

Rural Livelihoods under Stress: The Impact of Climate Change on Livelihoods in South Western Zimbabwe

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Abstract

The reality of climate change is now a well-accepted reality and there is emerging evidence that climate change poses a massive threat for development especially in poor countries. An understanding of the emerging trends of climate change and its effects in local ecologies is an important starting point in addressing the negative effects of climate change. This study sought to understand the impact of climate change on the livelihoods of local communities, focusing on Matobo District in Zimbabwe. The objective of the study was to understand how communities have been affected by climate change and how they are adapting to it as well as their perceptions about the gravity of the climate change phenomenon. The findings of the study were that the effects of climate change on livelihoods in the study area are alarming. Climate change has altered the physical geography of the area leading to a disappearance of flora and fauna and other natural habitat that constituted the livelihoods of the local people. Declining precipitation and rising temperatures are making farming increasingly more difficult, and thus aggravating food insecurity in the area. Urgent climate change programming steps must be taken to prevent a livelihoods catastrophe in semi arid regions in sub-Saharan Africa.

Key Words: Climate Change, Livelihoods, Semi-Arid Regions, Zimbabwe

1. Introduction

The reality of climate change is now a well-accepted reality and there is emerging evidence that climate change poses a massive threat for development especially in poor countries (Ayers & Huq, 2009; Boyd, Grist, Juhola & Nelson, 2009). An understanding of the emerging trends of climate change and its effects in local ecologies is an important starting point in addressing the negative effects of climate change. As Boyd et. al. (2009) point out climate change risks altering the physical and human geography with telling consequences for human beings. This study sought to understand the impact of climate change on the livelihoods of local communities, focusing on Matobo District in Zimbabwe. The objective of the study was to understand how communities have been affected by climate change and how they are adapting to it as well as their perceptions about the gravity of the climate change phenomenon. An understanding of both the effects of climate change and community adaptation mechanisms would facilitate for effective development programming to strengthen climate change resilience on the basis of community driven approaches.

The foregoing argument shows that climate change can no longer be sidelined as a development issue. The effect that climate change has on the poor communities in sub-Saharan Africa is increasingly prominent. According to Bunce, Rosendo and Brown (2010) the African continent risks becoming a major global food crisis epicenter if climate change issues remain unaddressed at local levels. The vulnerability of African communities to climate change is exacerbated by high poverty levels and already high temperatures and low precipitation.

High poverty levels reduce possible adaptation options for communities leaving them locked up in the climate change trap. It is therefore important to understand how communities have been affected by climate change and the possible pathways that exist to reduce the impact of the phenomenon.

2. Literature Review

2.1. The Climate Change and Development Interface

The negative effects of climate change are threatening to reverse development gains in many parts of the world especially in Sub-Saharan Africa. It is now an accepted scientific phenomenon that the global climate is changing. Precipitation and temperature patterns are changing. In the Sub-Saharan region rainfall patterns have become less predictable, precipitation has decreased on average, and temperatures are rising. (Holmgren K. and Oberg H, 2006). Evidence shows that the upward trend of the already high temperatures and the reduction of precipitation levels will increasingly result in reduced agricultural production in Sub-Saharan Africa. (Mano & Nhemachena, 2007; Biggs et. al., 2008). Agriculture is the mainstay of most rural economies in Africa. Negative developments in agriculture would adversely affect the rest of the livelihoods that depend on crop production. The Economist (2010:86) concludes that, 'Global action is not going to stop climate change. The world needs to look harder at how to live with it'. The overall impact of climate change on countries in the Sub-Saharan region has been negative. Davidson et. al (2003:98) argue that '...it is becoming increasingly clear that realization of the development goals can be seriously hampered by climate change.' Simatele, Binns and Simatele (2012) note that climate change is undermining efforts to protect livelihoods in Africa. Relevant development programming will need to increasingly incorporate climate change adaptation in order to holistically address development challenges pertaining to livelihoods in sub-Saharan Africa.

2.2. The Necessity of Local Climate Change Impact Studies

While several studies have been carried out on the impact of climate change on local livelihoods, there is very little dedicated literature to understanding the impact of climate change in Zimbabwe in particular. Existing studies cannot be generalized to include the Zimbabwean scenario due to several reasons. Firstly, livelihoods differ according to regions because they are ecologically dependent. Saarinen et. al. (2012:273) argue that 'Naturally, some regions and activities are more sensitive to climate change than others...' Regional ecological variations mean that livelihood strategies and the impact of climate change on those strategies will differ. Secondly regional climatic variations also mean that the impact would be experienced differently in different regions. For example, it has been suggested that while sub-Saharan countries will bear the brunt of climate change, Arctic regions stand to gain positively from climate change with the warming of temperatures enabling longer periods for growing crops. This argument shows the need for local studies on the impact of climate change on local livelihoods. This study sought to understand how local communities in Matobo are experiencing and responding to the climate change phenomenon. Nath and Behera (2011) argue that 'Local assessment of vulnerability enables us to understand why and how communities respond to the same type of environmental stress in different ways. As vulnerability varies across regions and sectors, the impact from climate change across the globe is also likely to differ.' (p 143).

3. Research Methodology

The study sought to understand the local farmers' experience of climate change in Matobo District. Specifically the researchers sought to understand if there were any noticeable climatic changes had taken place in Matobo District in living memory as far as farmers could tell. Furthermore the study sought to establish what the impact of observed climate changes, if any, on rural livelihoods in Matobo and what the future held for the said livelihoods. The study was carried out as follows.

3.1. Study Area and Population

The study was carried out in Matobo District in Matebeleland South, South Western Zimbabwe. A total of three Wards were purposively selected from the district in order to achieve the broadest spatial coverage. Other considerations included the geographical differences of the wards including the availability of water sources such as rivers, dams and boreholes. The selected wards for the study were Gwezha, Makhasa and Zamanyoni.

Map showing the location of Matopo District

3.2. Data Collection Methods

The study employed three data collection tools for triangulation purposes. These were focus group discussions, in-depth interviews with key informants and observation. Focus group discussions (FGDs) were used to bring together various stakeholders in climate change and livelihoods within the wards. The focus group discussions were constituted by the Ward councillors, kraal heads and local farmers who included both men and women and other traditional and spiritual leaders. Each focus group consisted of 15 people. An effort was made to ensure that the focus group discussions were as representative as possible of the different stakeholders in climate change. Particular attention was paid to gender representation and age differences in the focus groups. The focus group discussions sought to collect data on community perceptions about climate change and how the phenomenon had affected their livelihoods. Specific questions were asked on notable signs of climate change in local communities focusing on precipitation, temperature trends, yields of water sources, performance of crops, animals and the general ecosystem. Questions exploring how livelihoods had been impacted and how communities were adapting to climate change as they experienced it were also mainstreamed.

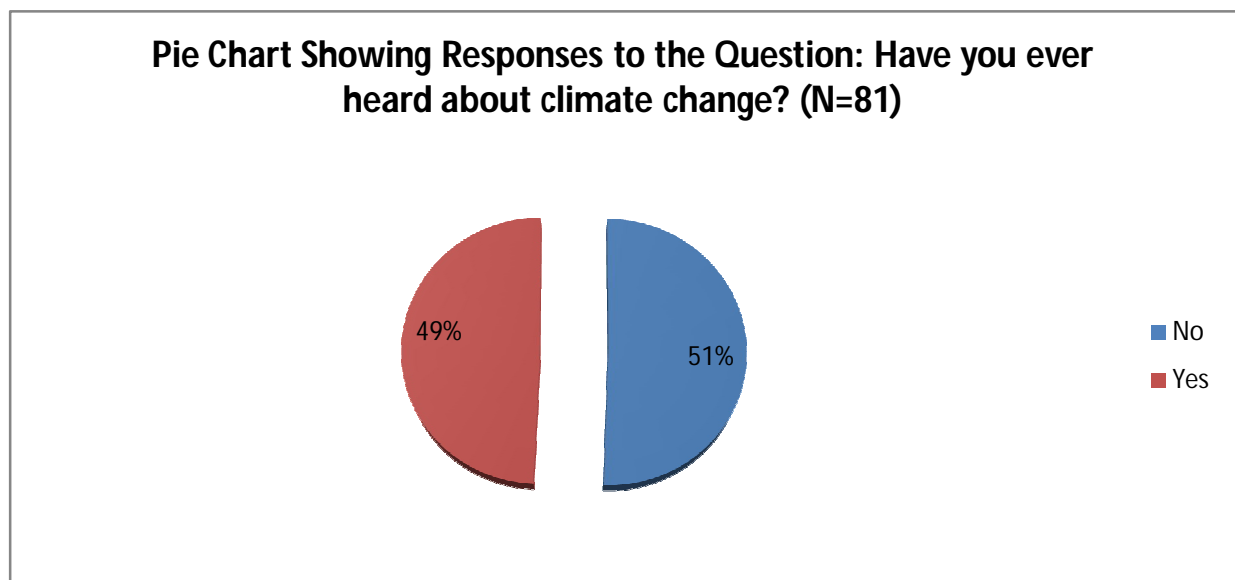
A total of eighty one (81) structured survey questionnaires were administered to eighty one households across three Wards in Matobo as shown above. Twenty seven (27) households were sampled from each village per ward selected. Systematic random sampling was used to select individual households. The objective of the household questionnaires was to understand how individual households experience climate change and to be able to make a quantitative assessment of the views. These questionnaires were ideally targeted at household heads who are also household decision makers on livelihoods issues. However, in cases where they were not present other responsible people acted as respondents for the household.

In-depth interviews were held with relevant stakeholders to the question of climate change in Matobo. Officers from Agricultural Extension Services Department, Zimbabwe National Water Authority (ZINWA) and Forestry Commission were interviewed to understand their perceptions about the climate change phenomenon in Matobo from their specialist perspectives. The study also employed observation as a data collection tool. Using this approach the researchers systematically observed the state of the ecological system pertaining to the grazing lands, crops and water sources amongst other things. Photographs were taken as part of the observation process. Lastly, data on the climate of Matobo was sourced from Zimbabwe Meteorological Services Department for rainfall and temperature patterns over the past 40 years beginning in 1970. The data was analysed for trends and compared with villagers' accounts of climatic changes over the years.

4. Findings of the Study

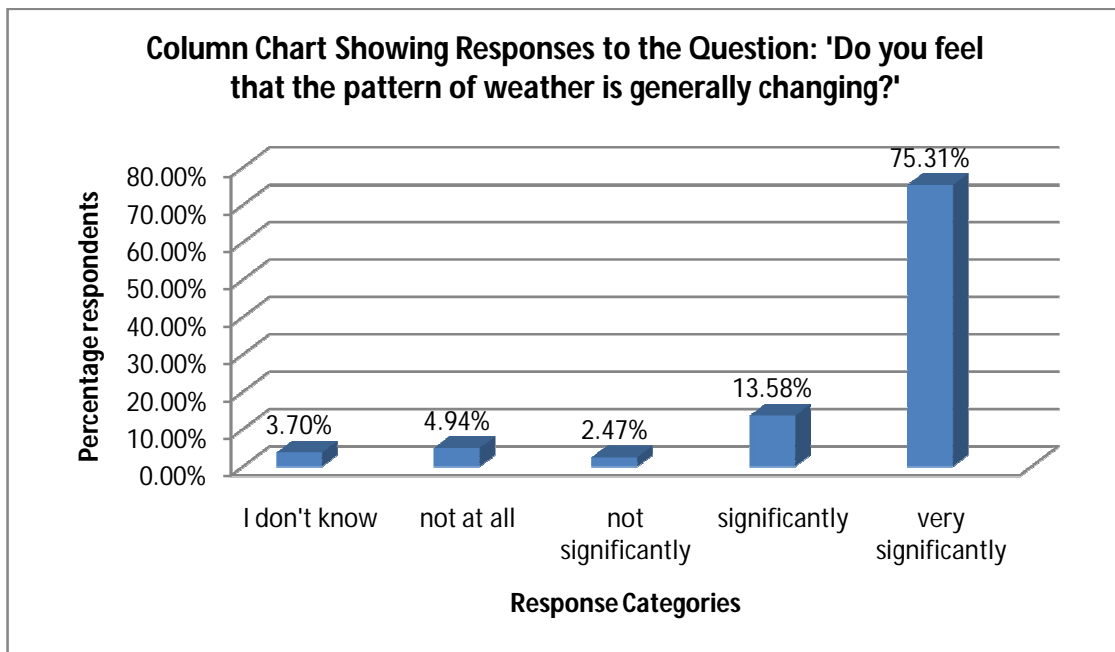
4.1. Farmers' Knowledge and Perceptions about climate change

A number of questions relating to climate change were asked in the household questionnaire in order to understand villagers' views about the notion of climate change. The first question asked concerned whether or not respondents had ever heard about climate change. Respondents were asked the question 'Have you ever heard about climate change?' Respondents were required to answer 'yes' or 'no' to the question. The pie chart below shows the distribution of responses to the question:



Source: Survey data

The distribution of responses showed that the majority of respondents (51%) had never heard about climate change. This shows that rural communities in Matobo and possibly other areas in Zimbabwe are not well informed about climate change. This is an important finding for climate change adaptation programming because responses cannot be effective without getting small holder farmers to understand the notion of climate change. This finding is in line with findings by other researchers who argue that one of the greatest limitations to climate change adaptation in Africa is lack of climate change information. (Enujeke and Ofuoku, 2012 & Brayn, 2005). However, it is important to quickly note that in spite of the fact that many farmers had never heard about climate change, they did observe that there were changes in their local climate. As far as villagers were concerned the concept of climate change (ukutshintsha komumo womkhathi (in Ndebele)) was a technical issue they had never been exposed to. However, they knew and understood that there were major changes taking place in their environment. It is important to note that participants in all the focus group discussions attributed changing climate patterns largely to religious reasons. Climate change was therefore not seen as a global problem but rather as punishment by local gods for failure to observe cultural practices. Another question was asked 'Do you feel that the pattern of weather is generally changing?' Respondents were required to select a response from a set of responses arranged in progressive order of levels of agreement. The following chart shows the distribution of responses to the question.



Source: Survey Data

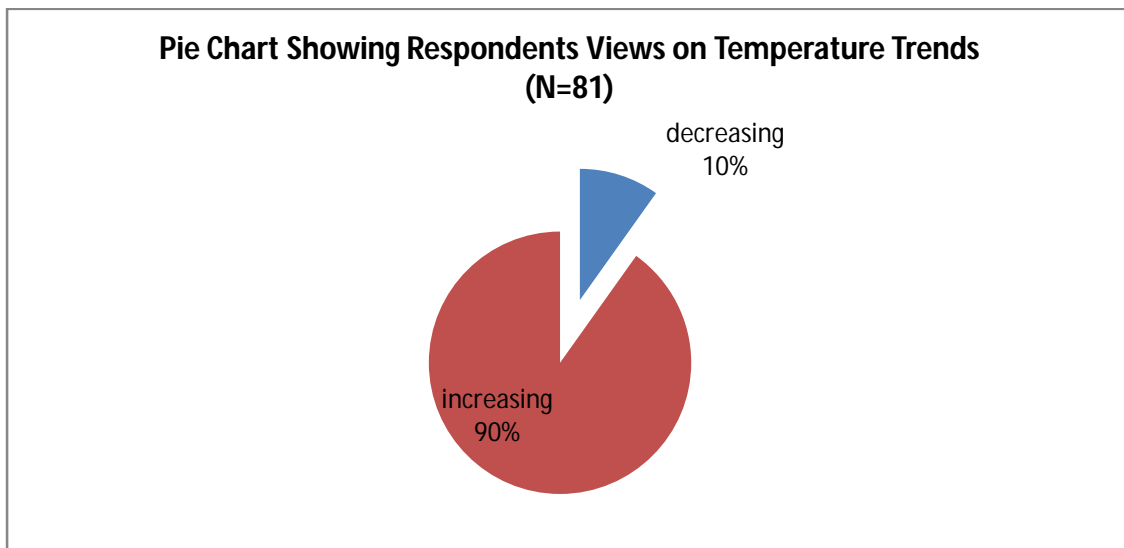
These results show that although villagers did not understand climate change as a technical notion, they did understand the changes taking place in their local climate. 75.31% of the respondents noted that they felt that the weather pattern was changing 'very significantly' in the area. Another 13.58% felt that the weather pattern was changing 'significantly', and another 2.47% felt that the weather pattern was changing but 'not significantly'. A total of 91.36% of the respondents thus felt that there was a change in the general weather patterns. The majority of the respondents felt that the difference was very significant.

4.2. Perceptions about Temperature Changes

Both participants in the focus group discussions and respondents in the household questionnaires unanimously agreed that a broad range of climatic and ecological changes had happened in Matobo over the period that they have known the place. Participants noted that these changes hinged around increasing temperatures and falling precipitation levels. In the view of focus group discussion participants from all the three groups temperature levels had dramatically increased in recent years. One woman noted in a focus group discussion (FGD2) that,

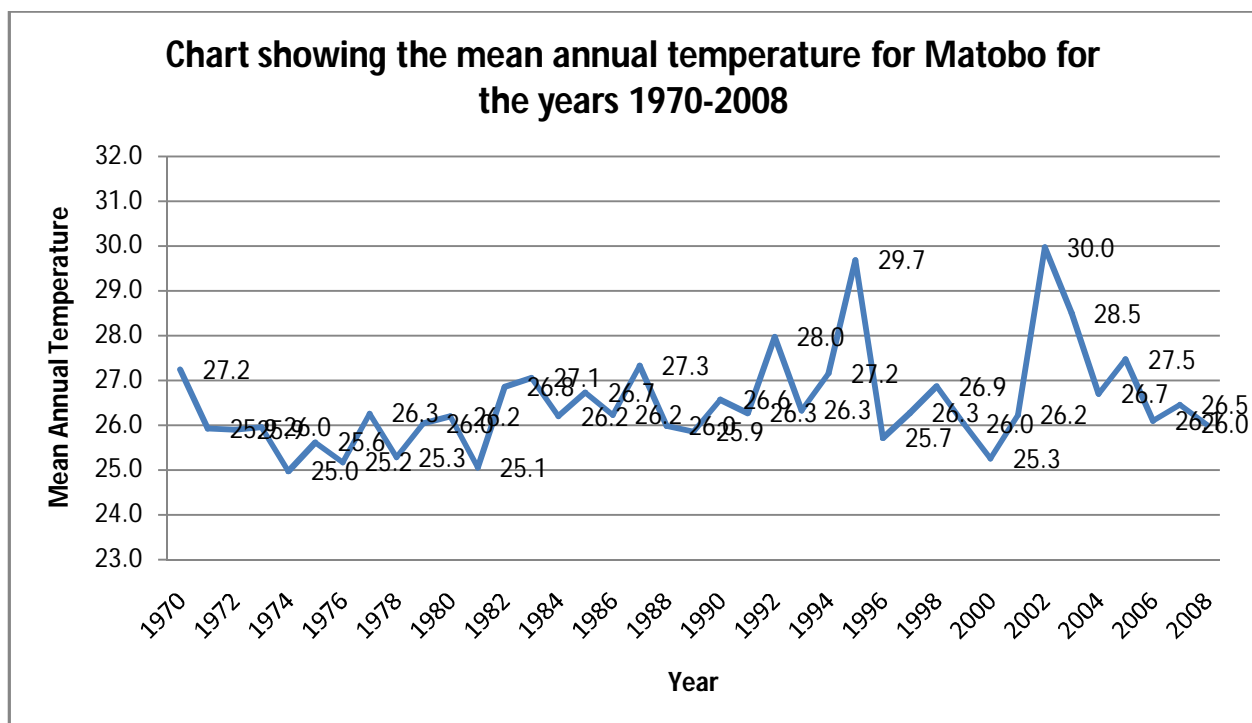
Since I was born in 1955 I have never experienced such hot temperatures.... And concerning farming I have a very good piece of land such that even when others were getting nothing, I would normally get something but now it has been many years since that wetland dried up...(FGD2)

Another participant in a focus group commented that 'Ilanga ungani seliyehlile sibili ngendlela elitshisa ngayo.' (It seems that the sun has moved its position closer to the earth judging from the way it is hot). It was commonly reported by participants in the three focus group discussions that the sun had come closer to the earth leading to higher temperatures. Data gathered through household questionnaires also corroborated the views gathered from the focus group discussions that temperatures were rising. A large majority (90%) of household questionnaire respondents said that they felt that temperatures had been rising over the years. The chart below shows the distribution of responses to the question on temperature changes. Respondents in the household questionnaire were asked to select a response about temperature changes in the area by selecting from three possible answers, 'increasing', 'decreasing' and 'not changing'. As noted above, 90% of the respondents pointed out that temperatures were increasing, and only 10% said that they were decreasing. It is notable that only one respondent out of 81 said that temperature was decreasing in their view. The response is therefore not statistically significant.

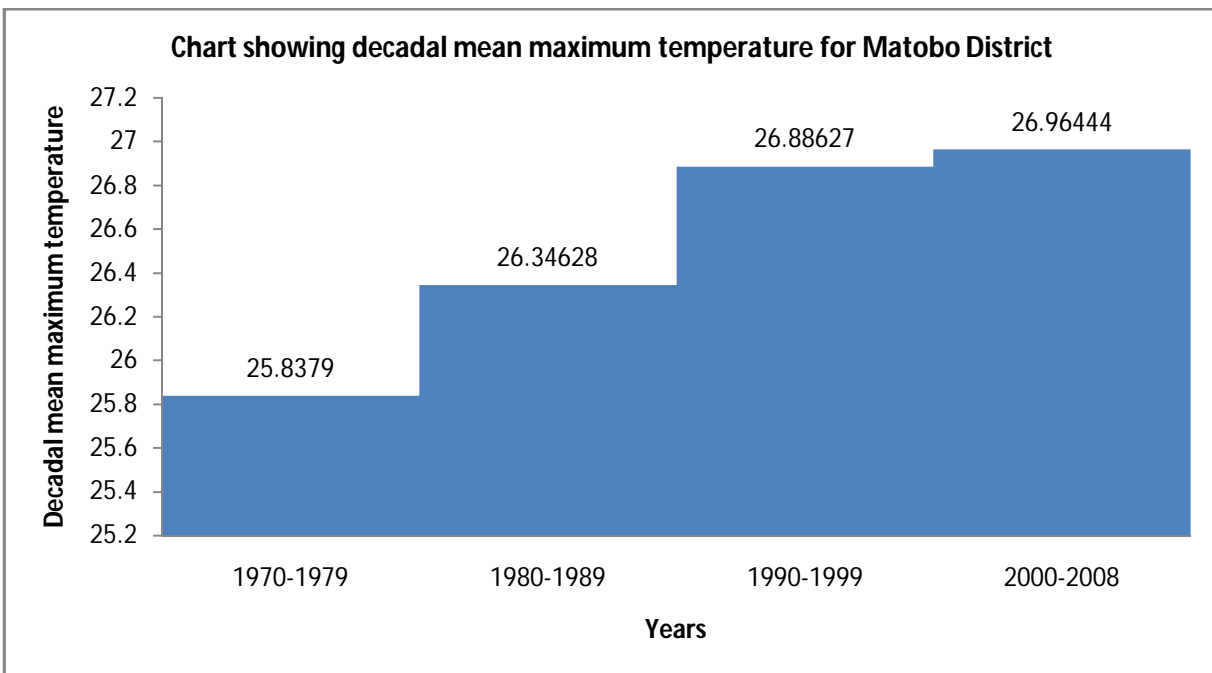


Source: Survey Data

A comparison of these findings with meteorological data shows that the respondents’ observations are scientifically valid. Between 1970 and the year 2008, a comparison of decadal averages shows that temperature has increased by about 1.12 degrees Celsius. This is approximately in line with the world average of 0.91 degrees Celsius over the same period. (Berkerly Earth Temperature, 2012). The two tables that follow below show the temperature changes that have taken place in Matobo since 1970. The data was obtained from the Zimbabwe Meteorological Services Department. The trend graph shows the annual variations in temperature. When using this graph, the changes over the years are not as obvious to the eye as they really are. However, the second graph portrays 10 year (decadal averages) of temperature trends. From this graph, the trend is much clearer showing that temperatures have been in an increasing trend for the past four decades.



Source: Meteorological Services of Zimbabwe



Data sourced from the Zimbabwe Meteorological Services Department

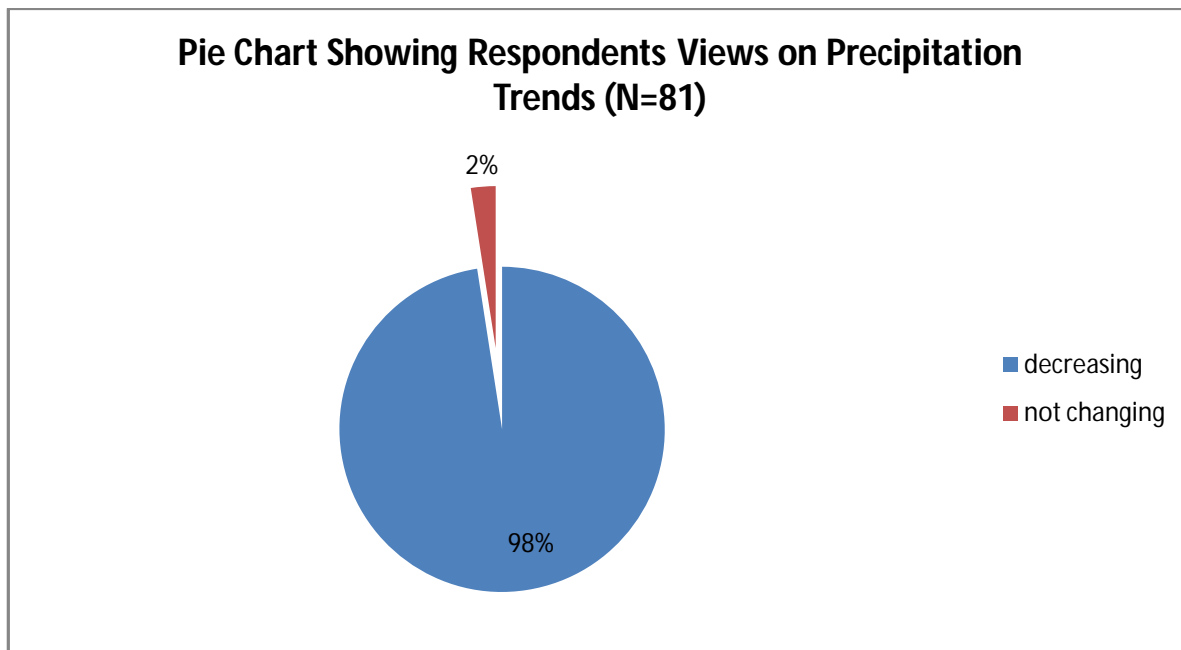
It is evident that temperature has indeed increased over the years with the last fifty years experiencing the most rapid changes possibly due to increasing carbon emissions.

4.3. Rainfall Changes and Community Perceptions

Both focus group participants and respondents in the household questionnaires were unanimous in the observation that rainfall patterns had changed in Matobo area. Two main changes were noted. Firstly, the local communities observed that the amount of precipitation had decreased notably. Secondly, they observed that the rainfall patterns had become unpredictable and the seasons had changed. Concerning the amount of rainfall, one respondent in a focus group discussion said,

In the years gone by, in the month of March rivers would be full and you would not be able to cross them. The ground would be green with grass and the rivers would be full. But now in March, look, it is hot – there is a shortage of water – look the crops have wilted and dried up completely – this should be a time when everything is green. (FGD 1)

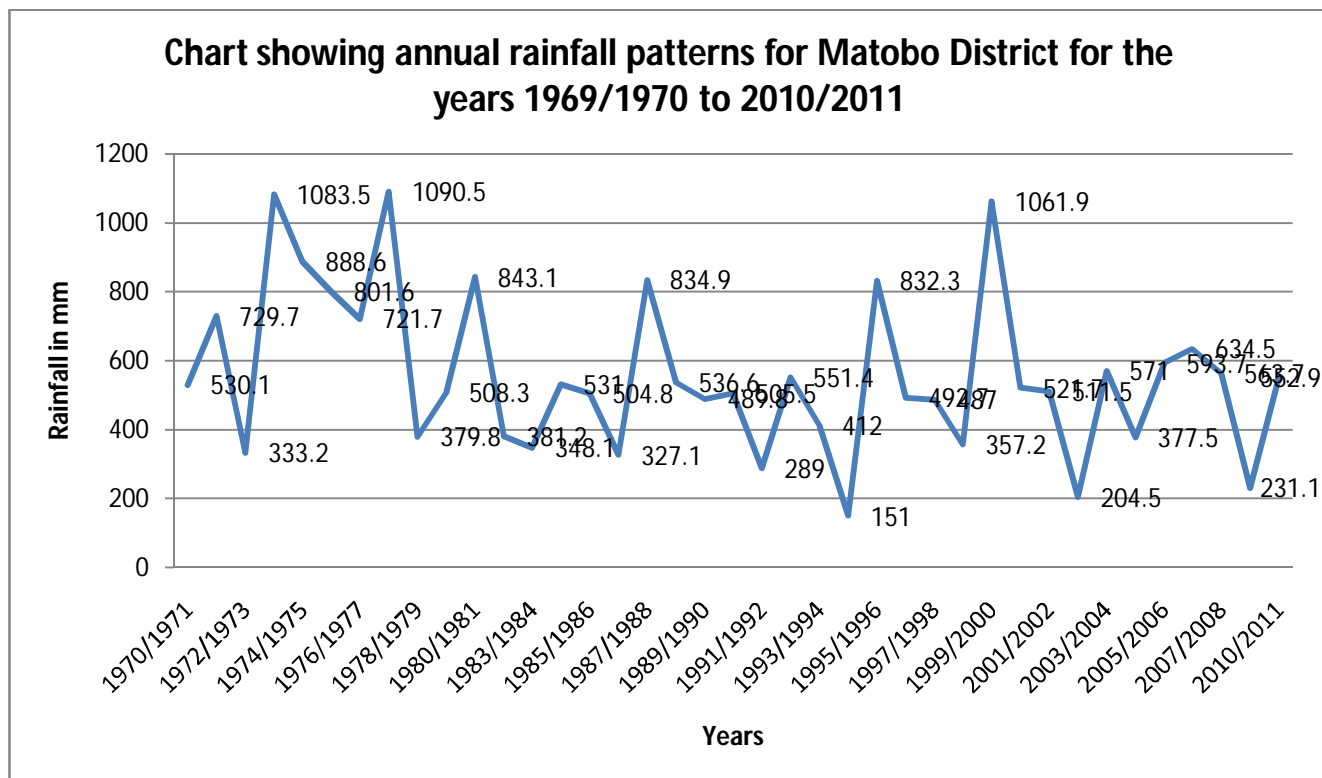
The general sentiment from this discussion was that precipitation levels had decreased significantly. This had led to negative effects on the livelihoods of the local communities. For example communities noted that several wetlands and springs around the area had since dried up. The research team was taken to a number of places that used to be wetlands and springs which no longer had water. Villagers pointed out that the particular places would normally be full of water in previous years at the time of the survey which was in March 2013. Respondents to the household questionnaire were asked to select a response about precipitation trends from three options ‘increased’, ‘decreased’ and ‘not changing’. The chart below shows the distribution of responses.



Source: Survey Data

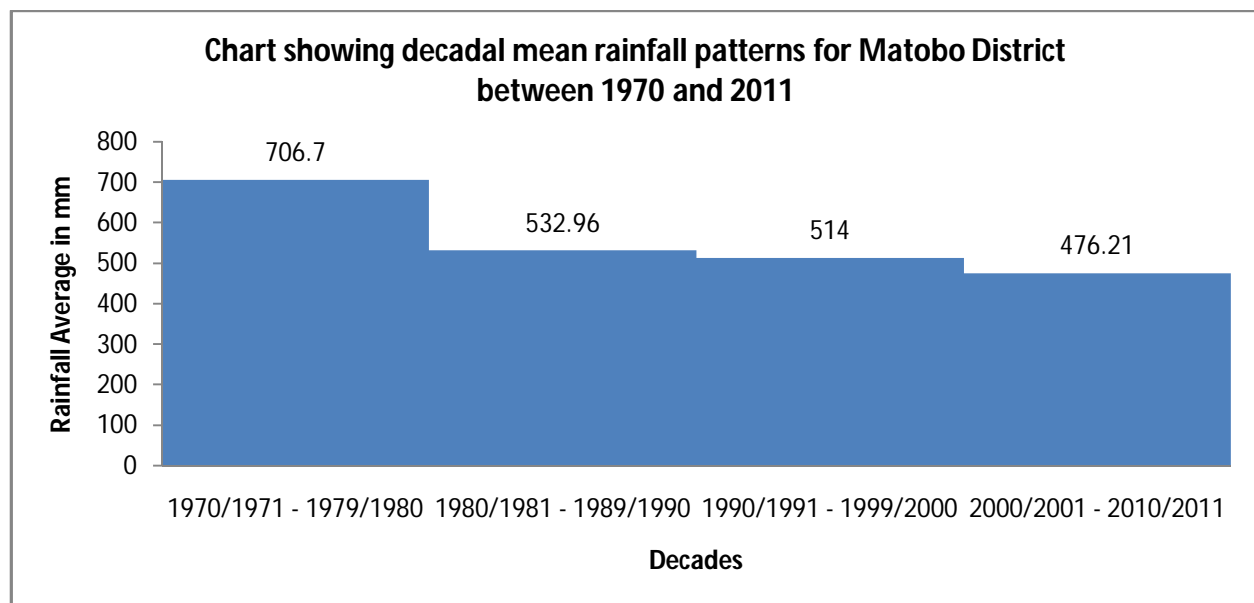
Data from the survey was compared with data from focus group discussions and data from the Zimbabwe

Meteorological Services Department about climate change patterns in Matobo District. Findings show that there is a general convergence of opinion and facts across the three types of data as shown in the tables that follow below. Precipitation has been steadily reducing.



Data Sourced from the Zimbabwe Meteorological Services Department (Graph by the authors)

An analysis of the rainfall data for Matobo District over the past 40 years shows an interesting trend. In the first decade from the year 1971/1972 to 1981/1982, there was a total of seven (7) agricultural seasons with a minimum of 700 mm of rainfall. The following decade which started from 1983/84 to 1993/94 had a total of one (1) agricultural season which surpassed 700 mm. This happened in the 1987/1988 agricultural season with a total of 834.9 mm. The next decade following this is the decade 1994/1995 to 2004/2005. This decade had a total of two agricultural seasons with rainfall above 700 mm. These were the years 1995/1996 and 1999/2000. From the year 2005/2006 to the time of writing this report in 2013 (7 years), no agricultural season had reached the 700 mm point. Judging from previous patterns, it was evident that at the most, this decade would have only one such season. Chances are that there might be none. It is also notable that for the forty years under review, the lowest seasons in terms of rainfall amounts in Matobo had happened more frequently within the last twenty years. Between 1970/1971 and 1991/1992, no rainfall season had less than 290 mm of rainfall. This was a space of twenty (20) years. Between the years 1991/1992 and 2008/2009 (16 year span), there was a total of 4 such occurrences showing that the frequency of dry agricultural seasons is increasing. We conclude therefore, that there has been a reduction in terms of rainfall quantities in Matobo district. The frequency of wet agricultural seasons is reduced, and the frequency of dry seasons is increasing. The views of local communities are in tandem with meteorological evidence.



Data Sourced from the Zimbabwe Meteorological Services (Graph by the authors)

4.3.1 Erratic and unpredictable rainfall seasons

Besides the evidence of reduced rainfall amounts, there is also the issue of seasonal variability of rainfall timing. It should be noted that the survey was carried out in the month of March which is traditionally considered to be part of the rainfall season in Zimbabwe. The focus group discussion participants noted that the rains were normally now starting late in November or December and ending early before the crops could mature. They agreed that in the past, rains would normally begin sometime in October. However, the seasons appeared to have shifted as the rains could now start as late as December. Even when the rains come in November, it was reported that the amount of rainfall could be very low or the distribution of precipitation afterwards could be too far spaced for crops to grow. There was a general feeling of uncertainty amongst farmers about when the best time to plant would be. Farmers generally felt that they needed an efficient weather forecasting system if they were to remain effective in farming. The unpredictability of rainfall patterns made farming a high risk business. As one farmer noted,

Even if we want to plant, it is now very difficult to know how to do it ... because its now unpredictable, if you try to plant in December, or in February, that might be how you perish ... and perhaps those that started early in November might get something ... you see ... (Focus Group Discussion 3)

The general feeling was that rainfall patterns had become more erratic and unpredictable leading to difficulties in planning agricultural activities for farmers. The dominant view was that rains were now starting late and ending early. Previous patterns had been changed, and the new patterns still remained largely unpredictable. Some participants also noted that in previous years there was a type of rain that fell in September before the main rains called 'imholisamahlanga' (the rain that causes maize stock to rot). From their observation, this rain was no longer falling and it signified a change in climate processes. The following quotation is from one focus group member who explained observed changes in rainfall patterns:

Talking about farming, things have changed very much ... When I was growing up the first rains used to come in September. We would start planting in September, October and November. By December to January we would start eating farm produce. But now the rains start in January here in this area ... but in the olden days we used to herd cattle putting sacks for rain coats ... but now you never need a rain coat. I remember we used to hide under the trees ... we had one tree that we weaved so that when it was raining and we were herding cattle we would have a place to hide.

4.4 Effects of Climate Change on Rural Livelihoods

4.4.1 Cropping

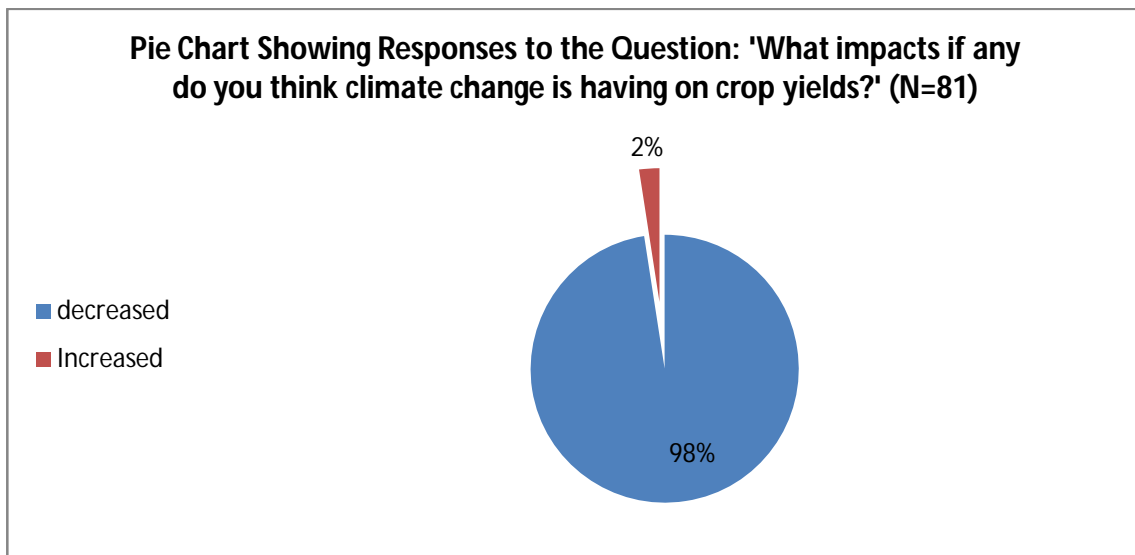
Rural livelihoods in Zimbabwe, as in most other Sub-Saharan countries, mostly revolve around farming activities. It is also important to note that farming in Zimbabwe is largely dependent on rainfall patterns. Any negative changes in the rainfall patterns are likely to negatively impact on rural livelihoods. This indeed has been the case in Matobo district. The reduction of precipitation resulted in inadequate soil moisture for crops leading to wilting. This was further exacerbated by high temperatures which enhanced evapotranspiration from moisture stressed crops. As previously noted villagers noted that unpredictable rainfall patterns have led to some villagers not planting at all in some seasons because they would have waited for the right rains until it was too late to plant. Some respondents also pointed out that consecutive drought years had now discouraged them from planting at all. One focus group participant said;

In planting, because of the high temperatures and the drought, it discourages you from continuing to plant. When you try like I tried this year ... but the crops wilt and dry up and fall to the ground ... it is discouraging... (FGD2)

Farmers expressed the view that farming was now done on the basis of trial and error. Planning was virtually impossible given the nature of rainfall patterns. As one farmer put it in the focus group discussions,

Farming nowadays is like gambling ... When I say farming is like gambling I mean that if you do not plant with the early rains, like this year, the ones who planted early got something but those who planted late got nothing. We were thinking that the rains would come in January, but only a little came ... so the crops dried up ... it's like gambling. In some years it is possible to start early and the crops wilt and die while those who started late may be able to reap ... it is unpredictable.(FGD 1)

It was the finding of this study that climate change had negatively affected crop production in the area of study. Responses from household questionnaires also corroborated the information gathered from focus group discussions. Respondents in the household questionnaire were asked to say how in their experience climate changes had affected crop production. They were required to select one response from three options pertaining to crop production, 'Increased', 'decreased' and 'not changed'. The pie chart below shows the distribution of responses to the question in the survey households.

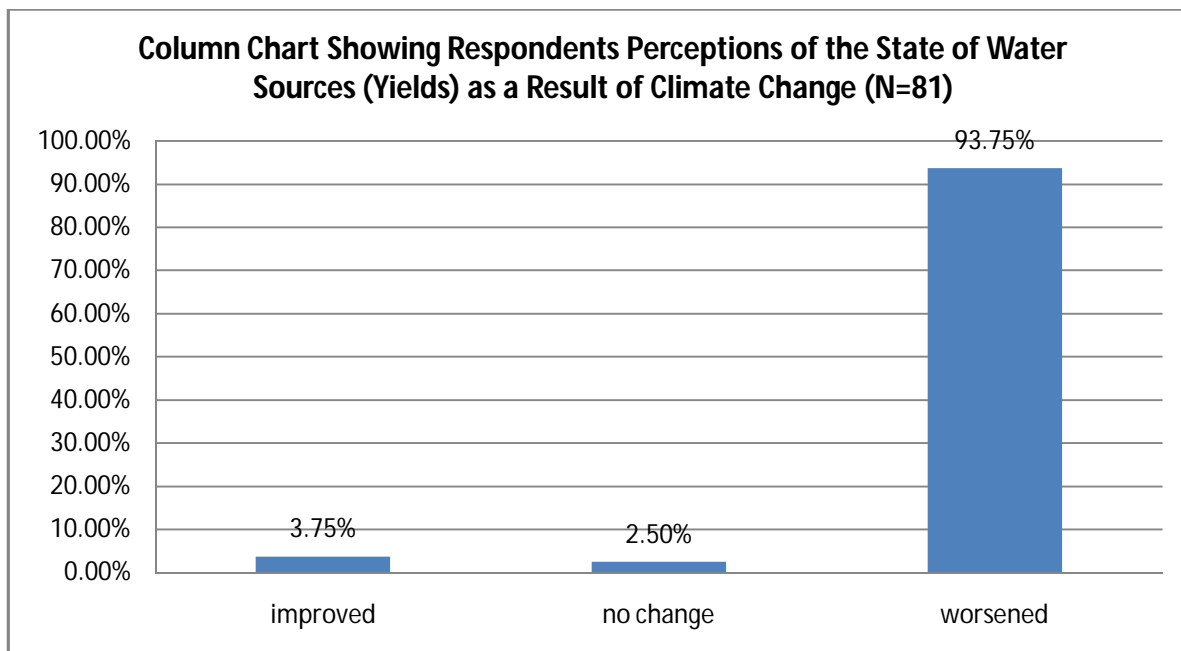


Source: Survey data

The results show that 98% of the respondents were of the view that crop yields had been negatively affected by climate change. According to responses from the survey population crop yields were affected by inadequate precipitation and rising temperatures leading to wilting.

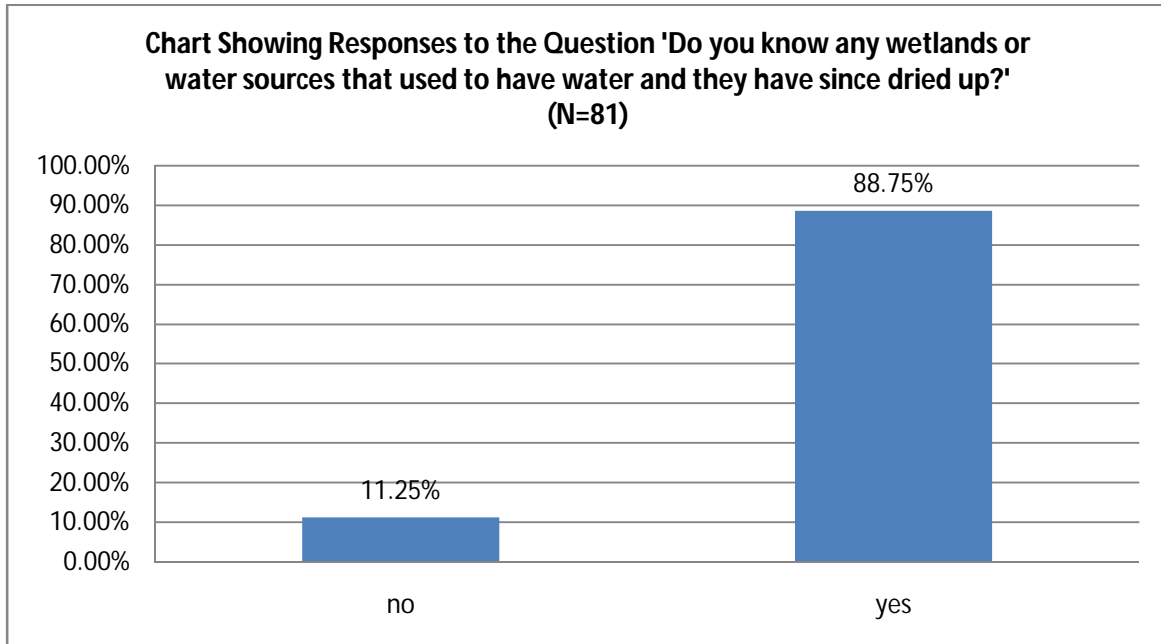
4.4.2. Water Sources

Water sources are a critical component of the equation in ensuring sustainable rural livelihoods especially in conditions where there is declining rainfall. The study also sought to understand the state of water sources in relation to climatic changes taking place. Focus group discussion participants unanimously agreed that water availability was generally decreasing as a result of reduced rainfall amounts. Respondents to the household questionnaire were asked to select a comment on whether the state of water sources yields had 'improved', 'worsened' or 'not changed' over the years. The findings from the questionnaire show that respondents were of the unanimous view that water yields from water sources have decreased as a result of decreasing rainfall. The chart below shows the distribution of responses.



Source: Survey Data

It was noted that several water points that used to provide water for animals and people had dried up. A specific mention was made of springs and pools in local rivers. Researchers were able to observe some of the springs that previously used to supply water to the communities but had since dried up. Household questionnaire respondents were asked the question ‘Do you know any wetland or spring that used to have water in the past but has since dried up?’. They were required to select an answer from two options, ‘yes’ or ‘no’. The chart below shows the distribution of responses to the question.



Source: Survey data

Photo showing two villagers pointing to a former spring that used to supply the local communities with water. The spring has since dried up.



Source: Survey Photo

4.4.3. Changes in Grazing Lands

The condition of grazing lands was noted to have deteriorated very quickly over the years. Local communities noted that the continuous seasons of drought had meant that the pastures were deteriorating and failing to recover. Focus group discussion participants pointed out that the previous year had been a disaster as many people had lost their cows due to the poor state of pastures. The focus group discussion respondents were asked to comment on the state of grazing lands as a result of climate changes. One focus group member said:

As far as grazing pastures are concerned oh!! That is disaster! This past year it was disaster. The cattle were not here, they were taken beyond the city (Bulawayo). ... here it was white dust .. there was nothing. The rains that came at the beginning of the season raised a little bit of this grass which you see. There was no grass here. Many people lost all their cattle. The few cattle you see here had been sent to graze in other places beyond Bulawayo... but I notice that this year will be the same as last year.(FGD1)

It was pointed out that some people had lost all their cattle to drought. The cattle that survived the previous season had been sent away to pastures outside the region of Matobo. Some were sent several hundreds of kilometres away to places with better pasture. Other strategies used by local communities to save their cattle involved selling some of the cattle in order to buy supplementary feed for the rest of the cattle. All these strategies invariably meant that climate change was coming with a great cost for local communities trying to adapt to it. Some focus group discussion participants were of the view that there is need to shift away from large livestock like cattle and to move towards smaller livestock like goats. The feeling was that any development interventions addressing climate change should focus on small livestock like goats which are more resilient to droughts. Reduced rainfall did not only affect the grass, but the general state of the ecosystem including trees. One particular tree that was mentioned is 'umtshatshatsha'. According to the discussants in Focus Group Discussion One, this tree produces fruits that are nutritious for both goats and cows. However, farmers noted that the tree was no longer producing enough feed for cattle and goats because of reduced rainfall according to their interpretation.

4.4.4. Wild Fruits

Food security amongst rural African communities in Zimbabwe has always been supported by the consumption of wild fruits especially during times of food crisis. Wild fruits act both as feeding supplement in good times and a coping strategy against food insecurity in times of lack. Responses from all the three focus group discussions showed that wild fruits had also been negatively affected by climatic changes leading to a reduction in the availability of wild fruits. Focus group discussants pointed out that the area under study previously had a wide variety of indigenous fruits including uxhakuxhaku, umwawa, amavunguvungu, amaganu (marula), umnyi, amongst others. However fruit yields had either seized altogether or drastically reduced for most of these trees. One participant in a focus group discussion said:

Talking about wild fruits, I got married in 1975, in my in-laws fields there were imiwawa fruit trees which were amazing, we used to harvest them and make 12 trays each individual. That thing brought us a lot of business because people used to come from far places to look for imiwawa fruit which had big healthy seeds. But after a while those trees started to skip some years without fruits, the ones with fruits would have quite a few. If you looked inside you would notice that the seeds were sticking because there was no rain.(FGD2)

4.4.5. Honey

The local communities noted that honey had also been reduced to very low levels in the survey area. They said that they believed that this was a result of the fact that trees were not getting enough rainfall and they were not flowering. Bees were no longer getting enough flowers to make honey. Furthermore, it was pointed out from focus group discussions that big trees were disappearing due to deforestation. Focus group participants noted that bees normally use big trees with small caves to make their home for honey. In the absence of such trees there were less and less bees in the area. One participant said,

There are no bees anymore because of the condition of trees. The lack of rainfall causes trees not to have flowers. You know that bees need flowers ... and besides there are no longer any big trees where the bees can make their home in their caves. Trees are getting finished in the bush... (FGD1)

4.4.6. Amacimbi (Mopane Worm)

Many communities in Zimbabwe, especially in the Matabeleland region have traditionally relied on *amacimbi* (mopane worm) for their livelihoods. This worm is a nutritious delicacy used for relish across Matabeleland and other parts of Zimbabwe. Many families have traditionally made a livelihood not only through the consumption of the worm but also through selling it for income generation. Participants in the focus group discussion were asked to discuss the state of this livelihood avenue in the light of climate change. All participants across the three focus group discussions that were held agreed that there had been a major reduction and in some cases a total disappearance of the worm across the whole of Matobo. Participants attributed the changes variously to religious reasons and to declining rainfall patterns and increasing temperatures. The following responses were obtained from the focus group discussions,

... I was born in 1973. When we were growing up we went to school using mopane worms money. We used to go with our grandmothers to harvest mopane worms all around this place. Our grandmothers would sell the mopane worms for us and we would also be able to buy blankets but now there are no mopane worms. Our region here had a lot of mopane worms. We never used to go far, we would literally go behind the hut to harvest. But now you cannot find anything. Mopane worms were our way of making a living for people who do not have jobs to work. We knew we had money during the mopane worms season. We used to harvest twice, in April and in December but now there is nothing. We do not know what sent our mopane worms away. They were our wealth...(FGD2)

5. Conclusion

The study concludes that the phenomenon of climate change is manifesting itself in a very real way in the area of study in Zimbabwe. If the findings of this study are anything to go by, climate change will prove to be a disaster for the livelihoods of poor people especially in semi-arid regions in sub-Saharan Africa. This study has shown that increasing temperatures and decreasing precipitation are altering the natural environment leading to the disappearance of natural habitat, flora and fauna which has critical implications on rural livelihoods. Traditional and indigenous fruits are disappearing due to reduced precipitation and increasing temperatures. This has led to the destruction of important food supplements for local communities making them vulnerable to food insecurity. This is aggravated by the fact that growing crops is no longer viable as agricultural seasons often fail due to unfavourable weather conditions discussed above. Farmer's adaptation to the changing climate is limited by several factors including lack of climate change and adaptation knowledge. The survey showed that most farmers were unaware of the concept of climate change. They believed that poor agricultural seasons were a local phenomenon in Matobo that could be solved by obeying their local gods. We conclude that unless urgent steps are taken to educate local farmers about the notion of climate change and possible pathways to adaptation, sub-Saharan Africa is faced with massive food insecurity and rising poverty levels in the near future. Livelihoods strategies are disappearing with climate change. Urgent adaptation measures must be driven by key stakeholders including governments and the NGO sector. Climate change poses a real development threat to the developing world.

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