
# FACULTY OF ARTS

## DEPARTMENT OF DEVELOPMENT STUDIES

## DISSERTATION

### RESEARCH TOPIC

**SURVIVAL MECHANISMS ADOPTED BY RURAL COMMUNITIES EXPERIENCING CLIMATE CHANGE: THE CASE OF HAMA, CHIRUMANZU, ZIMBABWE.**

**BY**

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**DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF ARTS IN DEVELOPMENT STUDIES HONOURS DEGREE.**

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**RESEARCH SUPERVISION ACKNOWLEDGEMENT FORM**

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I the undersigned do/do not acknowledge that the above student has consulted me for supervision on his/her research project/ dissertation until completion. I therefore do/do not advise the student to submit his/her work for assessment.

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## DECLARATION

I, Noel Mbondo, declare that the work that I have submitted is my own effort and it has not been submitted elsewhere for any degree purposes in another university. I certify that the work in this dissertation which is not mine has been identified and acknowledged. It is being submitted in partial fulfilment of the requirements of the Bachelor of Arts in Development Studies Honours degree at Midlands State University.

SIGNATURE DATE

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**ABSTRACT**

This research serves the purpose of revealing the survival mechanisms or response strategies that Hama community employed amidst of climate change manifestation. The study delved the various key segments namely environment, agriculture, water, health and energy which are important for human survival highlighted in the Zimbabwe National Climate Change Response Strategy (ZNCCRS, 2013). The research encompassed two crucial elements with regards to survival mechanisms adopted by the community, that is, climate change adaptation and mitigation. Adaptation involves coping or surviving of a population experiencing climate change while mitigation encompasses reduction or minimizing the occurrence of climate change manifestation which can also mean prevention. The study was motivated by the increase in global alarm with regards to climate change and the desire to improve livelihoods especially in the African continent with less adaptive capacity. Qualitative approach was employed to explain or give detail to the effects of climate change through interview and questionnaires as well as observation. Considering that the community receives little government and NGO support, community participation is imperative with regards to the strategies that are employed in response to climate change. Indigenous Knowledge Systems are a key component in rural people's response to climate change due to lack of real knowledge about climate change, hence there is conscious and unconscious response. Programming solutions to improve the lives of local people were suggested. Chief of them all is the need for serious government intervention to reduce the burden or responsibility of local people to respond to climate change on their own. To ensure resilience and sustainability, there is need to make use of local people's skills and knowledge about their environment to enhance participation for the betterment of livelihoods.

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## ACRONYMS

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| ADB | African Development Bank |
| AEZ | Agro Ecological Zone |
| AGRITEX | Agricultural Technical Extension Support |
| CBA | Community Based Approach |
| CAMPFIRE | Communal Area Management Programme for Indigenous Resources |
| CITES | Convention of International Traders in Endangered Species |
| EMA | Environmental Management Agency |
| FAO | Food and Agriculture Organisation |
| GHGs | Greenhouse Gases |
| GoZ | Government of Zimbabwe |
| IEL | International Environmental Law |
| IKS | Indigenous Knowledge Systems |
| IPCC | Intergovernmental Panel on Climate Change |
| NGOs | Non-Governmental Organisations |
| RDC | Rural District Council |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNICEF | United Nations Children Fund |
| ZIMASSET | Zimbabwe Agenda for Sustainable Socio-Economic Transformation |
| ZNCCRS | Zimbabwe National Climate Change Response Strategy |

## INTRODUCTION

There is an increase on global distress and worry concerning climate change with its effects manifesting harshly especially to communities which depend or survive on climate resources Salick and Ross (2009). This means that there is a shift of focus from wars and conflicts, though still present but at minimal level, to a fight against the glitches that climate change has brought. It is therefore imperative to focus on different strategies that help to overcome the effects of climate change. The African continent has been labelled with lack of adaptive capacity because of the economic challenges the continent is facing Downing et al (1997). It remains a major concern for the African continent to respond to the effects of climate change and variability which are intensifying rapidly posing a greater threat to human survival on earth.

The effects of climate change, as agreed by scholarship have compromised human survival on earth and it appeals for action to take place to bring relief to livelihoods that are affected by evils of change in climate. This research therefore focuses on the response strategies or survival mechanisms which rural communities in Zimbabwe, in particular Hama community in Chirumanzu have been embarking on in order to survive amidst of climate change. According to Madzwamuse (2010), Africa is vulnerable due to widespread poverty that has struck the continent and limited coping capacity because of lack of resources. It therefore means that how rural communities have accomplished to sustain their life in the occurrence of climate change is important. The research centres on four segments which are agriculture, water, health and energy important to human life as argued by the Intergovernmental Panel on Climate Change (2007). The understanding of survival mechanisms should be premised on the ability of a community to adapt and mitigate climate change, hence coping to live despite the fashion of climate change.

The researcher has made an effort to look into the effects of climate in respect of Hama community in the above mentioned segments, highlighted on how the community has managed to survive and endure especially considering that some of the strategies are not sustainable in nature. There have been also suggestions that have been forwarded backing what the community is already undertaking in terms of activities to curtail the effects of climate change. The research is important in that it brings awareness to different development players who are involved in the transformation of rural communities. In Hama community, not much is being done by the government and even the NGO sector in terms of reducing the effects of climate change. Ultimately, it improves and enhances the capacity of the local people to undertake sustainable development projects to reduce the effects of climate change. It also gives the people an insight of climate change since certain endeavours they engage are not done in full knowledge of what they are fighting against.

**BACKGROUND**

The history on the study climate change has no definite date to trace from when it came into existence as it is evidenced by numerous scientists' views and arguments. Perrandi who talks about the 19$^{th}$ century views on climate change postulate that it is daunting task to trace back and derive a period which climate change started. His argument is supported by the views by other scholars who argue that there period was occupied with wars and little focus would be delivered to climate change issues that the earth had started witnessing. James Hutton (1983) is of the idea that there were cyclic changes that were taking place. This is because he discovered past glacial activities in places too warm for glaciers in modern times. These scholars tried to eliminate the focus of scientists and researchers on the date of climate change existence or even the causes but largely on the way forward, in this case, survival mechanisms. The argument is also that, the time climate change indicators were witnessed it was late as human life was already under threat.

It becomes significant to provide measures that can reduce the effects of change and variability in climate. Basing on what Hutton and Perrandi advocates, the best key would be to take a closer look on sectors which climate change has largely affected in order to bring sustainable measure to rectify the challenge that the globe is under threat from. Climate change has seen the globe witnessing in food security, human health, degradation of the environment, energy struggles as well low supply of water that sustains local people from one raining season to the other. Although there has been little information concerning climate change in Africa, there has been review and observations on past changes and future threats for the continent in rainfall and temperatures (Hulme et al, 2000). The discovery confirms that during the period 1961-2000, there have been extreme climate conditions in Western and Southern Africa with very hot days and cold nights in one season and hot nights and cold days in another.

Since climate change is a global concern, meetings, conventions and summits to discuss the matters at stake regarding the compromise and threats posed to human life such as the United Nations Framework Convention on Climate Change, Kyoto Protocol, REDD and other efforts. The main agenda of these various meetings has been aimed at apprehending diverse strategies and survival mechanisms to adapt and cope with climate change. According to the European Union (2015), adaptation mechanisms should be sustainable and must target the crucial sectors within a given community. This means that considerations should be first given to fundamentals that will cover basic needs which reduce the vulnerability and the impact of climate change. It is also important to note the significance of Indigenous Knowledge amongst rural communities to adapt to climate change and even mitigation. According to the Intergovernmental Panel on Climate Change (2010), IK can be useful and has a greater potential to provide sustainable mechanisms for the survival of rural communities. The other advantage is that, indigenous knowledge will ensure community

empowerment since it originates with local people that informed decisions will be presented as well as participation hence sustainable in nature.

The global climate change response strategies have been mainly targeting the causes of climate change and with no doubt scholars have agreed on industrialisation as the major instigator. According to the IPCC (2000), greenhouse gases have a potential to cause future problems regarding climate change in their work on climate change scenarios. The main aim was to assess the effects of these gases especially in the form of carbon dioxide that pollutes the air and leading to global warming. The initiative was therefore to reduce the amount of gases through industrial activities by capitalist countries. It also came with it regulations that would be used to charge countries that would violate the measures of reducing the greenhouse gases. The World Meteorological Organisation together with UNEP agreed that the only way to reduce evils that climate change is bringing on the planet was through reducing the quantity of gases emitted hence a stepping stone to a sustainable living.

As cited before that climate change has largely affected the segment of water, this has not been only the case of Africa or other poor nations but even the rich and capitalist nations (Salick and Ross, 2009). These include European countries, America, Latin America and Central America. There has been lack of fresh water across the globe despite other countries receiving adequate precipitation. However, the above mentioned continents and states due to their access to plenty water from seas and oceans have embarked on the process of desalination. It is defined as the removal of salts from sea water in order to make it appropriate for domestic use and even watering of gardens and feeding animals. This has been managed because of the presence of sophisticated and advanced technology that purifies the water. Many countries have adopted this strategy as there has been lack of fresh water. Currently, Israel although located in a desert has the biggest desalination plant to provide

water for the citizens and even for animals. This explains why the country has been flourishing amidst the harsh weather conditions and unfavourable climate.

The climate change situation in Africa has a greater hold or grip on the agriculture sector and the dependence on rain fed agriculture (Downing, 1997). Unlike European countries that diversify in their economies, the continent of Africa largely, if not solely depends on the agricultural sector. African countries would not suffer from the adverse effects of climate change if they had sophisticated technology to acquire the reach resources such as gold, oil, diamonds and platinum to mention a few. The players within the continent have tried to come up with measures to rectify the challenges that are being brought by climate change within the sector the continent relies on. Although the initiative did not originate in Africa, the concept of Green Economy is prevailing in most countries within the continent. This means that environmental policy and planning comes first as a priority to preserve the environment already under the damage of climate change and variability. For instance, Uganda adopted organic agriculture from conventional agriculture. The country is claimed to be the lowest users of chemical or artificial fertilizers which came as the government introduced the policy. This tally with Collins (2010) who argues that underground water pollution is caused by run off of chemical fertilisers by 50% from agricultural fields hence the adoption of organic farming a strategy to rectify the evils of climate change.

In Zimbabwe, there has been a late response to the call of climate change and variability and its effects have been more of a shock to the nation because of lack of preparation, inadequate resources, poor government policy formulation in the event of a hazard to mention but a few. Zimbabwe, despite the late response to climate change, has been active in international discussions on climate change as far back as 1992 when it ratified the concession with UNFCCC and accepted as connoted by the Government of Zimbabwe. The country later on accepted the Kyoto Protocol in 2009 which however was late due to the damage that climate

change had already done to most rural communities. The nation then endorsed the Zimbabwe's National Climate Change Response Strategy in 2013 which was part of the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIMASSET) as cited by GoZ. The main agenda of ZNCCRS was to address the food security situation since Zimbabwe is an agro-based economy and since the country is susceptible of droughts and also its dependence on rain fed agriculture. This has had an effect of malnutrition especially on children who lack coping strategies and the physical ability for the sustenance of their lives. The response strategy is also aimed at addressing and looking into sector by sector in order to ensure that each sector is provided an adaptation and mitigation strategy that corresponds with the effects which includes education and awareness programs.

With reference to the research area, that is, Hama community, not much has been done by other development players to ensure the betterment of the locals' welfare but much is owed to the community people themselves in the measures they undertook for them to earn a livelihood. Much of what has been done is largely centred on agriculture as it is the major and solely sector that provides for the community. In respect of agriculture, the community has adopted intercropping to ensure diversity of crops during harvest time. This means failure of one crop will not determine food shortages for the locals. To aid the proceeds Hama people get from their fields, they also started small gardens either close to the homestead or close to the water source especially for vegetables. Ultimately, the measures put into place by the heads of villages and chief to safeguard the environment are ranked best. This is evidenced in the regulations against the cutting down of trees in order to preserve moisture as the community suffers from water stress.

**STATEMENT OF THE PROBLEM**

Muzari et al (2014) states that, survival mechanisms of climate change and variability cannot be duly discussed without identifying the problem. There is no solution without the presence

of a problem. Therefore this section serves to highlight the statement of the problem. This research focuses on the adaptation and mitigation response strategies that rural communities, in this case, Hama community has used in the face of climate change. As highlighted before, there is no solution that can come without the presence of a problem, the research has also unpacked the challenges that community people have faced as a result of change in climate. Largely attached to Hama community livelihoods and other communities, climate change has compromised the food security situation, that is, agriculture and water mainly. These communities have suffered because of lack of adaptive capacity. As widely agreed by scholars, the dependence of rural communities on rain fed agriculture is the major instigator that worsens the situation within rural communities.

Hama community of Chirumanzu district in Zimbabwe employed a number of mitigation and adaptation strategies to curtail the effects of climate change and variability. The efforts that the community has placed were primarily to improve the food availability and water access for families within the community. For instance, community leaders in the form of chief and village heads established regulations against the cutting down of trees which they inherited from Environmental Management Agency (EMA). This serves to preserve moisture to a community which suffering from water shortages. It also preserves forests which are the inhabitant place for wild animals. Local people have also situated their gardens close to water sources to aid for their food. The limitations of the two strategies adopted is that, in the regulation of cutting down of trees, other community people do not consider the measure and proceed because there law is not deterrent to the extent arresting people. Locals who are found in conflict against the law only pay small fines. In relation to the gardens that are located near water sources, wild animals devour the crops because the distance from gardens is not close to where homesteads are sited hence no protection from these animals.

## CONCEPTUAL FRAMEWORK

Survival mechanisms are best described as a systems or measures that are established in order to reduce further intensification of a problem at hand. In the view of Joseph Collen (2012), survival mechanisms are reactions that are employed in order to rectify and resolve an impending challenge or difficulty affecting a particular population. This can be conscious or unconscious decisions. The unconscious nature of responsive or survival mechanisms stems from a lack of knowledge of the real or true cause of the problem they are facing. This type of survival mechanism is implemented as a natural response to an impending challenge. The thought process is not as intensified as that involved in the conscious. To further clarify, the unconscious responsive strategies are mainly adopted in these rural settings by what is commonly accepted as Indigenous Knowledge Systems. The conscious one is from a well based perspective or knowledgeable manner such as that executed by governments or Non-Governmental Organisations.

Survival mechanisms in the context of this study refer to climate change mitigation and adaptation mechanisms. According to Moser and Ekstrom (2010), climate change adaptation refers to the alteration in socio-ecological systems to definite expected effects of climate change. They also states that adaptation can be short term and long or long term coping strategies and they should be profound to meet goals of climate change. In other words, it refers to coping or surviving in the face of climate change. Nyon et al (2007) climate change mitigation involves of actions to reduce the magnitude of climate change whether long term or short term. Mitigation therefore comprises of activities and policies to lessen greenhouse gases. Locals in Hama have engaged in the digging of wells to mitigate water shortages. This has enhanced the agriculture system at local level and also for animals. With regards to the survival mechanisms employed by Hama community, the research will focus on the following strategies, that is, introduction of drought resistant crops which cope with low

rainfall, conservation farming, establishment of gardens near water sources, organic farming as well as intercropping. With regards to water, community people employed irrigation and construction of water tanks while in health there was construction of ablution facilities through WASH program. In energy, there is rural electrification though it covers a small portion of households as well as solar energy.

Intergovernmental Panel on Climate Change (IPCC, 2007) defines climate change as a "change in the state of climate that can be identified or recognised by changes or variability of its properties and that persists and perseveres for an extended period of about a decade or typically longer". In reference to this study, climate change can be noted by abnormal rise in air temperature, prolonged drought periods, decrease in precipitation levels, amidst other factors. United Nations Framework Convention on Climate Change (UNFCCC, 2011), further connotes that climate change and human activity are intertwined. Much blame of these adverse effects of climate change is a result of industrialisation which has seen more greenhouse gases (GHGs) such as carbon dioxide and carbon monoxide being released into the atmosphere. This has also been contributed to global warming leading to change in weather and rainfall patterns which has been the greatest challenge faced by livelihoods in rural communities. Whereas climate variability refers to weather or climate fluctuations which are recognised by an extreme to one end of weather and it is unpredictable. Climate variability does not have a consistent happenstance as they can occur in one season and not occur the following. For instance, short winters and long summers or one rainfall season that will precipitate longer than the other.

Rural communities are defined as associations maintained between the populace in a given area and in which they live on spread out farm states and in villages which in most instances forms the centre of mutual activities (Sanner, 2003). In this piece of work, rural communities

are characterised as people who share common societal beliefs and live in an egalitarian society such as that exhibited in Hama, Chirumanzu.

**THEORATICAL FRAMEWORK**

There are a number of theories or philosophies that can be used to structure the work of this research. The topic of climate change in a bid to come up with strategies or responsive mechanisms to rectify the evils brought about by climate change intertwines a number of theories. This means that different theories can be integrated to explain the causes, impacts and then strategies that can be executed in order to reduce or lessen the impact of climate change. The researcher used the concept of Sustainable Development as the foundation to this study since it is aimed at bringing programming solutions that improves human livelihoods for the better. This is in line with the propositions of the Sustainable Development Goals (SDGs) of 2015 which are aimed achieving specific targets by the year 2030 according to the United Nations. The targets incorporates every country and not only the poor countries hence they are universal in nature as they require urgent action from all front such as businesses, civil society, governments and local people.

According to the World Commission on Environment and Development (WCED) in their report "Our Common Future" of 1987, "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This becomes imperative in the establishment of policy that is aimed at responding to the effects of climate change. According to the United Nations (2015), there is need for exigent action to combat climate change hence agreeing with the concept of sustainable development. Failure of the international community to ignore the rampage of climate change reflects how multiple stakeholders should be involved in bringing solutions to the impending challenge.

The concept of sustainable development is crucial in formulation of climate change response strategies in that it focuses on the fundamental components which are economic growth, environmental protection and social equity. Gro Harlem Brundtland (1983) is of the view that there is need to promote economic and social enhancement through employing mechanisms that are detrimental to the natural environment hence avoiding overexploitation and pollution. The desire of interconnectedness between social equity and economic growth by the former Norwegian Prime Minister tallies with the thinking of Patricia Mische that there is need to preserve human communities as well as the natural environment.

The concept seeks to address institutional gaps within governments that are responsible for carrying the burden of protecting the environment. In other words, sectorial approach serves best as it mandates every body of the government to commit in order to lessen the impacts of climate change. In this regards as connoted by the Brundtland Commission, economic growth should be given priority same with environment. Technology which scholarship blames as the major degrader of the environment has to be monitored. Mentioned in the concept, population growth has to be monitored as it can put pressure on the resources based on the thinking that the earth's resources are finite according to the World Bank (2012). Another key component is the provision of basic needs to every person and also giving an equal share to the least developed countries from the resources that are obtained from their environment.

In summation, the concept of sustainable development gives priority of humans and attached to that is the preservation of the natural environment. Industrialisation and the effects of the Second World War being primary contributors of the ecological change are the concern to reduce the impacts. This means that, carbon emissions should be minimized at all costs to lessen further harm. In relation to this study, activities that are undertaken by community people should be environmentally friendly. This can be necessitated by equal sharing of

resources as well as responsibilities to the damage that has been done hence a multi stakeholder approach.

**OBJECTIVES OF THE STUDY**

1) To examine how climate change and variability has affected Hama community.
2) To assess the effectiveness of the response or survival mechanisms adopted by the community to adapt and mitigate climate change.
3) To examine the propositions on how Hama community can effectively deal with climate change.

**RESEARCH QUESTIONS**

1) What is the nature and impact of climate change in Hama community?
2) What has been done by community members to cope and mitigate the effects of climate change?
3) What suggestions would be put forward to respond to climate change in Hama community?

**SIGNFICANCE OF THE STUDY**

Climate change and variability has had adverse effects on livelihoods and even animal life across the globe and much of these effects have been largely felt by the African continent. Climate change which has become topical has compromised and led to a competition on few resources that are finite between humans and animals in a continent already in failure and struggle to sustain livelihood in a sustainable manner. It remains a major concern for the nation of Zimbabwe to respond to the effects of climate change and variability which are intensifying rapidly posing a greater threat to human survival on earth. Ajam Braham states that, “complaining is finding faults wisdom is finding solutions”. Thus it is the responsibility of Zimbabweans and development practitioners to search for strategies to respond to the evils of climate change instead of sulking and complaining.

The researcher selected Hama, Chirumanzu because of knowledge of the geographical area. Coupled to this, the researcher would face little to no resistance from the locals because of connection with the community. This made the acquisition of data a simple task instead of a daunting one. Hama residents solely depend on agriculture as a source of livelihood and the sector is sustained by rainfall which has among the years reduced and changed in terms of patterns. This has posed a threat to their survival and it is important come up with strategies to respond to the crisis that has affected the sector.

The beneficiaries of this study are mainly the Hama, Chirumanzu residents because the work will provide on with new dimensions which the community is supposed to implement to curtail the effects of climate change. This will alert them of the problem in a conscious manner hence capacitated with the ideal knowledge to note a particular problem then bring a solution. The government and the council will also benefit from the study as they will not have a generic approach when dealing which such challenges. Their policy, programs and projects will be geographically based and this work provides one for Chirumanzu, Hama. Governments have tendency of assuming solutions to implement in a given population hence poor targeting.

**LIMITATIONS OF THE STUDY**

Cooperation from council in terms of the documents requested was minimal as the researcher only receives partially and out-dated sources which would not provide current information as the researcher preferred. In addition the targeted sample size was not reached. The target was for a sample size of 50 people but the realised number was 35. This was as a result of residents being occupied with field preparation for the next cultivation period. The other challenge was lack of knowledge that includes the terminology surrounding this research which made questioning a daunting or an overwhelming task. Financial challenges especially for the purposes of travelling from one point to the other to gather the necessary information.

## RESEARCH METHODOLOGY

The research naturally took a qualitative approach due to many variables that within the study. There was little to no numerical data to a topic which brings many dimensions that needed an explanation or interpretation from the researcher. There was need to deduce meaning from the information through the use of manifold sources. These include other research papers, books, journals etc. Data from primary sources such as interviews and questionnaires needed to be validated by the use of the aforementioned secondary sources. The flexible research design accounts for this to be noted as a qualitative research. It was during interviews and group discussions that the researcher was led on which areas to concentrate on.

## RESEARCH DESIGN

The case study of this research, that is, Hama, Chirumanzu was selected because of the community's dependency of climatic resources. It is also because of the fact that the area is feeling the effects of something they are not responsible for.

## DATA GATHERING INSTRUMENTS

### QUESTIONNAIRES

There was an ample use of questionnaires, amounting to a total number of 15 questionnaires. Questionnaires are important or useful in that the respondent has the time to complete and to think over the questions asked. It also helps the researcher streamline the answers that are needed. The questionnaires necessitated time efficiency and good organisation. The researcher was able to collect both quantitative and qualitative research data from a sizeable number of respondents.

### INTERVIEWS

The research was actually very extensive in nature to the extent that not everything would be housed in questionnaires hence conducting interviews (20) was paramount to this work. It was through these interviews that the information or data gathered was written down for use

later and some were recorded as there could be a probability of missing important aspects through writing. This was done to get full details about the research being carried out. Moreover, it was difficult for some of the respondents to read English especially due to their illiteracy. Confidence would be realised the language they understand and are comfortable using, that is Shona hence conducting interviews became essential.

**SAMPLING**

Sampling can be defined as the selection of a small fraction of participants in a given larger group of participants. This selected small fraction of participants will represent the total group as a whole (Fridah, 2002). Sampling provided the research with the opportunity to produce practical and accurate results. Also, Hama area is too large to hand questionnaires and conduct interviews with each resident thus the need to select a sample that would represent the whole.

**SNOWBALL SAMPLING**

The research made use of snowball sampling. This method of sampling allows the participants to nominate other candidates after being selected. This sampling method allowed for the researcher to reach participants within the same field of study interest. The sampling method aids the researcher in discerning features that were unknown to him/her before the study commenced. The referral system used by this method eliminates resistance from the participants in an African setting as they are not apprehensive as they would be with other sampling methods.

**TARGET POPULATION**

Chirumanzu as a district has a population of about 80 351 according to ZIMSTAT census of 2012. The target population for the research is estimated to be 4200 people in Hama area. A total of 35 participants responded to this research.

## LITERATURE REVIEW

This segment will focus on the discussions and deliberation by various scholars and experts in the field of climate change, putting much emphasis on survival mechanisms that have been adopted in the face of change in climate and variability. Climate change response strategies are aimed at reducing the occurrence hence mitigation as a major subject and how communities or states can cope amidst of the effects of climate change, that is, adaptation. In other words the review will point out on mitigation and adaptation to climate change. In this literature review, the researcher will put forward discussions on the distinction between climate change and variability, gaps that other scholars have not covered in respect of climate change. The section will also factor in the analysis of mitigation and adaptation to climate change by rural communities globally, in the African continent and in Zimbabwe.

Firstly, since this research pertains to Zimbabwe, there have been arguments raised on whether the country has experienced climate change or climate variability. Manjengwa et al (2014) believe that the Zimbabwean situation is not as a result of climate change but climate variability. Climate variability is defined as weather fluctuations which manifests through extreme weather performances and are not predictable and they do not happen consistently. According to the Institute of Environmental Studies, climate change is recognized after a period of 40 years of consistent occurrence whereas climate variability can occur in one season and not the following. An environmental officer by the name Masiiwa in an interview mentioned that Zimbabwe has not yet experienced climate change due to the inconsistency in terms of weather performances. In such a scenario, it means that the country's response strategies should be aimed at adapting or mitigating a shock that the communities can suffer as a result of climate variability. The space between the two noticeable droughts of 1992 and 2002 has been the basis through which scholarship cemented their arguments on. The Government of Zimbabwe through the Ministry of Environment suggest the interchangeably

use of both climate change and variability because one way or the other, climate variability will graduate to climate change.

In the global context, climate change adaptation can be achieved through reduction of greenhouse gases according to the IPCC (2007). This stems from the fact that, much of what the world is experiencing now with regards to climate change, is as a result of industrial activities that the developed world has undertaken in previous years. Under International Environmental Law (IEL), states have got the obligation or mandate of protecting the environment from any possible harm. This has led to the establishment of different policies, regulatory measures and principles which states are supposed to adhere to in order to reduce future damage. The United States of America special envoy on climate change in 2016 proposed that both developed and underdeveloped countries should make it a goal to fight climate change. Propositions such as protection of trans-boundary pollution and the principle of shared resources are examples of pieces of legislation to reduce the effects of climate change. States have therefore become more careful in different activities they undertake due to the reparations they pay after a state is found in conflict with the set measures hence a stepping stone to climate change mitigation.

An important dimension, that is, agriculture which scholarship made efforts in order to alert the globe on climate change response strategies. Howden et al (2007) states that currently, 1.2-1.5 billion hectares are under crops, 3.5 billion hectares are being grazed by both wild and domestic animals and 4 billion hectares of forests. They went further to mention that in order to meet the population growth, the production is agriculture has to double current production. This means that the major considerations should be given the agriculture sector in order for food production to correspond with population. With the agriculture sector already underperforming evidenced by the decrease in global production of wheat, oilseeds and coarse grain from 15% to 35% as stated by Ferres (1999), the weather predictions reveals that

climate change will have subsequent impact of agriculture. The suggestion on global level is to diversify in the sector in order to meet the demand of the growing population. According to Kurukulasuriya and Rosenthal (2003), climate change is of major concern to agriculture in every rural setup especially in Africa. Their argument is based on the reality that, African countries have less adaptive capacity with regards to shocks especially on a sector they depend on. They pointed out that a number of factors such as market fluctuations, policy formulations, technology and trade as motivations for agriculture hence it should be the starting point for governments when responding to the effects of climate change.

In as much as the above stated is true, scientists have found ways to curtail the negative impacts of the changes brought about by climate change. These ways will hence forth be known as survival or responsive mechanisms to climate change. In South Africa, the Minister of Environmental Affairs on 15 September 2015 at the University of Johannesburg stated that there was a need to increase the intensity towards reducing the negative impacts climate change was having on South Africa. His words express the intensity of the problem. He states that, "the impacts threaten to severely undermine the developmental gains made by our young democracy in the past 21 years". For example, South African has initiated the Green Transport Strategy, which saw the introduction of energy efficient transportation into the public sector; hence inclined to the concept of green economy. They have also indulged in shifting freight from road transport to rail, thereby reducing the carbon foot print.

In the agricultural sector, Uganda has implemented some initiatives to the aforementioned cause. They have adopted organic agriculture to conventional agriculture. Organic agriculture can be defined as agriculture that makes use of naturally occurring substances, such as manure, meanwhile prohibiting the use of synthetic substances. Organic agriculture can also be best described as a production system that sustains the health of the soil, ecosystem and people, by relying on ecological processes and natural cycles (Joshi 2016). This wave or

interest in this manner of conducting agricultural practices was fanned by a justification given by Collins (2010). He notes that 50% of water pollution in Africa is caused by run-off from agricultural fields. This is only exacerbating an already present catastrophe in Africa. The continent has for years been experiencing problems of access to fresh and clean water. Therefore by this program demonstrates Uganda's ingenuity when addressing this problem.

There has been an important subject concerning climate change adaptation which can improve the livelihood especially in the African context. The bringing in of technology has aided to predict or reduce the effects of climate change. However, rural people have always been aware and well knowledgeable of how to deal with challenges that would threaten their lives. This is called Indigenous Knowledge Systems. It is the use of local or indigenous knowledge to predict, mitigate and respond to the problems that a community will be facing. According to Hernert and Robert (2001), they argue that indigenous knowledge is cost effect, participatory and sustainable. It is therefore important to embrace the use of local knowledge when providing strategies to curtail the effects of climate change. Participation is necessary for development to take place in a sustainable manner according to Page (2002). He postulates that community participation is of vital significance for the development of rural communities hence through indigenous knowledge participation will enable sustainable survival mechanism.

In Zimbabwe, the government has been criticized because of lack of commitment to effectively deal with the effects of climate change with regards to policy formulation and project implementation. The government of Zimbabwe has acknowledged that climate change is serious and is a threat to livelihood especially rural people as stated by GoZ (1998). The country does not have any specific national policy or even a legislative framework for climate change adaptation. However, the efforts by the country which manifested through different development policies in different sectors reveal the will of the government to reduce

and adapt to climate change. Firstly, the government's endorsement of the UNFCCC and Kyoto Protocol in 1992 and 2009 respectively has been regarded as a stepping stone to bring survival strategies amidst of climate change. In 2016, the government through the current Minister of Agriculture, Perence Shiri and President Mnangagwa introduced Command Agriculture which is aimed at increasing food production. This initiative brought success to the country as it witnessed a bumper harvest in the season 2016/2017. Through this strategy, farmers obtain agricultural inputs from the government to maximize productivity as other farmers have no capacity to acquire needed inputs to utilize the land. Nevertheless, the initiative has been criticized of being political but has yielded results that have improved local people.

Different governments and NGOs have been condemned of leaving out the gaps with regards to climate change mitigation and adaptation (Chagutah 2010). They have largely focused on responding to agriculture and other visible elements while the effects of climate change now exceed the perceptible. There are a number of knock-on effects of climate change which are compromising livelihood in various communities. The theory of ecofeminism which states that women and nature are one and will suffer more from the effects of climate change according to Shiva and Mies (1995) calls for greater consideration to the affected group. The hypothesis of child labour versus child work has not been answered especially in the African context as reports of children undertaking duties that undermine their rights UNICEF (2014). These effects include, the burden of fetching water on women and children, school dropouts especially the girl child, child headed families, migration by parents or men who can undertake off farm activities, early child marriages, children betrothal just to mention a few. Rosenzweig et al (2002) connotes that players who engineer strategies to mitigate and adapt to climate change should put into consideration the above mentioned effects hence scaling vulnerability in coming up with programming solutions. In other words, the plight of the most

vulnerable groups should be prioritized, therefore the strategies sustainable in manner as it incorporates all groups.

## ETHICAL CONSIDERATIONS

The researcher paid thoughtful attention to confidentiality while undertaking this research. Every stakeholder with regards to the work of this study was given confidence that there would be no disclosure or misuse of the information obtained from the participants. The researcher was honest and did not practice any gimmicks to acquire information from the people. There was no promise given to the participants in giving information which is usually given through monetary funds. The researcher also respected the leadership of the community and various offices from which information was found.

# CHAPTER ONE

## THE EFFECTS OF CLIMATE CHANGE IN HAMA COMMUNITY

### INTRODUCTION

Hama community is housed in Chirumanzu District in the Midlands Province of Zimbabwe. The community encompasses wards 3, 4, 7, 8, 9, 10, 23 and 25 of Chirumanzu district. The district as a whole lies in Agro Ecological Region three (3) and four (4) but the Hama community is located in region four. The area is characterized by great aridity and erratic rainfall patterns. Chirumanzu district as a whole has a population of 81 000 whilst Hama community has a population of 11 7000 according to ZIMSTAT (2012). The main activity that the inhabitants of the area depend on is agriculture chiefly crop cultivation such as maize, rapoko and groundnuts. The soils that are found in the area are usually sand and clay soil with small parts covered with loam.

The section will provide with detailed information and material pertaining to the effects of climate change in Hama community of Chirumanzu district in Zimbabwe. Major focus will be on the various sectors that are essential to human survival and life sustenance of earth and these are agriculture, water, health and energy. It is important to outline the effects that climate change strike on humans and animal life in order to come up with programming solutions. These programming solutions, in the case, survival or responsive mechanisms will therefore aid in the betterment of rural people's livelihoods. Therefore, it becomes necessary to point on the negative impacts that climate change and variability poses on the environment and human life in Hama area. The effects are also categorised into physical or environmental, aimed at exposing how the physical environment is under threat. Another class or dimension is on the socioeconomic factors which directly affect the lives of local citizens of the community and how climate change has affected the political stance.

The effects of climate change and variability in this study will be looked at sector by sector. This will provide information on the evidence of climate change in Hama, Chirumanzu on the damage that change in climate has produced on the environment. These sectors include agriculture, water, health and energy. Focus on the natural or physical environment though it is intertwined to the sectors that will be looked at is another aspect to take note of. This stems from the notion that the environment is where different activities that sustain rural livelihoods are undertaken. For instance, the way agriculture and the environment are affected by climate have a two way explanation. The first scenario is that, if agricultural activities or farm practices are poorly done, they will degrade the environment because everything is practiced on the environment. The other dimension is that, the infringement of the environment will mean that agriculture cannot be fully practiced in a manner that will provide for community livelihoods. The compromise on the agriculture means that community people will add more pressure on the environment as they depend on climatic resources. Socio-economic effects of climate variability and change are also going to be highlighted to show how the community livelihoods are struggling since they depend of climatic resources.

**The effects of climate change on the physical environment in Hama Community**

A better understanding of how climate change and variability has affected and compromised community life in Hama area can be drawn from the impact on the environment. The impact is usually negative especially in Africa. Scholars argue that, other countries such as China, Russia and Scotland will experience the positives that climate change will bring. This is mainly because certain ice seas are melting which will be to their advantage in terms of trade. For instance, the Arctic sea case, countries already are contending to take control. In the African context, with Hama included it has been difficult for scientists to predict any possible positive that the change in climate will bring. Rather communities are continuing to struggle to mitigate and cope with the effects of climate change because they rely on the environment.

The first noted effect of climate change on the environment in Hama area is sparse vegetation cover due to dwindling erratic rainfalls within the area. This has been a result of lack of enough rainfall or inconsistency of precipitation over the years with notable droughts occurring consistently. Images of the Govere area in the past two decades together with reports from local people provided currently shows a great difference on how the situation was before. Through an interview, a local man testified that, "*the size of the forests and vegetation cover has become smaller as compared to the past years. There are certain places which we were not aware exist in our community which later on revealed as a result of low rainfall patterns that led to the drying of trees hence loss of forests.*" The dilapidation of forest especially the "Musasa" tree which dominates the larger percentage of the trees within the community reveals the harshness of climate change because the forests would preserve the moisture to support agriculture which the community depends on. Through observation, there are no leaves in some of the three and they have dried up. Local people have been using these as a source of energy given there is no electricity in the rural areas. The situation has also been worsened with lack or no evapotranspiration taking place as the trees no longer support the process.

The lack of adequate rainfalls as mentioned earlier on meant a decrease in food production from agricultural fields hence food insecurity for the inhabitants of the Hama area. Most rural communities across the African continent survive from climatic resources which does not exclude Hama from the victims. This means that local people will exploit every option available for them in order to provide for their families. Part of the exploitation involves harsh activities on the forests mainly and other climatic resources in a degrading manner because of lack of knowledge on how to preserve forests and climatic resources for future generations who would also want to survive within the same means. This has intensified the struggle for locals because it is also another way through which rainfalls decreased as there

was no longer the process of evapotranspiration. The exploitation of forests was through deforestation, in other words the cutting down of trees. Locals mentioned that the cutting down of trees was largely done for agricultural purpose to increase the size of the fields with households expanding in numbers. The other reason why trees are being cut down is because of housing in the local area.

Connected to the dilapidation of forests as we as deforestation, local citizens from Mavhaire, Taringana and Govere affirmed on the rareness of wild animals in the forests. Across the globe, there is a fear and alarm that certain species of animals can cease to exist, thus extinction. Measures and regulations to preserve animals have been undertaken such as the establishment of CAMPFIRE (Communal Area Management Programme For Indigenous Resources) in Zimbabwe and also CITES (Convention Of International Traders In Endangered Species) globally. The formation of these conventions and institutions emerge because of global fear to lose certain species of animals. In Hama area, though still present, the wild rabbit is scarce as compared to the previous years according to local reports. It has been a result of change in climate through lack of adequate water that led to the situation which the community is suffering from. Interviews highlighted that hunting which aided the food supply of the local people decreased as hunters can visit the forest 4 consecutive days without catching any animal which is different from what they testified would happen previously. Animals such as the wild rabbit, kudu, hare and impala are now almost extinct within the community.

Hama old residents who have stayed in the area for 30 years or more attribute the challenges that the community is contending with to water shortages. Their thinking is justified because one way change in climate has revealed itself is through inconsistent or lack of rainfall. In this respect, local citizens have complained due to the extinction of unique shrubs which used to be found in their forests. They stated that during the years of droughts, such shrubs would

not grow because they require a lot of water or would be in short supply. Such shrubs or plants would be used for medicinal purposes for humans and animals and as a result of climate change which manifested through water shortages the shrubs cease to exist. Two Traditional healers from Hama mentioned that, "*it is now difficult to access herbs in the forests and also roots of plants that are necessary for the medicine preparation process. The roots that we find these days have less water content which is necessary for healing. Other trees are no longer in existence.*" Also, certain mushrooms type no longer grows in the forest especially in the Chipadza Forest across the Shashe River. These would aid the diet of local people particularly from November to March when rains would fall regularly. They were places which were known to be sources of mushrooms which no longer supply for the community and water shortages as highlighted the major instigator of short supply.

The way through which climate change has affected rural communities is intense because climatic resources complement each other in order for the dependants to survive sustainably. Failure or short coming of one results in the dysfunction of the whole process. The sparse vegetation as well as loss of trees especially in the mountainous areas within the community resulted in the loss or decrease of "murakwani" (humus) which is produced after the process of decay and decomposition of leaves and natural insects in the soil aid the process. Local farmers would require no artificial or chemical fertilisers which degrade the environment because of the presence of "murakwani" which is rich with natural nutrients to support the agriculture that the locals would practice. Through an interview farmers would gather it from mountains and carry to their fields. A farmer by the name Isaac Adamu from Govere in Muzorori village stated that, *"we would gather humus from the mountains to our fields. The humus would effectively support our agriculture through the provision of adequate nutrients for about two to three years without adding anything to the soil and we would realize high yields.*" This led to the adoption of chemical fertilizers which only a few would afford mainly

due to the different types that are required such as compound D for start and Ammonium Nitrate after about 6 weeks of germination. Their complaints are that humus is now scarce and only those with scorch carts can reach the mountains that are far from the community.

It would be injustice not to mention on the lack of enough pastures to feed domestic animals that the Hama community is now facing. Due to low rainfalls which are being experienced as a result climate change, grass growth has been awful as well as the trees as mentioned earlier. Local herds depend also on the environment like humans and the poor performance of pastures mean that there is distress for animals. This results in the reproduction process of animals taking place at a slower rate because of food shortages. In the event of the birth of calf or kid which are common domestic animals, they usually die early because the food from the environment and the mother will not be sufficient to support the life of these young ones. It should be noted that some of conflicts that the African continent is facing now is as a result of lack of pastures and other groups would want to dominate others by claiming boundaries. Hama has not reach that stage yet because the community is small and tries to live in harmony and egalitarianism but the pastures are now small. Herdsmen have complained for reaching faraway places to find better places where animals can feed. This has forced the community to destock and even selling animals because they would die as a result of food shortages.

The greatest challenge that the locals are facing is that since forests are now small, there is the battle between wild animals and domestic animals due to what is known as ecosystem imbalance. Cases of goats being eaten by hyenas and foxes are common in the Hama community. Foxes which are not familiarized seen in the day now visit homesteads to attack the animals for feed. This is because of the extinction of certain animals in the food chain that leaves the wild animals with no option but to attack domesticated animals. Locals believe that it is due to the fact that herdsmen reach far places which is close to the habitat areas for these

animals that pulls them to attack. In 2010-2011 there were cases of hyenas killing humans within the community whilst trying to protect their animals. Community citizens are now building their kraals with tall large trunks to minimize the risk of losing their flocks from wild animals. The unavailability of food automatically leads to the increase in crime rate and in the case of Hama it is stock theft that is common. Climate change is responsible for all these struggles that the community is suffering from as local people are unable to produce.

Since it is a matter of deliberation amongst scholars whether Zimbabwe is experiencing climate change or climate variability, unpredicted abnormal rains have been noticed within the community. The occurrence of such climate activities is under climate variability because it does not happen consistently. This has resulted in gullies hence environmental degradation. Through interviews, Dennis Muzorori said that, "*unexpected rains that falls in large volumes, with high intensity and duration contribute the formation of large gullies in our community*." The researcher observed the uneven of the roads and naturally formed ditches which came into existence because of such unpredicted rains. Other manifestations have been soil erosion which is the washing away of top or surface soil by either wind or water. Water has largely been the instigator and also led to silt like soils within the community.

**The effects of climate change on Agriculture**

Hama community of Chirumanzu is housed in the agro ecological region four although the district as a whole is found in two regions, that is, region three and four. Agro ecological region can also be termed Agro Ecological Zone (AEZ). Region four is characterised by low rainfall or in other terms erratic rainfall patterns as well as aridity. Erratic patterns mean that it is difficult to predict or anticipate the coming of rains or precipitation. Precipitation does not occur in a consistent manner and this has an impact negatively on a community which solely depends on agriculture as a means of life. This therefore compromises the food security of the community as the local people rely of the rains which are in this case irregular

and unreliable. The challenges that the community is encountering emanate or spring as result of the characteristics of the region which Hama community is situated. There is no correspondence between the weather patterns of the area and what the community members would be expecting. This has led to situations of drought, delayed rainfalls and even flooding due to unpredictability of the rains.

To add on, as it has been mentioned earlier on that Hama community is located in Agro Ecological Zone four which is characterised by aridity and very high temperatures, there is an increase in the aridity of the region. Mugadani et al (2012) connotes that dry regions in Zimbabwe, that is, region 4 and 5 have expanded by 5.6% and 22% respectively. The changes or expansion of the regions can mean a possible reduction in food production hence food security compromised for the local people and across the nation. This means that the region is drifting towards climatic conditions that ate not favourable for the practice of agricultural activities that will provide food sustainably for the locals since they are victims because of their presence in the regions that are expanding. The major reason why this is a compromise of Hama community is because it depends on rain fed agriculture.

The first point to note in respect of the effects of climate change on agriculture in communities is decreased yields or reduced food production. Rural people in most of African countries depend on the various activities they undertake in their fields or farms. This has been their way of life dating back to the Iron Age and years before the colonisation evidenced by different archaeological findings. According to African Development Bank (2016), most countries within the continent largely depend on agriculture for their life sustenance and the greatest potential that Africa has is in agriculture. It goes on to mention that the continent's misery can be realised through under production in the agriculture sector. This all explains why agriculture is of great importance when it comes to livelihoods in rural communities and

why it should be a distressing matter. Agriculture in rural setup is mainly subsistence and depends on the rain.

In Zimbabwe, the staple crop, that is, maize started to show signs that production would diminish dating back to the Fast Track Land Reform Program. In previous years, if communities failed to produce what was enough for their sustenance from one season to the other, they will buy from fortunate places or the Grain Marketing Board. After the Land Reform together with climate change already on the rise, maize production decreased throughout the whole country approximately by 20% according to Food Agriculture Organisation (2006). This does not exclude Hama from victims in respect of areas which started to realise decrease in production of the staple crop. A farmer within the area outlined that, *'in the 1990s we would yield or harvest 30+ bags of maize per each field. This is contrary to the current situation where we can only get about 5 bags of maize in every farm we have."* Other households are reported to have produced nothing in periods of drought. Community people would produce enough maize which they would sell to the GMB and even private buyers. Their food would also be enough at times to feed the households for two seasons even if there would be an occurrence of a drought.

People in the Hama community would also diversify in the years when rains were consistent and regular to support agricultural activities. Their diversification in cereal crops would range from maize, millet and rapoko. These would be produced in large quantities and would aid the families' feeds. Community citizens claim that the meals that would include millet or rapoko, in local or native language "mhunga or rukweza" were special because it was a symbol of abundance to them producing such cereals. These would also be used for example in the brewing of beer which communities would enjoy for their leisure. The farmers have lost record of when they last produced such crops. If produced, they are usually in small quantity which is not enough to meet the demands of the household population which have

increased recently. In Mutenderende, families which tried to grow the millet and rapoko dismally failed because the climate or the weather no longer supports the production of such crops. The meals prepared from such crops are healthy and proves how local people would not suffer from nutrition related diseases because of the nutrition content in their food. This is evidenced by the prizes of the mealie meal of such crops in retail shops. Therefore the unfavourable climatic conditions which led to the underproduction of these crops affected the community.

Under crop production, climate change has compromised the lives of local citizens through the death of nutrition gardens and cooperatives which were mainly used for the production horticulture products. One way through which rural people would survive despite the challenges they encountered was the complementary role the nutrition gardens played. Local households would situate their gardens close to water sources to facilitate the watering process of the crops that were grown in these gardens. These gardens were mainly for vegetables and also the growing of crops such as maize before the onset of the rain season for production to begin in the agriculture fields. With the reduction of the rains that the country started to receive, it has become difficult for community people to continue maintain the gardens because water is no longer accessible. Cooperatives that were either started by local people or introduced by NGOs are no longer functioning because of the same challenge, that is, lack of water to support them. The formation of a large garden with village people undertaking their activities in the apportioned area created what is called cooperatives. These currently cease to exist and in the villages they still are present, they are practiced at minimum production. Some of these gardens and cooperatives were wiped away by the floods and notably the gardens close to the Shashe River.

In animal husbandry, the number of herds and flocks which people used to have has changed because of climate change and variability. The lack of enough water has led poor

performance of pastures to meet the demands of the domesticated animals. As it is a fact that is agreed amongst scholarship that rural communities especially in Africa have less adaptive capacity, it is difficult for local people to aid the feeds of the animals with the feeds that are manufactured or used in commercial production. A local herd man outlined that, "*the health of animals show signs of undernourishment especially in cattle which require much feeds than any other domesticated animals. A family in Govere lost 4 cattle from in one year and the family believes that it was due to underfeeding.*" Other cattle are found dead in caves as they would be searching for water. Community people states that they enter such places and stick their heads and in trying to come out, they would stick their heads and fight and die. Today, the community is engaging on destocking and selling of their animals due to fear and even to aid or exchange with maize.

Climate change has exposed these animals to many diseases such as anthrax, foot and mouth and black leg which were not common when these animals would have enough food and water. The community people are poor and unable to purchase medicine to treat their animals. What really makes a bigger challenge when it comes to cattle is that they are used as draught power and they become important to the survival of local people. In respect of the bird family, heat related diseases have affected especially the chickens which suffer from heat stress. This means that the production is reduced because the conditions are no longer favourable for flock which is already fighting diseases in their bodies. The rearing of fowl has become a daunting task with the Hama community because they are becoming expensive to maintain because of the diseases they are always suffering from.

**The effects of climate change on water**

When it comes to how climate change has affected the water situation in the rural communities, in this case Hama area, it is imperative to first focus on precipitation level decrease. Scholarship is of the view that, African countries should attribute most of the

challenges they are encountering to the decrease in water supply hence the manifestation of climate change and variability. According to Mugabe (2012), annual rainfall levels in Zimbabwe are anticipated to decline by 60% by the year 2080. This means that communities across the nation will come across distressful situations in the future to the fact that they lack adaptive capacity to climate change. In Hama community local citizens mentions that after the 2002 drought, the community has not been receiving enough rainfall to support their activities. This is mainly agriculture and also for consumption by animals.

In the same token, precipitation has also changed in terms of the period it would come the years that the area would flourish as compared to the current situation. Community citizens from interviews have reported that, "*rains would come in mid-October and the period would mark the beginning of agricultural activities in the fields. After the year 2000, rains shifted their period of coming and would come in mid-November*." During this era farmers were compromised but would produce what would sustain the family though not to the level they were producing at in the years when rains would come early. From 2005 to date, the situation has changed the rains can reach December without falling. In the event of receiving the rains, they have low intensity and low duration which makes them inadequate to meet the demands of the activities that rural people undertake. This hampers the potential of farmers to produce as agriculture in almost all rural communities depend on the rains hence climate change hinders sustainable living for the locals.

Hama community is surrounded by a number of rivers such as the Shashe River, Nyautonge River and also Mavhaire River. During seasons when the community would receive plenty of rainfall, there was no struggle because the rivers would flow from one season to the next. Richard Mgange stated that, "*the great Shashe river currently no longer flows the way is used to which led to the death of water points within the community as it was the main source of water*." This has given the burden of fetching water on community people especially women

and children. Argawal (2010) connotes that, river flow rates in the sub-Saharan Africa are most likely to reduce by 70% by the year 2050. Most districts across Zimbabwe are already experiencing the decrease in the river flow rates and animal life is under threat because that's where they would drink from. Another challenge is that there is demise in the water points in the form of wells "matsime" that locals dug long ago and the underperformance of boreholes as the water table has gone down. The old local residents claim that these were passed from one generation to the other and they would support the life of village people. Despite one family having contributed to the creation of a well, the whole village would act as stewards because they would survive from them. Too much sunlight or high temperatures have dried up surface water and this has affected the community lives.

**The effects of climate change in health**

Climate change and variability has posed threat on the health of both humans and animals in most rural communities across the African continent. The diseases that local people usually suffer from are water infections thus the reduction in water received by a particular community determines the quality of life that community will have. Through observation, animals and humans contend for water sources and reports from the community states that people especially children drink from the same source that animals drink. The water in most cases in unsafe to drink because animals urinate in the same water that humans would want to use. Lack of clean water as well as flooding raise the risk of problems associated with poor hygiene and sanitation and diseases which fall under this category are bilharzia, cholera, typhoid and diarrhoea. These diseases are deadly because the community does not have the adaptive capacity. In Hama community, reports from St Theresa Hospital shows evidence of diarrhoea and bilharzia in children hence climate change has affected the community.

Since the community is failing to produce enough food to provide for the local citizens or households, it becomes inevitable to encounter nutrition related problems. The challenge

emanates from the fact that, there is an increase in population within the community which does not correspond with the production capacity of the environment has. In other words, the food available for the local people does not meet the requirements of the population. A nurse from St Theresa Hospital pointed out that, *"An average family in Hama community has 4 children and parents who live together with the grandfather as well as the grandmother. Rural people believe that the bearing of more children necessitates the different activities which provide for the family*." However, this no longer applies because it is difficult to produce considering the unfavourable conditions. Most children are undernourished and suffer from kwashiorkor because the food is in short supply. It is becoming a survival of the fittest in the rural communities as household individuals go out to search for their own food.

There are more diseases that local people are suffering from owing to climate change such as respiratory problems. This is due to increase in temperatures especially considering that the area is under region 4 which is characterized by hot or high temperatures. These are largely common in pregnant woman from the reports obtained from St Theresa Hospital. Pregnant women experience challenges with their pregnancies especially when delivery time approaches. This can lead to maternal mortality. Respiratory problems from pollution and smoke which comes from veld fires are also experienced considering that veld fires occur every year. The biggest potential struggle in respect of the effects of climate change on health is on HIV/AIDS affected people. This is because the disease manifests itself when the conditions are unfavourable and there is a fear of loss of people with HIV because of climate change.

**The effects of climate change on energy**

Most rural communities depend on forests as their source of energy and Hama is involved as it has been their way of life. According to the African Development Bank, less than 10% of rural sub-Saharan Africa is electrified. Bates et al (2008) states that 45% of electricity in Sub-

Saharan Africa is hydro generated. Given the above mentioned, it shows that the electrification of rural communities is almost an impossibility. This is mainly because the country, that is, Zimbabwe is already failing to provide enough power in the areas which are electrified and the Kariba power station is not effective enough because of decrease in rainfall. Hama people since the electrification of the community is a pipedream, depends on the forest through cutting down of trees for firewood. With the forests already diminishing, households travel long distances to access firewood for their everyday use. The burden is usually on woman and children hence vulnerability increases on the part of local people. Therefore, the low water supply and the destruction of forests are leading to a decrease in the energy supplies for the local people.

**Socio economic effects: the plight of women and children**

The effects of climate change affect different groups differently within the society. It is widely agreed by scholars that women and children are more vulnerable as compared to men because of their physical make up. For instance, concerning water, Rosen and Vincent (2008) states that time spent fetching water will increase 6 times within 20 years in sub-Saharan Africa. In Hama community women are experiencing the pain from the distance they travel to fetch water. This increases the vulnerability of women to cases of rape hence climate change is extending the grip on livelihoods. In respect of energy, from a gender perspective, the burden of acquiring energy source will increase on the part of women. All this reveals how climate change has crippled sustainable life for local people.

On the part of children, there are more cases of school drop outs and the explanation for this is a two way. The parents are poor and are unable to pay for the fees that are required by the schools as they have no income streams especially with the disruption of agriculture. The other explanation is that, parents assign duties for children which hinder them to attend school. Scholarship has been deliberating on the issue of child work and labour as children

are engaging on activities that helps the family for their survival. Other households in Hama community are child headed homes. Children are reported to have missed school whilst looking after cattle and undertaking agricultural activities. They perform this to support the parents' effort to provide for the family hence this increase the vulnerability of the community to future climate problems because of lack of knowledge.

There is interconnectedness between the challenges that women and children suffer from as a result of climate change and the dynamics of how families operate. The African culture subjects the family under the father or the husband and their misleading affects the whole household. For instance, men are able to migrate from poverty stricken areas as a result of climate change to better places where they can undertake rural off farm activities. This leaves the family with the woman as the head or the children as heads of homes. This increases the burden of women as they take responsibility of large families without men's support. The same applies in situation where the child is the head, they strive to earn a living hence climate change has affected more than the physical environment.

**CONCLUSION**

Communities that depend on climatic resources suffer from interconnected problems because the short comings of one lead to the dysfunction of the whole system. Climate change largely affects the environment but the effects are felt by local citizens. In this regard climate change starts by affecting the environment hence the whole system under collapse because of the rural communities' dependence on the environment. This research focused on effects on the environment, the agriculture sector, water, health and energy. Furthermore, there are effects that Hama community has not been directly facing as a result of climate change, for instance, the challenges that women and children encounter. The greatest challenge when it comes to climate change that the community has faced is the decrease in water supply and high

temperatures. Other challenges then stems from the low water level supply within the community and across the nation.

# CHAPTER TWO

## SURVIVAL MECHANISMS ADOPTED BY HAMA COMMUNITY

### INTRODUCTION

The chapter focuses on the responsive or survival mechanisms that the community has adopted in order to ease their lives amidst the harsh effects of climate change. This section is the subject of this research and it will highlight on different engagements that the community citizens partook and are currently practicing to earn a livelihood. This refers to the past present situational analysis, looking at what the situation was before and what the community is engaging on now. The survival mechanisms are premised on two aspects, that is, adaptation to climate change which is evidenced by how the community has been coping while experiencing the effects of climate change and variability. The other aspect is that of mitigation, which is focused on reducing vulnerability or the impact given there has been an occurrence of a climatic activity that compromises the lives of local people. Since climate change is understood to affect different sectors such as water, agriculture, the environment, the survival mechanisms will also be given in line with each sector. These response strategies will be evaluated to see to it if they are effective hence examining their strength and weaknesses.

### AN OVERVIEW OF SURVIVAL MECHANISMS ADOPTED IN HAMA COMMUNIITY

The researcher has discovered that there has not been much of government support and even NGO support within the community as compared to other districts basing on the information obtained from the Rural District Council. However, this does not mean that there is absolutely nothing taking place in respect of external stakeholders but activity and support is happening at a lower rate. On the part of NGOs it is understood because they have been closing down within the country because of different factors that are usually politically inclined. Therefore, Hama community like other rural communities especially in Africa has

been embarking on what is called Indigenous Knowledge to respond to the effects of climate change and variability. Indigenous knowledge is defined as a traditional local knowledge that has been built upon and passed from one generation to the other especially through the word of mouth (Osunade 1994, Warren 1991). This means that most of the activities that the community has been engaging on to either mitigate or adapt are based on the local understanding of the ancestors who discovered the communities which the current generation is residing. On the other hand, there has been an incorporation of indigenous knowledge together with modern ways through technology to ensure an effective strategy. The researcher has also observed that Community Based Adaptation is sustaining local livelihoods.

**ENVIRONMENTAL RESPONSE STRATEGIES**

The starting point in respect of climate change adaptation and mitigation has been agreed by scholars to begin with the government policy or regulations to fight the effects (Downing 1997). This is also equal to the government's effort to curtail the effects of climate change and variability in a manner that necessitates livelihoods transformation. Others environmental experts and scholars believe that the basis of local people's participation is motivated by the commitment of the government to fight against what cripples local livelihoods. In the case of Zimbabwe, the country is a signatory of different international conventions aimed at reducing the effects of climate change through mitigation and adaptation such as the Paris Conference signed in 2017 by the former president R.G. Mugabe. The Zimbabwean government also ratified the United Nations Convention on Climate Change in 1992 and in 2009 the government made consent and accepted the Kyoto Protocol. As highlighted earlier on, community members especially in the modern days get confident when their government is obliged to support in fighting a common enemy, in this case climate change.

Since climate change starts by affecting the environment which then hampers the lives of local people, it is important to highlight on what has been done to mitigate and adapt to climate change in Hama community. Before the change in climate or the weather patterns in a consistent manner like what is currently happening, local people had understood the importance of the environment because that is where they earned their livelihood. The first point when it comes to mitigation of climate change is awareness. This refers to alertness of the local people on what can cause damage to the environment they depend on and it is usually done by experts in environmental management. In this case, the Environmental Management Agency together with the Chirumanzu Rural District Council carried out campaigns to establish a knowledge base in community citizens on how they can reduce activities that intensifies climate change. EMA has managed to establish a set of rules or principles that local people are supposed to adhere to. Failure to abide will result in penalties on the part of the local people which make it effective because community residents make an effort try and follow these principles hence reduction in how locals degrade the environment out of ignorance.

In line with the above, community citizens have been showing commitment through attending these campaigns which is not typical of rural people to attend meetings where they benefit nothing. An agent of EMA at Hama growth point mentioned that the effectiveness of campaigns are measured by the how people cooperate to learn about what affects the environment they live in. Rural communities have been encouraged to reduce carbon emissions just like the case is globally to reduce the rate of which global warming can take place. In rural setup carbon emissions usually occur as a result of veld fires. Community people have been participating in the creation of fireguards as annually the community records the occurrence of fire which threatens vegetation cover. Funded by the government together with EMA there has been active participation by local people to prevent fire which is

usually caused by human behaviour or lack of stewardship to the environment. Nevertheless, due to the belief that burning the dry vegetation will facilitate fast growth of new shoots, community people have been starting fire in forests and even around their households.

In respect of deforestation or the cutting down of trees, different stakeholders such as EMA have been instrumental in educating local people to participate in the preservation of forests which is a stepping stone to climate change mitigation. There is an integration of efforts to preserve vegetative cover and forests within the community. The introduction of the tree planting day across the nation which happens on every first Saturday of December has facilitated the growth or increase in the number of trees. The Chirumanzu RDC has been disbursing trees to the local people of Hama notably the gum trees and other indigenous trees in order to prevent the extinction or loss of the home grown trees. Community people have largely participated in the growing of trees in the forests and around their homesteads. In Hama community, almost every household has both an indigenous fruit tree and foreign trees.

Other homesteads have close to 35 trees on their homes especially in Govere village. This has supplemented the diet of local people and is regarded as a diversification in the activities they undertake. The planting of gum trees is based on the thinking that, after they fully mature, the community people guided by the stakeholders whom will have supplied the trees will then harvest and sell the trees as timber. This will generate income for the local people. However, gum trees require a lot of water as their roots move down to extract the moisture present in the soil. This leads to loss of underground water and it will suffocate the lives of other trees within the vicinity. Respondents reported that there are usually no other trees which grows close to the gum trees. Natural grown plants such as mushrooms when they grow under or close gum trees will be poisonous. Gum trees also take a lot of time to mature hence it is a long project for local people and much of the benefits have not been realized by citizens

Old citizens within the community highlighted that before what the various stakeholders are implementing now, local people were cognizant of the need to preserve the environment. There are forests which are believed to be sacred and community people would not breach the laws set by village heads who will have receive instructions from spiritual leaders in the society hence the implication of indigenous knowledge which is believed to have started with culture. One village head interviewed mentioned that, "*the community can sustain on its own even without the support of stakeholders. Basing on the practise which we use, in the event of cutting down of trees, there person does not cut everything but leaves the trunk with some few branches. There is also a considerable gap left between the trees cut in order to ensure that the forests is preserved and not wiped out*." The practise is still being undertaken and has facilitated the preservation of the environment hence adapting and mitigating the effects of climate change.

The information obtained from the Chirumanzu Rural District Council shows that there has been gulley rehabilitation in order to reduce soil erosion. Unpredicted rainfalls would cause gullies within the community and these were ugly to the environment and their presence would cause serious damage to animals and humans. EMA has been giving grants aimed at the rehabilitation of these gullies in order to ensure that the environment is recovered and utilized hence a sustainable initiative. The funding of such projects has created employment for local people and has given them purpose to reconstruct the damage that has been done by climate change. This served a doubled purpose in that community people are now able to sustain their families from the income they obtain from participating in the rehabilitation projects, at the same time conserving the environment hence handling or coping to climate change.

## MECHANISMS ADOPTED IN THE AGRICULTURE SECTOR

The agriculture sector is by no doubt the most important sector for the community and the nation at large. According to African Development Bank (2012), most African states including Zimbabwe are agro based economies hence it is inescapable for communities to make an effort in order to provide for their families. With predictions already showing evidence that climate change will have a hold or grip with regards to agriculture in Zimbabwe due to unfavourable climatic conditions, rural communities have implemented various strategies that have enabled them to survive amidst climate change. Related to the case study, that is, Hama community unlike other communities does not have other sectors that they can shift to in order to better the livelihoods within the society. Despite little support from the government, NGOs and other internal and external stakeholders, the community has been for years practising their agriculture activities in a manner that has necessitated their survival. This in other words means that the community has been adapting and mitigating climate change largely through the incorporation of Indigenous Knowledge.

### Agricultural inputs

Rural farmers since the dawn of independence have always been struggling to obtain agriculture machinery and other inputs to ease the farm activities they undertake. This has muzzled the farmers' potential to produce to full capacity. The major reason why community farmers would not have adequate inputs to undertake the major activity that supports life within the society is financial exclusion or in other words lack of initial capital. This however has not been a hindrance to the local people because of the principle egalitarianism. This in other words means classlessness within a society, social equality and access to equal opportunities. An AREX officer mentioned that, "*the principle suggests that the resources within the community are shared amongst all the people. In relation to the Hama community, a person with mouldboard ploughs and draught power which is usually the major farming equipment in rural setup can cultivate the fields of those without.*" A respondent indicated

that the person to whom the cultivation will have been done will pay with what is available to them and this is based on trust. It therefore means that no family is left out without cultivating their fields hence the practise of agriculture occurs. Despite the yields produced from the fields, this initiative by local people has been the basis through which people practise their activities in order to produce for their families.

The introduction of chemical fertilizers has managed to enhance production in fields of local people but this has been limited to a few individuals who can afford to buy them. One hectare of maize requires 400kgs of Compound D and 300kgs of Ammonium Nitrate according to farmers guide produced by Farm and City. Since 2009 the prizes have been sky rocketing and one bag of Compound D which is equals to 50kgs' prices ranged between 30-35 dollars, Ammonium Nitrate ranging between 35-41 dollars in the year 2017. Local farmers have always been cognizant of the fact that high yields can be realised after the addition of some nutrients which support growth such as these chemical fertilizers they cannot afford to buy. The reason why production has decreased in the farms is soil infertility as a result of change in climate. Although climate change has reduced the process of humus formation (murakwani), local farmers have been using the humus in their fields which has natural nutrients. Through observation, local people also use ant-hills as the soil is claimed to contain nutrients. Portions in fields with either these two have produced bigger cobs hence increased productivity. Therefore locals are adapting to climate change and the use of natural nutrients preserves the soils because the chemicals damage the soil hence the coping mechanism sustainable in nature.

The efforts by the government cannot be ignored when it comes to the provision of agricultural inputs. Rural communities across the country have been receiving farming equipment such as mouldboard ploughs, inputs such as seeds and chemical fertilizers. This has been criticized by a number of scholars, analysts and reporters as they claim that these

initiatives were based on the desire to garner political support. A farmer in Hama community mentioned that, *"these inputs were given on the basis of the farmer's potential to produce which was calculated by yields from previous seasons*." This in past years has increased production because farmers have been eager to acquire more input due the competition that government created amongst local people. This collaborative effort by the locals together with the government served both mitigation and adapting to climate change through making available the resources. The initiative has focused on those with the ability to produce leaving out others hence the manifestation of social inequality.

**Labour**

According to International Labour Office (1992), the nature and characteristics of rural communities demand on the ground work force or labour due to the manner of activities they undertake in order to sustain their lives. This means that the number of people or labour force to undertake assigned agriculture duties influences the production to be realised by a family. This has been a reason why rural people would bear more children despite the lack of resources to take care of the children. In respect of the labour concern, Hama community has embarked on local organised cooperative, (humwe) in local language hence the application of indigenous knowledge. Praise Fusire from Mavhaire stated that, *"households within the same village send representatives in the form of labour to a single household to carry out farm activities and other tasks related to agriculture. This continues to happen until every household has been covered, for instance the weeding process. The village people will weed the field of the intended household for that particular day."* This unites the community and makes work much easier because of the number of people undertaking one activity therefore adapting to climate change as production now requires more people in the form of labour.

**Introduction of drought resistant crops**

This initiative has been adopted by most communities across the nation and even other rural communities within the African continent. According to Intended Nationally Determined Contributions (2016), one of the long term strategies that rural communities that are vulnerable to climate change can adopt is to introduce the cultivars or variety that are drought tolerant. This is because the country is receiving low rainfall levels which are worsened by the lack of irrigation in rural communities to support the growth of varieties that require more water. The researcher discovered that the shift to drought tolerant crops is an effective adaptation strategy. Through observations and interviews, sorghum (mapfunde) is a major crop that community people are growing. According to Moyo (2012), Chirumanzu district receives rainfall of 250mm or less. This however has no impact negatively to the yields that are obtained from sorghum because the crops can survive the harsh conditions that the climate has been posing on the community hence the community adapting to the effects of climate change.

Respondents have also highlighted that, other drought tolerant crops such as cowpeas and sesame have also been grown as they survive amidst of poor rainfall that the community receives. Farmers have given a report of producing 1000 to 1200kgs of cowpeas and sesame hence they claim bumper harvest as a result of this shift to drought resistant crops. Health experts pointed out that these drought tolerant crops produce meals with high nutritional value. One respondent from the community highlighted that, cowpeas have earned income for the local people. The advantage of these drought tolerant crops is that they do not require addition of chemical fertilizers. An Extension officer from Mvuma reported that rural communities can grow these varieties without fertilizers. This means that their production is sustainable in nature because they preserve the soils as chemical fertilizers have been criticized of being harmful to the environment due to the carbons gases they carry and also

the pollution of underground water aquifers (Collins 2010). On the other hand, for instance sorghum, birds have been devouring the crop because it is exposed and does not have a cover like maize. This means that labour demand increases to maintain high yields because other households have not been producing after birds devour everything close to harvest time.

**Growing of early maturity varieties**

The growing of early maturity or crops that does not take long to produce is largely practiced on maize. Despite poor performance in terms of the yields that re realized in the production of maize, the community people have not abandoned the production of maize. Instead, they have been growing early maturity variety which produces within the confines of the rain season which has become short. Rainfall season in Hama community is claimed to start on the onset of December up to end of March as respondents highlighted. SeedCo which is a company that most farmers buy from has varieties such as SC513 which usually takes 3 month to yield. Farmers have therefore obtained reasonable yields of close to 1.5 tonnes per hectare of maize which sustains their families together with the yields from drought tolerant crops. Therefore climate adaptation because farmers are able to maximize the rains the community receives to produce.

**Barter through optimum production.**

This practice is premised on the principle of egalitarianism within rural communities and how they assist each other in food burdens. Farmers within the community have different strength in the production of crops. Through interviews, others can produce more maize amidst of climate change, others can produce groundnuts. Different households will then effectively focus on the production of crops which contributes to the realisation of high yields. Climate change hampered the potential of farmers to diversify in agriculture and produce high yields hence they produce optimum peculiar crops. The crops that are largely produced in Hama community are maize, groundnuts and round nuts. After harvest time, families will then trade

amongst themselves what they will highly produce which others do not have. The barter is usually done in times of difficulties or when community households experience food shortages. The exchange can also take place even with people who are foreign to the community. It becomes an adaptation strategy because families can obtain what they do not have from those with.

**Conservation farming**

Another way by which Hama community has been surviving amidst of climate change is through the introduction of conservation farming which is a coping mechanism to the effects of climate. According Erenstein (2003), conservation farming is a type of farming that aims at producing high yields optimizing on the available the natural resources whilst preserving the natural environment. It also makes use of external inputs that facilitate the realization of high yields. The practise largely focus on minimum tillage or least possible disturbances of the soil in order to reduce soil erosion, to ensure effective crop management and conserve water.

The practice of conservation farming in Hama and other rural communities in Zimbabwe has been locally termed "dhiga udye". This has been widely practised across the nation especially in regions which receive low rainfall levels to support the growth of crops. Through interviews, the researcher learned that community people use this method on maize production. It includes digging of holes within the field that is big enough to contain at least two plants. The farmers will then add chemical fertilizers in the hole with some nutrients that facilitate crop growth. The farmers then cover the applied nutrients with the soil and water the hole who then plant the seed. In Hama community the practise has been undertaken before the onset of the rain season. This means that water from near sources would be used to moisture the hole hence the facilitation of crop growth. The mechanism preserves water because it is poured straight into the hole. An AGRITEX officer mentioned that, *"production*

*of maize increased tremendously by 30% as compared to the previous years when households would not produce more than 5 bags of maize."* Since the practise discourages too much mechanical interaction with the soil, the strategy mitigates soil erosion in the event of flooding of too much rain. It also ensures proper crop management as the crops will be visible within the field hence sustainable in nature.

There has been noticeable NGO involvement to support conservation farming as a strategy to adapt to the effects of climate change. Conservation farming simultaneously improves the yields that a farmer can realize and preserves the environment from damage through reduced mechanical interaction with the soil. Midlands AIDS Services Organisation (MASO) recently has been actively involved in the support of conservation due to the realization that maize production needs to be resuscitated as a staple crop to support community lives. The organisation has been including HIV infected people to participate in this initiative hence tolerance of all citizens. This does not segregate any group of people within the community and it continues to unify community people despite their backgrounds. There has been an increase in yields from agriculture fields which is evidenced by the size of cobs that are bigger than the produced using conventional methods of production. Thereby, issues of food security addressed within the community.

**Establishment of gardens near water sources**

As it has been highlighted before that the community is under threat due to decrease in water levels that is adequate to supply activities undertaken by households, gardens have been situated near water sources. These are usually close to rivers since the community is surrounded by three rivers namely Shashe, Mavhaire and Nyautonge. This is a community brainchild according to respondents. Although the process of establishing these gardens is environmentally unfriendly, community people stresses on their importance as they are able to carry out their horticulture endeavours. Horticulture products such as tomatoes, covo

vegetables, and rape are produced to support the sustenance of local households. The strategy is effective in the sense that, local people depend on manual labour hence the distance to reach the water to moisture the soil becomes short. Within these rivers, respondents stated that, *"there are portions which never dry in the rivers thereby providing water for these gardens."* Nevertheless, these gardens are vulnerable of being devoured by wild animals such as baboons, monkeys, rabbits and even birds because they are far away from homesteads hence the absence of security.

**Fig 1: showing community gardens close water sources**

**Organic farming**

Another way through which community citizens in Hama community has been mitigating the effects of climate change is through the adoption of organic farming. This type of farming emphasizing on avoiding the use of pesticides, chemical fertilizers and genetically modified

seeds (Hicknel 2013). In other words, organic farming seeks to use natural nutrients in crop growing such as humus, manure from animals and compost. It is a method that is environmentally friendly and aims at reducing the damage through carbon processes that are caused by chemicals. Through interviews, farmers mentioned that after having workshops with extension officers, they adopted the system which increases productivity especially in maize. The advantage is that, the mechanism is cheap because it focuses largely on the use of available natural resources to support crop growth and maximizes profits. Agriculture extension officers noted an increase of 20% in maize production which ensures food security within the community. Environment experts argue that there are chemicals that farmers use in the production of crops especially maize that will hinder crop rotation. These chemicals are usually too strong for other crops and they cause wilting after germination. Chemicals such as atrazine do not facilitate crop rotation after being applied hence mitigating and adapting to the effects of climate change. The use this mechanism tallies with global desire through the use of Green Economy as a way to reduce the effects of climate change.

**Mixed cropping or intercropping**

This measure is usually practised by subsistence farmers across the African continent in regions that do not receive adequate precipitation. Intercropping involves the growing of different types of crops in the same field and should have almost closer or same duration of reaching the reaping stage. The Grain Marketing Board report of 2015 states that maize yields per tonne decreased to less than 30%. This is mainly because of the decreased rainfall levels which supports production in rural communities including Hama community. The practise aims at maximizing the nutrients in the soil as well as the moisture. Through observation, mixed cropping is applied on the crops that are familiar to rural communities. These include maize, groundnuts and round nuts. Agronomists are of the view that the strategy ensures crop complementarity role. Their explanation is that, crops with longer roots

will extract moisture from the soil and the crops with shorter ones will use the moisture extracted rather than losing it through evaporation. Mixing maize with nitrogen fixation crops such as groundnuts contributed to the increasing yields that local people realized within the community though they are unable to comprehend the process hence adapting to climate change.

**Small livestock rearing**

Many households within Hama community lost their cattle due to different diseases as a result of climate change. The primary purpose of cattle has largely been the provision of draught power, milk and meat. Although rural people are usually not aware, their cattle act as their security as their entitlement. The reason for emphasis on cattle is that it has been the domesticated animal that local people valued the most. The other struggle that is attached to the rearing of animals is loss of pasture or carrying capacity which no longer supports more herds. Families lost their cattle as they would exchange or sell to get food since there have been food shortages within the community. Veterinary report of 2008 specifies that the diseases such as red water were responsible for the death of over 60% of cattle during the drought of 1992. After the 2002 drought, it has been noticed that more cattle died and since then, the community has not realized an increase in cattle as the case was before the escalation of these droughts.

After the realization that households were suffering from loss of their herds as it had become an expense to rear and maintain animals, community people shifted to small herds under the guidance of extension officers. The local people now focus on the rearing of goats and sheep which does not require much in terms of food. A respondent said that, *"the goats can feed for about two hours and usually they feed around the homestead. The responsibility of fetching water for small animals is easier than for cattle. One beast can drink up to 40litres which is equivalent to the amount of water that that all household goats can consume."* Sheep and

goats are claimed to be resistant to diseases that affects animals and can survive amidst of harsh climatic conditions hence local people adapting to climate change. Donkeys which have not been familiar in Hama community are now used in different activities that rural people undertake because they can also survive harsh conditions hence the replacement of cattle as a source of draught power.

Another dimension by which the community has been surviving is through the rearing of small animals for sale as income generation projects. These are notably chicken, hare and pig projects. With regards to the rearing of chickens, local households focus on both broilers and road runners (boschveld). There has been an increase demand of the local breed (boschveld) of chickens because they are health more than genetically modified breeds. Community people are therefore optimizing on the demand to produce more to sell to butcheries and for barter within the same community. The broilers are also among the flock that the Hama people have been producing. This has been facilitated by the vast space that rural households have for the provision of shelter for these chickens. These projects have been started by families with access to capital or with economically well backgrounds. Local schools buy from these community people hence the injection of income which contributes to the sustenance of the business. Through interviews, one community member mentioned that the loss of the hare in the forests has been re-established by rearing them at home. These have been aiding local people with what they require to sustain their lives. Pigs are fed using what is available to local people and they do not stress on feeds especially during the raining season. They complement the feeds manufactured by producers with unique grass that they obtain from their fields.

## STRATEGIES EMPLOYED TO ADDRESS WATER SHORTAGES

### Irrigation

Scholarship has deliberated and discussed on potential alarming water level decrease which the continent of Africa can face in near years that demand immediate action to both cope and mitigate the effects of climate change. Zimbabwe is expected to experience a 60% annual rainfall decrease by the year 2080 according to Mugabe (2012). The introduction of irrigation schemes has been therefore imperative in addressing the water stress that the country, largely the rural communities depend on for their consumption as well as for animals. The main advantage of irrigation is that it necessitates rural farmers to carry out their farm activities throughout the year because of water availability hence ensuring food security. Also, irrigation serves a dual role in both mitigating and adapting to climate change. Adaptation is realized in the sense that, the amount of rainfall that a community receives will be aided by water from irrigation schemes introduced. Mitigation is recognized in the event of precipitation not taking place within the community hence the available water from irrigation will be used in different activities.

In Hama community there was the establishment of Hamamavhaire irrigation scheme which is one of the largest within the whole district. The first improvement that the scheme brought was the employment creation during its establishment as one respondent highlighted. Community people were the participants in the setting up of the structures hence development oriented in nature. A farmer expressed that, *"the scheme is a hope for the community as compared to what the community would experience other years without receiving adequate rainfall that facilitate the production of food for community people."* An environmental officer from Chirumanzu RDC connoted that, the community can realize food security if they optimize on the initiative. This means that the establishment of the scheme is a stepping stone to curtailing the effects of climate change.

The scheme is supported by electric boreholes as the source of water and these boreholes are frequently serviced to ensure efficiency hence production is persistent. There are also small dams that are around the Hamamavhaire which up to now have never dried up to support the different endeavours that local people undertake. Respondents claim that there is plenty of water for use within the area and their burden of fetching water has been reduced since the establishment of this scheme. The major achievement that the scheme brought to the local people is all year round production and agriculture diversification. Crops which have been grown under this scheme were maize, wheat, groundnuts, beans, chilli and vegetables. Therefore the scheme has ensured the resuscitation of horticulture production at the same time producing staple crops for the community. An extension officer reported that community members close to the scheme produce excess food which most of it is sold hence income generation. Local people have been selling their products to the local clinics and even the St Theresa Hospital as well as mission schools. For years farmers have had their established market. Green maize cobs that are produced before other farmers produced is transported and sold in Masvingo with higher prices due to demand. The dried maize will then be sold to the GMB. This serves both to mitigate and adapt to the effects of climate change.

**Construction of water tanks and adoption of water pumps**

Hama people have been committed to maintain and improve their standards of living despite the threats from water shortages as a result of climate change. They have employed innovative strategies to ensure that their households have water for domestic use and for their farming activities. The community has an advantage of resources that are available to implement anything that improves their life. The local people have been constructing tanks on top of rocky ground or “dwala” which then reduces the sinking of the water into the ground. The bricks used to construct these tanks are created locally by family members

usually the males which make the strategy cheaper hence empowerment of local people. High temperatures within the area mean that the time span to undertake agriculture activities has increased. The water is then pumped from different streams which are far from the fields into the tank ready for use. This ensures that community people are always in the fields most of the year because of water availability to moisture the soil hence adapting to climate change through increasing productivity.

**Borehole drilling and rehabilitation**

One way through which community people have been accessing water is through the use of boreholes. These boreholes have been usually established by NGOs and the government with the Chirumanzu district. Information obtained from the Chirumanzu RDC highlights that the council has a capacity to drill 5 boreholes in the whole district and can rehabilitate approximately 10 of already established boreholes. From the council budget, drilling on one borehole costs about $6000 and the rehabilitation procedures costs $1000. Local people close to where either the rehabilitation or the initial drilling takes place would be employed to ensure that they are participants in what is established for them. The idea is to empower local citizens with a sense of entitlement hence ensuring stewardship on these facilities that helps them. The burden of fetching water notably decreased on the part of women and children and it is believed that boreholes are 2km within the vicinity of each household according to an environmental officer from RDC. This initiative has been excellent despite the decrease in underground water aquifers or lowering of the water table. It means that the functioning of these boreholes has been minimal. In Hama community areas such as Govere still fetch water from wells and rivers which is contaminated and shared with animals. The women in the area complain about the time they spend fetching water which put their lives under risks and vulnerability of being raped hence the manifestation of knock on effects of climate change.

The council has also admitted that drilling of 5 boreholes and rehabilitating 10 is a pipedream because they do not have the capacity to the economic recession of the country.

**Small dam rehabilitation**

This task has been mainly headed by a catholic organisation, Caritas which defines the religion and culture of Chirumanzu people. Much of the infrastructure development and systems within the district is credited to the Catholic Church. This organisation has been employing local to participate in the rehabilitation of small dams within the community. Most of these small dams in Chirumanzu no longer function due to lack of service. Caritas has therefore burdened itself in the therapy duty of these small dams. A project coordinator mentioned that, *"it is better to empower the local people with a skill set and facilities for them to sustain rather than subjecting them to food hand-outs."* The main purpose of these rehabilitation procedures is to ensure agriculture support through making available water for animals as well as nutrition gardens. From a developmental perspective, this initiative serves a dual role of empowering the local people by making water available and also uniting the community as religion is claimed by scholarship to be a greatest influence in people's lives.

**STRATEGIES EMPLOYED ON ENERGY**

**Use of solar energy and electrification**

Although it still remains a major concern in the context of rural communities in Africa, there has been an improvement in terms of energy for the Hama community people. A number of households own at least a solar. This is a stepping stone to change and is an indicator of development as the concept of Green Economy is applied. The solar energy is mainly used for lighting purpose. The limitation is that, the community does not have the capacity that enables them to undertake their activities using solar energy and this is only limited to a few households who can afford. Another mechanism is respect of energy is rural electrification. Households near Hama growth point have electricity hence reduction in the exploitation of forests to fetch firewood as a source of energy. Rather the local people are now focusing on

restoration of forests through by planting of trees and regulating the cutting down of trees. There is no balance in terms of electricity in local households because parts of the community without are continuing to exploit forests.

**MECHANISMS ADOPTED IN HEALTH**

There is not much that has improved in relation to the health of rural people due to lack of awareness. It is difficult to make mention of one element with regards to health because the success of health is interconnected. In Hama community, reports from St Theresa highlight on the improvement of health of children due to balanced diet. The number of people who also visit the hospital has changed as compared to previous years when local people would value the medication from traditional healers and not the hospital. Construction of ablution facilities has been recognized on almost every household which ensures hygiene within the community. Through interviews, the researcher observed that local people now boil water before drinking as they fetch water from contaminated and open sources. Despite all this efforts, there is need to improve the health services of the local people as large volumes are still victims of poor health.

There has been a collective effort by the NGO sector together with the council with regards to health in a bid to improve livelihood especially on service delivery. This undertaking has been termed WASH program (Water, sanitation and hygiene). It has been done throughout the whole country in rural districts after the realization that rural communities required an improvement especially on waste disposal. Pelatia Choto from Taringana applauded and stated that, *"the ZIMWASH program is one of the significant initiatives that have been undertaken by the civil society which transformed and improved rural livelihood."* The construction of toilets in rural schools and homesteads significantly reduced the use of the bush system which many rural people practised before. In Hama community MASO has been chief in leading this initiative with major support on homesteads with people with HIV. The

bush system contaminates water especially after precipitation and many cases of water borne diseases would be recorded in the rain season at St Theresa Hospital. The construction of toilets would also come with it a container close for the washing of hands hence safe practise of sanitation.

**Fig 2: showing evidence of wash program on toilet construction**

**CONCLUSION**

This chapter's main objective was to reveal the findings on the strategies that are employed by rural communities to respond to the effects of climate change and variability. Although the community has had minimum NGO and government support, it has managed to survive amidst the harsh conditions that compromised the environment that rural people depend on. Nevertheless, the least possible support that the government and civil society organisations have offered should be acknowledged as it has helped community sustenance. The poor performance of the economy has been the major blame that hindered support from key entities for the betterment of rural livelihoods. The response strategies by the community

people were largely based on the traditional knowledge and community value systems such as respect of sacred sites. This has helped in both mitigation and adaptation. However, despite the various efforts by government, NGOs and the community people, rural livelihood is still compromised and there is need for urgent action to combat the effects of climate change and variability. Efforts should be focused on improving adaptive capacity of rural livelihoods.

## CHAPTER THREE

## PROGRAMMING SOLUTIONS AND RECOMMENDATIONS

### INTRODUCTION

The chapter will reveal various suggestions or recommendations that rural communities in Zimbabwe and other African nations can implement to effectively deal with climate change and variability. The reason for this incorporation or broader perspective is that climate change has become a threat to human survival on the planet earth. Therefore leaving the responsibility to community people is an overwhelming task. For the purposes of this research, the researcher will focus on Zimbabwe and give reference to other African countries. Various scholars and weather experts have subscribed to the fact that various players and entities are key to the establishment of serious and meaningful resolutions to the challenge that African communities are facing. These players include the government, the NGO sector, private or business sector together with the active participation of local community people. The World Commission on Environment and Development known as the Brundtland Commission published a report in 1987 emphasizing on engaging on unity of the environment and development hence the strategies should be sustainable in nature.

In 2015, the international community embraced various goals that are aimed at improving livelihoods at global level with specific targets to be accomplished by 2030. These are called Sustainable Development Goals. SGD 13 states that, “take urgent action to combat climate change and its effects”. This burdens both the international community and national governments to place massive effort in trying to combat climate change. Therefore, every response strategy should tally with the demands mentioned in the SDGs. The major focus is on increasing the adaptive capacity and strengthening resilience especially to climate related hazards. Other targets are to improve education and awareness together with institutional capacity. Also included is serious policy formulation by national governments, increasing

capacity on climate change related planning to address the needs of vulnerable groups and mobilizing $100 billion annually by 2020 suggested by the UNFCCC in order to assist the least developed countries. This therefore means that leaving the responsibility to mitigate and adapt to climate change to local people is equals to burdening them.

**Community people**

The contribution of local people with regards to climate change survival mechanisms is predominantly centred on participation. The greatest compromise on the part of rural people has been absence of a stable environment to participate on. White et al (1994) states that there are two levels of participation namely genuine participation which is evidenced by equitable distribution of political and economic power and pseudo participation which involves merely imposing a project on the locals. As clearly highlighted in the article 27 (1) of the Universal Declaration of Human Rights, participation is a basic human right. Liberation of the rural people can be realized when they claim their rights to fully participate in the events that ameliorates their lives.

With regards to measures that can be employed to improve rural livelihoods, the community proposed the enhancement of water sources and services. Complain that tops the concerns of rural people are usually water shortages which they claim has contributed to the struggle they are facing. A local headman from Govere suggested that, *"the government should ensure water provision to our community as the activities that we undertake require water. Considering that we depend on agriculture, it becomes difficult for us to provide for our families without adequate provision of water that necessitates agriculture."* Local people believe that construction of dams and drilling of more boreholes will improve their lives especially in cattle rearing and crop production. Another important factor to note is that water availability will improve farm activities due to that it eases the burden of fetching water on the part of women who makes the greater percentage of field workers.

Community people also proposed financial inclusion especially to be able to access agriculture inputs. Farmers from Hama community are confident that the agriculture sector has potential to redeem the situation at hand. A farmer quoted mentioned that, *"lack of financial muscle or initial capital to venture into serious agricultural projects has hampered our ability to produce. We have no income base that enables us to purchase inputs whose costs are now high."* The implication of this is that, local people are committed to participate to redeem themselves from the struggle that climate change has brought. The government should therefore cooperate through ensuring availability of agricultural inputs. Also included is the concern of technology that facilitates easy undertaking of project. Climate change demand community people to produce more with less. Therefore, the provision of technology is imperative to the rescue of rural people. The proposition agrees with the concept of sustainable development which talks about economic development and environmental preservation. Hence, the provision of capital to the local people improves the rural livelihoods.

Rural communities are characterised by their knowledge of the environment through a skill set termed Indigenous Knowledge which is a determinant that predicts and instigate a strategy to be employed. The effectiveness of the local traditional knowledge is mainly through preservation of the environment hence mitigation. Rural livelihoods should incline to the idea that preserving mechanisms sustain life since they depend on climatic resources. Priority should be on water and the natural environment or forests. This means that passing the local knowledge from one generation to the other is imperative. Through observation, the rural old people seem to possess this knowledge while the younger generation is neglecting the way of life that has sustained generations. For instance, there are water portions within rivers that are sacred that have ensured that rivers do not completely dry. With regards to forests, communities in Hwange and Chimanimani preserved forests through de-bucking.

Other communities have preserved the environment by adherence to the principles of the areas especially in terms of sacred sites. Instilling confidence in the local people to believe in the power of traditional knowledge ensures an improved livelihood in dealing with climate change.

**The Government: Central Government**

With no doubt, the government in any setup is the biggest entity responsible for promoting development of country citizens and in this case protecting livelihoods against the prevailing climate change. Firstly, the priority engagement for the government is on policy formulation since the country does not have a specific national policy or legislative framework for climate change adaptation as connoted by Government of Zimbabwe. According to Rugara, an EMA agent, significant policies should be established in order to ease the burden of responding to climate change. Critics from weather experts state that, it is inadequate for the government to ratify different conventions hence the claim that they focus on paper work and not implementation. The government has been responding after the occurrence of a hazard, for instance the Tokwe Mukosi incident. Such is claimed to be ineffective because measures should be put in place to mitigate and adapt. Many communities across the country have not received much government support Hama included which left the local people with an overwhelming task.

Scholarship emphasizes on more on legislative frameworks and climate governance as an effective manner through which governments can minimize the impact of climate change on communities. The major reason of this is to address the scope and scale of vulnerability in Zimbabwe so as to coordinate the efforts in implementing projects that will improve the adaptive capacity of the country. 49 of the least developed countries of which 33 are in Africa are required to undertake a National Adaptation Programmes Action (NAPAs) by the UNFCCC. The fear is that delay on policy will increase the vulnerability of local people

hence this framework aims at the identification and prioritization of critically adaptation activities. Governments should therefore look into vulnerable sectors and implement measures that effectively lessen the impact. For example, in agriculture, optimizing on rain fed crops and use of irrigation can improve the food security situation within the country and with regards to water, improved water use in agriculture and water harvesting.

Together with policy formulation, the government has to include or consider on a climate budget which caters for researches, responding and mitigation mechanisms. This work hand in glove in the sense that, the establishment of serious policy will lead to the consideration of climate change in the national budget. The local government has blamed the central government on the lack of funds to carry out projects that are aimed at mitigating and adapting to climate change and variability. Kanyenze (2017) states that most African countries have been reported to lack capacity to respond to climate change because of deprivation of funds. This means that to improve the situation in Zimbabwe, there is need for improvement with regards to resource allocation to effectively deal with the climate change situation. The Chirumanzu RDC confirmed that failure to fulfil the objectives set is as a result of lack of funds. Rwanda has improved through the support of President Paul Kagame's national action on climate change with the involvement of relevant ministries to lessen the burden on local citizens.

In the same token, financial inclusion will improve the standards of local people because economic growth ensures development. Financial inclusion is the ability of individuals or groups to appropriately access financial services or products (Ernest and Young 2006). The manifestation of inclusion financially is evidenced by access, affordability, reliability as well as acceptance. Rural people have limited access to funds that facilitate them to undertake income generating projects that removes them off the hook of poverty. The government should enable that community people to diversify in their agricultural activities as the main

sector of the economy. Besides agriculture diversification, local people are incapable of venturing new initiatives because of lack of financial support hence exclusion financially. Scholarship is of the view that access to funds by the local people is a stepping stone to meaningful development since it improves the adaptive capacity. In other words rural people are better off with access to financial services to fight against climate change.

A report by EMA in 2013 shows that rural people are ignorant and engage with the environment in an unfriendly manner which sustains the struggle they face. This is blamed on the government as it has enforced weak measures or in other words lacks serious deterrent laws which govern the relationship of humans and the environment. One way of explaining this is that, the failure to perform to the standards and expectations of the general population and outsiders made the government to loosen its measures so as to allow people to exploit the environment. Pielke (1998) is of the view that, national governments should foster restrictive measures that will instigate mindfulness thoughts in local people when interacting with the environment. Therefore, the central government has a mandate to amend and enforce such measures which serves as the basis to consider the next generation which will depend on the environment.

Furthermore, another way to effectively deal with climate change is through adoption of the Green Economy. The aim of this initiative is to run on “zero emission”. UNEP (2008) defines green economy as economy that results in improved human wellbeing and social equity while reducing ecological scarcities as well environmental risks. Other scholars refer to this concept as greening the economy. Zimbabwe has partially endorsed this strategy but the realization of change and improvement comes through making it a priority to green the economy. Uganda adopted organic agriculture from conventional methods of agriculture and currently, the country is ranked the lowest users of artificial or chemical fertilizers. The Ugandan government proposed the policy which is now used country wide.

The Zimbabwean government should therefore recognize the effectiveness of green economy as a strategy to mitigate and adapt to climate change. Major focus should be given to sectors that sustain the economy, that is, agriculture and mining as well as water. The government through its recently introduced agriculture initiative, Command Agriculture uses plenty of artificial fertilizers and other chemical which are harmful to the environment. This contradicts the concept of green economy because these chemicals instigate emission hence unfriendly in nature. The Hama community is a victim of unfriendly interaction of chemicals and the environment hence measures by the government facilitate an improvement locals way of life. For instance, in Gwanda, the government together with NGOs embarked on the installation of boreholes which are solar powered. This served a dual role of reducing saving water as the country is already under water stress and has promoted improvement in cattle ranching as there is water availability for the large herds with the region. This ensured diversity within the agriculture sector which is another strategy to curtail the effects of climate change.

In addition, the government should also employ the sector by sector approach and incorporating technology. The main reason why scholarship has pointed on limited adaptive capacity on least development countries is the lack of technology and proper prioritization. It is therefore imperative for the government to consider determinants of adaptive capacity. The manifestation of climate change and variability within the country has been through floods and drought which means technology should be employed in most affected areas. For instance, to reduce water shortages, irrigation schemes have to be introduced, early warning systems in the event of and flood control measures. Each sector should have appropriate technology that correspond with the effects to be dealt with hence effectiveness and sustainable.

**The local government**

In Zimbabwe the local government is referred to as the council and in this case the Rural District Council. The local government directly interacts with rural people in different endeavours they undertake. In the case of Hama of Chirumanzu, the council admitted that there is no adequate support that is given to the local people and communities experiencing climate change. Despite the few projects the council undertake, the first proposition is to implement various projects from a grassroots approach. This entails that the council has to engage on considering the needs of the rural people rather than imposing projects on communities. Other scholars refer this as bottom up approach. This is effective in the sense that the people experiencing the devastating effects inform the council as a key player of various propositions that can better the livelihoods. The council has accused of assuming the challenges that rural people encounters or generalizing the problems hence ineffective in dealing with effects of climate change.

As it is widely agreed that knowledge is power through philosophical hypothesis, it is imperative to teach local people pertaining to the knowledge of climate change and variability. Oxfam (2007) is of the view that rural people have partial or no understanding with regards to climate hence it is the responsibility of the council to teach local people. This is evident with the case of Hama where people engage in different activities as a way of sustaining their lives. This means that local people are not fully aware of the intensity of the problem they encounter. The effect is that since rural people lack adaptive capacity, their response does not produce results that are effective to minimize the effects of climate change and variability. Through observation, local people's response with regards to climate questions shows the lack of knowledge which is worrying because programming community solutions can be realized when an affected group is knowledgeable of the challenge they face.

Therefore, awareness on what climate change is, signs and manifestation, how to effectively deal and other necessary information should be disseminated to the local people.

**NGOs**

Civil society organisations in Africa have become more active than national governments because of the availability of funds from donors. Most African states have NGOs undertaking various activities in almost every sector of the economy which makes them to be key players with regards to climate change and variability. Since most of these organisations are shifting their endeavours to climate change response strategies for the betterment of livelihoods, their impact cannot be underestimated. Nevertheless, NGOs operation should encompass support the adaptive capacities of local people through embracing traditional knowledge systems which is premised on the grassroots approach of development. In other words, NGOs are not supposed to wipe away the social systems in rural setup but rather should conform to the existing structures. Scholarship is of the view that local people are committed to participate effectively in the projects they are consulted before their genesis. For instance, in Hama community, local people desire water access and availability to undertake their daily activities which means that a project should involve their proposition. In relation to systems, the rural livelihoods value and respect the structure of the family yet NGOs have been accused of bringing new cultures which local people do not receive.

Another way through which NGOs can ensure effectiveness in climate change response strategies is through annihilate poor targeting, dependency and project reduplication on the part of local people. This has been the characteristics of civil society organisations when implementing projects. For instance, in Matenda of Zvishavane community local people complained that CARE International has been focusing on nutrition gardens which other organisations had implemented before hence project reduplication. Poor targeting involves an NGO choosing a wrong group of people to participate in a project. Such projects have high

potential to fail to yield intended results. This is usually experienced in health related schemes. As highlighted before that rural people lack adaptive capacity, they are vulnerable to depend on the activities that originate with civic organisations or even their support which makes is unsustainable. In Zimbabwe most communities experienced depression after NGOs pulled out. This was shaped by the dependency setup that NGOs had created hence it is imperative for them consider the elements of poor targeting, dependency and reduplication of projects.

Civil society organizations can also improve project effectiveness through optimizing on already existing projects within the communities that originate with local people. Many environmental scholars and experts are of the view that rural people lack knowledge of climate change hence their activities are not a response in their context but rather endeavours meant to sustain life. In Hama community, there is a considerable group of people especially women are active in ISAL projects which are a stepping stone to responding to deficiencies the community has. ISAL involves the bringing together of agreed sums of money by a group of people who are both participants and beneficiaries. In local knowledge it is termed "mukando", which refers to participants contributing together. Therefore NGOs should take advantage of this initiative by engineering the entrepreneurial potential through ISAL. Their knowledge and funds can elevate the livelihoods of local people through enhancing the project. Chasi (2011) is of the view that people centeredness approach is effective in project planning and implementation. The funds from this initiative can be diversified hence an improved livelihood.

**CONCLUSION**

This main purpose of this section was to bring forward suggestions and propositions that can help the livelihoods in the face of climate change. The programming solutions gives the different key players are responsibility to engineer change to the generality of the population.

This is because climate change needs collective effort especially on least developed countries. These suggestions were mainly centred on increasing the adaptive capacity of communities and national governments as a stepping stone to combating climate change.

## CONCLUSION TO THE STUDY

The subject of climate change and variability in the contemporary times has become more pronounced because of the different manifestations mainly on the environment. These exhibitions are largely negative especially in the African context. Climate change has captivated global attention as a threat to human survival specifically on countries with less adaptive capacity to respond. The international community through different conventions has taken the responsibility to reduce the effects of climate change so as to lessen the burden on humanity. The aim is largely centred on reducing emissions that are chief to the perpetration of climate change and variability. Rather than focusing on the causes of climate change, efforts are directed to navigate how to survive amidst of climate change hence adaptation and mitigation.

This research has been focusing on Hama community of Chirumanzu District in Zimbabwe which is situated in region 4 in the Agro ecological zones. The community has become a victim of change of climatic patterns. Scholars believe that Zimbabwe is not yet experiencing climate change but rather climate variability. In this regard, Hama community has robbed of their dependency lifestyle on the environment as a result of climate change and variability. The greatest challenge is on food shortages as a result of the underperformance of the agriculture sector, reduced annual rainfall levels and deterioration of forests. Therefore, the community responded in a bid to redeem themselves from the manifestations of climate change and employed various response strategies that have been discussed in this research. Despite the community's effort, lives are still under threat and there is need for more government and other important stakeholders' support to curtail the effects of climate change. Chief of all is to improve the adaptive capacity of rural communities and increasing awareness.

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**APPENDICES**

My name is Noel Joseph Mbondo and I am a student from Midlands State University (MSU).

I am carrying out a research strictly intended to meet the requirements of the partial

fulfilment of the Bachelor of Arts in Development Studies Honours Degree. My research topic is entitled: Survival mechanisms adopted by rural communities experiencing climate change, the case of Hama, Chirumanzu, Zimbabwe. I kindly ask your cooperation to respond to the following questions.

**Interview questions**

1. What are the major effects of climate change in your community?
2. How has climate change compromised livelihoods within the community?
3. What are the strategies employed by community people to respond to climate change?
4. Have the strategies improved livelihood especially in ensuring food provision and water access?
5. What are the challenges that the community is encountering while responding to climate change?
6. What has the government and NGOs done to support the community to respond to climate change?

What recommendations would you propose towards effective climate change response strategies?

**Interview questions for key informants**

1. Designation of the respondents?
2. How has climate change affected the whole district?
3. What are the current statistics in terms of rainfall patterns, temperatures and production within the district?
4. What have you done to help the community to respond to climate change?
5. What recommendations would you suggest the government should undertake to effectively combat climate change and its effects?