the mining activities where they have been burning fossil fuels which releases a lot of carbon in the atmosphere through their mining equipment as well as cutting down trees which have a pivotal role by acting as carbon sinks. Therefore the quest of this research is to ascertain the role of local authorities especially Chikomba Rural District Council in mitigating the effects of climate change.

If the burning of fossil fuel continues at present rates, temperature globally will increase by 4°C come year 2100 (IPCC 2007). Rainfall fluctuations are Precipitation changes are projected to cause high precipitation in mid to high latitude areas, at the same time high prevalence of droughts in subtropical areas (IPCC 2007). Anthropogenic climatic changes are as a result of the buildup of green house gases (methane and carbon dioxide) in the atmosphere. These accumulations are driven by society's use of carbon. The combustion of fossil fuel in different places like industries and cars ultimately results in droughts, floods that are frequently being experienced by communities (Sheppard, 2012). Therefore fossil fuels have far reaching consequences on the local populace especially the rural inhabitants who rely mostly on the agricultural sector as well the natural resources for subsistence.

Fires contribute to climate change when trees and vegetation which act as carbon sinks are burnt and at the same time contributing to the release of green house gases such as carbon dioxide. Zimbabwe experienced six of the warmest years in the 100 years that has passed. Bulawayo, Harare, as well as Beitbridge weather stations observed an upward spiral in daily maximum temperatures as well as a 2 degree Celsius rise in the maximum temperatures daily over the last century (EMA, 2009). Zimbabwe covers 39 075 700 hectares of land and a total of 950 905

hectares of land was destroyed by fire in 2009, and plantations with an estimated value of \$120 million were destroyed in the same year (EMA, 2009).

The greatest fire damage was recorded in Gwanda District with a total of 72272 hectares being lost to fires. In 2009 in Chikomba district 27 960 hectares were lost to veld fires (EMA, 2009.) These veld fires contribute immensely to the global climate change and are a constant evil to the environment as they result in the loss of biodiversity which in turn destabilizes the food chain and food webs hence a threat to sustainable development as environment protection is one of the integral pillars of sustainable development. Local authorities are the closest and locally accountable and accessible public institutions, with a role to represent local interests and deliver locally relevant services. Meeting community welfare needs and facilitating local economic development are essential municipal functions critical to development (Chatiza, 2010). Therefore it is the gist of the research to discover the role of the local authorities in mitigating the effects of climate change in Chikomba district since it is not immune to the contribution to climate change and its effects as well as the fact that they are key drivers of sustainable development within their jurisdiction that is at the grassroots level of society.

Prior to the Industrial revolution there were approximately 280 molecules of air. By 2007 it has increased to 379 molecules (IPCC, 2007). More so anthropogenic causes are not the only drivers but there are other natural players such as volcanoes which release more than 130 million tons of carbon dioxide each year (United States Geological Survey, 2010). This is in addition to methane which is emitted into the atmosphere during the mining of coal and the production and transport of natural gas and oil.

Methane emanates from decomposing organic matter as well as wetlands and from cow dung as a byproduct of digestion. Live plants emit tiny amounts of methane. Prior to the Industrial revolution, the levels of methane in the atmosphere have doubled. Methane traps nearly 30 times more heat than the same amount of carbon dioxide (Jise, 2009)

Methane is the second most widespread green house gas released in the United States from human interventions. In 2011. Methane contributed to 9 % of the USA anthropogenic green house gas emission (EPA, 2010). Furthermore, methane is emitted by natural sources such as wetlands, as well as human activities such as leakage from natural gas systems and the raising of livestock. (EPA, 2010). Methane has increased in amount in the atmosphere since the industrial revolution and it's most likely that the pragmatic rise in methane volumes in the atmosphere is as a result of human interventions, it is very likely that the observed increase in methane concentration is due to anthropogenic activities, primarily the use of fossil fuel and agriculture (IPCC, 2007).

Human actions have as well led to the emission of enormous amounts of nitrous oxide into the atmosphere. The amount of nitrous dioxide concentration in the atmosphere globally has risen from a pre industrial value of approximately 270 ppb to 319 ppb in 2012. Almost a third of all these nitrous oxide emissions are human induced are predominantly as a result of agriculture. (IPCC, 2007).

Nitrous oxide is one of the components in the atmosphere as it helps in the earth's nitrogen cycle , and has different sources. Anthropogenic causes such as burning fossil fuel, agriculture, management of waste as well as industrial processes are raising the amount of nitrous oxide in the atmosphere. Its molecules averagely stay in the atmosphere for about 120 years before their

removal by a sink or through their destruction by chemical (EPA, 2010). Nitrous oxide concentration has increased since the inception of the industrial revolution by approximately 18 %, with a moderately speedy rise prior to the end of the 20th century (Solomon et al, 2007)

2.2 The consequences of climate change effects on the development trajectory

Climate change has come as another variable of oppression against the rural inhabitants who are over reliant on the natural environment as well as the agricultural sector. Rural livelihoods are anchored on the natural resource endowments (Scoones, 1998). The rural livelihoods are at stake due to climate change and climate variability. This has led the rural populace to languish in abject poverty and widened the fissures of vulnerability.

The notion of sustainable development is at the heart of the debate about environmental management, rural development as well as poverty eradication (Scoones, 1998). In Africa, projected climate show that a larger vulnerability to climate shifting climate with agricultural production as well as food accessibility harshly compromised while millions of coastal inhabitants exposed to sea level rise. By 2020 rain fed agricultural yields are most likely to reduce by 50% in other African countries (IPCC, 2007). This would be heavily detrimental to the concept of sustainable development since people entitlements would be affected hence it leaves the rural poor in a compromising situation where they might not be able to meet the needs of the future generations hence remain in the vicious cycle of poverty. Therefore the local authority has got a larger role to play if the elusive land of sustainable development is to be reached.

Climate change has reached greater heights were it has resulted in the loss of biodiversity. This has been lamented by Ulaanbaatar on a research in Mongolia, where he noted that due to increased warming and frequency of droughts as well as improper human actions, 70 % of land

has been decrepit. This has led to biomass loss by about 50-60 %, as well as the decrease of vegetation species by 6 times for the past 60 years. This has been of much effect to the rural community and their development due to them being heavily dependent on these biodiversity for consumption. The reduction in biodiversity is an upset the food web and food chain as well. This is an upset on sustainable development because the reduction of biodiversity is an evil to the environment since there will be an encroachment into the environmentally sensitive areas thereby there won't be environmental sustainability which will in turn upset the attainment of sustainable development because the future generations will not be able to benefit from the same environment that the current generation is benefitting from.

Sub-Saharan Africa is located in a dry area characterized by low unpredictable rainfall and high temperatures (Gommes & Petrassi, 1996). These circumstances might result in unconstructive implications taking place in the livelihoods of the inhabitants of the region. Climate change may be considered as posing the greatest threat to agriculture and food security in the 21st century, particularly in many of the poor, agriculture-based countries of sub-Saharan Africa (SSA) with their low capacity to effectively cope (Nzuma, 2010; Ludi, 2009). In Sub Saharan Africa, climate change poses a main peril to sustainable development as well as the accomplishment of MDGs. It is expected to affect food and water resources that are critical for livelihoods in Sub-Saharan Africa (SSA) where much of the population, especially the poor rely on local supply systems that are sensitive to climate variation (Nzuma, 2010). The sustainability of smallholder farmers largely depends on food and water resources which when affected by extremes such as droughts and floods may cause low production of food and livestock may be threatened as well thus resulting in a shock of livelihoods (Mapfungautsi and Munhande, 2013). Rainfall is expected to predominantly fall with time and temperatures are expected to rise (Mutekwa, 2009), which will

eventually result in agricultural activities not thriving given that rainfall and temperatures are the key variables necessary for production.

Poverty levels in SSA are high with 28 of the 31 low human development countries located in the region and most of the people in the region depend on agriculture for their livelihoods which makes them more vulnerable (UNDP, 2008). Access to income given such a background becomes a challenge and with climate variability the current poverty levels are likely to increase. Africa is the only region in the world where poverty is on the increase; by far the highest incidence of under nourishment is found in sub-Saharan Africa. In Africa, the vast majority (up to 80%) of the population live in rural areas, and 70% of this rural population are dependent for a large part of their livelihood on food production through farming or livestock keeping (Berger et al, 2005). Rural farmers' livelihoods needs urgent attention since they mostly depend on crop and livestock production so as to take care of their households.

It must be noted that livestock has and is still being revered to as a form of wealthy in African communities and that they act as a shield to the human when catastrophe strikes, for example in 2008 those who had livestock sailed through because they would sell and acquire grain as Amartya Sen puts it across as entitlements. Climate change has affected the rural communities immensely which has propelled the researcher to dig deeper into the role of the local authorities in mitigating these climate change effects which has given the rural folks sleepless nights.

Approximately 65% of the population of Zimbabwe resides in rural areas. Principal livelihood activities are the production of food and cash crops, animal husbandry, and employment on commercial farming estates, with limited off farm economic activities (ZIMVAC, 2005).

The majority of smallholder farmers in Zimbabwe are vulnerable given that they are located in areas that are remote, far from markets and receive low and unreliable rainfall. They are poorly resourced in terms of technology and heavily rely on basic tools and agricultural capital is limited to them (Mutekwa, 2009). The most immediate impact of erratic rainfall on rural livelihoods is on crop production.

Droughts and floods undermine farm yields and the national harvest, reducing household and national food availability, and agricultural income derived from crop sales. Poor harvests threaten food security and livelihoods from household to national level, to varying degrees according to the extent that the family or nation depends on agriculture for its food and income (Devereux, 2007.) The researcher thinks that these effects would be felt only to households or economies that are vulnerable however on those that are diversified these effects would not be felt since there will be other sources of income as well as enhanced entitlements which enhances that there would be sustainable development.

The main livelihood source in Chikomba is agricultural production meaning that the vast population of the district heavily relies on agriculture and this is evidenced by the fact that only 4 wards out of 30 are in town meaning that the other wards are either in communal areas or commercial farms, even those in town are heavily involved in urban and peri-urban agriculture proving that they are not even spared of the blishes of climate change. Climate change and variability as earlier noted affect production and thus livelihoods are not spared.

Poorer nations are disproportionately vulnerable to disasters and hence to the effects of climate change for a number of reasons. Firstly, the ability to adapt and cope with weather hazards depends on economic resources, infrastructure, technology, and social safety nets (IPCC, 1995).

Developing countries often do not have the resources for these and thus are ill-prepared in terms of coastal protection, early warning and disaster response systems, and victim relief and recovery assistance (GEF, 2001). Secondly, for many countries, climate change is only one of the many environment problems they confront. Many are already under pressure from population growth, rapid urbanization and resource depletion, making them vulnerable to the further challenges thrown up by climate change (IPCC, 2001; Jepma et al, 1996)

The impacts of climate change, and the vulnerability of poor communities to climate change, vary greatly, but generally, climate change is superimposed on existing vulnerabilities. Climate change will further reduce access to drinking water, negatively affect the health of poor people, and will pose a real threat to food security in many countries in Africa, Asia, and Latin America. In some areas where livelihood choices are limited, decreasing crop yields threaten famines, or where loss of landmass in coastal areas is anticipated, migration might be the only solution. The macroeconomic costs of the impacts of climate change are highly uncertain, but very likely have the potential to threaten development in many countries (African Development Bank et al).

The Horn of Africa's pastoralist areas (Ethiopia-Kenya-Somalia border) have been severely hit by recurrent droughts, causing livestock losses that have plunged approximately 11 million people who are dependent on livestock for their livelihoods into crisis and triggering the mass migration of pastoralists out of drought-affected areas (IPS, 2010). The loss of livestock is heavily detrimental on the rural livelihoods as they rely on livestock for draught power, for manure in conservation agriculture as well as safety nets in drought situations where they will be used in exchange for grain. Also in many communities in Africa livestock is seen as a symbol of wealth hence loss of it will be a heavy weight on the shoulders of the rural poor who are finding it hard to coexist with climate change variability. Thus climate change for it to be

mitigated there is need for multisectoral approach whereby all stakeholders will be involved and mostly the local authorities as the touch bearers at the lowest echelons of society.

Climate change has come as a huge blow to the small holder farmer who is involved in tobacco growing thereby rendering them weak to adapt to climatic effects. Dorward and Kydd (2002) note that the presence of risk lowers the productivity of rural economies in three ways: (1) reducing returns to investment, (2) distorting investments away from income maximizing toward risk-reducing activities, and (3) discouraging investment altogether, because returns are low and investors are risk averse. Climate risks have a say to underinvestment furthermore to long-run agricultural stagnation and rural poverty in countries that are dependent on rain fed agriculture (Devereux, 2007). This has a high likelihood of lowering yields as well as low dividends to the farmers, who immensely rely on rain fed farming, if adaptation to these effects is not prioritized as matter of urgency. This will further heavily affect the small holder farmer who is finding it hard to make ends meet since there are no supportive mechanisms to enhance their productivity that is the credit facilities are paying a blind eye on the plight of the small holder farmer due to lack of collateral security.

Climate change is a further burden to the farmers who have resorted to tobacco production as a measure to gain revenue thereby shunning small grain production due to poor remuneration from the authorities like the GMB. This has hampered food security in an era where climate change has taken its toll and the responsible authorities are poor to deal with the effects and let alone move the country from the shackles of underdevelopment.

Gogo further propounds that production declined from a peak 1102 tons in 1999/2000 season to just 90 tons in 2002 before recovering to around 500 tons during the 2008/9 season. Average

annual rainfall gradually declined to a low of 578mm from as high as 1379mm, reflective in the variations in output (Gogo, 2013). Though climate change was in force however this coincided with miscalculated land reform policy where by land was taken from the white farmers who had the means and ways to produce and being given to the poor black farmer who had no farming equipment and let alone ample or adequate knowledge of how farming should go about. This really affected production in the country and this led the once bread basket of Southern Africa be turned into a begging basket.

The United Nations Environment Programme (UNEP), propounded that eight countries were suffering from water stress or scarcity in 1990. By 2025, the number of countries expected to experience water stress will rise to 18 ,affecting 600 million people (World Bank 1995). Between 1990 and 2025 many countries will shift from having water surplus to water scarcity as a result of population growth alone. According to estimates, by 2025, up to 16 percent of Africa's population (230 million) will be living in countries facing water scarcity, and 32 percent (460 million) will be living in water-stressed countries (Johns Hopkins 1998). The poor rainfall patterns will have downward effects on the farmer since they rely on the production of tobacco for income earning as well as enhancing entitlements. Chikomba district is also affected by these changes since there are also tobacco farmers in the district who are also feeling the heat of climate change which is affecting their livelihoods. Thus the research will be taking a closer look at Chikomba District so as to ascertain the role of the council in mitigating these effects on rural livelihoods as well as on sustainable development.

Desertification is also a climate variability which has threatened rural livelihoods. According to the United Nations Convention to Combat Desertification, desertification is referred to as land degradation in arid and sub humid areas resulting from various factors including climatic

variations and human activities. There is a backward and forward linkage between climate change and desertification that is by removing the trees it results in the loss of carbon sinks hence climate change, on the same note climate change also results in desertification.

Climate change has resulted in the loss of various species of plants and animals. These losses have affected rural livelihoods in many ways. The rural people rely on the natural resources for survival therefore if desertification occurs it means the agriculture sector will be dealt a huge blow as well as the fuel energy which is mostly used in the rural setup as well as the wild fruits which help enhance the food security of the local inhabitants. Therefore it is of grave concern that climate change has largely affected the rural people.

Climate change related droughts, floods and additional severe weather conditions demean as well as decrease drinkable water provisions and boost water-related ailments like cholera along with diarrhea, chiefly in places with insufficient hygienic infrastructures, insufficient access to secure consumption water and cleanliness, joint with poor sanitation practices, are main causes of unwell health and critical disease in the third world. At the moment, these diseases are already killing approximately 2.213 million humans annually in third world countries, of which about 90 percent are children under the age of five (Prüss et al , 2002). Women are predominantly affected by water-related diseases due to their participation in gendered roles like washing and fetching water. This will further widen the gender disparities that already were downgrading women in most communities.

The United Nations Development Programme alludes that the progress in human development achieved over the last decade may be slowed down or even reversed by climate change, as new threats emerge to water and food security, agricultural production and access, and nutrition and

public health. The impacts of climate change – sea-level rise, droughts, heat waves, floods and rainfall variation – could by 2080 push another 600 million people into malnutrition and increase the number of people facing water scarcity by 1.8 billion (UNDP, 2008). This is impacting heavily on the countries of the global south where the human capital which is necessary for the development of any society is incapacitated by the grievous impacts of climate. This will be a death nail to sustainable development due to the fact that when people are poor they tend to abuse the natural resources which will lead to environmental degeneration which in turn will haunt the local inhabitants as there will be poor productivity as well as the loss of biodiversity.

Climate changes as well as other diverse endeavors towards it are of key significance towards development and poverty alleviation. The evidence shows that ignoring climate change will eventually damage economic growth. Inaction entails risks of major disruption to economic and social activity, later in this century and in the next, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century (Stern, 2006). This is of major importance to development because economic meltdown will bring with it some social evils which will be detrimental to development for example in Zimbabwe in 2008 when the drought struck there was economic meltdown which resulted in poor health, education as well as economic development. Climate change has also caused conflicts in the Darfur region where the people are fighting over scarce water resources as well as pastures and this will result in the loss of human capital as well as infrastructure which backslides the development strides that would have been taken.

The consequences of increasing temperatures, changing precipitation patterns, and a rise in sea level will affect all aspects of the Earth system, from phytoplankton in the sea to mountain glaciers in the Himalayas (IPCC 2007). Social-ecological systems will undergo transformations

that test their resilience, and many species are expected to disappear as the result of changes to habitats and food supplies (Steffen et al., 2004). Ecosystem services will be altered, i.e., the provisioning of food and water, the regulation and control of disease, and pollination processes, to name a few (MA, 2006). The challenges faced by humans at the turn of the 21st century—poverty, disease, conflict, environmental degradation, and so on may be exacerbated by climate change. In short, the implications of climate change are serious. Climate change can be considered as the biggest environmental threat in human history and as the defining human development challenge for the 21st century (IPCC, 2007; UNDP, 2007; Stern, 2007).

Climate change arguably poses the greatest threat to reducing poverty, advancing global development, and realizing human rights the world has ever seen. People in developing countries are not responsible for the climate crisis, but they are paying the highest price. It is the poorest nations, and the poorest communities within them, including women and indigenous communities, which are experiencing negative climatic effects most immediately and most powerfully. (The United Nations Non-Governmental Liaison Service (UN-NGLS, 2010)

Climate change is gravely escalating poverty levels particularly in the third world countries. The possible effects of climate change on food production are not limited to crops and agricultural production. Climate change will have far-reaching consequences for dairy, meat and wool production, mainly arising from its impact on grassland and rangeland productivity. Heat distress suffered by animals will reduce the rate of animal feed intake and result in poor growth performance (Rowlinson, 2008). The people in the third world rely on agriculture as a source of livelihood hence the death of livestock on top of poor yields is exacerbating the poverty levels hence making it difficult to attain the MDG of poverty reduction. However it is not only climate change that will make this goal a far away dream to attain, there are other issues that includes

corruption in the third world that has become rampant in this day. Issues of debt crisis which emanated from the Structural Adjustment programs whereby the developing countries due to poor management of the financial resources which has resulted in the developing countries accruing heavy debts which makes it very difficult for the attainment of the reduction of poverty.

Climate change will gradually further increase these risks and vulnerabilities, putting pressure on already over-stretched coping strategies and magnifying inequalities based on gender and other disadvantages (UNDP, 2007). The drought levels as well as the flooding in the region are making agricultural production a difficult endeavor in most communities yet it has been the anchor of most livelihoods thereby dampening their poverty levels. Africa's Lake Chad, once a landmark for astronauts circling the earth, is now difficult for them to locate. Surrounded by Cameroon, Chad, Niger, and Nigeria . . . , the lake has shrunk by 95 percent since the 1960s. The soaring demand for irrigation water in that area is draining dry the rivers and streams the lake depends on for its existence. As a result, Lake Chad may soon disappear entirely, its whereabouts a mystery to future generations (Brown, 2009).

Climate change is projected to reduce the assets and livelihoods of many poor people, for example health, access to water, homes, and infrastructure (Global Watch 2011). This will heavily impact on food security of the continent there by hampering all the efforts to eradicate extreme hunger and poverty. Chikomba district has also seen a fair share of these impacts therefore it is not immune to climate change impacts. The research would like to unravel the role the local authority is doing so as to ensure development within its jurisdiction

Climate related disasters like floods and droughts have hugely affected the attainment of the MDG of universal primary education. During flooding and water related disasters induced by

climate change, people get destabilized children become wandered about and displaced. They would suddenly find themselves in conditions they are unprepared their education would be the number one prize that would be paid in change for food, cloth & shelter. During drought children are mostly used to assist in searching day and night for food and water for their family thus abandoning school with increase in sickness and related calamities, most children are likely to face interference in their education life(Global watch, 2011). This is affecting a lot of children as the parents will be struggling to make ends meet meaning that the education of the child will be not prioritized hence being put at stake. Climate change poses a great threat to the literacy levels and mostly to sustainable development since the children who are the future leaders would be less enlightened hence brewing future conflicts.

Climate change is even making it hard to attain the MDG of promoting gender equality and empowering women. In northern Ghana 70% of women cultivate the land; these women are directly responsible for feeding their children. The harsh weather conditions have affected their farming practices. This means that they have to spend more hours and days on the farm. This has prevented them from taking part in decision making processes. If better ways of living is not assured for these women, the attainment of the millennium development goal three; promote gender equality and empower women will not be a success story (Srem, 2011). Climate change is a major threat in the empowering of women in decision making, matters of governance as well as making them self dependent members of the society. However the failure in the attainment of gender equality cannot be squarely pinned on climate change because it is the political will of the decision making bodies and governments at large to put in place policies as well as better enforcement of those policies in as far as gender equality is concerned.

Women's traditional roles as primary users and managers of natural resources, primary caregivers and laborers engaged in unpaid labor (i.e. subsistence farming) mean they are involved in and dependent on livelihood and resources that are put most at risk by climate change (Global Watch 2011) This is due to the fact that climate variability like food and water scarcity ,desertification and floods as well as other variables , women will mostly be engaged in reproductive roles like food searching, as well as searching for firewood and water amongst other domestic chores while he men are relaxing at home. Due to the effects desertification poses women will be mostly involved in deforestation thereby furthering climate change. Furthermore women have been having little access to productive assets which will render them weak when catastrophe strikes. Therefore there is need for gender analysis in disaster situation.

Climate change also challenges the MDG of reducing child mortality. Every year, 1.5 million children died of diarrhea which is the 2nd highest single cause of child mortality and kills more children than AIDS, malaria and measles combined (WHO/UNICEF 2009) malaria kill more than I million children and pregnant women in Africa, central Asia & Latin America it cause 500 million illnesses annually around 40% of the world's population are currently living in malaria – endemic areas.

The health implications of climate change are profound. Climate change will increase experience of heat stress, injury and death from natural disasters (such as floods and windstorms), vector-borne diseases (such as malaria, dengue, schistosomiasis and tick-borne diseases), and water- and food-borne diseases. The elderly and women are likely to be disproportionately affected by the increased disease burden. In the third world where relentless health tribulations such as HIV and AIDS, malaria and malnutrition are already tormenting the people, the additional implications of climatic changes will probably result in human mortality increases. Human

capital is very important in sustainable development since it is these humans who drive development therefore the loss of human capital will hugely affect development as well as make the attainment of the millennium development goal of reducing child mortality as well as that of combating HIV and AIDS, malaria and other diseases.

Climate change has hugely affected development by hampering the attainment of MDG of reducing maternal mortality. Maternal mortality is likely to increase due to the fact that pregnant as well as nursing mothers are likely to be actively involved in searching for food, fetching firewood as well as other responsibilities especially in the developing countries.

More so, since water quality would be affected, pregnant women as well as nursing mothers would be threatened by water born diseases. The resulting flooding would also exacerbate poor sanitation related disease which would definitely affect maternal health. It is imperative therefore that all programmes designed to reduce maternal mortality in achieving the MDGs are designed with climate change in view (Ifemide 2011). Children and pregnant women are particularly susceptible to vector and water-related diseases. Anemia resulting from malaria is responsible for a quarter of childhood mortality in Africa (OECD 2009.)

Climate change will hugely affect environmental sustainability. Likewise, the predicted rise in average temperatures will make forest and savanna areas more prone to fires; further increasing the vulnerability of rural areas to the effects of climate change (Griebenow and Kishore, 2009). This will affect sustainable development in that the environment would face imbalances due to loss of numerous species which will upset the food web and food chain and the future generations will not be able to benefit from the same species. This goal is the primary target of climate change and the same time the solution to climate change verse-versa. Environmental

sustainability is the key factor in combating climate change. In other words ensuring environmental sustainability is the main goal with various targets aims at primarily combat climate change (Ifemide, 2011). Climate change is likely to alter the quality and productivity of natural resources and ecosystems, some of which may be irreversibly damaged, and these changes may also decrease biological diversity and compound existing environmental degradation (Global Watch 2011). It is therefore imperative to note that climate change is cutting across the entire development panorama. It is a matter of concern to all parties to act in accordance since climate change will put offset the strides previously taken.

2.3 Strategies to mitigate the effects of climate change (Adaptation mechanisms)

Adaptation is processes through which societies make themselves better able to cope with an uncertain future. Adapting to climate change entails taking the right measures to reduce the negative effects of climate change (or exploit the positive ones) by making the appropriate adjustments and changes (UNFCCC, 2007). The Intergovernmental Panel on Climate Change (IPCC) coined that adaptation refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Adaptation also involves learning to manage new risks and strengthening resilience in the face of change (IPCC 2001)

According to Herald article published in June 2013 by Jeffrey Gogo, switching to smaller drought resistant grain varieties such as sorghum and millet are now widely pushed by agriculturalists, as a sustainable way of escaping hunger bred from the volatile climates (Gogo, 2013). The present and potential fluctuations in climate sanctions better shrewdness in development planning so as to lessen risk as well as reinforce food production as well as food

security. Food production has become a bone of contention in recent times due to climate variability hence the local authorities along various stakeholders including NGO's has a role to play if the eradication of hunger is to materialize in this era of variations in climate.

Facilitate drought-preparedness and mitigation through appropriate technologies, including use of remote sensing, local weather forecasting, drought-tolerant crops, early warning information systems, irrigation technology and the building of resilience in rural communities (Farming First, 2013). Though these strategies are important strides so as to attain sustainable development in the developing world but the challenge is that in the third world there has been social, economic and political ills which have bedeviled the efforts to implement development initiatives in these countries as these might be too expensive. Africa has been drawn back by corruption, bad leadership, debt crisis, non transparency as well as conflicts therefore the attainment of these strategies might be a pipe dream in the attainment of climate change adaptation and ultimately sustainable development. Makarau also echoed the same sentiments when he said that investments in irrigation and dam construction were now very important and vital (Makarau, 2013.) Guvamombe also suggested that drip irrigation which is solar powered is the future for climate change adaptation (Guvamombe, 2013).

Zimbabwe was once the bread basket of Southern Africa but now it has been relegated to food importers to due lack of irrigation and water harvesting techniques by the small holder farmer who are languishing in the doldrums of poverty. Gogo further highlighted that the amount of human beings living lower than the poverty datum line which is the measure of hunger used by the UN, rose from 29 % in 1995 to 58 % in 2005, deteriorating to unconfirmed levels in 2008 Poverty has been a major problem in Africa but it has been further worsened by poor government

support due to debt crisis as well as poor government policies that have been paying a blind eye on the plights of the local inhabitants who are already languishing in poverty and lacking proper government support.

The use of green revolution technologies as well as genetically modified crops is also a way of mitigating the effects of climate change on the agro dependant economies and rural livelihoods. (Hazzell,2011) highlighted that if some 9 billion people are to be fed by 2050 in an environmentally sustainable way as well as in the era of climate change, there is greater need to access the most excellent science can provide. However the issue of Green revolution has been criticized by AGRA which propounded that, green revolution technologies benefit relatively few farmers, often at the expense of the majority. These technologies produce concentration of land ownership, increasing economies of scale (production has to be at a larger scale to get into and stay in the markets), and declining number of food producing households in the context of limited other livelihood options (AGRA, 2013).This would pose a challenge to the small holder farmer who solely rely on agricultural produce for survival.

Gogo further echoed that policy interference in natural as well as water resources management, sustainable fishing methods , winter horticultural activities and apiculture projects among others are needed in order to improve adaptation(Gogo,2013). There is dire need to enlarge the adaptation capacities as well as resilience of communities to the effects of climate change and variability, as well as setting up effective early warning systems so as to lessen the impact of climate aligned disasters and tragedies (Bungare, 2013).For all these strategies to be efficiently and effectively implemented there is need for astute policy makers in the form of councilors at the grassroots level.

According to Zinyama and Shumba citing Chombo in 2013, said that as we move forward, it is our view that there is merit in introducing some minimum educational qualifications for councilors with the view of enhancing their craft competence. With respect to performance of 2012 local authorities' budgets, we noted with concern that most budgets performed at levels below 50% due to various reasons (Zinyama and Shumba, 2013). This implied that councilors are short of the capability to conceptualize, plan, manage and evaluate policies, programmes of action, monitor as well as evaluate the use of public resources such as financial, human or capital. Therefore the research is going to unravel the role of these local authorities in as much as mitigating of the effects of climate change or adaptation is concerned despite these challenges of craft incompetence.

IPCC noted that for there to be effective adaptation there is need for rainwater harvesting expansion ,expansion of water reservoirs which stores water, irrigation competence and water use efficiency as well as desalinization (IPCC, 2007) It further notes that alterations of cropping dates as well as crop variety, enhanced management of land like soil protection as a result of planting and erosion control (IPCC,2007) as other measures to adapt to the heinous effects of climate change that has terrorized the ordinary inhabitants of the global south especially the poor rural farmer who has for all life has been depending on exploiting natural resources as well as spill offs from the agriculture sector. All these sectors are threatened by climate change that leaves the rural folks with no option but look up to the responsible authorities for assistance because they cannot cope with these atrocious effects. Therefore the research is going to leave no stone unturned in trying to create a deeper understanding on what the local authorities are expected to chip in so as to uplift the locals from the scourge of climate change.

2.5 Summary

The reviewed literature on scholarly views, assertions and comments from different sources served as a yardstick of analysis and has helped the researcher to assess the role of the local authority in climate change adaptation. It also enabled the researcher to give a more detailed analysis of the subject matter (the climate change impacts on the inhabitants of the district) empirically through reflecting/basing on the above reviewed perspectives.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The chapter looked at the research methodology that was implemented in this research. The researcher used qualitative research throughout the whole research procedure. Various types of data collection instruments were used which includes interviews and questionnaires as well as secondary data sources. These data mining instruments were used to residents as well as local authority officials. This was in an attempt to get an in depth knowledge of the matter at hand from the respondents as they are the ones with the hands on experience of the phenomena. The chapter also outlines the research instruments, sample and sampling procedure, population of the study, ethical considerations and data presentation

3.1 Research Approach

The research made use of qualitative research methods. Qualitative research is the staple form of research of the social sciences. It is descriptive, non-numerical way to collect and interpret information. Qualitative research is highly contextual; being collected in a natural real life setting hence goes beyond giving a mere snapshot or cross-section of events and can show how and why things happen (Charmaz. 1995). Therefore it was the appropriate technique as it was aimed at getting the lived experiences of the local community in Chikomba. Qualitative research is more explanatory and hypothesis generating. The qualitative research method allowed the researcher to get at the inner experience of participants, to discover rather than to test.

It investigates the way people react, work, live and manage their daily lives. Qualitative methods are best understood as data enhancers. When data is enhanced it is possible to see key aspects of

cases more clearly. Qualitative research is more concerned with meaning. The strength of qualitative research lies in its ability to provide complex textual descriptions of how people experienced the effects of climate change in the district. It provided information about the “human” side of the issue; that is the often contradictory behaviors, beliefs, opinions, emotions, and relationships of individuals. Qualitative methods were also effective in identifying intangible factors, such as social norms, socioeconomic status, gender roles whose role in the research issue may not be readily apparent.

Furthermore, qualitative methods pay attention to finer details. The topic researched needed a real payment of attention to detail and not just give numerical values and statistics which do not give specific importance to the lived experiences of the people as well as that there is no room for generalization as different people have different experiences . There was therefore need for an approach which reflects and pays attention to the lived experiences of the people and what they think should be done to alleviate their challenges.

3.2 Research Design

One of the critical steps in conducting research is developing a research plan or design. A research design is a description of the format and theoretical structure under which the study will be carried out. A research design is a way of regulating the research in attempt to come up with results which are reflective of the situation on the ground. It then means that at the conclusion of the study, the design should bring forward a convincing outcome which resembles the reality of the situation in Chikomba, when the design is set properly. The researcher made a research plan, which was used for the research, this included data collection tools, size of the population and

methods that were to be used in sampling. The researcher used Chikomba District as a case study and it stands as the lynchpin of the research design.

A case study design was implemented in mining the information on climate the role of local authorities in mitigating the effects of climate change. A case study was utilized so as to provide a description, explanation and assessment of a observable fact in a specific area, in this study was on the effects of climate change in the district . According to Alston and Bowles it examines one case usually defined as a typical case, in order to fully investigate and thoroughly analyze the details which may be lost in a larger study (Alston & Bowles, 2009). A Case Study focuses on one instance (or a few instances) of a particular phenomenon with a view of providing an in-depth account of events, relationships or processes occurring in that particular instance.

3.3 Study Population

The population of this study consisted of 121 162 people that is 58 000 males as well as 63 162 female (Zimstat, 2013) in the 30 wards that make up Chikomba district to enhance the existence of a representative sample. The research covered only those who could meaningfully give the data required by the research and met the sampling procedures outlined in this research, because, for example, some age groups especially minors could not be able to comprehend some questions on climate change. The sampling procedure is highlighted below.

Table 3.1: Sample Size

Stakeholder	Level of involvement	Number of participants
Council Management	Managers	2
Councilors	Councilors	2
Key Informants	Members of the community	15
Total		19

3.4 Study Sample

The study population discussed above is generally too large and unmanageable to the researcher. Researchers therefore need to define their population and sample. Sampling is the method (or process) of selecting certain members to represent the whole group. The process restricts the investigation to a small but well chosen group of subjects that is called the sample that represents a much wider group (the population). The population can be considered as a set while a sample becomes a sub-set of the population. A sample is also referred to as unit of analysis in research. A sample should display all the characteristics of the population for it to be described as representative enough to draw valid conclusions. So sampling is a vital part of research process and the strategies for choosing a sample will influence both the results and interpretation.

3.4.1 Purposive/Judgment sampling

With purposive sampling, the chance that a particular sampling unit will be selected for the sample depends upon the subjective judgment of the researcher. The sampling units were selected subjectively by the researcher who attempts to obtain a sample that appears to him or her to be the representative of the population. Also referred to as judgment sample, purposive

sampling seeks for information-rich cases of maximum variations. Normal application is for small samples from a population that is well understood and there is a clear method for picking the sample. The technique is used to provide illustrative examples or case studies. Purposive sampling was used in this study as the first line of determining the overall sample for the research.

This method was used in choosing the 4 council members that is the 2 council management and the 2 councilors who have been selected based on the duration of their services to the council and these are the only ones to be interviewed.

This research further used purposive sampling on selecting the 15 other respondents from the community. Only persons who understood the subject matter of climate change were administered questionnaires to. It was a deliberate exploit, to get the required data on what the drivers of climate change were in the district as well as the effects of climate change and the strategies that can be implemented so as to reduce the effects of climate change on the local populace. This was advantageous to the researcher as it saved him on time and enabled him to acquire the most relevant of information. The sample size is supported Creswell who said that data are collected from the individuals who have experienced the phenomenon. Often data collection in phenomenological studies consists of in-depth interviews and multiple interviews with participants (Creswell, 2006). Polkinghorne (1989) recommends that researchers interview from 5 to 25 individuals who have all experienced the phenomenon. Jean Piaget, whose theory on Cognitive Child Development is still influential up to this day, used population of his own three children to come up with the theory. Therefore, the sample size is therefore justifiable.

3.5 Research Instruments

Research instruments are tools used for collecting information and data needed to find solutions to the problem under investigation. The researcher used multiple methods for collecting data which were qualitative. Questionnaires and interviews were the common research instruments used. Surveys were conducted using questionnaires and then interviews were conducted to complement the questionnaires in a bid to examine the role of local authorities in mitigating the effects of climate change in Chikomba district.

3.5.1 The Interview

Kahn and Cannel as cited by Saunders et al (2007), defined an interview as a purposeful discussion between two or more people. Data gathering was done through unstructured interviews which used open-ended questions. According to Thakur, (2003); an interview has two basic objectives, that is, discovery and measurement. Discovery indicates gaining new knowledge, or new insight of certain unexplored qualitative aspects of the problem. On the other side, according to Gorden (as quoted in Thakur, 2003), “the scheduled interview, with high topic control, is more efficient and effective in obtaining uniform coverage, precision and reliability of measurement.” Interviews were used in this research to get information from the 4 council officials who included 2 council managers and 2 councilors.

Major strengths of using the interview are that it; gave room for further exploring of the area of interest. The dependable and fruitful technique of probing was used where the researcher immediately recognized just how the respondent’s answer failed to meet the question’s objectives .They enabled the researcher to make deductions from respondent’s body language

due to the directedness involved, as well as enabling clarification of questions and clearing up of any misunderstandings. Responses for interviews were usually quick and precise.

There are, however strategies available to the researcher to enhance the rigor of the findings obtained from interviews. Use of multiple methods of data collection is one such strategy that was used in this study.

3.5.2 The Questionnaire

A questionnaire is a document containing questions designed to solicit information appropriate for analysis. The study used unstructured questionnaires to solicit respondents' views regarding the quality of service delivery offered by the Chikomba RDC. Foddy quoted by Saunders et al., (2007) emphasize that for a questionnaire to be reliable, "it must be understood by the respondent in the way intended by the researcher and the answer given by the respondent must be understood by the researcher in the way intended by the respondent". The questionnaires designed were of the unstructured type consisting of open ended questions. The questionnaire were administered to 15 members of the community so as to get the community perspectives as well as the lived experiences of the people especially those who understood climate change so as to ensure the reliability of the data.

Questionnaires were of great help to the research. This is due to the fact that, it allowed for the collection of large amounts of data from a sizeable population. Questionnaires also gave better anonymity, thus encouraging respondents to be honest and sincere. It overcame the problem where respondents may want to hide their attitude because they feel they are socially unacceptable. It reduced bias and errors that might result from the personal characteristics of interviewers and interviewee. However they had their own shortfalls which includes the low

response rate (people take their time to respond and return), the researcher also lacked control over the nature of respondents' responses (e.g. responses could be biased, inaccurate or incomplete.), more often than not the researcher was not available to provide clarity in those areas that needed to be clear to respondents. To overcome weaknesses identified in the use of questionnaires, triangulation of data collection methods was used. Such measures were taken to ensure the reliability of research instruments used and the data to be collected.

3.6 Ethical Considerations

Ethics involves considerations such as fairness, privacy, honesty, respect for the integrity and dignity of the individual and confidentiality of certain information. I ensured that participants or subjects were accorded their human rights. Participants were also made fully aware of the nature of the research and their role within it. The subjects were also encouraged to sign consent forms before participation.

3.7 Chapter Summary

This chapter discussed the common research designs and identified the study as a case study. Sampling techniques were also explored in detail in this section. The chapter explained the research instruments used in the study and these were the questionnaire and the interview. Strengths and weaknesses of the data collection instruments were discussed. Finally, the chapter discussed the issue of ethical considerations in research. The next chapter, Chapter IV looks at Data Presentation and Analysis.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

The objective of this chapter is to present, analyze and discuss data that was collected. In order to give the findings meaning, the objectives of the study needs to be reiterated. The objectives that the chapter aims to satisfy includes to investigate the key drivers of climate change, to examine the consequences of climate change on the development trajectory of Chikomba District and to proffer climate change mitigation strategies that can be employed by Chikomba Rural District Council. The sources of data discussed in this chapter are answered questionnaires from the respondents which in this case are the members of the community as well as separate interviews from a councilor and council manager with the sole purpose of getting to understand the role of local authority in as far as climate change adaptation is concerned as they are the custodians of rural development and hence sustainable development.

4.1 Information about the sample

Fifteen questionnaires were administered to the 15 respondents who constituted the target population in Chikomba District. The researcher had ample time to administer the questionnaires and this enhanced the answering of all the questionnaires. As a measure to improve reliability and validity of the data, interviews were used so as to complement the questionnaire. The researcher conducted interviews with 4 council officials who comprised of two council managers as well as two councilors.

Table 1: Table represents data on sex, age, education level, occupation and duration of stay of respondents.

Sex composition	#	Age of respondents	#	Education level of the respondents	#	Occupation	#	Duration of stay	#
Females	11	<19	2	Primary	1	Farmer	12	1-5	1
Males	8	20-39	6	O level	9	Miner	0	6-10	3
		40-59	4	A level	6	Teacher	2	11-15	5
		60+	7	Tertiary	3	Other	5	15+	10

Source: Field data

There were more female respondents than male. All the female respondents were 11 out of the 19 respondents whilst male respondents were 8. Most rural setups are mostly constituted by women probably due to the fact that men are socially constructed as the heads of the house therefore they have the duty of fending for the family hence they become mobile in search of greener pastures. The population in Zimbabwe constitutes approximately 52% women and 86% of these women rely on land as a productive asset for their livelihoods (FAO, 2003).

This clearly highlights that women are the ones that are mostly found in the rural setup. However this has widened the gender dynamics where by the scale has been tilting on the side of men where men has been seen as the breadwinners while women are only left to produce in the rural setup in this era where climate change is backtracking all their endeavors to attain sustainable livelihoods through food production. Hence women are the most affected members of the community by the changes in climate as they are left alone to grapple with the effects of these

climate changes which has further affected their entitlements thereby affecting the food availability in the family as well as food accessibility since they will be heavily relying on selling the proceeds on agricultural products for dividends. Also in the town setup of Chikomba district women have been left out at home as housewives thee by depending on men who have further exacerbated gender inequalities and subsequently domestic violence. However there were only 8 men who were respondents due to the fact that man in rural setups might be very few due to the fact that maybe it's either they would have died or moved in search of greener pastures. In the town setup they are hardly found at home during weekdays when the researcher carried out the research.

Respondents below nineteen years were very few hence only two and this implied that the data was obtained from a mature group whose experience in land use and management was very high, thus increasing the validity and reliability. Six respondents were between the age of 20-39, four people were between the 40-59 age group, seven were 60+ years old. This however serves to show that the people who were dealt with might have the required experience of the effects of climate change hence this would serve to reduce bias on the results as well as that all age groups were represented meaning that the data collected is a clear and concise representation of how all these various age groups are being affected by climate change as well as their views on what should be done so as to uproot the local inhabitants from the vagaries of climate change.

Generally the literacy level of the people in Chikomba with particular emphasis to the respondents is relatively high hence easy understanding as well as quick response to the matter at hand that is climate change thereby improving the authenticity of the findings. This is evidenced by the fact that only one individual managed to only finish primary education only, nine reached ordinary level, six managed to attain advanced level while three reached the tertiary level.

However the individual who reached primary education could not perfectly answer the questionnaire since climate change is a more technical area or field of study therefore provides a challenge to those who are not well versed in it therefore the ignorance might result in unsustainable land uses.

The composition of the respondents in accordance to their occupations is as follows: Twelve respondents were farmers; two were teachers the other five were housewives who had no formal occupation. Chikomba mostly comprise of the farming community that is evidenced by the fact that there are only four wards in town out of the thirty wards and this speaks volumes as in that the larger part of the district comprises of farms and communal areas where farming is the major source of livelihood. These farmers are the ones that are mostly affected by climate change since they are the primary producers of food and largely rely on it for their survival.

Of the nineteen respondents that were dealt with in this research there was a better representation on their stay in Chikomba. Only a single individual had stayed in the district for less than five years, three individuals had stayed in the district for 6-10 years; five respondents had stayed in the district for 11-15 years whilst 10 respondents had stayed in the district for more than 15 years. This was a good representation since each time frame had individuals. The availability of more respondents from 15 years plus was good for the research as these were the people who had stayed in the district for quite a long time and could give accurate and reliable data of what they had experienced over the years.

4.2 Key Driver of Climate Change in Chikomba District

The researcher achieved this objective through the use of questionnaires administered to 15 respondents in the different wards of the district. The community believes that the causes of

climate change are broad and cannot be viewed in a monocausal way. The table below will produce the research results.

Table 2: The major drivers of climate change in Chikomba District

Driver	Number of respondents
Carbon dioxide	10
Methane	2
Nitrous Oxide	3
Total	15

The table above indicates the major drivers of climate change as alluded to by the fifteen respondents that the questionnaires were administered to. Carbon dioxide emission was seen as the major driving force that is the anchor for the occurrence of climate change in the District. This is evidenced by the fact that 10 respondents echoed that it is the major driver of climate change. The diagram also shows that 2 respondents cited that methane gas is also a contributor to the changes in climate in the district while the other 3 believed that nitrous oxide is a cause of concern for the changes in the global climate.

All these drivers that have been noted above which were found with the research are human influenced and this is in line with what the Intergovernmental Panel on Climate Change propounded, that most of the observed increase in the globally averaged temperature since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations (IPCC, 2007.) This is a clear indication that the climatic changes that are affecting our societies today emanated from the activities that were recklessly done by human beings so as to improve their lot. These activities are now having far deeper consequences on the population

due to unsustainable use of natural resources as well as limited environmental protection which have bedeviled the attainment of sustainable development where the future generations might not be able to enjoy the benefits that the earth is enjoying today.

4.2.1 Sources of these gases

The respondents gave various sources of the greenhouse gases discussed above. Of the 15 respondents 4 propounded that the carbon emissions are coming from deforestation. The researcher believes that deforestation is the uncontrolled cutting down of trees which act as carbon sinks. The cutting down of trees is a contributor to green house gas emission as the trees are the ones that absorb most of the carbon which is emitted as they use it in photosynthesis. Therefore the cutting down of trees will result in the stored carbon in these carbon sinks to be released into the atmosphere which will then destabilize the concentration of carbon in the atmosphere which will then result in climate change.

Deforestation does not only result in climate change but also climate change results in deforestation meaning that there is a backward and forward linkage between the two variables. Deforestation therefore does not only result in climate change but to other far deeper consequences like land degradation due to shortage of soil binders which will then result in river siltation meaning that the river flow patterns will be affected hence lack of water in rivers for agricultural productivity. Therefore the research established that deforestation was one of the sources of carbon dioxide emission which resulted in climate change.

The researcher found that veldfires are one of the sources of carbon dioxide. This was established after questionnaires had been administered to the 15 respondents who gave their different views on the sources of carbon dioxide. 5 of the respondents noted that the prevalence

of veldfires especially in the dry season was the other source of carbon dioxide. EMA also echoed the same sentiments as the research found as it said that, in 2009 in Chikomba district 27 960 hectares were lost to veldfires (EMA, 2009.) Veldfires are a major source of greenhouse gases mainly carbon and they have immensely contributed to the climatic changes that are occurring today.

Veldfires are a major hindrance to sustainable development as there will be the loss of various species both plant and animal species which might result in the future generations being robbed of enjoying the same natural endowments as well as upsetting the food chain and food webs. These veldfires encroaches into environmentally sensitive areas which will upset the attainment of sustainable development. Veldfires as well due to their contribution to climate change which is seen as a threat to sustainable development if little or no action is taken to mitigate it also bears the brunt of hindering sustainable development as well as sustainable use of natural resources since environmental protection is one of the major pillars of sustainable development.

The findings of the research proved that burning of fossil fuel was a source of the carbon I the district. 6 respondents spelt out that the burning of fossil fuels through combustion in vehicles, activities that are done in Manhize by ESSAR as well as the burning of coal in tobacco curing is the major sources of carbon dioxide emission in the district. This is supported by Camil who echoed that burning fossil fuels releases about 8.5 billion tonnes of carbon (as CO₂) into the atmosphere each year, causing its concentration to increase and Earth's greenhouse warming to strengthen, which leads to rising global air temperatures. Since 1880, average global air temperature has risen approximately 0.9°C (Camil, 2010). This is taking place in Chikomba as the research found out that in Manhize Mountains in ward 7, ESSAR has been using heavy vehicles as well as well as machinery in their extraction of ore in the mountains along the Great

Dyke. This was a source of carbon as the research found out. Furthermore the research found out that the burning of coal in tobacco curing has been another source of fossil fuel. Coal contains a huge amount of carbon but the Council as established by the research has been selling coal to the farmers in a bid to limit deforestation. However the use of coal is detrimental to the environment thereby increases emissions which various conventions like the Kyoto protocol are trying to reduce so that the world could live in harmony with the environment and the natural ecosystems.

The researcher also identified that the local authority was also involved in activities that result in the emission of carbon dioxide in the atmosphere. This was aired out by 3 respondents who said that the council has been involved in the burning of the garbage they have collected. This is a clear indication that the local authority has played a role in the occurrence of climate change in the district. It shows that the local authority does not have other alternatives to dispose the garbage or that they might be having others but not willing to partake them.

The research also established that the use of inorganic fertilizers was a major source of nitrous oxide. 3 respondents cited that the use of fertilizers by farmers both rural and peri-urban farmers was a major source of nitrous oxide gas. This is supported by the IPCC which states that more than a third of all nitrous oxide emissions are anthropogenic and are primarily due to agriculture (IPCC, 2007). The intensification and intensification of the use of fertilizers has resulted immensely in the global climatic changes that are taking place now over the years. The rural people as well as those in urban areas use fertilizers so as to improve agricultural productivity and hence this has resulted in climate change. This has resulted in the effects being felt in the aqua world whereby eutrophication due to the sporadic rainfall patterns has resulted in the loss of aqua biology thereby affecting sustainable development as economic development is an

important pillar of sustainable development hence those who rely in selling fish for a living will be dealt a heavy blow as well as the food webs and chains would be largely affected.

The research noted that the use of organic fertilizers and the garbage in the town are a source of methane. 2 respondents echoed that organic fertilizers like cow dung is a major source of methane in the district. Methane is emitted by natural sources such as wetlands, as well as human activities such as leakage from natural gas systems and the raising of livestock (EPA, 2010). This view is a broad view of the sources of methane which is comprehensive of the sources but however the case in Chikomba agrees with this view in that livestock raising is a major source of methane as Chikomba is a cattle ranching region where livestock production is at its high but it differs a little bit in that the research found out that garbage in the district was also a source of methane through the questionnaires that were used to collect the data. The research found out that the Council has been neglecting its duties of garbage collection hence there was lots of garbage around the town area hence methane would be produced through the garbage.

4.3 The consequences of climate change on the development trajectory of Chikomba

This objective was satisfied by the use of questionnaires administered to 15 respondents in the district. 10 of the respondents noted that climate change has affected food availability resulting in food insecurity due to sporadic rainfall patterns. As Chambers and Conway (1998) puts it across a livelihood as comprising the capabilities, assets (including both material and social resources) and activities required for a means of living. Therefore the results of this research clearly highlights that food hugely affects the capabilities of the rural people who are finding it hard to grapple with the effects of climate change that has resulted in them being food insecure

as well as resulting in malnourishment. As well as their assets would be affected as the research found out that those with livestock would be forced to dispose them so as to compensate for the low grain availability. The activities of the rural populace will lead to the increased over exploitation of natural resources which would hugely impact on sustainable development. Also social development as part of sustainable development would be dealt a heavy blow if food insecurity is the order of the day. The research therefore found out that food unavailability which impacts on the entitlements of the local populace is one of the impacts of climate change on the livelihoods of the people.

The research denoted that climate change has resulted in the dwindling of water sources due to high temperatures as well as low rainfall. 8 respondents spelt out that climate change has resulted in the shrinking of water bodies which has affected the urban dwellers due to water shortages also the rural farmers and inhabitants who rely on water for agriculture or even for consumption and day to day chores as perennial rivers are getting dry quickly. Nzuma supports the research when he said, it is expected to affect food and water resources that are critical for livelihoods in Sub-Saharan Africa (SSA) where much of the population, especially the poor rely on local supply systems that are sensitive to climate variation (Nzuma, 2010). This is a supportive assertion to the research as the findings clearly highlighted that the local populace is affected highly by water shortages which has resulted in poor health as well as worsening the entitlements of the people as well as making sustainable development a pipe dream as water availability is a subset of social development as water is a essential resource for human survival.

5 respondents highlighted that high temperatures has resulted in the loss of trees as well as health hazards to both livestock and humans. This is a detrimental phenomenon on the livelihoods of the people who hugely rely on natural resource endowments for their survival. The research

found out that the loss of trees have largely affected the rural people as they have been instrumental in binding the soil there by reducing soil erosion as well as the fact that the local inhabitants rely on wild fruits in times of distress and therefore the loss of trees is a huge blow to their entitlements as well as food availability and accessibility. The research denoted that the cutting away of trees has resulted in the siltation in rivers which has further worsened the water availability scenario. The researcher also found out that the high temperatures have been affecting rural livelihoods as some respondents have cited that climate change has resulted in the prevalence of diseases like malaria in the district as well as animal related diseases like red water.

12 respondents noted that climate change has exacerbated poverty in the district. The results of the research show that the poverty levels which were already in the district are being worsened. The respondents cited that the people depends on agricultural products for survival therefore poor agricultural yields has resulted in the poverty levels being widened. The people were crying out foul at the fact that rainfall inadequacy is the major borne of contention as they are left reeling with the effects of climate change.

The people are mostly affected due to the incapability to cope with the effects of climate change. This is supported by the IPCC which says that, the ability to adapt and cope with weather hazards depends on economic resources, infrastructure, technology, and social safety nets (IPCC, 1995). Therefore the research proved that the people are mostly affected due to the poor coping strategies as well as poverty which is further widened by climate change. This will make sustainable development a difficult endeavor since economic development is a pillar of sustainable development yet the local people are encraved in a vicious cycle of poverty due to climatic changes which have come when Africa has been struggling to meet the millennium

development goals due to various reasons which includes bad governance as well as debts therefore climate change has come as a further stress.

1 respondent noted that the loss of wetlands was affecting the livelihoods of the rural community. The research evidenced that wetlands are integral to the livelihoods of the rural populace. The respondent highlighted that wetlands were the source of water when other alternatives would have been exhausted as well as some crops like rice which have been grown in these wetlands are affected meaning productivity will also dwindle; therefore wetlands are being destroyed by the high temperatures. This has also affected biodiversity which has also been lost since most of the amphibians stay in these wetlands therefore their disappearance would mean a loss of both habitat and life on the part of the animals. A change in species diversity alters the biochemical cycles and affects the overall functioning of the whole system. In short the stability, functioning and sustainability of the ecosystems depend on biodiversity (Tilman, 1997). This is a clear indication that the biodiversity is very integral if the elusive land of sustainable development is to be realized.

This objective was fulfilled through the interviews that were conducted with the local authority personnel as well as questioners that were administered to the community. The Health and Social Services Officer at the Council, Mr. Taruvinga said that, “ *climate change has retarded agriculture production, brought diseases such as malaria due to excessive heat, it has also affected draught power and induced poverty and hunger on people who would normally feed themselves and it has depleted water sources as wells run dry easily due to poor water table levels.*” This clearly highlights that climate change has affected every area of development in the rural setup. Draught power is an important resource in Chikomba district since they are used for the cultivation of the land so as to improve productivity in the area as well as a resemblance of

wealth and entitlements on the part of the rural folks. However climate change has resulted in the loss of this important resource which is used as a safety net when a drought occurs were they will be traded so as to buy grain. Also as alluded to climate change has also affected the health of human meaning that the human capital will be affected meaning that production will be hampered as well since a health nation is a wealthy nation. All these have affected the development of Chikomba as well as sustainable development as the people are encircled in a vicious cycle of poverty.

The Projects officer Mr. Maseka also had the following to say:

“there has been persistent droughts in the district that has affected the food security of the district and the fact that the district is suitable for cattle ranching there has been the emergence of sophisticated diseases affecting livestock and the decrease in pastures “

This clearly shows that the development of the district is at stake as it is much involved in cattle ranching therefore the emergence of the new diseases in livestock is a blow to the people who were already poor. This resembles the loss of entitlements by the local population which make it even more difficult to attain sustainable development as the people are being further engulfed in the doldrums of persistent poverty.

The other two councilors (Councilor Mudzimu and Councilor Munyati) who were interviewed also echoed the same sentiments narrating that climate change has resulted in the food insecurity of the district as well as the advent of diseases on livestock which has retarded development in the district and has exposed the people to further shocks. This is further supported by the United Nations Development Programme alludes that the progress in human development achieved over the last decade may be slowed down or even reversed by climate change, as new threats emerge

to water and food security, agricultural production and access, and nutrition and public health(UNDP,2008). This is a clear indication that the research is fitting in well into the body of knowledge that has already been there. This is because the research found out that food insecurity has resulted in malnourishment on the local people hence there is need for urgent action if sustainable development is to be attained.

Questionnaires were administered to 15 people and they had different views on how climate change affects development. All the 15 people said directly and indirectly that climate change is affecting the agricultural sector hence increasing poverty on the people. Climate change is hugely affecting agriculture productivity in the district and this has led into the GMB coffers at the district levels to become empty meaning that there are very little who are having extra grain to sell to the market. This will in turn affect the nation at large where the nation will not be able to feed its people due to poor harvest. This is because the poor rainfall and the souring temperatures are making agriculture production a tricky venture. This has resulted in income failures for the farmers which will have far deeper consequences for the development of the district as well as the country at large because the economic base of the people is being washed away and due to failure to diversify, the local people are left with nowhere to look up to.

Some respondents highlighted that climate change have exacerbated poverty levels in the district there by upsetting the attainment of the MDG eradicating extreme hunger and poverty. They highlighted that climate change is causing people to be poor due to the washing away of their economic base that is the agriculture sector as well as the natural resource base. Eradicating poverty would need a lot of effort in this era of climate change where climate change is increasing the fissures of poverty through the destruction of livestock which is a source of wealth to the local people as well as the crop production sector where the people rely on for income as

well as the washing away of natural capital which the people rely on for survival. Therefore if no mitigatory action is taken the people will remain in the shackles of poverty hence the attainment of the MDGs would be a pipe dream both for Chikomba District and the nation at large.

Respondents cited that in the district climate change has affected the attainment of universal primary education as well as increasing child labor. The respondents cited that children would be sacrificed on their education since there will be no money for them to feed themselves and let alone for education. This is because climate change is affecting the source of income for the parents therefore with that little income they might be getting education will be of less priority. The respondents went on to cite that child labor has increased due to the fact that the parents would need to increase production hence the children would be forced to work at the family area or search for employment elsewhere so as to bridge the gap. Education is a child right as enshrined in the African Charter but however the right is becoming a privilege due to the climatic factors which are hard hitting on the already poor African people. And climate change will even make it harder to attain the MDG of universal primary education for all yet education and literacy levels are strong pillars of development. This would even make it hard to attain sustainable development due to the fact that the future of the country will be dealt a huge blow as this would be brewing future conflicts in posterity where there will be the increase of the uneducated. Also social development as well as economic development and even environmental development which are fundamental principles of sustainable development are being affected.

The respondents also cited that climate change is making the attainment of environmental sustainability. The respondents noted that climate change results in desertification as well as overutilization of natural resources thereby upsetting the attainment of the MDG. The environment is an important and critical endowment for the survival and welfare of the human

race but however climate change has resulted in the disappearance of some important resources which has led in the washing away of soil thereby leading to soil erosion. Also the effects of climate change on the agricultural sector have led to the unsustainable use of natural resources.

Some respondents cited that climate change has affected the development of the district due to diversion of funds. They noted that the funds that are supposed to be channeled towards other development initiatives are now being channeled towards climate change. Climate change as a broad area requires a lot of energy and money so as to mitigate the effects therefore the respondents thought that this energy being channeled towards climate change could have been channeled towards other areas which have been lacking over the years.

4.4 Mitigation strategies that can be employed by Chikomba Rural District Council

The objective was attained through the use of questionnaires to the people as well as interviews that were conducted with the local authority staff. Respondents cited that there is need to put in place by laws as well as effective enforcement which strongly make people desist from deforestation. Deforestation is an unsustainable use of natural resources result in climate change and in the long run result in desertification. Therefore the respondents noted that the local authority has been not implementing fully their bylaws if there are any. However interviews with the local authority officials showed that the local authority has bylaws as all the 4 interviewed officials concurred with that. Councilor Munyati said that,

“the local authority has bylaws in conjunction with EMA such as illegality of veldfires, cutting of trees as well as doing away with illegal sand abstraction”

This is a clear indication that the local authority has bylaws but however as the researcher found out on the community that the local authority is not correctly enforcing the bylaws thereby

deforestation has become rampant in Chikomba District. Therefore enforcement mechanisms are a strategy so as to try and curb deforestation in the district.

Some respondents noted that organizing workshops for traditional leaders and councilors so as to educate people on environmental protection. This is better emphasized by the respondent who said that:

*“the local authority must put in place measures like organizing workshops with councilors and traditional leaders so as to capacitate them to educate the local communities in which they reside since they have influence and authority over their subjects “*The idea is that the education or sensitization of the leaders would have trickle down effects on the local populace as it will be coming from the community leaders hence it might be easy for the people to cooperate. This will enhance sustainable development in that it enhances both social development and environmental sustainability which are critical elements of sustainable development hence sustainable resource utilization. However this as a strategy might work but the most moving thing is that these activities have been happening in front of these community leaders and they have been taking minimal action.

Controlled grazing sensitization and enforcement is another strategy the respondents proffered to be implemented by the local authority. One of the respondents had this to say:

“the district is heavily reliant on cattle ranching as a pillar in agriculture, therefore the local authority must introduce controlled grazing sensitization programmes as well as enforcing them so that the cattle rearing issue will be preserved” The respondents had the idea that Chikomba district is a largely cattle rearing area where grazing pastures are very critical in the development of the livestock. Therefore livestock production is very integral to the district development yet it

is being affected by the adverse effects of climate change. Therefore over grazing comes as a sustainable way of utilizing the grazing pastures so that they won't become scarce at the same time serving their purposes. This is a strategy which will serve the livestock from the vagaries of climate change.

Provision of irrigation facilities as well as water harvesting was proposed by the respondents.

The respondents noted that

“ The council must put in place mechanisms like irrigation and water harvesting schemes so as to enhance water availability which will help in the attainment of food security in the district as the water problem is the source of poor harvests” The respondents believed that the local authority has a major role to play in the improvement of the welfare of the local community hence it has a role in mitigating the effects of climate change through the provision of funds and equipment for water harvesting as well as irrigation facilities. This is a noble idea but the challenge is that the local authority is incapacitated to be in a position to implement such strategies though they help in enhancing sustainable development in that the people would be assured of food security since water would be available.

Respondents proposed that there is need for people to be educated on crop diversification. One of the respondents had this to say:

“crop diversification is a viable method for the improvement of the food security of the area since the region is prone to droughts hence the local authority must make sure that the people are engaged and educated on that.” Respondents believe that crop diversification is a better way to deal with the climate induced persistent droughts that are tormenting the whole district.

This is supported by Mapfungautsi who said that The strategy reduces the risk of complete

crop failure in the event of midseason dry spells and due to different responses to climatic conditions, some crops tend to survive (Mapfungautsi, 2013). This shows that there is need for the implementation of crop diversification programmes by the local authority so as to enhance agricultural productivity and hence improve the entitlements of the rural folks as well as their wellbeing and welfare.

Some respondents cited that there is need for the drilling of boreholes for there to be water availability. This can be best understood by what has been said by one respondent who said that:

“ Due to water scarcity caused by climate change there is need for the drilling of boreholes in all the wards and villages as well so as to avail drinking, washing as well as bathing water to the people since climate change has resulted in the drying up of wells which the people were reliant on hence the influx of diseases such as cholera and diarrhea as was the case in 2008” This shows that due to climate change there has been the advent of more disease which are water related therefore there is great need for intervention by the local authority if the attainment of sustainable development is to be realized. Therefore drilling of boreholes is a noble idea so as to help the communities from water scarcity which has resulted in retarding development.

4.4.1 What the local authority have been doing to mitigate the effects of climate change

This was attained through the use of interviews on the local authority staff. The 4 interviewees cited that the council has been involved in fodder production for livestock. This was comprehended by Councilor Munyati's assertion that, *“ the council has been involved in the hay production project whereby there is grass cutting which would form hay and selling it to the local cattle breeding farmers so as to supplement stock feed as grazing pastures are being*

affected by climate change.” This is a complementary project to the local people as the respondent spelt out that all the beef breeding farmers are able to access the supplements. However the problem is that most of the people in Chikomba are poor therefore are not able to purchase these services meaning that the intervention is elitist in nature since the masses are not able to purchase the fodder.

Furthermore Councilor Mudzimu propounded that, *“the council has been involved in the selling of coal to the farmers who are involved in tobacco production so as to curb deforestation”* Deforestation is a serious problem in Chikomba District due to the tobacco farmers who have increased their production due to failure of the grain crops. This has resulted in extensive cutting down of trees throughout the district. However this initiative is problematic in that the local community has already cited that this same coal is a major driver of climate change through its emission of carbon dioxide which in turn results in climate change in the district.

The research noted that council has been involved in the holistic land and livestock management. This has been cited by Mr. Maseka who said that, *“council has been involved in the holistic land and livestock management in conjunction with the Ministry of Gender; this takes place after harvesting, whereby kraals of community livestock are put on a particular crop field using changeable kraals overnight for approximately one week varying on the number of the cattle. During the stay in the field the livestock will be impacting on the land through hooves-action, meanwhile depositing dung and urine which in turn enriches the soil fertility and reduces the need of artificial fertilisers. This process eliminates the need for labour to transport manure to fields and the thrust is to enhance food security, as well as promoting environmentally sensitive policies and this was evidenced by Mr. and Mrs Murwira of Leleza farm who is one of the beneficiary of this pioneer project were voted to have the best crop in the district .”* This is

supported by Chiguvare who propounded that the Holistic Land and Livestock Management (HLLM) approach is a decision making framework that enables people to make decisions that are economically, socially and environmentally sound.

The approach seeks to promote food security at household level, manage livestock and the environment more efficiently in order to increase crop yields, improve pastures and reverse land degradation (Chiguvare, 2013). This is a clear indication that the HLLM is a sustainable way of improving the welfare of the people and it fits well in the theoretical framework of the research that is sustainable development. However the challenge is that cow dung has already been cited by the research as a driver of climate change therefore this might result in climate change being worsened though food security is being attained.

The research found out that the local authority has been working in conjunction with various NGOs in mitigating the effects of climate change. One notable statement by Mr Taruvinga was that, *“The council has been joining hands with various NGOs like Heifer international where the local people are given a heifer to pass on to other members of the community which has given other people the chance to own livestock, also we have engaged in the construction of irrigation for example at Wazvaremhaka and Tavara where irrigation schemes were setup as well as Oxfam which has been drilling boreholes in the district for example at Madamombe, Pokoteke as well as Mbiru “* These are clear indications that the council is also engaging other stakeholders so as to fight and combat the effects of climate change.

4.4.2 Community perspective on the efforts by the local authority

The research found out that the community was not content with the strides taken by the local authority in as far as climate change mitigation is concerned. One respondent noted that, *“there*

is nothing much on the ground being done to stop activities that contribute to climate change: This concurs with what other respondents were saying that is “*not much has been done by the council to make sure that the populace is aware of what climate change is all about, people are not aware of how their actions and activities influence climate change and the action to be taken so as to mitigate its effects*” All this are indications that the local authority though it deems to have done something in as much as climate change adaptation it has not done enough to make the people have faith in it as a force to reckon with in terms of climate change adaptation.

4.4.3 The role the local people think other actors should play in climate change adaptation

The people had various opinions on the role they thought government should play in climate change adaptation. Some respondents said that the government must provide funds for the attainment or the fulfilment of efforts towards climate change adaptation. One of the respondents had the following to say that caps all the other comments in terms of funding, “*government should avail funding for the climate change adaptation programme*” These adaptation programmes need financial support for them to come to fruition, therefore the research noted that the government as an important actor should make available the required resources for adaptation which is the panacea to sustainable development in the era of climate change.

The other respondents cited that the government must provide policies that enhances reforestation. This is best understood by one respondent who cited that, “*government must put in place mechanisms that allows or fosters afforestation as trees act as carbon sinks*” It is therefore imperative to note that the research identified carbon sequestration as a measure government must pursue so that there is more carbon trapped by trees unlike it going into the atmosphere.

The Research found out that the community believed that NGOS should act as safety nets providing funding for climate adaptation strategies as well as educating the locals on climate change. One respondent best said this by saying “ *NGOs must provide funding as well as assistance so as to bridge the gap which the government and local authority are failing to fill due to lack of financial resources*” This respondent had a comprehensive strategy of which the others fell in this. Due to lack of financial resources the people are most left vulnerable to the effects of climate change but due to NGOs influx the gap will be filled hence reduced suffering on the part of the masses.

The respondents noted that the community should grow more trees as well as get involved in better farming methods so as to mitigate the effects of climate change. One respondent comprehensively said that. “*the community must grow a lot of trees instead of cutting more so as to protect the environment and also the community must diversify their crops so as to diversify risk*” The research managed to solicit this information which is good for societal development because crop diversification is very vital because the entitlements of the local people will be improved because this will lead to the growing of drought resistant crops which will make sure that the food security of the people will be enhanced.

4.4.4 Challenges encountered by the local authority in mitigating the effects of climate change

The research noted that a financial constraint is one of the challenges the local authority is facing. The respondents cited that the council does not have the required financial base to deal with climate change mitigation. This has been comprehensively said by another respondent who said that, “*because of lack of resources the local authority fails to educate and monitor activities in their community*” Financial resources are integral for any goal or achievement to be attained

and this is one of the challenges the local authority has been facing. Mr Taruvinga further asserted that, ” *lack of appreciation on the need to budget for climate change related issues* ” This highlights that the budget are also neglecting the issues of climate change therefore making it difficult to mitigate the effects.

The research also identified lack of qualified personnel as a major challenge for climate change mitigation. The respondents noted that the local authority has been facing a huge challenge of qualified personnel both on the workers as well as councillors. “*The local authority lacks qualified personnel on both the councillors who are the policy makers as well as the workers who are the implementers and this has affected budgeting and policy formulation at grass roots level.*”

Finally, the respondents cited that lack of information as well as resistance from the community is also a challenge on the part of local authorities. “*resistance and reluctance by the local community who will continue to cut down trees even though they are sensitised as well as the low levels of understanding on both the community members as well as its leadership*” Therefore it is imperative to note that this challenge will hamper council efforts in as far as climate change mitigation is concerned.

4.5 Summary

In this chapter the researcher was presenting his findings from a fieldwork research he carried out in Chikomba District between August and October 2013 on the research topic in question. He presented as well as analyzed and discussed the data and research findings. The research managed to denote the drivers of climate change in Chikomba while at the same time evaluating the impact of climate change on the livelihoods of the people of Chikomba district. The research

also managed to examine the consequences of climate change on the development trajectory of Chikomba District as well as proffering climate change effect mitigation strategies. In the next chapter the researcher will be concluding the research, then lastly he will suggest some recommendations he thinks will be necessary.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter begins by giving the conclusions of the research findings. The researcher comments on the results of the study in relation to the research objectives, research questions and the subject matter. He then closes the chapter and the research project by looking at and giving the suggestions he found from his fieldwork respondents' suggestions and his personal recommendations to improve the efficiency and effectiveness/ impact of local authorities in as far as mitigating the effects of climate change is concerned and for similar future researches.

5.1 Conclusions:

Pertaining the first objective of this research project to ascertain the key drivers of climate change the research found out that the causes of climate change in the district are broad and diverse. Climate change has been driven by anthropogenic causes in Chikomba. The leading driver as the research has found out is the emission of carbon dioxide in the atmosphere which was largely driven by human activities. These human activities include the burning of forests that can be referred to as veldfires. This as the research has found out has become rampant in Chikomba District especially during dry seasons.

The burning of garbage by the local authority has also become the other source of green house gases specifically carbon which has largely resulted in the occurrence of climate change. This is due to the fact that the council does not have other sustainable ways of disposing the garbage so they are only left with burning them. Furthermore the research found out that deforestation has also become a driver of climate change in the district. Deforestation has been uncontrolled in the

district hence it has resulted in the emission of carbon into the atmosphere which has resulted in climate change. The research findings also noted that burning of fossil fuels in the district is also a contributor to carbon emission. This has been through the burning of fossil fuels like coal in tobacco curing as well as motor vehicles and machinery in the Manhize Mountains.

Furthermore the findings from the research also noted that nitrous oxide has also contributed to climate change in the district. The research noted that the use of inorganic fertilizers has contributed to nitrous oxide that is being emitted into the atmosphere. Also the respondents highlighted that methane which is coming from cow dung and garbage which is left uncollected for most of the times by the local authority. All these discussed above are the research findings of the research in relation to the first objective.

Moreover referring to the second objective that is to ascertain the consequences of climate change effects on the development trajectory of Chikomba. The research came up with the conclusion that the locals have been affected by climate change in different ways. The findings showed that climate change has resulted in food unavailability in the district which has affected the food security of the district; climate change has resulted in the washing away of the water sources that the people rely on in their day to day survival. Also climate change has resulted in the loss of trees as well as the natural endowments of which the locals heavily rely on them for their survival as well as to enhance their entitlements. The research noted that climate change has resulted in the loss of wetlands which are very important for the rural folks as they provide them with water when the other available sources would have run dry as well as being used for crop production like rice and their disappearance have heavily impacted on the livelihoods of the local people who are already being bedeviled by climate change impacts and hence depleting their entitlements which makes the people unable to deal with climate change effects.

Moreover, in relation to the second objectives the findings led to the conclusion that climate change is heavily affecting the development of Chikomba District. This has been through the fact that climate change has resulted in the loss of livestock. Since Chikomba is a cattle rearing district the death of livestock means the people will become vulnerable to the effects of climate change since it is a form of wealth to the people as well as they act as draught power meaning that this will reduce food production hence food insecurity in the district. The research found out that climate change has affected the attainment of the MDGs mostly eradicating extreme hunger and poverty , environmental sustainability as well as that of universal primary education for all. This has led climate change to affect the attainment of sustainable development.

In relation to the final objective that is to proffer climate change effect mitigation strategies that can be employed by the Chikomba Rural District council the research came up with various ways and methods so as to curb the effects of climate change. These strategies includes that the local authorities must be involved in water harvesting as well as starting irrigation projects for the local inhabitants within their jurisdiction. The findings denotes that the local authority must put repulsive bylaws that are heavily enforced so as to make people desist from cutting down trees, the respondents noted that council should be involved in organizing workshops for traditional leaders and councilors so as to educate people on environmental protection. As well as controlled grazing and crop diversification should be implemented by the local authority so as to improve the availability of fodder for the livestock and diversify risk in terms of crop failure.

The research noted that council has been involved in some climate change mitigation strategies so as to improve the welfare of the people. These activities include selling of coal to local farmers so as to curb deforestation as well as provision of supplementary fodder for the livestock. The local authority as articulated by the research has been partaking the holistic land

and livestock management program which enhances food security. The local authority has got their bylaws that deal with environmental protection in conjunction with EMA. However the research also through questions to the community concluded that the local authority has not done enough in mitigating the effects of climate change as most people are suffering the effects of climate change despite their endeavors.

The local authority has been facing a fair share of challenges as well as the research concluded. The local authority faces challenges of lack of funding to implement different projects in climate change mitigation, also the lack of mostly qualified personnel that is on the part of councilors who are the policy makers and the workers who are the implementers meaning that this lack of technical knowhow is a challenge in the smooth running of projects that improve the welfare of the locals. The local authority is also facing challenges of resistance from the people who are continuously cutting down trees.

5.2 Recommendations

- ❖ Lobbying for better enforcement of laws through the engagement of law enforcers such as the police as well as EMA so as to reduce the cases of veldfires.
- ❖ The council should adopt alternative cleaner methods of waste disposal such as recycling of the waste unlike the burning of refuse they have been involved in.
- ❖ The council must implement the polluter pay principle on the companies like ESSAR so that they reduce their emission of carbon dioxide in the atmosphere which results in climate change.
- ❖ Chikomba Rural District Council should allocate more financial resources for service delivery especially climate change mitigation by buying more waste bins and establishment of a lined dump site so that residents will not dump their wastes everywhere. They should also ensure that the garbage must not be dumped everywhere as this garbage is the source of methane which is driving climate change. The council to

provide bins in the residential area, bus stops, grocery shops and schools so that disposal of these refuse would be controlled and disposed in a manner that is in harmony with the environment.

- ❖ Local authorities should form partnerships with the private sector, community-based organisations and Non-governmental Organizations in the provision of services to the local people so as to capacitate them in this climate change era.
- ❖ Council must intensify the holistic land and livestock management program so that all the residents would be able to enjoy its fruits. This is so because the project does not cover the whole district

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APPENDIX 1

QUESTIONNEER FOR THE LOCAL COMMUNITY IN CHIKOMBA DISTRICT

I am carrying out a research on “**The role of Local authorities in mitigating the effects of climate change: The Case of Chikomba Rural District Council**”. My name is Budiro J Maponde. I am studying Development Studies at the Midlands State University. The purpose of the questionnaire is to solicit information on the above topic. Be assured that responses will be strictly confidential and will be used for the sole reason of pursuing academic interests. No individual names are required on the questionnaire. You are kindly requested to answer the questionnaire honestly.

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION.

i) Tick in the appropriate box

1) Sex Male Female

2) Age <19 20-39 40-59 60+

3) What is your marital status?

Single Married Divorced Widowed

4) Educational level

Primary “O” Level “A” Level Tertiary

Other (Specify) -----

5) Occupation:

Miner Farmer Teacher Other

Specify -----

7.) How long have you lived in Chikomba

1-5yrs 5-10yrs 10-15 15+

SECTION B

<p>8) Do you understand anything about climate change Yes</p> <p style="text-align: center;">No</p> <p>If yes list the causes of climate change -----</p> <p>-----</p> <p>-----</p>	
<p>9) As a resident of Chikomba District what do you think about climate change?</p>	
<p>10) What are the signs that climate change is taking place in your area? -----</p> <p>-----</p> <p>-----</p> <p>-----</p>	
<p>11) What do you think are the measures council should put in place to fight climate change -----</p> <p>-----</p> <p>-----</p> <p>-----</p>	
<p>12) What are the impacts of climate change on the livelihoods of the rural community?-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p>	
<p>13) Do you think that climate change can affect development? Yes</p> <p style="text-align: center;">No</p> <p>If Yes ,explain-----</p> <p>-----</p> <p>-----</p> <p>-----</p>	
<p>14) Do you think that climate change can affect the attainment of the Millennium Development Goals Yes</p> <p style="text-align: center;">No</p> <p>If Yes, please explain-----</p>	

----- -----	
15) List institutions which you think must be involved in climate change mitigation----- ----- -----	
16) What do you think is the role of government in climate change adaptation----- ----- -----	
17) What do you think is the role of NGOs in mitigating the effects of climate change ----- ----- -----	
18) What do you think is the role of the community in climate change adaptation ----- ----- -----	
19) Do you think the local authority has done enough as far as climate change adaptation is concerned? <div style="text-align: center;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </div> If the above answer is no, explain.----- ----- -----	
20) What do you think are the challenges faced by the local authority in fulfilling their mandate?----- ----- -----	

APPENDIX 2

Interview Schedule for the Chikomba RDC officials.

1. How old are you?
2. What educational level have you attained?
3. How long have you worked for Chikomba Rural District Council?
4. Do you understand the climate change phenomenon?
5. What is the impact of climate change in the district?
6. What measures have you put in place to mitigate the effects of climate change in the District?
7. What challenges does council face in fighting climate change?
8. How has climate change affected development in the district?
9. Does Council have any environmental laws that can assist in Climate change mitigation?
10. What is the Council doing to attain the Millennium Development Goals in view of climate change?

APPENDIX 3

PROFILES FOR COUNCIL PERSONEL INTERVIEWED

The list gives brief information about the council personnel who were interviewed in the study. The names are organized in alphabetic order depending on their names.

Pardon Mudzimu	Councilor Ward 9
Reginald Munyati	Councilor Ward 15
Shepherd Maseka	Project Manager
Solomon Taruvinga	Health and Social Service Manager