

***Impacts of seasonality and climate change on rural livelihoods in Zimbabwe:
Implications on strengthening community resilience and adaptation options:
The case of Ward 5 and 35 of Zimunya in Mutare South District***

A synthesis report by:

The Poverty Reduction Forum Trust

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About the Poverty Reduction Forum Trust (PRFT)

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Goal

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For more information about our work, feel free to contact us and visit our website on details below:

Poverty Reduction Forum Trust
59 Mendel Road, Avondale, Harare
Tel: 263 (4) 307472/3
Email: info@prftzim.org
Website: www.prftzim.org

Executive summary

Climate change acts as an additional constraint to poverty reduction and sustainable socio-economic development for both urban and rural Zimbabwe. Most areas in Zimbabwe are vulnerable to climate change due to the heavy reliance on climate sensitive sectors such as agriculture. In Zimbabwe, climate change impacts among other contributing factors negatively affect food and non food systems. Climate change and variability impacts are more pronounced in rural areas where over 70% of the population heavily dependent on climate-sensitive livelihoods such as arable farming and livestock, among others. This study intends to provide a baseline information on the extent of seasonality and climate changes, climate change impacts on small scale farmers, livelihood systems and identify adaptation options and/or coping strategies being employed in Zimunya (Ward 5 and 35) under the Mutare Rural District Council. The study sought to establish both the effects of climate change and community adaption mechanisms as a way to inform effective development of programmes to strengthen climate change resilience on the basis of community driven approaches.

In this report, we used future climate projections based on CSIRO MK3 Global Circulation Model for the 2040s to model the possible changes in rainfall and temperature in the study area. The future climate projections are based on the A1B (best case) and the A2 (worst case) scenarios. The rationale for adopting climate change scenarios for the 2040s is that they allow for medium term planning for adaptation. In this report, we found evidence that climate change over Zimunya is characterised by temperature and rainfall shifts and extremes.

In this report we sought to investigate various issues with regards to climate change in Mutare rural specifically focussing on Zimunya area. We sought to understand local awareness and perception of climate variability and trends related to climate change and associated impacts on natural resources in the study area. We achieved this through conducting interviews on the communities' perception of changes in rainfall seasonality and abundance. We also used Geographic Information System (GIS) to map households interviewed during the survey and analyse future climate scenarios. The results of the secondary data analysis were triangulated with primary data so as to come up with rich conclusions on seasonality and climate change in ward 5 and 35 of Zimunya.

Our results show that most people are of the view that rainfall amount has decreased lately and the seasons are shifting. In addition, most households highlighted that temperatures are also increasing although some indicated that it's becoming cold. Natural climatic hazards such as cyclones were not found to be a common phenomenon in the area. We also found out that the frequency and severity of droughts has increased and these are accompanied by changes in quality and quantity of water resources. All these changes are having a negative effect on the environment resulting in changes in the extent of forest resources and forest cover. We also found out that the changes in climate have resulted in a decrease in wildlife/fisheries in the area.

We also found out that different social groups are affected differently by the effects of climate change; but the poor, women and children were perceived as the most vulnerable groups. In Zimunya area, there are limited livelihood options so communities continue to depend on rainfed agriculture for survival. The major factor which makes the communities vulnerable is the change in the pattern of rainfall although the annual total may not have significantly changed. Based on the results of this study we proposed adaptation options and actions which can be taken by different players to reduce the negative effects of climate change in the area. These include developing ward based resilience and vulnerability plans as part of the overall disaster risk reduction approach and share the plans and other vulnerability assessments to foster cross-

scale learning between the public, government and civil society for the RDC. In addition, the promotion of natural resources management and watershed/catchment protection through institutional strengthening of ward based environmental sub-committees (ESCs) and the formulation, enforcement and monitoring of community participatory environmental by-laws is crucial.

For Agritex and Department of Mechanisation there is need to promote farmer managed demonstration (farmer field schools) as an extension approach of crops that are increasingly becoming suitable to the changing climate. In the face of depleting forests especially due to brick moulding, firewood and opening new lands, Agritex is encouraged to roll out agro-forestry and conservation agriculture initiatives with the farmers at household level. It is recommended that the Ministry of Environment, Water and Climate promotes the collection, dissemination and use of local risk climate information (including scientific data and local knowledge about trends and changes) which will be used in Community Based Adaptation (CBA) initiatives as local farmers' decision making tool on such important times for planting, weeding and harvesting.

Community members and Local leadership are encouraged to identify community-based climate change adaptation activities that reduce community vulnerabilities. These can include value addition to agricultural and NTFPs, sustainable wetland utilisation based on EMA guidelines, intensive horticultural production activities to take advantages of proximity to Mutare town. With the increased rates of deforestation it is recommended that community members turn from use of traditional inefficient firewood cook systems to clean burn coke systems that use less wood. Furthermore with community members relying more on adaptation measures of brick moulding it is recommended that the traditional brick moulding kilns be replaced with vertical shaft technologies that have a potential to reduce carbon emissions.

The donors and all development partners are expected to play important roles to support Forestry Commission with financial and technical resources to run tree planting activities at household, village, ward and district level as well as raising awareness of communities on reforestation and afforestation and effects of climate change. More importantly they are recommended to facilitate and support the collection of local weather data through training and equipping local weather stations at local schools and at identified farmer households on wind, rainfall and temperature. In addition they should enhance institutional, financial and human capacity of the Mutare RDC to address the climate change impacts especially hazards and to implement climate change smart budgets that are responsive to climate change. In case of adverse disasters they should support social assistance programmes like Cash Transfers and Food for Asset programmes to assist the most vulnerable community members affected by climate change impacts.

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Key Terms and Definitions

Climate change: A change in the state of climate that can be identified (e.g., by using statistical tests) or by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer (IPCC 2007).

Vulnerability: Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity (IPCC 2007).

Adaptation: Involves adjustments to enhance the viability of social and economic activities and to reduce their vulnerability to climate, including its current variability and extreme events as well as longer-term climate change (Denton 2010)

Mitigation: action or activities that lead to the reduction of a cause(s) of a given impact or reducing the undesirable risk to the minimum level possible

Drought: refers to long term decrease in rainfall.

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List of Acronyms

TCP	Total Consumption Poverty
PICES	Poverty, Income, Consumption and Expenditure Survey
MDG	Millennium Development Goal
FEWSNET	Famine Early Warning Systems Network
ZimStat	Zimbabwe National Statistical Agency
ZIMVAC	Zimbabwe Vulnerable Assessment Committee
IPCC	Intergovernmental Panel on Climate Change
PRFT	Poverty Reduction Forum Trust
GDP	Gross Domestic Product
RBNB	Rural Basic Needs Basket
FGD	Focus Group Discussion
GIS	Geographic Information System
CSIRO MK3	Commonwealth Scientific and Industrial Research Organisation
NTFP	Non-Timber Forest Products
EMA	Environmental Management Agency
CBA	Community Based Adaptation
AGRITEX	Agricultural research and Extension Services
ZINWA	Zimbabwe National Water Authority
RDC	Rural district Council
ARDA	Agricultural and Rural Development Authority
SDDs	Sustainable Development Goals
SLF	Sustainable Livelihood Framework
CSA	Climate-Smart Agriculture
LPD	Livestock Production Department
DDF	District Development Fund
SAFIRE	Southern Alliance For Indigenous Resources
FAO	Food and Agriculture Organisation

1.0

Introduction and background

Poverty remains relatively high in most parts of Zimbabwe. It is generally higher in rural areas than urban areas based on results from the ZimStat 2011/2012 survey. Poverty remains more widespread in the rural areas (76%) while urban household poverty statistics is estimated at 38%. ZIMSTAT (2013) defines poverty as the inability to attain a level of well-being constituting a realistic minimum as defined by society. It further defines poverty as the prevalence of households or people whose consumption expenditures per capita are below the upper poverty line while extreme poverty represents households whose per capita consumption expenditure fall below the lower poverty line. Results from the ZimStat 2011/2012 Poverty, Income, Consumption and Expenditure Survey (PICES) show that poverty is around 63% for the Total Consumption Poverty (TCP) and 16% for the Food Poverty for households in the country.

The poverty situation in Zimbabwe is compounded by many factors, including weak macroeconomic performance and high unemployment, resulting in most people being unable to access health care, education and nutritional food. Zimbabwe continues to be food insecure which acts as one of the greatest impediment towards the attainment of targets under the Millennium Development Goal (MDG) now Sustainable Development Goals (SDGs) on poverty eradication. In Zimbabwe, seasonality and climate change act as additional constraints to the reduction of poverty. Seasonality refers to the change in the timing and distribution of rains resulting in a change in the timing of rainfall becoming more unpredictable without distinct seasons (Devereux et al. 2012). The changing seasonality is one of the major impacts of climate change faced by smallholder farmers in developing countries including Zimbabwe. Seasonality affects farmers' incomes and food security through fluctuating food stocks and prices, resulting in fluctuating food consumption patterns in poor households.

Climate change refers to the change in the state of climate that can be identified (e.g., by using statistical tests) or by changes in the mean and/or the variability of its properties, that persists for an extended period, typically decades or longer (IPCC 2007). The impacts of climate change create challenges and impose severe losses and hardships on the poorest communities as their livelihoods are likely to be more sensitive to adverse impacts of climate change (Ziervogel and

Calder 2003, IPCC 2007). The most dominant and widespread disaster due to climate change is drought, whose frequency is observed to be on the increase. Seasonality and climate change are a key constraints to sustainable rural livelihoods, and a driver of poverty and hunger, in most developing countries particularly in the tropics (Devereux et al. 2012). Most people in developing countries cannot cope with seasonal climatic variations which normally lead to drought or flood, resulting in adverse consequences for agriculture, spread of disease and disaster risk management. In most tropical countries, climatic seasonality shapes and structures rural livelihoods mostly in negative ways; such that development interventions must account for seasonality in their design and implementation, so as to achieve positive impacts (Devereux et al. 2012).

Globally, the impacts of climate change and variability present the biggest challenge to sustainable food systems. Climate change is a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period. Climate change is increasingly becoming a threat to planet earth and people's livelihoods. In most parts of Africa near surface temperatures have risen by at least 0.5°C during the last 50 to 100 years. In 2011, a study showed that near surface temperatures between 1995–2010 were significantly higher than the 1979–1994 period in Zimbabwe. Of great concern is the notion that Africa's temperatures are projected to rise faster than the global average in the 21st century. In Southern Africa, it is projected that by the end of the 21st century, temperatures will be between 3.4°C and 4.2°C above the 1981 – 2000 average. World-wide, the major adverse impacts of climatic change have been declining water resources, reduced agricultural productivity, and the spread of vector-borne diseases to new areas and changes in populations and distribution of biodiversity among others.

In Zimbabwe, since temperature recordings in 1900, the period between 1980 to present has been the warmest. The country's annual mean surface temperature has warmed by about 0.4°C between 1900 and 2000. According the 2013 National Climate Change Response Strategy, Zimbabwe is experiencing more hot and fewer cold days than before as a result of climate change and variability. The Zimbabwe Meteorological Services reports that daily minimum and maximum temperatures have risen by about 2.6°C and 2°C in the last century, respectively. Intra-seasonal characteristics in the summer rainfall have also changed characterised by decrease in rainfall over the last 30 years. The changes in climate have resulted in frequent occurrence of natural disasters such as floods and droughts. There is evidence from research that has

further revealed that climate change has caused a shift in Zimbabwe's agro-ecological zones (Mugandani et al. 2012). With five natural regions, areas such as Chinhoyi and Chivero for example, have shifted from natural region II to region III as a result of significantly reduced rainfall which results in fewer yields as compared to previous seasons. It is evident that these changes in climate have an impact on the seasons which may in turn result in a shift in the livelihoods of rural communities.

In Zimbabwe, climate change impacts, among other contributing factors, negatively affect the agricultural productivity and all the four dimensions of food security namely food availability, food accessibility, food utilization and food system stability. Climate change and variability impacts are more pronounced in Zimbabwe due to our agro-based economy with over 70% of the population living in rural areas and heavily dependent on climatic-sensitive livelihoods such as arable farming and livestock production among others. Since the country's staple crop is maize, food security is usually linked to the production of maize. The Famine Early Warning Systems Network (FEWSNET) warns that households in most southern provinces will face severe food shortages in September 2015. The least drought affected areas in the Northern parts of the country are expected to be stressed from October to December 2015. The 2014 Zimbabwe Vulnerable Assessment Committee (ZIMVAC) estimates that 5% of the rural population is currently food insecure and the situation is likely to continue through to September 2015. The number of people who face food insecurity is likely to increase to 1.5 million people from January to March 2016.

At national level, there is abundant evidence to show that climate change reduces the country's Gross Domestic Product (GDP) because of the agricultural sector's backward and forward linkages with other sectors of the economy which are sensitive to climate. The Minister of Finance and Economic Development's 2015 Mid-Term Fiscal Policy review statement acknowledged that the 2014/2015 drought year affected the Gross Domestic Product (GDP) with annual projected real GDP growth rate for 2015 revised downwards from 3.2 percent to 1.5 percent. According to the 2015 Mid-Term Review, the contribution of agriculture to the original growth projection of 3.2 percent has been weighed down by the drought induced underperformance of agriculture with the sector expected to shrink by -8.2% in 2015. Other factors which include lack of inputs, credit and technology has led to the reduction in crop yields for both cereals and cash crops such as tobacco and cotton.

While the impacts of climate change and variability can be shown through the loss in both agricultural productivity and the reduction in the GDP of the country, there are varied

local seasonality and climate change impacts that persist at local level. These cannot be immediately reflected in the calculation of the country's economic growth rates. There are also various local mitigation strategies that have been pursued and are yet to be evaluated in terms of their impacts on livelihood sectors specifically on the rural food security systems.

Understanding the impacts of climate change on the economy will require an increasing need for the country to develop effective adaptation and mitigation strategies that can sustainably respond to the diverse and complex nature of impacts of climate change on rural livelihoods systems. Informed by its Rural Basic Needs Basket (RBNB) survey tool implemented in Mutare rural with the aim of collecting rural poverty information to inform sustainable strategies on rural livelihoods, PRFT realizes the need to carry out an in-depth study in Ward 5 and 35 of Zimunya to provide a baseline information on how and to what extent seasonality and climatic change have affected local food and non food systems. Local information on changes in climate and seasonality has increasingly become important in strengthening communities in managing the livelihoods effects which these changes bring. The baseline also identified coping strategies being used by local people in the face of seasonality and climate change.

Previous studies on climate change show that climate change has more negative effects on women and children. According to FAO (2011), women farmers account for about 45 to 80 percent of all food production in developing countries which means they are likely to be affected more by changes in climate. Moreso, about two thirds of the women in developing countries and more than 90% in Africa are engaged in the agricultural sector. Hence there is need to understand the context in which women have been affected by seasonality and climate change impacts and to what extent the mitigation measures have affected their livelihoods.

Based on the 2013 National Climate Change Response Strategy, the government of Zimbabwe acknowledges the importance of climate in the identification of appropriate institutions and implementation of effective adaptation measures as some of the critical pillars in mainstreaming climate change. The policy recommendations to be derived from this study will contribute towards informing the implementation of the government's National Climate Change Response Strategy. This report is based on research carried out in Dora communal area in Mutare South district. In this report, we used household surveys, focus group discussions (FGDs) and secondary data to gather information on the impact of seasonality and climate change on local livelihoods carried out in wards 5 and 35 of Zimunya communal area in Mutare Rural District.

1.1

Purpose and Objectives of the Study

The Poverty Reduction Forum Trust seeks to provide local specific evidence on climate change and vulnerability which can support both the formulation and implementation of policies and projects on strengthening climate change resilience at local community level. This research seeks to contribute to informing policies and interventions on climate change, climate smart livelihood activities both agricultural and non agricultural activities which should translate into increased agricultural productivity, food security and housed incomes of the poor households and small holder farmers. In this research, however, we focused the baseline research on two wards in Zimunya (Ward 5 and 35), Mutare rural in Manicaland Province where PRFT

is monitoring the food security through its Rural Basic Needs Basket Survey. The choice of the target wards was reached after consultation with different stakeholders in the area including the Rural District Council.

The specific objectives of the study were to;

1. Measure the extent of seasonality and climate change in Zimunya communal area;
2. Understand the seasonality and climate change impacts in Mutare rural, disaggregating the data or vulnerability by gender;
3. Explore the extent of effects or vulnerability;
4. Understand the current adaptation and mitigation strategies being employed; and
5. Assess the effectiveness and efficiency of adaptation strategies (resources needed versus rural livelihood outcomes) on food security and other rural livelihood indicators disaggregating information by gender.

2.0

Background of the Study Area

This section outlines a brief background on the study area and the methods that we used to collect data in the target area

2.1 Study area

The study was carried out in two wards in Mutare Rural District Council (Ward 5 and 35) Figure 1. The area falls in Agroecological region III of Zimbabwe based on the classification by Vincent and Thomas 1960.

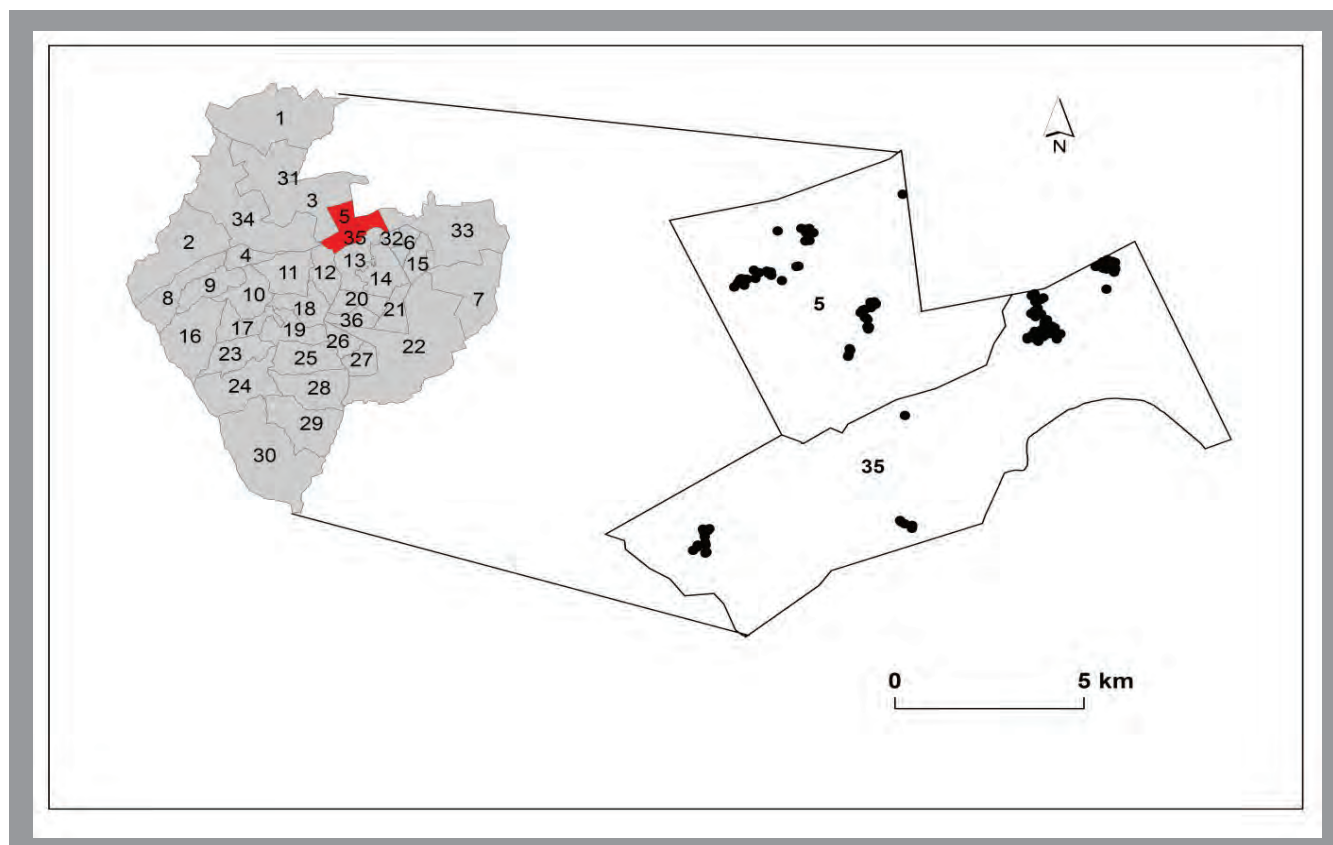


Figure 1: Location of Study wards in Mutare Rural district council (left panel) and the location household involved in the survey in the study wards (right panel).

2.2 Soils and elevation

In terms of soils, the two wards are dominated by three main types of soils which are Eutric leptosols, Ferric Arenosols and Haplic soils (Fig 2). The soils are derived from granite and therefore they are dominantly sand to sandy loam. The

Leptosols are very shallow soils and develop over hard rock or highly calcareous material. Where they occur on loose material, they are deep but are extremely gravelly stoney. The Arenosols in the tropics are formed from young sandy deposits. In terms of elevation, the study area ranges from 900 to 1700 m. In general the area is in the middle veld characterised by moderate to high rainfall.

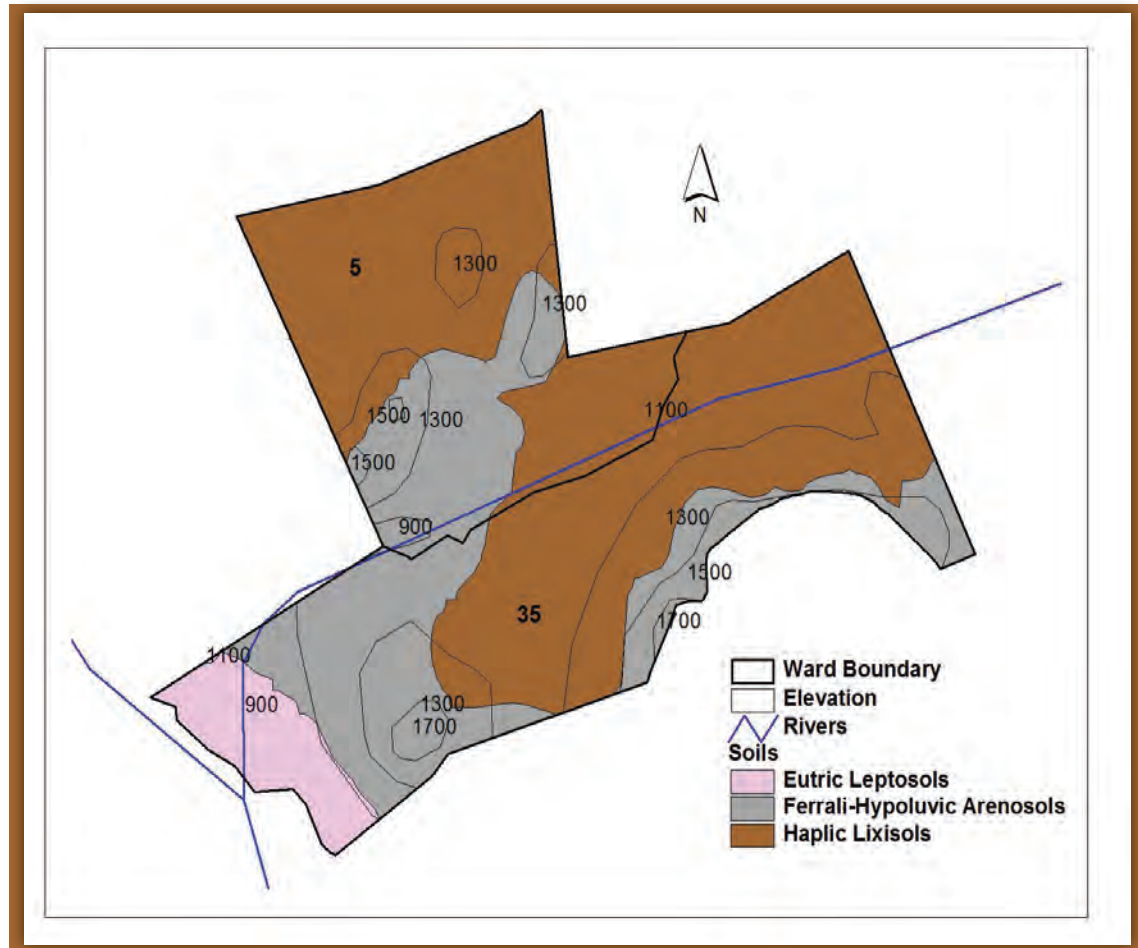


Figure 2: Soils is the Study area

2.3 Demographic and social Profile of the area

Data on population distribution was obtained from Zimbabwe Statistics (ZIMSTAT) Census reports for 1992, and 2012 (CSO, 1992, ZimStat, 2013). The population data were used to determine the population density, trends in population growth as well as distribution by

gender which are key in understanding spatial variations in vulnerability across the study area. In terms of population, ward 5 has a total population of 3822 while the total population of ward 35 is 6545 (ZimStat, 2012). Table 1 shows the population of the two wards based on the population Census of 1992 and 2012. In general the two wards have more females than males with the female population constituting more than 50% of the population in the two wards (Table 1) (ZimStat 2013).

Table 1: Population in the study area from 1992 to 2012

Year	Ward	Male	% Male	Female	%Female	Total
1992	5	2487	46.29	2886	53.71	5373
1992	35	2512	49.04	2610	50.96	5122
2012	5	1831	47.9	1991	52.1	3822
2012	35	3118	47.6	3427	52.4	6545

As a result of the higher number of females in both wards, the sex ratio is also high with ward 5 having a sex ratio of 92 while ward 35 has a sex ratio of 91 based on the 2012 census (ZimStat 2013).

From 1992 to 2012, ward 5 experienced a 40% negative population growth while ward 35 was characterised by a 21.7% increase in the population. The population density of the ward 5 and 35 of Mutare rural is 0.00009 and 1.042 based on the population census of 2012.

The possible reasons for decrease in population in ward 5 is that people migrated to the neighbouring ARDA estates following the government's acquisition of the farms for resettling people affected by diamond mining in Marange. The land bordering the ward was opened to pave way for people being displaced by diamond mining in Chiadzwa. A number of households in the ward took advantage of this and settled themselves in the ARDA estates

Some people especially men, in search of employment, went Mutare while others went to South Africa

2.4

Rainfall and Temperature pattern in the Study area

The target wards in Mutare Rural District Council falls in agroecological region 3 which receives an average rainfall of 800mm. An analysis of the mean monthly rainfall in the area shows that the highest rainfall is received in summer particularly from November to March (Figure 2). The historical rainfall records show that the wettest years were 2000 and 2001 which coincided with Cyclone Eline which resulted in

heavy rainfall particularly in the eastern part of the country (Figure 3) (<http://pmm.nasa.gov/data-access/data>). The years 2002 and 2012 recorded the lowest amount of rainfall (Figure 3). In terms of the amount of rainfall received, we observed that the amount of total amount of rainfall received in a year may not change significantly over the years but is the seasonal distribution that is more important.

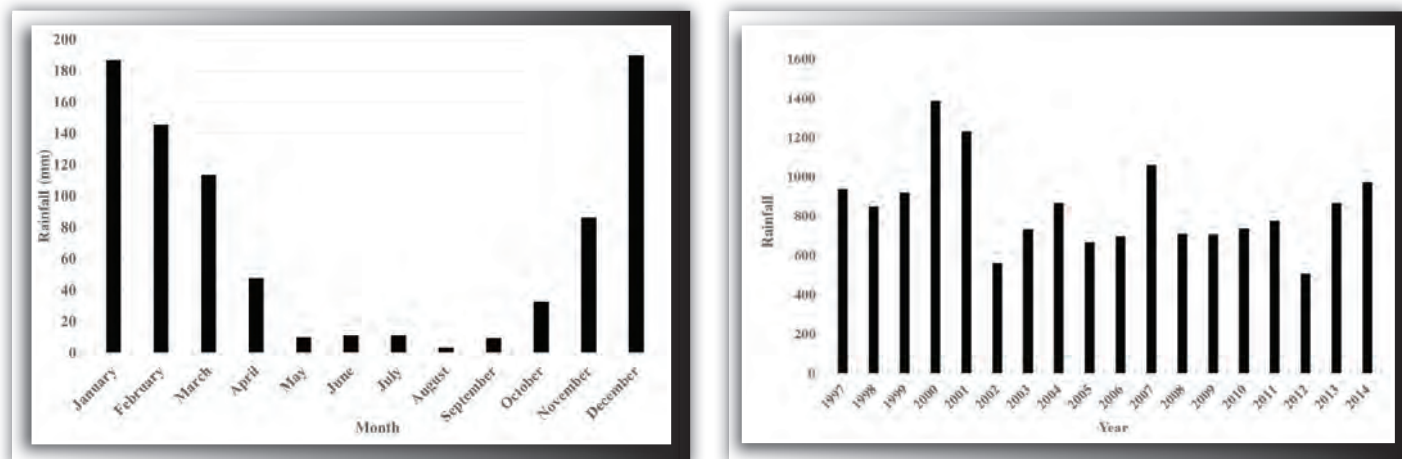


Figure 3: Mean monthly rainfall (left panel) and Mean annual rainfall (right panel) for Mutare rural district council
The mean monthly maximum temperature received in the area is around 25 degrees Celsius with a maximum peak from August to December while the lowest maximum temperature is received in July (Figure 4).

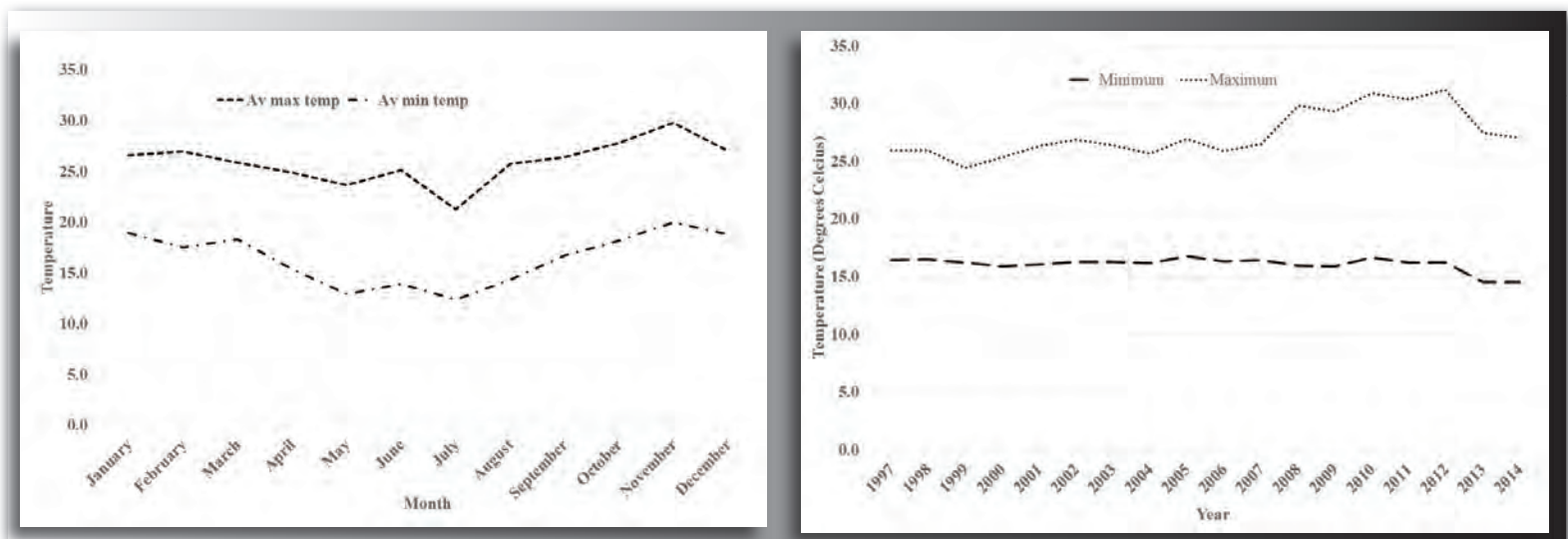


Figure 4 Mean Monthly minimum and maximum temperature (left panel) and mean annual minimum and maximum temperatures (right panel)
The mean annual minimum and maximum temperature also follows the same pattern with the annual average of 15.3°C and 27°C.
In general the area is cool which is characteristic of areas falling in agroecological region 3.

3.0

Methodology

The overall approach and methodology for the study was based on both secondary and primary data collection methods. The primary data collection involved the use of three key data collection tools which were Focus Group Discussions (FGDs), in-depth interviews with key informants and household interviews. These three tools were used for the purpose of triangulation with primary data.

Firstly, we did household consultations using household questionnaires (Annex1). We followed household interviews with FGDs with local communities to gather information about seasonality and impacts of climate change on rural livelihoods in the two wards (Annex 2). The FGDs were organized to consult with local communities of all age groups on seasonality and impacts of climate change. The FGD participants included households, the elderly people, councillors, village heads, head men, ward development community members and government

departments (agriculture extension and livestock). We also talked to key informants which included Rural District Council, AGRITEX, EMA, and ZINWA (Annex 3).

We also determined the livelihood systems in the target area as this forms a basis for adaptation to seasonality and climate change. A livelihood system as comprising the capabilities, assets (including both material and social resources), and activities required for a means of living (Chambers and Conway 1992). Assets and activities, undertaken usually at the household level, is often referred to as the household's livelihood strategy. During the FGD we were guided by the Sustainable Livelihood Framework (SLF) to determine the vulnerability and adaptive capacity of communities in Dora communal area, Zimunya. The sustainable livelihood approach considers natural, physical, human, social and financial capital as determinants of the ability to cope with climatic shocks (Figure 5) (Carney 2002, Elasha et al. 2005).

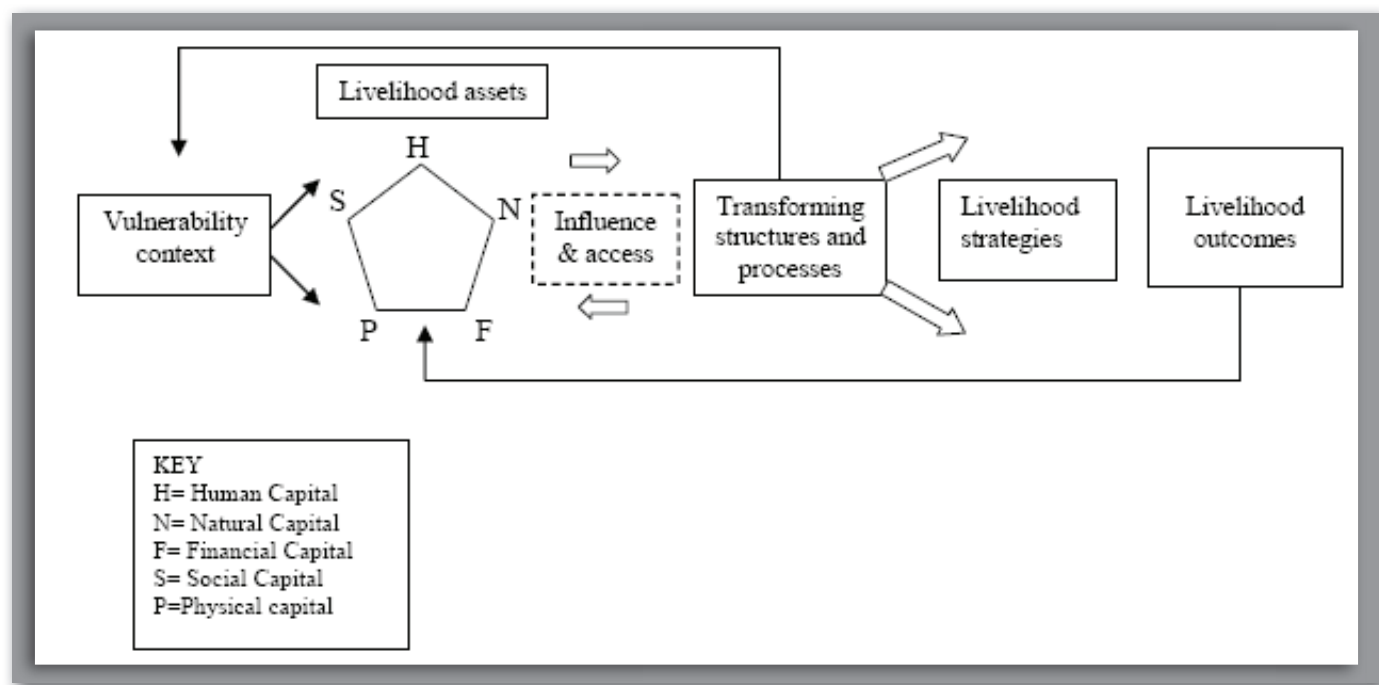


Figure 5: Sustainable Livelihoods Framework

We also adopted the methodology outlined in the Participatory Tools and Techniques for Assessing Climate Change Impacts and Exploring Options' toolkit (Raj Regmi et al. 2010). Thus, to systematically analyze vulnerability in Zimunya, we adopted the following steps:

1. Listing current known climate risks and thresholds of concern to exposure units in the target area;
2. Synthesizing existing knowledge on climate vulnerability in a rapid participatory exercise with stakeholders; and
3. Integrating results from a variety of quantitative and qualitative methods.

In addition, we also assessed the consequences and impacts of climate related changes and trends, with particular attention to livelihoods and socio-economic impacts. The specific areas were similar to those from

the FGD but were focussed on getting more detailed information. We georeferenced all the households who participated in the household interviews (Figure 1). A total of 127 interviews were conducted in the two wards i.e., 63 in ward 5 and 64 in ward 35. Out of the 127 interviewees, 56 were female and 71 were male. In carrying out the household interviews, we sought to understand the nature of climate change in the area and how the changes in climate have affected livelihood in the area (See Annex 1). In order to understand climate change in the study area, we also analysed climate data for the target area. The climate data were downloaded from <http://pmm.nasa.gov/data-access/data>.

4.0

Climate change Impacts and Survey Findings

We conducted household interviews, key informant interviews with stakeholders in the target districts as well as focus group discussions with farmers on the various aspects of vulnerability and adaptation to climate change. The following section outlines the results of our survey.

4.1 Climate related variability, trends and changes

This section presents the results of the household surveys and focus group discussions. We explored community's perception on changes in temperature, rainfall, cyclones, drought, and floods based on ward 5 and ward 35 of Mutare rural. We asked participants to indicate their understanding in terms of observed changes in the major climatic parameters in their area and how these changes have affected livelihoods. The main objective was to identify, map and rank the local climatic hazards based on the frequency and risk of occurrence in the two wards. This exercise was done to identify the most important climatic threats to livelihoods in the target area. We also

assessed the historical trends in the occurrence of the climatic hazards.

In the two wards, communities recognized a number of climatic hazards that affect their livelihoods. These climate hazards combine with other threats and current conditions to shape the degree of vulnerability of communities.

4.2 Farmers perceptions on changing climate

Figure 6 shows the results of community's views on whether climate is changing. The figure represents the total count of people per ward based on gender. We observe that 49% of the women in ward 5 and 38% of the women in ward 35 agreed that observe changes in climate. Overall, the participants indicated that they observe that climate is changing. In ward 5, 51% of the men interviewed indicated that they observe that climate is changing while about 62% of the men in ward 35 indicated that climate is changing.

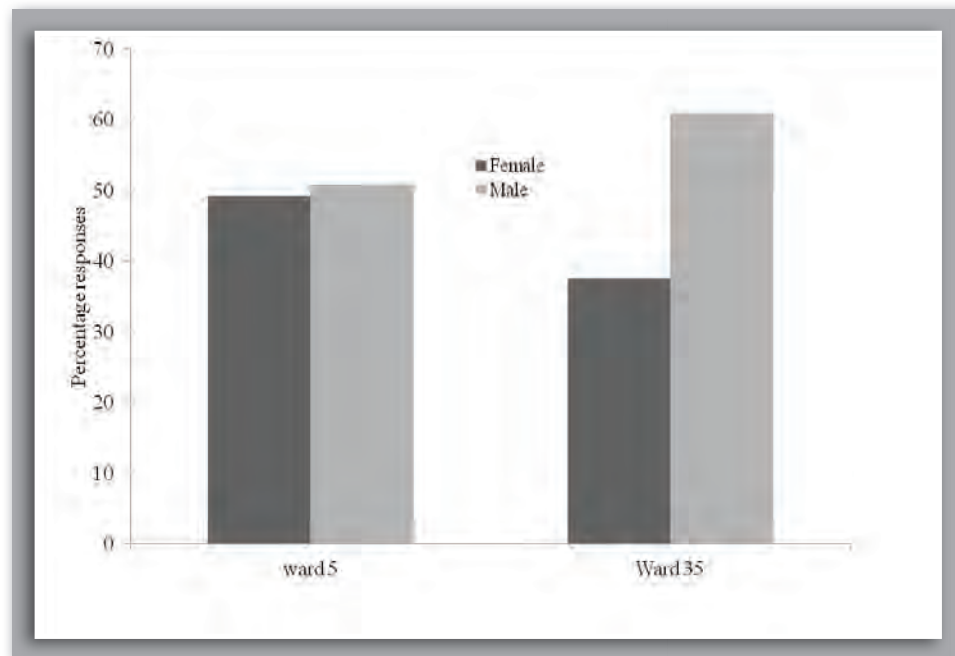


Figure 6: People perceptions in terms of Climate change

4.3

Community's perception on Changes in Rainfall, temperature, floods and drought

Table 2 shows the communities' perceptions on rainfall, temperature, the occurrence of floods and drought. In both wards, households observed that rainfall has decreased and temperatures are increasing although some highlighted that temperatures tend to be very low during winter. There

are rare incidences of floods because of decreased rainfall but the frequency and severity of droughts has increased.

Table 2: Perceived changes in rainfall, temperature, floods and drought in Zimunya for ward 5 and 35 based on household interviews

Climatic factor	Change	Comment
Rainfall	Reduced	In both wards people observed that both the duration and quantity of rainfall has decreased over the years
Temperature	Decreased	Most people observed that it is becoming colder and temperatures especially in winter have decreased
Floods	No flooding	Overall, people observed that because of the reduced rainfall amount there is generally no flooding in the area or they are rare. Most people remember cyclone Eline in 2001/2002
Drought	Increased	The frequency and severity of drought have increased in the area

Table 3 shows the results of participatory mapping of vulnerability in the two wards using FGDs. The results show that drought is the most common climatic risk that threatens the livelihoods of people in the area followed by late onset of rains. Besides the evidence of changing climate, farmers highlighted there is now the problem of seasonal variability in the timing of rainfall. The FGD participants and the household interviewees highlighted that rains were now starting late in November or December and end in February or early March. The pattern of rainfall distribution in the area has been very poor such that it cannot be useful for agricultural production. This means most crops cannot grow to maturity because of a short growing season. The majority of farmers indicated that in the past, rains started in October. Lately, there is a general shift from October to late November or December. However, the seasons appeared to have shifted as the rains could now start as late as December. The farmers

indicated that when they received rains in November or December, the amount can either be high or very low and erratic making it difficult to plan on the planting dates. After the first rains, it will also take time to receive the second rains to sustain plant growth. This introduces uncertainty among the households on the best time to plant. Farmers highlighted that they would be able to plan best if there is a good weather monitoring system to enhance weather forecasting. Table 3 shows the livelihood options affected by the different climatic hazards in the in ward 35.

Household interviews indicated that seasonal droughts are also common in the area. The results show that rainfed agriculture and grazing pastures are mostly affected by drought and seasonal droughts. The late onset of rains mostly affects livestock production which is one of the key sources of livelihood for the area.

Table 3: Livelihood options are most affected by climatic hazards-Ward 35

Livelihoods (capitals)		Climatic risk					
		Drought	Floods	Late onset of rains	Early cessation of rains	Mid-season dry spell	Seasonal drought
Agriculture	Rain fed	4	1	3	3	3	4
	Irrigated						
	Livestock production	3	1	4	2	2	3
	Market gardening	3	1	2	2	2	2
Water	Dams	3	1	4	2	2	3
	Rivers	3	1	3	2	2	3
	Groundwater	3	1	2	2	2	3
Forest management	Community	4	1	3	2	2	3
	Government						
Habitat type	Savanna grassland	4	1	4	2	2	4

0 – Not vulnerable to the hazard, 1 – Low vulnerability to the hazard, 2 – Medium vulnerability to the hazard, 3 – High vulnerability to the hazard, 4– Very high vulnerability to the hazard

4.4 Climate change-related impacts and vulnerabilities and gender

One of the key priorities in climate change analysis is to understand the different types of vulnerability to climate change that women and men face, and their gendered implications (Denton 2010). This is because gender-related inequalities are pervasive in most developing countries including Zimbabwe. Although women account for almost 80 per cent of people in the agricultural sector in Africa, they remain vulnerable and poor (Denton, 2010). It is well documented that rural women in particular play a key role in environmental and natural resource management hence, women and their livelihood activities are particularly vulnerable to the risks posed by environmental change (Denton 2010). In most developing countries ineffective, gender blind policies, and entrenched patriarchal traditions,

are to a large extent responsible for the numerous constraints faced by women (Denton 2010).

Understanding the differential vulnerability is important for developing adaptation strategies. Investigating the differences between the vulnerability of men and women is an area that requires specific attention and is particularly important in many Southern African communities where women and men often undertake different reproductive activities (Ziervogel et al. 2008). Women can be vulnerable to low rainfall and drought because during these times they often have to fetch water and firewood from long distances (Ziervogel et al. 2008).

Our results show that in ward 35 seasonal droughts and drought mostly affect both males and females as they have to travel long distances looking for food for their families. Seasonal droughts are droughts that occur in a season characterised by late onset of rains, mid-season dry spells and early cessation of rainfall. Table 4 shows the different groups and how they are affected by different climatic hazards.

Table 4: Social groups affected by climate hazards in ward 35

Social Groups		Climatic hazard					Mid-season dry spells
		Drought	Floods	Late onset of rains	Early cessation of rains	Seasonal drought	
Gender	Elderly	3	1	3	3	3	3
	Male	4	1	2	3	4	3
	Female	4	1	3	3	4	3

0 – Not vulnerable to the hazard, 1 – Low vulnerability to the hazard, 2 – Medium vulnerability to the hazard, 3 – High vulnerability to the hazard, 4 – Very high vulnerability to the hazard

In ward 5, females and the poor were identified as the most vulnerable groups to the different types of climatic hazards. The other social groups are affected in different proportions by climatic hazards (table 5) From the results of our survey, we conclude that males and females are generally affected in the same by climatic hazards except the late onset of rains which is lower for men than women. Women who were interviewed in Dora indicated that they

were more vulnerable to climate change implications on food availability as the role to feed the children would mostly lie with them. The women showed that they were walking long distances and spending more time on income generating activities to source food requirements for the family. This reflects that women devote more of their time to food planning and production in rural areas.

Table 5: Social groups affected by climate hazards in ward 5

		Climate hazard				
		Drought	Late onset of rainfall	Early cessation of rains	Seasonal drought	Mid- season dry spell
Age	Children	2	0	0	0	0
	Adults	3	1	3	2	1
	Elderly	2	1	1	2	1
Gender	Male	2	1	2	1	2
	Female	3	3	3	3	2
Class differentiation	Poor	3	3	3	3	3
	Rich	1	0	1	0	0

0 – Not vulnerable to the hazard, 1 – Low vulnerability to the hazard, 2 – Medium vulnerability to the hazard, 3 – High vulnerability to the hazard, 4 – Very high vulnerability to the hazard

4.5

Communities and key informants' perception on the impacts of climate change on water sources

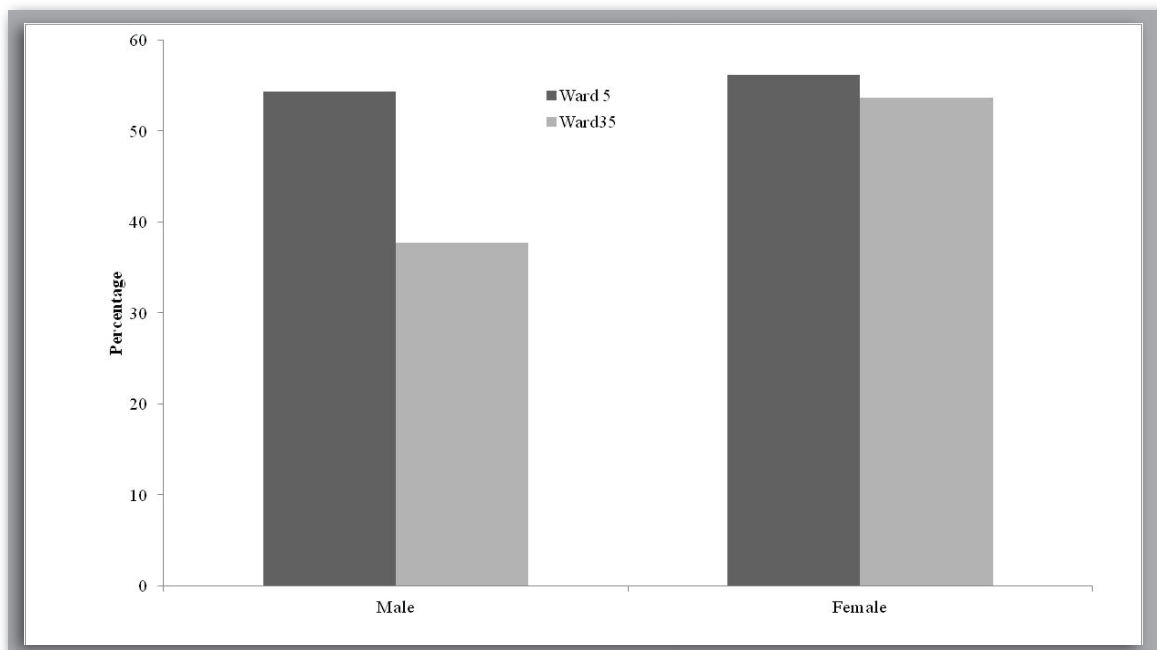
The interviews with communities and key informants indicated that the changes in rainfall patterns have impacted negatively on water resources. In both wards, the table shows that most people regardless of gender acknowledged that water resources have become scarce. In ward 5, 52% of the women highlighted a significant decrease in water resources due to reduction in rainfall while 48% of the males also indicated a general decrease in water resources. In Ward 35, more women (52%) indicated that water resources have decreased while 48% of the males concurred. We found out that most of the boreholes in the ward are drying up due to the lowering of the water table forcing people to resort to fetching water from river banks. The problem of water shortage is compounded by the breakdown of boreholes which would still be providing water. The repair of broken down boreholes takes a long time since communities cannot quickly raise enough money for the repair of the boreholes. The decrease in rainfall in the area has also resulted in people walking long distances to get water for drinking and in some cases end up digging for water from river beds because most of the water sources would have dried up. In fact 63% of the people interviewed in ward 35 indicated that they get water from the river beds while 71% of the households in ward 5 indicated the same.

4.6 Communities and key informants' perception on the impacts of climate change on Forest resources

Forests provide both non-timber and timber products. In this survey, we sought to investigate communities' perceptions on the impact of seasonality and climate change on the availability of forest resources. In both wards households felt that changes in climate have negatively affected forest resources in the area with most women highlighting that firewood is now scarce. In ward 35, 54% of the women indicated that forest resources especially firewood is now difficult to get while 56% of women in ward 5 also agreed that forests are diminishing. One of the reasons for the decrease in forests was reduced rainfall and also over utilisation by people through cutting down of trees for burning bricks. Brick moulding is one of the most common activities in the area so there is rampant cutting down of trees. Figure 7 shows the percentage of people who were of the view that in general forest resources are diminishing.

In addition to diminishing forest resources, most people in the two wards also observed that the agricultural land has

*Figure 7:
Percentage of
people with a
view that forest
resources are
diminishing by
gender*



generally become infertile. In both wards, both males and females agreed that the reduced fertility of the agricultural land has resulted in lower yields. Households grow maize, groundnuts and at times drought resistant crops such as sorghum. In both wards women felt that the soils are no longer providing food like they used to do. The main reason for reduction in fertility may be land degradation (Plate 1) and over exploitation of the land. Plate 1 shows

part of the degraded land in the target area. Most people depend on the land such that it is now exhausted so the fertility has gone down. Population increase in particularly in ward 35 has meant more pressure on land. In terms of percentage, we found that 56% and 54% of women in ward 5 and 35 respectively highlighted the problem of decreased soil fertility while 54% and 38% indicated the same problems respectively.



Plate 2: Land degradation in Zimunya

4.7

Impact of Seasonality and climate change on Fisheries and Health

In general, in terms of fisheries, most people were of the view that the amount of fish has also decreased in the area. Figure 8 shows the percentage of people who were of the view that amount of fish has been reduced. Households indicated that the reduction of rainfall has resulted in reduced water flows which have negatively affected the ability of water resources to support fisheries. In addition,

there is now overexploitation of the fishery resources due to limited livelihood options resulting in most people depending on fishing for survival. The inflow of polluted water from the city of Mutare especially Sakubva river is compounding the situation as the water is too dirty to support aquatic life.

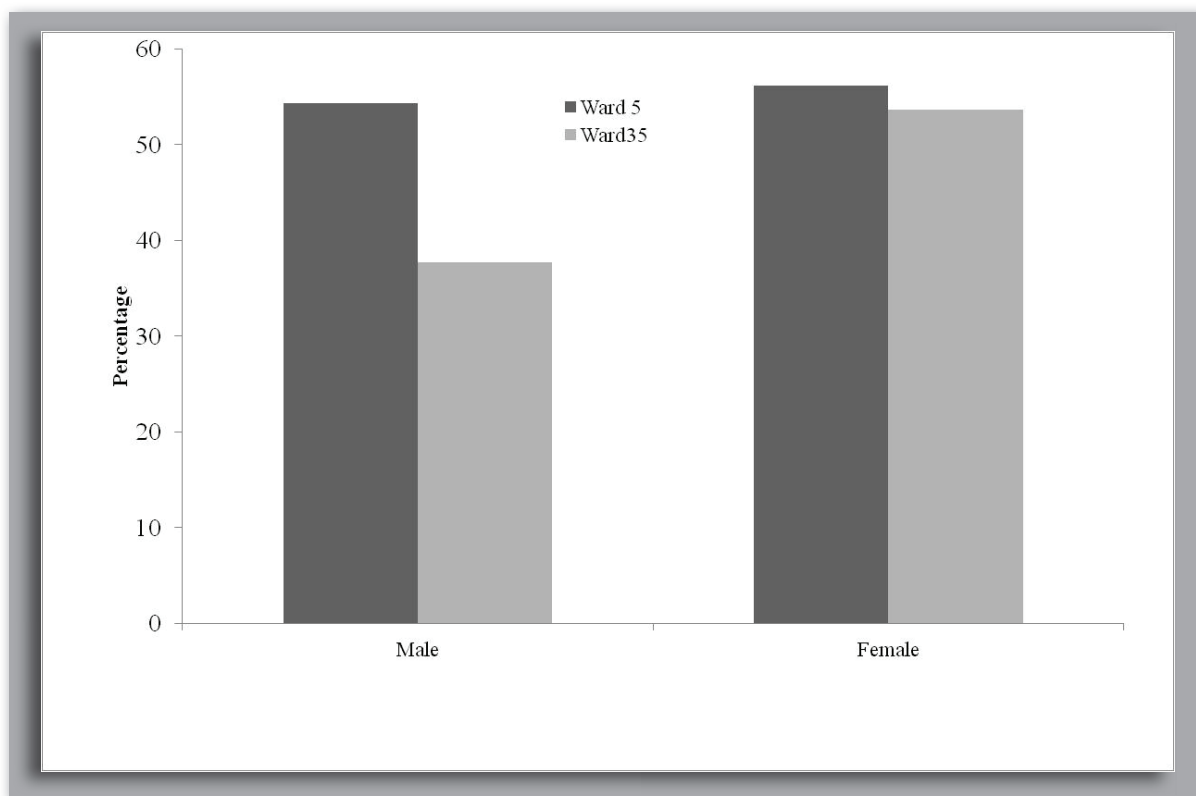
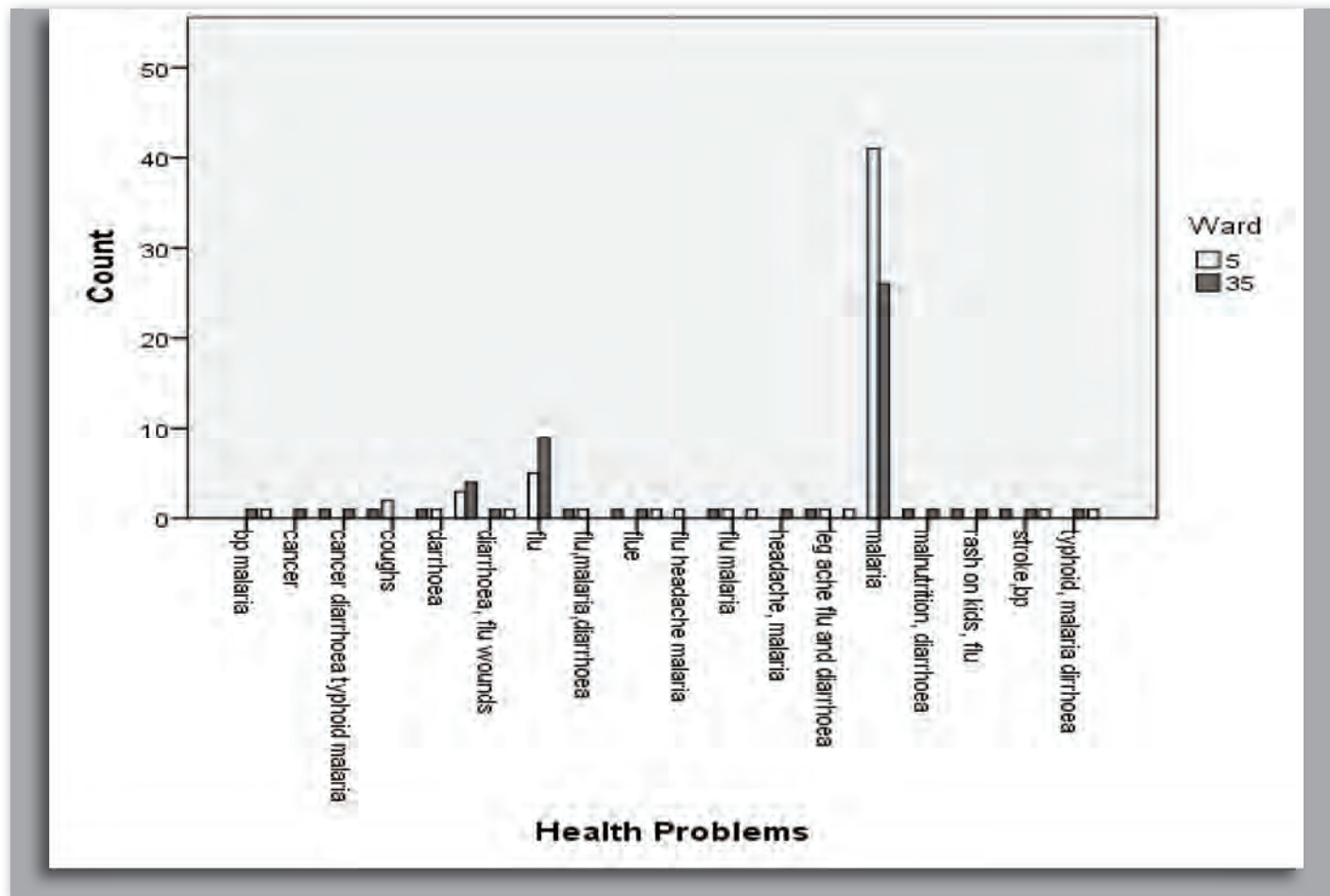


Figure 8: Number Percentage of people with a view that fisheries have been reduced by gender

In this study we also aimed to explore the impact of climate change on the occurrence of both human and animal diseases in the area. Figure 9 shows that most people felt that malaria incidence has increased in both wards followed by flu although the link between climate and flu is not very clear. A direct link between climate change and vector borne diseases such as malaria was observed as malaria incidences increase with an increase in temperature. All

other diseases are occurring in less proportion. The other diseases which are occurring in less proportion do not have a direct link with climate. Communities in the target area highlighted that the increase in flu incidences may be due to increase in wind blowing from different directions.

Figure 9: People's perception on Health problems resulting from Climate Change



4.8 The perceptions of communities on availability of food stocks

In both wards, most people also indicated that there are less food stocks available in the areas which have decreased since the 1992 drought. The limited stocks have resulted in increased pressure on income which has resulted in the diversion of funds from their intended uses. The major reason why food stocks are now dwindling year after year is change in the types of crops grown in the area. At present, the major crops grown in the area are

maize, groundnuts and round nuts. Historically people in the two wards used to grow small grains such as millet and sorghum. They have however stopped growing the small grains because of the following reasons;

- i) The small grains are labour intensive especially when it comes to harvesting and processing;
- i) "Modernisation"- young people no longer interested in what they perceive as crops for the past century,
- i) There is an extra requirement to protect the crops from quielea birds; and
- i) Lack of knowledge on crops that are adaptive to local conditions.

4.9

Impact of seasonality and climate change on pasture availability

Another impact identified in the area is the decrease in pastures. A large proportion of the people interviewed indicated that pastures have diminished. Figure 10 shows the count of people and their views on the availability of pasture in the area. In ward 5, 82% of the households interviewed indicated that there are no more pastures in the area while in ward 35 about 77% of the households interviewed also indicated that there no more pastures. The

reduction in pasture is associated with a general decrease in rainfall, and seasonal droughts. The combination of decreased rainfall and seasonal droughts has resulted in grass being unable to reach maturity over many seasons therefore reducing the amount of seed bank in the soil. The root stocks of grasses from where the grass normally shoots are also diminishing due to overgrazing.

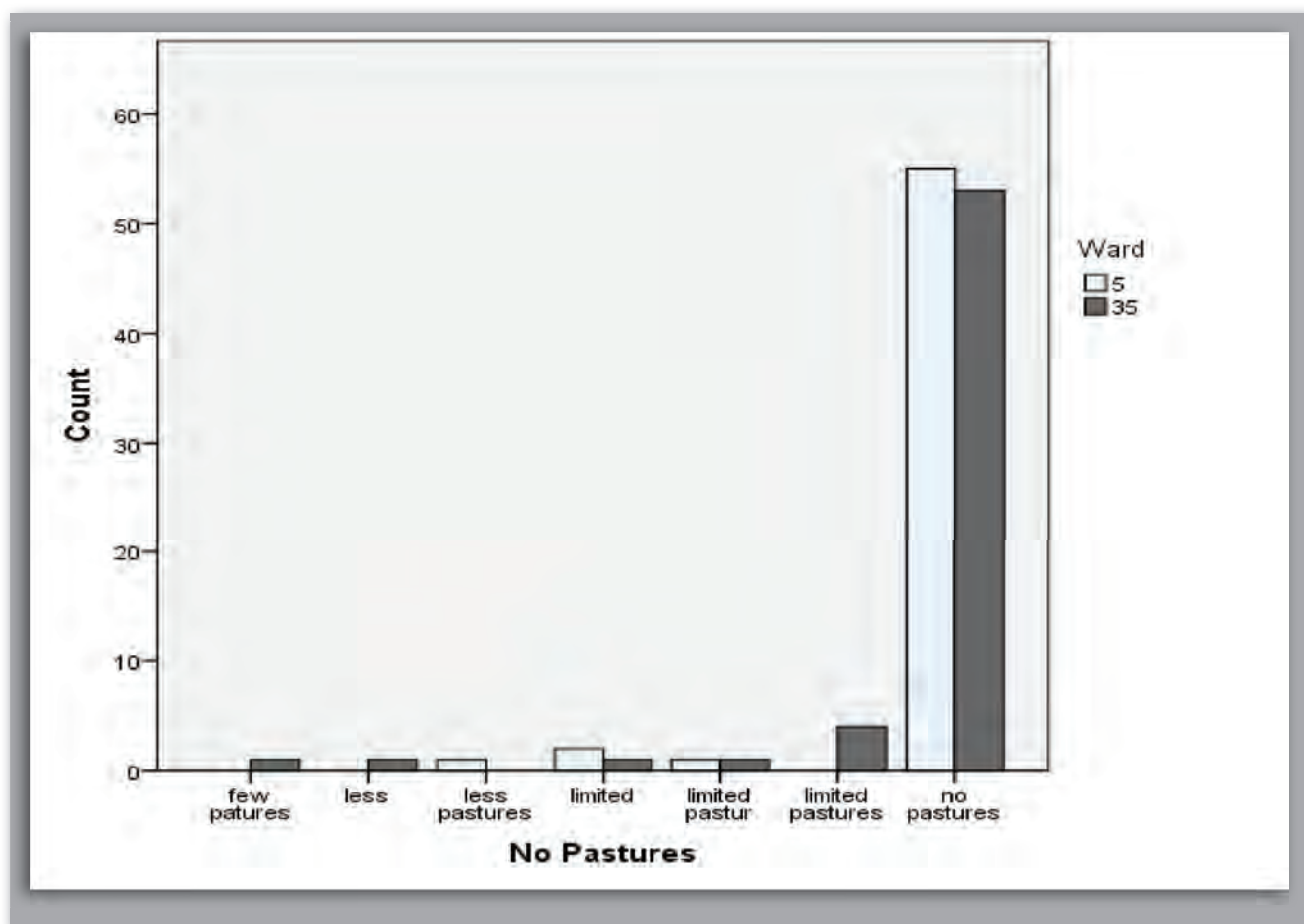


Figure 10: Availability of pastures in the area

4.10

Impact of seasonality and climate change on crop pests and animal diseases

We also sought to find out the effect of perceived changes in climate on the occurrence of crop pests. Figure 11 shows that in ward 5, 92% of the population noted that aphids and stalk borer are the most common crop insects in the ward while in ward 35 aphids and stalk borer

were also identified as the two common pests that affect crops according to the results of the survey. Other pests associated with climate change that have been noted in the two wards are armyworms.

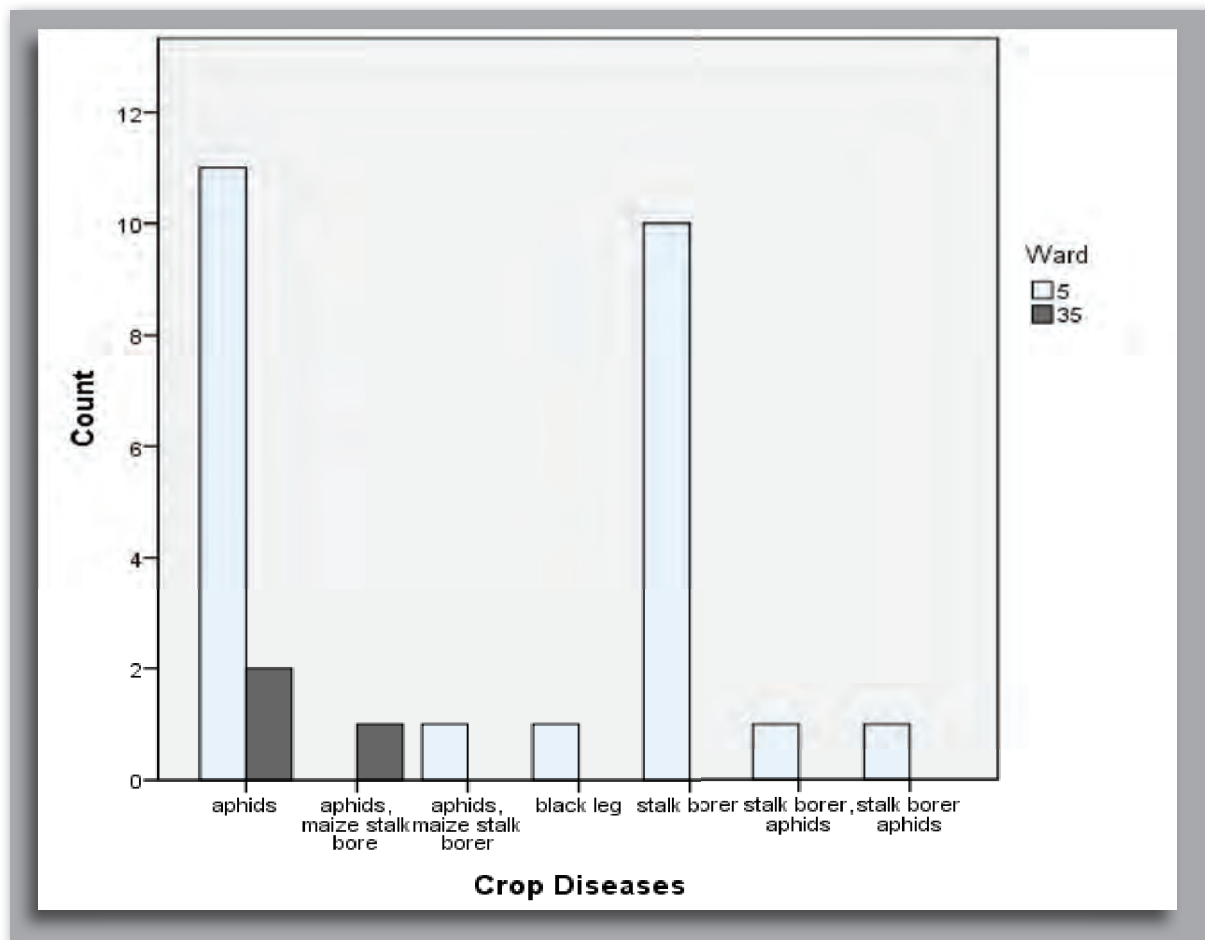


Figure 11: Occurrence of pests in Zimunya communal area

In this study, we also sought to investigate the livestock diseases which are common in the area. In both wards black leg was identified as the most common disease that affects livestock. In fact 59% of the people interviewed

in ward 5 and 39% in ward 35 identified it as the most common disease in the area. Other diseases which occur in the area, although in less proportion, are anthrax and foot and mouth.

5.0

Livelihood Resource Vulnerability

We carried out a livelihood resource vulnerability assessment to determine the intensity of impact of climatic hazards on the available livelihood resources in the two wards. In this exercise, we asked community members during FGDs to characterize and compare

how a range of livelihood assets are affected by climate-induced hazards. Table 6 shows that the risk of late onset of rains, mid season dry spell and seasonal droughts are the most common climate risks in the area.

Table 6: Extent to which livelihood options affected by the climatic hazards

Hazard	Risk of hazard happening	Impact of the hazard locally	Risk of hazard induced impact happening	Frequency of occurrence
Late onset of rains (characterized by delayed onset of the rains)	4	4	4	3
Mid-season dry spell (rains break for weeks on end about January/February)	4	3	4	3
Early cessation of rains (characterized by early cessation of the rains)	3	2	3	4
Seasonal drought (rains are light and patchy throughout the season)	4	4	4	4
Drought (in this case rains fail for two or more consecutive seasons)	3	4	3	4
Flooding- caused by excessive rainfall	1	1	1	1

1– Low risk 2 – Medium risk 3 – High risk 4 – Very high risk

Using FGDs, we also sought to investigate the importance of different livelihood resources in reducing the negative impacts of climatic risk in the area. Our results show that grazing resources, cropping land,

forest resources (including NTFP), water availability, access to markets and access to credit are the most important factors that help to reduce the negative effects of climate change on communities (table 7)

Table 7: Importance of livelihood resources in reducing negative climatic impacts

Resource Type	Resources Important for Livelihoods	How important are the resources to coping with climate risks?
Natural Resources	Grazing resources	4
	Cropping land	4
	Forest resources (including NTFP)	4
	Water availability	4
Physical Capital	Roads	3
	Wells	3
	Boreholes	2
	Cellphone/Phone	4
Financial Resources	Livestock	3
	Access to markets	4
	Access to credit	4
Socio-political Capital	Local government	3
	Traditional social networks	3
	NGOs	2
	Projects or investment in the area	3
Human Capital	Agricultural training	4
	Livestock training	4

1. Not Important, 2. Important, 3. Very important, 4. Very Very Important

The main important resources that the communities from the two wards raised were on the use of natural resources (grazing pastures, agricultural land, NTFPs and water), financial resources especially savings and lending (mukando) is the main facility in the two wards, access to markets and credit and development of human capital in agricultural crops and livestock training. With the responsive measures taken on Climate-smart agriculture (CSA) which is an integrative approach to address interlinked challenges of food security and climate change, these are seen as alternatives to close some local development gaps. These include decreasing agricultural productivity, inequitable increases in farm

incomes, food security and development and adapting and building resilience of agricultural and food security systems to climate change at multiple levels; and reducing greenhouse gas emissions from agriculture (including crops, livestock).

The farmers in the area highlighted that Government Programmes such as AGRITEX on crop production, LPD-Livestock production, Social welfare-targeting vulnerable community members and DDF- Borehole repairs have been helping them to enhance their livelihoods although this is not enough to improve their livelihoods.

6.0

Current adaptations and barriers

In this study we also sought to investigate the current adaptation strategies that people in Zimunya are using to reduce the negative effects of climate change. Despite the general reduction in rainfall in ward 5, our results show that males first consider farming as an option and then look at the other available options. Females opt for livestock production

first and then move on to cultivate in wetlands (Table 8). Gardening is the major source of livelihoods in both wards. However, households in ward 5 and ward 35 villages close to Sakubva river tend to benefit mostly from Sakubva river and a wetland which is widespread in ward 5.



Plate 1: Gardens along Sakubva river in ward 5 Plate



2: Gardens at wetlands in ward 5

Table 8: Livelihood options in Ward 5

	Option 1	Option 2	Option 3	Option 4	Option 5
Males	Farming	Piece jobs	Brick moulding	Buying and selling	Selling firewood
Female	Livestock production	Farming	Wetland farming and buying and selling	Chicken production/ brick moulding	Selling firewood
Youths	Selling river sand,	Buying and selling second hand clothes	Brick moulding and selling	Selling firewood	Field crops production

In ward 35, we found that different social groups have different livelihood options (Table 9). In general farming, livestock production and gardening (Plate 1) seem to be

viable livelihood options for most people in the community (Table 9).

Table 9: Livelihood Options in ward 35

Social Group	Option 1	Option 2	Option 3	Option 4	Option 5
Elderly >60 years	Field, garden crops and livestock production	Selling sand to Mutare	Making bricks	Selling firewood	Crashing and selling concrete stones.
Adult males	Field and garden crops	Making bricks	Selling sand in Mutare	Selling firewood	Gold panning in Odzi River
Adults females	Buying and selling field and garden crops	Voluntary savings and lendings/internal lending and savings	Garden crops production	Casual labour	Brick making and selling
Youths	Brick moulding and selling,	Field crops production	Selling river sand	Selling firewood	Buying and selling second hand clothes

We then asked communities in Dora both during household interviews and focus group discussions on the gaps which would prohibit enhanced adaptation to climate change. The following issues were raised;

- a. The households are moving away from short season varieties including small grains despite the fact that the area is very suitable for small grains. However, the lack of unavailability of small grain seeds and the lack of technology that enhances easy harvesting and processing of small grains were noted as some
- b. Households indicated that awareness campaigns on promotion of small grains were lacking
- c. A big gap in irrigation agriculture was noted. Farmers identified possible sites such as the confluence of Odzi and Sakubva rivers. However, opportunities for irrigation were noted in areas such as Mudzime village using water from Musakozora dam; Mundembe village using water from Mundembe dam; Madzime village using water from Kuture dam.

6.1

Future Climate change

In this report, we represent future climate change based on IPCC CSIRO MK3 model used in the IPCC Assessment Report Number Four (AR4) (Meehl et al. 2007). The data were downloaded from the IPCC website (www.ipcc.org) and processed in a Geographic Information System (GIS) for modelling climate change vulnerability in Mutare district. We adopted the future climate for the 2040s to allow for medium term planning for adaptation. The best case scenario is characterized by a balance between fossil intensive and non-fuel energy sources and makes the assumption that similar improvement rates apply to all energy supply and end-use technologies. In the best case scenario, it is assumed that people will become more

environmentally conscious and therefore will reduce the emission of green house gases. In doing so the rate of change in climate will decrease. In the worst case scenario, it will be business as usual and people will continue to produce green house gases and therefore contribute to the rapid change in climate.

Figures 12 and 13 illustrate projected anomalies for temperature based on downscaled future climate scenarios. The annual mean temperature is projected to increase by between 2.4 and 3.5 degrees Celsius during the 2040s under the Best Case and Worst Case scenarios respectively (Figure 12 and Figure 13) in most parts of Zimbabwe including the study area.

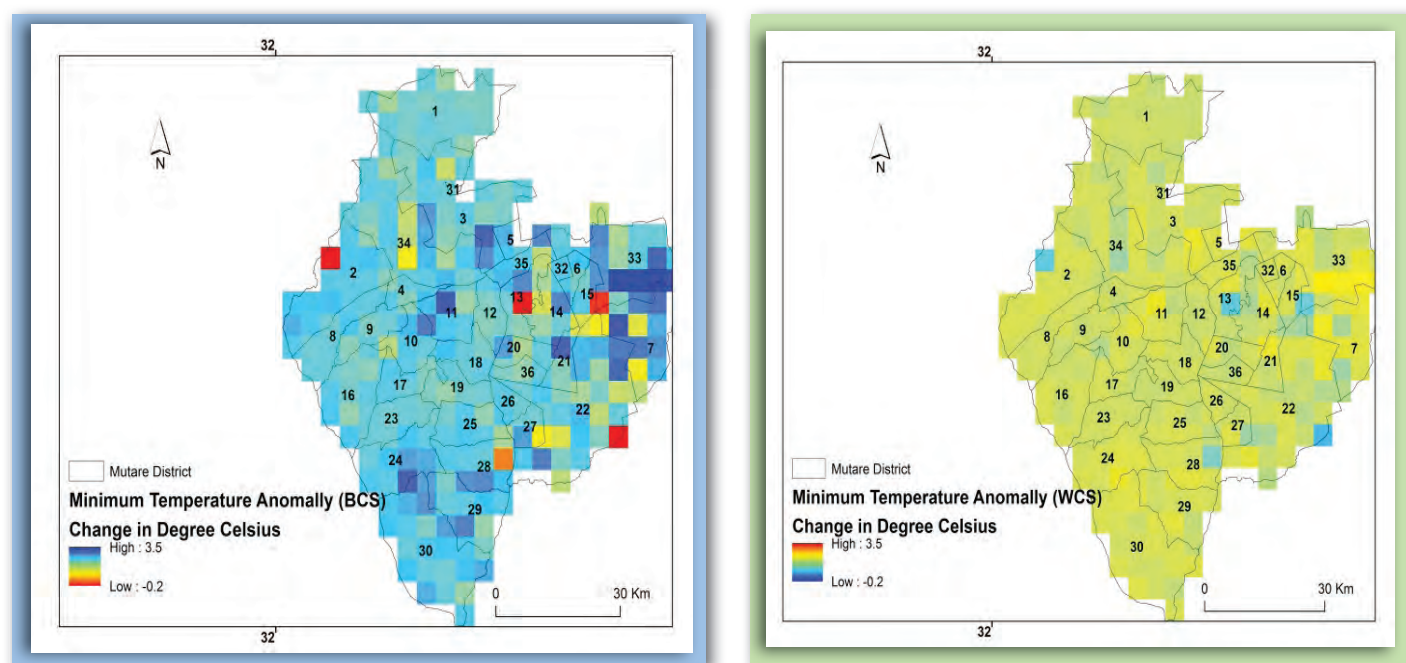


Figure 12: Minimum temperature Anomaly under BCS (left panel) and WCS (right panel)

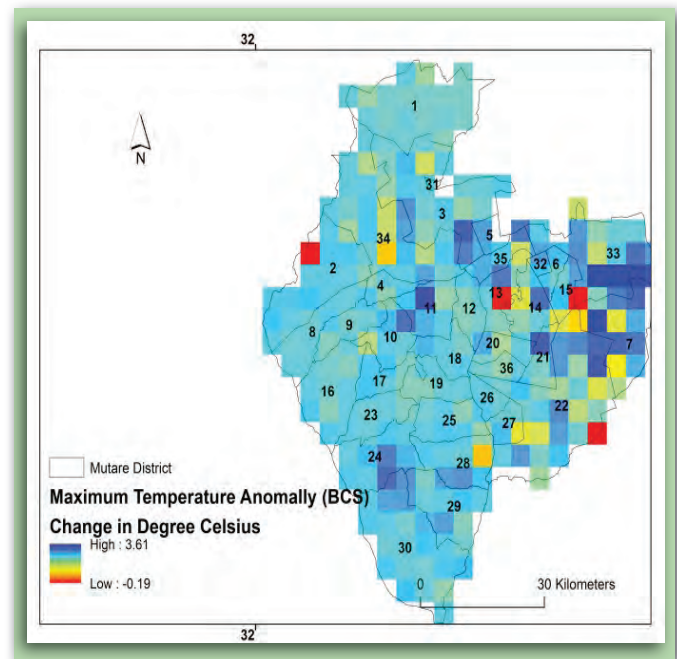
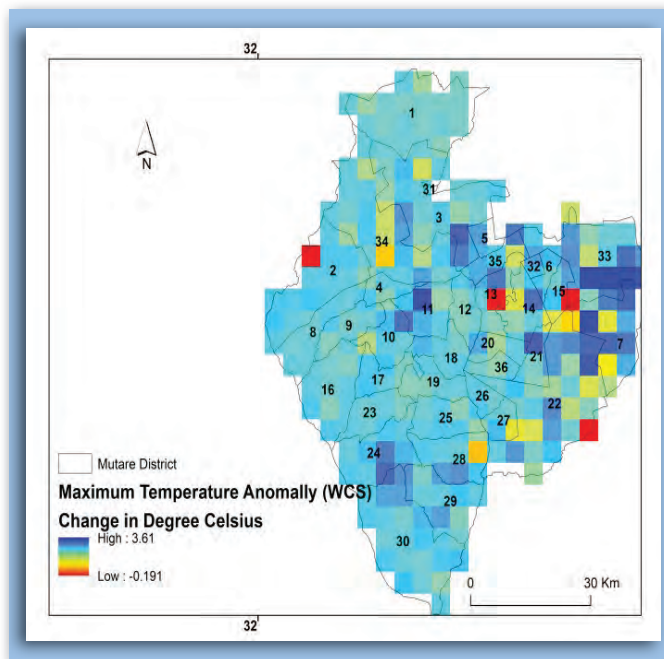


Figure 13: Maximum temperature Anomaly under BCS (left panel) and WCS (right panel)

The results of future climate based on the best case and worst case scenarios show that rainfall will decrease under both scenarios with significant reductions under WCS. The

changes are notable in most parts of the study area wards 5 and 35 (Figure 14).

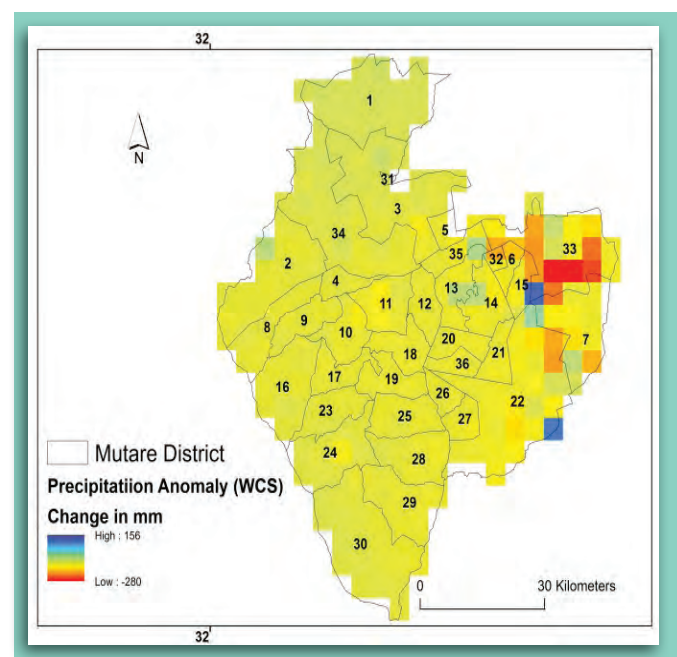
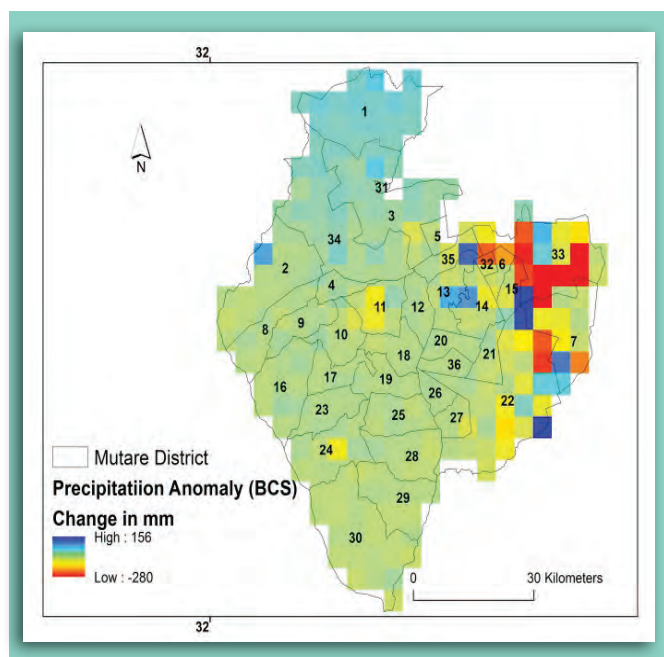


Figure 14: Precipitation anomaly under BCS (left) and WCS (right)

Rainfall anomaly is determined by subtracting the future projections in rainfall from the current rainfall. If the value is negative it implies that projected rainfall will be lower than the current rainfall. In this case under the worst case scenario, we observe that most parts in the study are will experience a decrease in rainfall.

7.1 Institutional Factors

One of the key barriers to adaptation to climate change in Zimbabwe is the lack of a clear climate policy in the country. In Zimbabwe issues of climate change are implied in environmental legislation (mainly through the Environmental Management Act). Such legislations are insufficient given the projected impacts of climate change, the scale and scope of vulnerability. The lack of appropriate legislative and policy frameworks inhibits the implementation of adaptation and constrains adaptive capacity in Zimbabwe (Chagutah, 2010). Women, children and the disabled are projected to be disproportionately affected by climate change, yet they are side-lined from decision-making on climate change adaptation. There is no gender sensitivity in policies involving the management and protection of the environment and natural resources in Zimbabwe (Chagutah, 2010). This despite the fact that the United Nations International Strategy for Disaster Reduction (UNISDR) Hyogo Framework for Action recommends that 'a gender perspective should be integrated into all disaster risk management policies, plans and decision-making processes, including those related to risk assessment, early warning, information management, and education and training'. The wards have no disaster plans but are in the process of developing some with the assistance of the local authorities. Ward Environmental sub committees exist (called Resource Monitors in the wards) but are not very functional.

7.2 Impacts and adaptations for alternative livelihoods

The analysis of livelihood options in the two wards shows an increase in alternative livelihoods either as stand-alone or as supplementary due to the fact that the main livelihood option of agriculture is becoming less reliable to sustain human needs. These include brick moulding; buying and selling fruits and vegetables; firewood trade and the crashing and selling of concrete stones. Most of these are dependent on the natural resource base and this

has increased the need for sustained natural resources management and some strong marketing capacity to a market that is not structured. As livelihood supplementary options, brick moulding, firewood trade and crushing of concrete stones are not highly climate sensitive and therefore if managed well can sustain livelihoods. Therefore, the local authorities and the Environmental Management Agency with assistance from development partners need to put in place natural resources by-laws to regulate the use of sand and trees which has a potential to reduce deforestation and soil loss through gullying. This has already been witnessed in ward 5 where a lot of environmental degradation has taken place. A lot of gullies are being left unclaimed as communities are involved in river sand abstraction which they sell to the rapidly expanding Mutare Urban area.

The analysis of the most important livelihood resources that help to reduce negative climatic impacts are good grazing resources, fertile cropping land, availability of forest resources, water availability, access to market and credit. These should continue to be protected as they support alternative livelihoods of the communities.

7.3 Impacts and adaptations for agriculture

Climate change will affect agriculture in the two wards by the effects of reduced moisture content for the rain fed crop, reduction in soil fertility through accelerated loss of soil cover. The results of the FGD concurs with the climate data that drought has become the most common climate risk that threatens people's livelihoods. Increasingly the phenomena of late onset of rains, mid-season dry spells and seasonal droughts has increased the vulnerability of farmers who depend on rainfed agriculture. Since agriculture is the main livelihood source for the two communities, it is therefore important that measures to increase production per unit area be employed to reduce labour requirements and use less water by employing watering techniques such as small gravity fed sprinkling and dripping.

The two areas have a number of wetlands whose area are getting reduced annually by unsustainable use (plate 2)

These wetlands are supporting both human and animal needs and with increased use they are drying up. The Environmental Management Agency needs to come up with an inventory of the wetlands in the area and raise awareness of their sustainable use as well as putting protective measures around key wetland resources to reduce loss. The proper use of these wetlands can sustain livelihoods through managed gardening and cropping, animal controlled drinking and; grazing and possible fishing. Gardening can be more profitable if it is supported

by efficient market linkages on horticultural produce that can be sold in the nearby Mutare town (plate 3).

Since the cropping seasons are no longer routine due to the increasingly erratic rainfall, changes in temperature and wind, farmers in the two wards must now adapt to cropping calendars suitable for the varieties that can withstand the changing climatic regime. Therefore Agritex needs to continue research in crop adaptive varieties.



Plate 2: Some of the wetlands found in the area



7.4 Impacts and adaptations for water and other natural resources

The findings of the study in the two wards were that water, forestry and fisheries resources have become fewer as

shown by decreased annual rainfall, drying wetlands, reduced river flows and drying wells and boreholes. This means water supply for agriculture on the whole is expected to decrease. Water management has increasingly become important. Construction of low cost water management structures like weirs and small dams as well as water harvesting techniques like roof top techniques will be particularly important for coping with water control. Overall



Plate 3: Crop production and gardening on wetlands in the area

increased infrastructure and capacity building for use and maintenance of water management systems will be required. Apart from decreasing water quantities, issues of water quality have become topical with suspected water pollution in Sakubva River as a result of the Mutare City Council waste disposal system. The river forms the main source of water for these two communities and others. Measures should be taken by EMA to ensure the water is not polluted as it will be used by the communities and

their livestock. The decreasing forestry resource base can be traced to increased trade in firewood which is mainly influenced by the ready market in the nearby Mutare urban due to erratic and costly electricity being experienced by the urban dwellers. There is need for strengthening the natural resources management to control the continued deforestation and loss of pastures.



Plate 3: Some of the water resources that could be utilised for irrigation to enhance adaptation

7.1.5 Lack of Access to finance and market

One of the key factors that act as a barrier to adaptation in the area is lack of access to microfinance. Communities in the two wards do not have access to credit and only

a few community members are accessing credit from DOMCORP, a Catholic Organisation operating in the area. In addition to lack of credit, communities' highlighted lack of markets as another problem because the main market is Dangamvura which is always flooded so the income they get from selling is low.

Conclusions and main recommendations

The study findings point out that the existing high vulnerability faced by rain fed agriculture reliant farmers in the two wards, to a large extent represents the whole district. This vulnerability will increase the challenges of poverty reduction efforts. There is need to acknowledge and further improve the understanding of community vulnerabilities so that appropriate adaptation measures can be implemented. Livelihoods of the communities in the two wards are tied to their local resource base (farming, brick moulding, selling firewood, livestock production) and this therefore subjects them to climate sensitivity. Based on the overall conclusions above, the field study survey carried out and the literature reviewed including the Zimbabwe National Climate Change Response Strategy we recommend the following:

Mutare Rural District Council

- Develop ward-based resilience and vulnerability plans as part of the overall disaster risk reduction approach and share the plans and other vulnerability assessments to foster cross-scale learning between the public, government and civil society.
- Promote natural resources management and watershed/catchment protection through institutional strengthening of ward based environmental sub-committees (ESCs) and the formulation, enforcement and monitoring of community participatory environmental by-laws.
- Through the Environmental Committee facilitate the establishment and enforcement of land use plans at district, ward, village and household level based on the ecosystems approach.

Ministry of Agriculture, Mechanisation and Irrigation Development (Agritex and livestock Development Departments)

- Promote farmer managed demonstration (farmer field schools) as an extension approach of crops that are increasingly becoming suitable to the changing climate.
- In the face of depleting forests especially due to brick moulding, firewood and opening new lands Agritex is encouraged to roll out agro-forestry and conservation agriculture initiatives with the farmers at household level.
- Disseminate local level relevant climate data that informs agricultural practices on patterns of planting,

watering and application of fertilisers in the face of the changing climate.

- Training in the use of local adapted seed varieties (OPV), Livestock feeding schemes, afforestation programmes, and mechanised conservation agriculture.
- Reduce the increasing loss of soil and increased degradation of land by promoting household level farm contour ridges.

Ministry of Environment, Water and Climate

- Promote the collection, dissemination and use of local risk climate information (including scientific data and local knowledge about trends and changes) which will be used in Community Based Adaptation initiatives as local farmers' decision making tool on such important times for planting, weeding and harvesting.
- The two wards have several wetland areas which are reported to be diminishing through agricultural use and natural factors. It is recommended that the Ministry undertakes a comprehensive wetland inventory and take appropriate management strategies to protect the remaining wetlands.
- Identify and map forests and land within the wards that can be put under intensive management with long term management for carbon mitigation.
- Climate change awareness campaigns

Community members and Local leadership

- Identify community-based climate change adaptation activities that reduces community vulnerabilities. These can include value addition to agricultural and Non Timber Forest Products (NTFPs), sustainable wetland utilisation based on EMA guidelines, intensive horticultural production activities to take advantage of the areas' proximity to Mutare town.
- With the increased rates of deforestation it is recommended that community members turn from use of traditional inefficient firewood cook systems to clean burn coke systems that use less wood. Furthermore with community members relying more on adaptation measures of brick moulding it is recommended that the traditional brick moulding kilns be replaced with vertical shaft technologies that have a potential to reduce carbon emissions.

Donors, NGOs and development partners

- Support Forestry Commission with financial and technical resources to run tree planting activities at household, village, ward and district level as well as raising awareness of communities on reforestation and afforestation and effects of climate change.
- Facilitate and support the collection of local weather data through training and equipping local weather stations at local schools and at identified farmer households on wind, rainfall and temperature.
- Build the capacity of the Civil Protection Committees at district and ward levels to develop local level early warning systems on droughts and animal and crop diseases and pests outbreaks to equip them to appropriately improve farmers' preparedness.
- Provide technical and financial support to the RDC, local government agencies at ward level to conduct comprehensive risks and vulnerability assessments and implement strategies with the formulated Disaster Risk Reduction plans.
- Enhance institutional, financial and human capacity of the Mutare RDC to address the climate change impacts especially hazards and to implement climate change smart budgets that are responsive to climate change.
- Support social assistance programmes like Cash Transfers and Food for Asset programmes to assist the most vulnerable community members affected by climate change impacts.
- There is also need to explore the possibility of solar powered irrigation by taking advantage of the abundant sunlight in the area. Communities need to be taught

on water harvesting techniques so that they can take advantage of the little rains that fall in the area.

- Securing improved rural livelihoods in the context of climate change should focus on diversification of rural household income sources. There must be a focus on the how to enhance income from non agricultural activities in a sustainable manner. There is need for projects for youth that should generate income without causing environmental degradation and ecosystem disturbance. Youth in the two wards should be supported with opportunities on income generating projects to improve their productivity in rural areas

Areas of further research

1. Water resources are a very important livelihood asset with the rural communities and with water development lagging behind it will be useful to conduct some risk analysis to predict the impacts of various climate change scenarios on water availability.
2. Conduct a bio-chemical study on the impacts of water pollution on Mutare river water which supports livelihoods of communities of wards 5 and 35.
3. Integration of indigenous knowledge with science based early warning systems to enhance farmer decision making on agricultural production and disaster risk reduction.
4. Identify economic, financial, political, legal, institutional, psychological, social and cultural factors that support, or act as barriers to, vulnerability reduction and adaptation.

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Annex 1: Household Questionnaire to assess impact of seasonality and climate change on rural livelihoods in Zimunya

A. GENERAL INFORMATION

Respondent Name			Village name		Household type	MHH	FHH
Respondent ID			Ward name		Household size		
Respondent Sex (tick)	Male	Female	District		Collection date		

Geo Location X Y

B. LOCAL AWARENESS AND PERCEPTION OF CLIMATE VARIABILITY AND TRENDS RELATED TO CLIMATE CHANGE

Are you aware that the climate is changing? Tick

Yes	No
-----	----

If yes what changes have you observed to the following:

B.1 Rainfall – Tick appropriate corresponding box

The same	
Reduced	
Increased	

	Last agricultural season (2014/2015)	5 years ago	10 years ago	20 years ago	More than 20 years ago
Quantity					
Period					
Duration					

	Last agricultural season (2014/2015)	5 years ago	10 years ago	20 years ago	More than 20 years ago
Mid-season dry spells					
Late onset					

Early cessation of rainfall					

B.2 Temperature- *Tick appropriate corresponding box*

The same	
Hotter	
Cold	

	Last season	5 years ago	10 years ago	20 years ago	More than 20 years ago
Hotter					
Colder					

B.3 Flood- *Tick appropriate corresponding box*

No flooding	
Rare	
Frequent	

B.4 Drought- *Tick appropriate corresponding box*

Frequent	
Rare	
Constant	

B.5 Water resources- *Tick appropriate corresponding box*

The same	
Numerous	
Fewer	

	Last season	5 years ago	10 years ago	20 years ago	More than 20 years ago
Number					
Abundance					
Quality of water					

B.6 Forest resources- Tick appropriate corresponding box

Unchanged	
Expanding	
Diminishing	

	Last season	5 years ago	10 years ago	20 years ago	More than 20 years ago
Firewood					
Construction timber					

B.7 Agricultural land- Tick appropriate corresponding box

Unchanged	
Infertile	
More productive	

B.8 Living creatures- Trees - Tick appropriate corresponding box

The same	
Reduced	
Increasing	

B.9 Living creatures- Animals- Tick appropriate corresponding box

The same	
Reduced	

Increasing	
------------	--

B.10 Living creatures- Fish- Tick appropriate corresponding box

The same	
Reduced	
Increasing	

	Last season	5 years ago	10 years ago	20 years ago	More than 20 years ago
Quantity					
Period					
Duration					

C. CONSEQUENCIES AND IMPACTS OF CLIMATE RELATED CHANGES AND TRENDS- WITH PARTICULAR ATTENTION TO LIVELIHOODS AND SOCIO-ECONOMIC IMPACTS

C.1 What health problems are you experiencing as a result of changes occurring to the climate?

1. _____
2. _____
3. _____
4. _____

C.2 What impacts are you experiencing in terms of food stocks availability during the winter and summer seasons?

1. _____
2. _____
3. _____
4. _____

C.3 What impacts are you experiencing in terms of your main sources of income?

1. _____
2. _____
3. _____
4. _____

C.5 What changes have you experienced in crop yields?

1. _____

2. _____
3. _____
4. _____

C.6 What changes are you experiencing in getting water for domestic use, watering plants/ crops and for livestock?

1. _____
2. _____
3. _____
4. _____

C.7 What changes are you experiencing in grazing pastures?

1. _____
2. _____
3. _____
4. _____

C.8 Are you experiencing any problems related to livestock and crop diseases and pests?

5. _____
6. _____
7. _____
8. _____

C.9 What changes are you experiencing in getting of fuel wood?

1. _____
2. _____
3. _____
4. _____

C.10 What changes are you experiencing in accessing non timber forest products?

1. _____
2. _____
3. _____
4. _____

C.11 What changes are you experiencing in incidences of bush fires?

1. _____
2. _____
3. _____
4. _____

Annex 2: Focus Group Discussion Checklist

FGD Composition- 15 participants

- a. Local leadership- Village heads, councillor
- b. Selected community members representing all the villages in the ward
- c. Elderly community members

For rural livelihoods, vulnerability assessment should answer questions such as;

- Who and what are the exposure units?
- What hazards and stresses are they exposed to?
- How resilient are the exposure units to current stresses?
- What has been the impact of historical episodes, such as droughts, floods, mid-season dry spells, delayed onset of the rains?
- Are the exposure units and stresses changing? In what ways?
- What indicators capture current and future vulnerability?

Group 1: Livelihoods Options, threats and plans

1. How are the different social groups affected by climatic hazards caused by climate change?

Social Groups		Climatic hazard					
		Drought	Floods	Late onset of rains	Early cessation of rains	Seasonal drought	Mid-season dry spells
Age	Children						
	Adults						
	Elderly						
Gender	Male						
	Female						
Class differentiation	Poor						
	Middle						
	Well off						

- 0 – Not vulnerable to the hazard**
1 – Low vulnerability to the hazard
2 – Medium vulnerability to the hazard
3 – High vulnerability to the hazard
4 – Very high vulnerability to the hazard

Access to finance

Selected group members

Group 2: Mapping

Which livelihood options are most affected by climatic hazards?

Livelihoods (capitals)		Climatic risk					
		Drought	Floods	Late onset of rains	Early cessation of rains	Mid-season dry spell	Seasonal drought
Agriculture	Rain fed						
	Irrigated						
	Livestock production						
	Market gardening						
Water	Dams						
	Rivers						
	Groundwater						
Forest management	Community						
	Government						
Habitat type	Savanna grassland						
	Wooded grassland						

0 – Not vulnerable to the hazard

1 – Low vulnerability to the hazard

2 – Medium vulnerability to the hazard

3 - High vulnerability to the hazard

4– Very high vulnerability to the hazard

Selected group members to draw a ward map showing

1. Land uses- residential, agricultural land, grazing, key infrastructure (health, schools, dip tanks, irrigation schemes)
2. Natural features- forests, water sources (rivers, streams, dams)

Group Analysis

What changes have occurred over the past 5, 10, 20 years for the features shown on the map e.g.

- land degradation (gullies, siltation),
- relocations,
- fishing
- agricultural activities (crops and livestock)

Group 3: Seasonal Calendar

Selected group members to define a season and seasonal times like

1. Forest -flowering of trees and birds- migration of birds and what these imply/means in the community
2. Agriculture - ripening of fruits, planting and harvesting periods
3. Weather- rainy periods, dry periods and droughts
4. Social events- major village functions and celebrations related to the natural environment

Group Analysis

What changes/ uncommon events observed with regards to seasonality of their environment? e.g.

- Prolonged droughts
- Increased frequency of dry spells (what times are they frequent)
- Increased rainfall
- Early fruiting/ flowering of trees

Use trend line e.g. animal/fish catch, agricultural productivity, water availability

Group 4: Community time line

Selected group members (*ideally group should be made of elderly people*) to reflect as far back as possible past trends, actions, problems and achievement starting with when the ward came into existence. Records things like

1. Spiritual and cultural events
2. Movements of people
3. Introduction of new technology
4. Natural disasters
5. Political events/decisions
6. Development projects

Please can you outline the historical drought timeline that you remember?

Group 5: To what extent are your livelihood options affected by the climatic risks?

Hazard	Risk of hazard happening	Impact of the hazard locally	Risk of hazard induced impact happening	Frequency of occurrence
Late onset of rains (characterized by delayed onset of the rains)				
Mid-season dry spell (rains break for weeks on end about January/February)				
Early cessation of rains (characterized by early cessation of the rains)				
Seasonal drought (rains are light and patchy throughout the season)				
Drought (in this case rains fail for two or more consecutive seasons)				
Flooding - caused by excessive rainfall				

1 – Low risk 2 – Medium risk 3 – High risk 4 – Very high risk

Group Analysis

Divide the major historic lines into Environmental and human and analyse whether the intensity and frequency has increased or not and why

1. What is the intensity of impact of climatic hazards on livelihood resources?

		Drought	Late onset of rains	Early cessation of rains	Seasonal drought	Floods	Mid-season dry spell	Exposure score
Resource Type	Resources important for Livelihoods							
Natural Resources	Grazing resources							
	Cropping land							
	Forest resources (including NTFP)							
Physical Capital	Roads -							
	Wells							
	Cell phone/phone							
Financial Resources	Livestock							
	Access to markets							
	Financial credit							
	Remittances							
Socio-political Capital	Local government							
	Traditional - socio social networks							
	NGO							
Human capital	Agricultural training -							
	Livestock training							
	Health							

- 0- No impact on the resource**
1 – Low impact on the resource
2 – Medium impact on the resource
3 – High impact on the resource
4 – Very high impact on the resource

Group 6: Animal and Plant Inventory

Selected group members to list and record uses/ significance, abundance status and localities of:

1. Forest trees and plants
2. Agricultural plants
3. Birds and animals
4. Fish types

Group Analysis

- Which plants or animals are in low abundance?
- What are the causes?
- What are the likely impacts on community life?

How important are the following livelihood resources in reducing the negative impacts of climatic risks

Resource Type	Resources Important for Livelihoods	How important are the resources to coping with climate risks?
Natural Resources	Grazing resources	
	Cropping land	
	Forest resources (including NTFP)	
	Water availability	
Physical Capital	Roads	
	Wells	
	Boreholes	
	Cellphone/Phone	
Financial Resources	Livestock	
	Access to markets	
	Access to credit	
Socio-political Capital	Local government	
	Traditional social networks	
	NGOs	
	Projects or investment in the area	
Human Capital	Agricultural training	
	Livestock training	

1. Not Important
2. Important
3. Very important
4. Very Very Important

Group 7: How important is each of the following factors in affecting your ability to cope with climate risks?

Factor	Rank
Inherent dryness	
A high frequency of drought	
Monocropping (over-dependence on one crop)	
Poor farming practices	
High incidence of poverty	
Limited alternative livelihood options outside agriculture	
Infrastructure (poor roads, bridges, modern energy, dams and water conveyance)	
Population pressure	
Lack of drought preparedness plans	
Limited use of climate early warning systems	
Low access to technology (irrigation, seed), markets, institutions	
Skewed ownership and access to drylands livelihood assets such as livestock and wild-life	

1. Not Important
2. Important

3. Very important
4. Very Very Important

Group 8: How do you cope with climate hazards and how effective are your coping strategies

Climate hazard	Impacts	Coping and adaptation strategy	Sustainability and effectiveness
Drought	Crop failure Loss of Livestock Shortage of water		
Floods	Homes destroyed Loss of livestock get a Loss of cultivated land Destruction of bridges Destruction of bridges		
Seasonal drought	Crop stress		
Late onset of rain	Late planting Short growing period Crop failure		
Early cessation of rain	Crop failure Shortage of forage		

- 0 - Low coping and adaptation effectiveness and sustainability.
 2 – Moderate coping and adaptation effectiveness and sustainability.
 3 – High coping and adaptation effectiveness and sustainability.
 4 – Very high coping and adaptation effectiveness and sustainability

Annex 3: Key Informant Interview Checklist

Name _____

Designation _____

Ward _____

General perceptions about climate change

1. Are you aware that the climate is changing: Tick

Yes	No
-----	----

2. If yes what indicate this on the following sectors and issues that you have observed in this ward

Sector	What Indicates these changes	What are the most serious impacts that have been caused to human livelihoods
Rainfall		
Temperature		
Seasons		
Agriculture- Crop yields		
Droughts		
Floods		
Water resources		

Wetlands		
Health- Human diseases		
Health – Animal disease outbreaks		
Health- Crop diseases and pests outbreak		
Forests		
Animals – Livestock		
Animals - Wild life		
Fish		
Rangelands/ Grazing pastures		
Agricultural land		
Human settlement		

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3. According to the table of climate change indicators and impacts above, on a rank of 1 to 5 what would you list according to priority to be the most serious impacts in this ward

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____

4. Does the ward has any institutional early warning sign for issues like drought, floods and diseases?