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RURAL COMMUNITY PERCEPTIONS ON THE IMPACT OF CLIMATE CHANGE ON SUBSISTENCE FARMING: MUTOKO COMMUNITY IN ZIMBABWE

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ABSTRACT

The present study explores the impact of climate change on subsistence farming in Mutoko community, Zimbabwe. Mutoko is a rural community situated in the eastern part of Zimbabwe. Climate change is one of the biggest environmental challenges. Its impact is more intense in developing countries, particularly in rural communities which have become a major concern to the societal livelihood. The most affected people are the rural poor because they are highly dependent on climatic and environmental factors in addition to their greater reliance on climate-sensitive sectors such as agriculture and health, posing critical challenges for natural development. Focus group discussions were conducted to explore perceptions of climate change and its impacts on subsistence farming. The study reports community members' awareness of changes in the local natural environment. The changes are increased temperature and scarcity of rain. Observable impacts of these changes are decreased crop yields because of drought. The findings are supported by observation that Zimbabwe lies in a semi-arid region with limited and unreliable rainfall patterns and temperature variations. Rainfall exhibits considerable spatial and temporal variability. It is concluded that the impact of climate change on subsistence farming is real and is negatively affecting food security in the study area.

Keywords: Farming, Climate Variability, Climate Change, Subsistence farming, Climate Adaptation, Zimbabwe

INTRODUCTION

There is a world-wide consensus that climate change is real, rapidly advancing, and threatening humanity. Social scientists presented evidence and tested models to substantiate awareness of the reality of climate change (Bhusal 2009; Chaudhary & Aryal 2009; Mugambiwa & Tirivangasi 2017). Climate change manifests as rising temperature trends and erratic rainfall patterns (Smith & Reynolds 2005; Broham, Caesar & Alexander 2006). Nhemachena, Mano, Mudombi and Muwanigwa (2014) attest that the main climate variables embrace rainfall and temperature. For Bhusal (2009) local communities are not aware of climate change instead they understand change in rainfall and to patterns. Haque Yamamoto, Malik and Sauerborn (2012) add that the main indicators of climate change are change in rainfall patterns and high and low temperatures. In the Sahelian region of West Africa for example, farmers point to shrinking water bodies, disappearing plants and crops, and changing settlement patterns as evidence of reduced rainfall over the last three decades of the twentieth century (Roncoli 2006; West, Roncoli, & Ouattara 2007).

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The Intergovernmental Panel on Climate Change (IPCC)'s Fourth Assessment Report indicates that increases in temperature patterns and erratic rainfall in the African Continent can impact agriculture by reducing crop yields by almost half by 2020 (IPCC 2007). This will have adverse impacts on the already vulnerable and poor communities that rely on climate-sensitive livelihood sources like agriculture and exploitation of biodiversity. Changes in temperature and seasonality have direct, immediate effects on flora and fauna as well as on human activities and health (Bhusal 2009).Climate change models for Southern Africa indicate that the region will face increased challenges due to projected changes in climate (Hulme et al. 2005). The IPCC (2007), Taros, Lewiston, and Usman (2005), Tadrosset al. (2009) predict rainfall reductions and increased variability for most parts of Southern Africa. Southern Africa has recently been experiencing recurrent droughts (including mid-season droughts) (Moyo et al. 2012), and these experiences together with other extreme climatic events are expected to increase (Twomlow, Steyn & Du Preez 2006). Extreme weather events, namely Tropical cyclones and drought have increased in frequency and intensity (Mutasa 2008; Tirivangasi 2018). Moreover, Zimbabwe Meteorological Service, daily minimum temperatures have risen by approximately 2.6°C over the last century while daily maximum temperatures have risen by 2°C during the same period. Climate records for Zimbabwe demonstrate that the country is already beginning to experience the effects of climate change, notably rainfall variability and extreme temperature increases (Saarinen et al. 2012). These conditions are expected to render land increasingly marginal for agriculture, which poses a major threat to the economy and the livelihoods of the poor due to heavy dependence on rain-fed agriculture and climate sensitive resources.

Several studies have been carried out on the impact of climate change on local livelihoods, there is very little literature to understand the impact of climate change on the livelihoods of rural communities in Zimbabwe. Existing studies on climate change in Africa cannot be generalised to include the Zimbabwean scenario due to several reasons (Nath & Behera 2011). Firstly, livelihoods differ according to regions because they are ecologically dependent. Saarinen et al. (2012) argues that naturally, some livelihoods are more sensitive to climate change than others. Regional ecological variations mean that the 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 (Nath & Behera 2011). This argument shows the need for local studies on the impact of climate change on local livelihoods.

REVIEW OF LITERATURE

Climate Change and Subsistence Farming in Africa

In Africa, climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years (Morton 2007). The effects of climate change are characterized by failure of crops, death of livestock and low crop yields, all of which lead to declining agricultural productivity particularly in nation states that relies on

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subsistence farming such as Rwanda, Uganda, Namibia and Zimbabwe.This will have adverse impacts on the already vulnerable and poor communities that rely on climate-sensitive livelihood sources like subsistence agriculture and exploitation of biodiversity, particularly(Tlhompho 2014). Growing of crops and rearing of animals predominantly for consumption by family rather than for the wider economy in most African state like Rwanda, Namibia, Senegal Zimbabwe, and South Africa is very common (Moyo et al. 2016). This means that subsistence farming is not for commercial purposes hence production is at a small scale because it is only meant for the family. This form of farming in which nearly all the crops or livestock raised are used to maintain the farmer and the farmer's family, living little, if any, surplus for sale or trade (Kaya 2016).

Climate Change and Subsistence Farming in Southern Africa

The IPCC (2007) argues that rainfall reductions and increased variability for most parts of Southern Africa. Southern Africa has recently been experiencing recurrent droughts, including mid-season droughts and these experiences together with other extreme climatic events are expected to increase (Twomlow et al. 2008; Nyahunda & Tirivangasi 2019; Muzerengi & Tirivangasi, 2019). Climate change models for Southern Africa indicate that the region will face increased challenges due to projected changes in climate (Maponya & Mpandeli 2013). In Southern Africa, climate change has been projected to scale up food insecurity and poverty levels amongst rural communities that relies on subsistence farming (Turpie & Visser 2013).Such an impact on agricultural production would directly influence food security in countries that relies on subsistence farming like Namibia Zimbabwe and South Africa, leaving 600 million facing malnutrition by 2030 in addition to predictions that do not take climate change into consideration (FAO 2016). Climate change is impacting negatively on the poor as they are least resilient and their livelihood is tied to climate-sensitive resources such as agriculture, fisheries, forestry and other natural resources (Cherotich, Saidu & Bebe 2012).Efforts to mitigate climate change are not sufficient to stop future climate changes as the effects are negatively affecting subsistence farming in rural communities who are more vulnerable to climate change (IPCC 2013; Tirivangasi 2018).

Explanation of Climate Change Phenomenon Through Afrocentric Theoretic Lens

The present study adopted the Afrocentricity Model as an approach to the study of climate change impacts on the subsistence economy of a rural community. Afrocentricity was adopted to examine the impact of climate change on the subsistence farming of a rural community. Adoption of the Afrocentric approach necessitates the use of focus group discussions to probe the participants' cultural experiences of climate change and its impact on the subsistence farming among Africans in Zimbabwe. Data were derived from the study participants' experiences of climate change and observations of its impact on their cultural practices. Afrocentricity is a paradigm that has its core on the understanding of the African identity as rooted, centred and located in the aspects of the African culture (Asante 2007; 1993; Mazama 2001).

Afrocentricity recognises the African voice and reaffirms the centrality of cultural experience as the place to create a dynamic multicultural approach (Mkabela 2005). For Mazama (2001) Afrocentricity emerged as a methodology that operates within African ways of knowing and existence and has resulted in the implementation of principles, methods, concepts, and ideas

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that are derived from African cultural experiences. As a tool of enquiry, it operates as a methodological framework to investigate Africans real experiences in their own cultural settings (Pellerin 2012).The Afrocentric paradigm is a revolutionary shift in thinking proposed as an adjustment to black disorientation, decentredness, and lack of urgency. Mazama (2003:31) argues that the Afrocentric approach asks the question, "What would African people do if there were no white people?" In other words, what natural responses would occur in the relationships, attitudes toward the environment, kinship patterns, preferences for colours, type of religion, and historical referent points for African people if there had not been any intervention of colonialism or enslavement? Afrocentricity answers this question by asserting the central role of the African subject within the context of African history, thereby removing Europe from the centre of the African reality. In this way, Afrocentricity becomes a revolutionary idea in studying climate change and its impact on the way people sustain themselves in a rural setting because it studies ideas, concepts, events, and personalities and socio-economic processes from a standpoint of black people as subjects and not as objects, basing all knowledge on the authentic interrogation of location (Asante 2000).

Furthermore, the Afrocentric scholar or practitioner knows that one way to express Afrocentricity is called marking (Asante 1998). Whenever a person delineates a cultural boundary around a cultural space in human time, this is called marking (Mazama 2003). It might be done with the announcement of a certain symbol, the creation of a special bonding, or the sighting of personal heroes of African history and culture (Asante 2000). Beyond citing the revolutionary thinkers in our history, that is, beyond Amilcar Cabral, Frantz Fanon Malcolm and Nkrumah, we must be prepared to act upon our interpretation of what is in the best interest of black people, that is, black people as a historically oppressed population (Mazama 2003). This is the fundamental necessity for advancing the environmental and socio-economic processes. Asante (1998) asserts that Afrocentricity is the substance of our regeneration because it is in line with what contemporary philosophers such as Haki Madhubuti and Maulana Karenga among others have articulated as in the best image and interest of African people. What is any better than operating and acting out of our own collective interest? What is any greater than seeing the world through our eyes? What resonates more with people than understanding that we are central to our history, not someone else's? If we can, in the process of materialising our consciousness, claim space as agents of progressive change, then we can change our condition and change the world.

Reviere (2001) asserts that the principal advantage of an Afrocentric approach is that it compels a researcher to challenge the use of the traditional Eurocentric approach in the enquiry process. Using this theory, the researchers will try to explore the rural community's perceptions of climate change and its impact on the subsistence economy. Asante (2000), posits that African issues need to be approached using African lenses/glasses rather than using other theories which were designed to solve issues completely different from African problems. Asante wrote a lot about Afrocentrism as the best approach ever in solving African issues, though he shuts himself from the worldview. Asante is supported by Collins (1990) who asserts that African phenomena are best understood using African methods of analysis. The African methods of analysis are ways of looking at African matters which analyse them (African matters) within the African context. Asante (2000) argues that Afrocentricity seeks to relocate the African person as an agent in human history to eliminate the illusion of the fringes.

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Asante (2000), points out that Afrocentricity draws its concept from and bases itself on the culture of the African and totality of African experience. He explains that Afrocentricity has four main characteristics: Protection of African cultural elements in the context of art, music, and literature and of the Pan Africanist cultural elements as based on responses to situation, environment, and conditions. A devotion to finding the subject place of African in social, political, and religious phenomenon with implications to questions of sex, gender, and class. A concern in psychological relocation as determined by ritual, symbols, and signals. A devotion to lexical refinement to avoid gender and sex pejoratives of any other person including Africans and celebration of centeredness and agency. Keto (1989) argues that the African centred perspective rests on the premise that it is valid to position Africa as a geographical and cultural starting base in the study of people of African descent. He mentions that the objective therefore is to view the world from the perspective of the people studied. He asserts that the Afro-centric comprehensive model for the teaching and learning of knowledge about African peoples makes possible an understanding of, and appreciation for the social, environmental, cultural, and intellectual patterns of African people.

Afrocentric approach was used in this study because it is holistic and centred on the African worldview. At the centre of this study are the African people, their culture, identity, values and socio-economic activities, experiences with regards to their history and belief system in relation to climate change. The African methods of analysis are very important in this study because they will help the researchers to understand impact of climate change within the African context. For example, the researchers will be able to understand climate change in Africa, why climate is important to the African people and why is it necessary to have climate change solution programmes in Africa. Looking at the different arguments which different scholars have advanced concerning the Afrocentric approach one can argue that the central theme of the ideology is to regenerate African people. The regeneration of the African people should take place in all aspects of their lives; for example, culture, socio-economic factors to mention but a few. The main idea of the theory regarding the regeneration of the African people helped the researchers to understand the rural community's perceptions of climate change and its impact on the subsistence economy, given that the main aim of the study is to explore perceptions of climate change and its impacts on subsistence farming among rural, Zimbabwean African people.

RESEARCH METHODOLOGY

Research Design

A qualitative, exploratory study was conducted to examine perceptions of climate change and its impacts on subsistence farming. Exploratory research design is deemed necessary for its ability to produce descriptive information appropriate in the analysis of people's individuals and collective social actions thoughts and perceptions. A qualitative methodology of inquiry is rooted in the exploratory paradigm as opposed to the positivist school of thought (Corbetta 2003). The exploratory paradigm emphasises understanding, analysing, and describing phenomena without necessarily relying on quantitative measurements and statistics (Dawson 2007). In direct contrast to positivism, exploratory approaches accept subjectivity as opposed to objectivity.

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Phenomenology also allows for interpretation of events and phenomena such as those identified in the investigation of rural livelihoods and climate change challenges in Mutoko community of Zimbabwe as opposed to strict quantitative measurements. The exploratory approach is characterised by a focus on qualitative interpretation of people 's perceptions and meanings attached to social phenomena, attitudes, beliefs and value systems (Lincoln & Guba 2000). Within the context of this research, social phenomena such as personal experiences, beliefs, attitudes, and opinions of the members of the Mutoko community were investigated. According to Leedy (1989), the qualitative research methodology might be considered a 'warm' approach to the central problem of research as this kind of research investigates issues identified earlier in addition to interpersonal relationships, meanings construction, experiences and associated thoughts or feelings. With this, the researchers attempted to attain rich, deep, real, and valid data on climate change experiences and responses in the Mutoko communal lands.

Population and Sample

The sample of the study was drawn from two villages of Mutoko, Chimuti and Chingwena villages in rural community to collect quality and reliable data. The researchers used purposive sampling to select the study participants. This type of sampling is based entirely on the judgment of the researchers, in that a sample is composed of elements that contain most characteristics representative or having typical attributes of the target population (Singleton 2004).The respondents should have good, relevant knowledge of the domain of the study and should also be able to interpret the meaning of their own cultural phenomena (Cotton 1996). The sample was purposively selected to be comprised of people who have extensive knowledge of phenomena, situations, conditions and elements in the natural, socio-economic and spiritual environments that are responsible for the cause of a variety of challenges by climate change which is affecting their livelihood. The study sample was made up of fifty (50) elderly members purposively selected from the community. The participants were the community members who stayed in the community for more than 35 years which is evidence of long period of stay in the area and immense knowledge of cultural values and livelihood patterns. The sex ratio of the participants will be 50% female and 50% male. The age of participants ranged from 35 and above years. The Figure 1 shows the study area.

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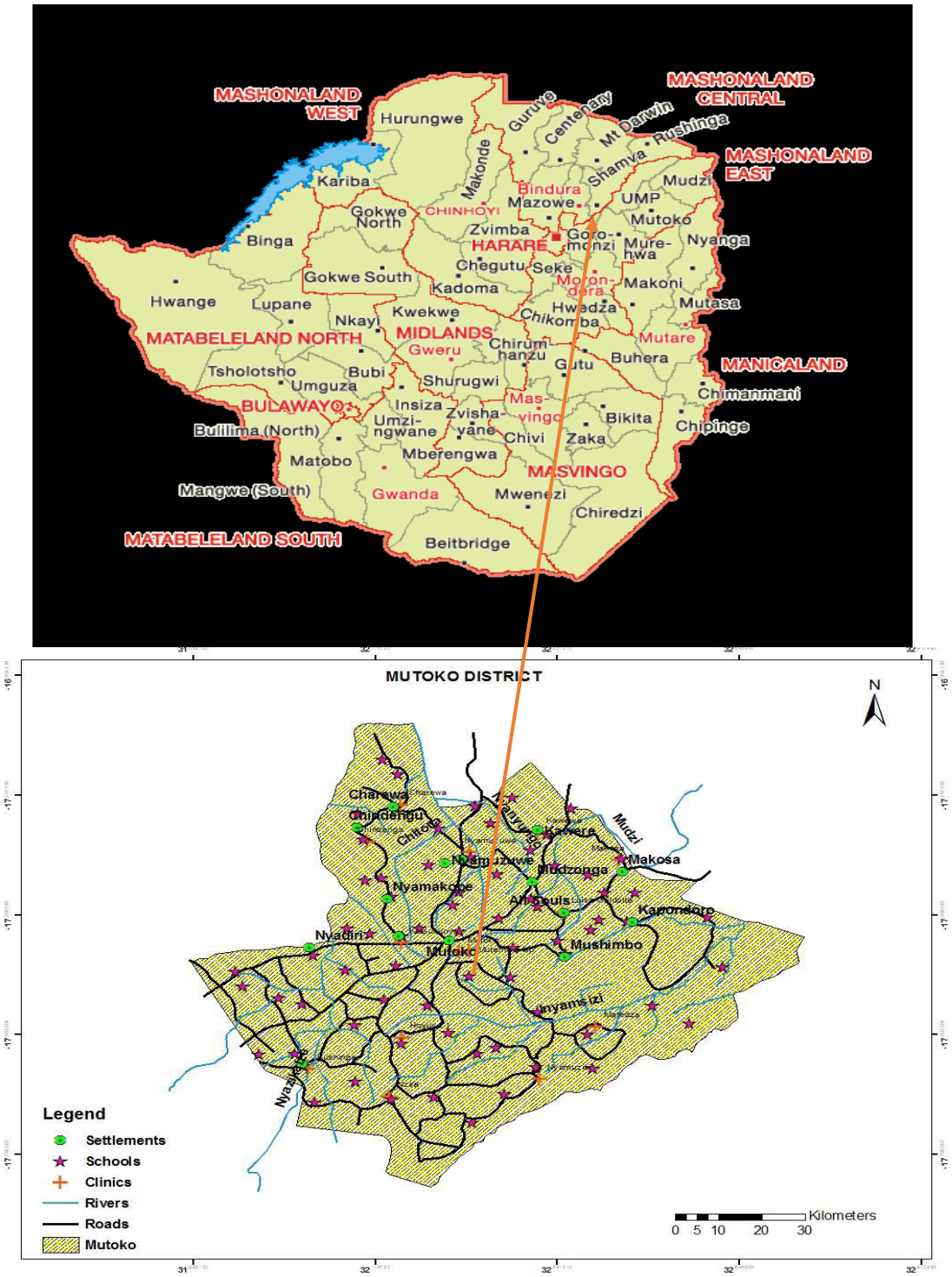
Figure 1: Map of Mutoko District.



Source: Adapted from Bhatasara (2018)

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Data Collection

Primary data for this study were collected using focus group discussions. Krueger (1998) views focus group discussions as a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive and non-threatening environment. He argues that such discussion often enables the participants to discuss issues they consider important. This approach can also be used to explore where little is known or views of a certain sample, such as particular culture, age group or gender, need to be obtained (Neuman 1997). Focus group discussions generally comprise of four to eight research participants whose participation is voluntary and who are homogeneous in some respects (Krueger 1998). The reason why the study employed focus group discussion is that the researchers are far more concerned about group input in gathering relevant information to the study aim. Participants were brought together to share experiences about changing climatic conditions and their impact on the subsistence farming in their cultural settings.

The researchers conducted focus group discussions with five groups of about six members each, the despondence were grouped into groups after the researchers made arrangements with the village head*, 'Sabhuku'* to meetup with them on Saturday morning during their weekly briefing meetings with the elders of the community. Therefore, the discussions were centred on the participants' experiences and knowledge of changes in climatic conditions. Experiences and knowledge of changing rainfall were examined by asking questions about observable changes in rainfall and temperature patterns. These questions were followed by questions about the impacts of observable changes on the local practices of making a living. Participants were grouped in the same group because they were sharing same qualities to make the discussions productive and faster. There were six participants in each group to make the groups to be easily manageable. Each group of participants was interviewed once; each session had the same thematic questions. Totally, five sessions were conducted during the focus group discussions. The discussions were carried out at Mutoko in the two villages from the 1st to 10th of September 2016. Each session of the focus group discussion lasted for one hour. The researchers made use of pseudo names during the discussions, a way of protecting the identity of the participants.

The following themes were discussed during the focus: Determining participants' knowledge about climate variations in the form of increased temperature and erratic rainfall patterns. Examining participants' knowledge of the impact of variations in temperature and rainfall patterns on the community's subsistence farming. At the beginning of each session the researchers briefed the participants about the themes of the session through explaining and defining key terms and what was expected of them. The discussions were conducted in *Shona*. All the sessions were recorded using a tape recorder and then transcribed into English. At first the participants were not comfortable to be recorded, but the researchers explained to them that their real names would not be mentioned or appear anywhere in the final document.

Data Analysis

Analysis of data was done through a thematic approach to categorise data under two themes namely, perceptions of variations in temperature and rainfall patterns and their impact on the community's subsistence farming practices. According to De Vos (2005:31), "thematic data

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analysis qualitative analytic method is used for identifying, analysing and reporting patterns (themes) within data". Therefore, captured themes in the data were related to the research objectives and represented some level of patterned response or meaning within the data set. This characteristic of thematic data analysis enabled the researchers to derive meaning from the data collected. According to Burns and Grove (2003:479), data analysis is a mechanism for reducing and organising data to produce findings that require interpretation by the researcher. Data analysis is a challenging and a creative process characterised by an intimate relationship of the researcher with the participants and the data generated (De Vos 2002:339). The researchers made use of thematic data analysis. Data analysis is a multipronged process that every researcher embarks on to make sense of the data: break it down, study its components, investigate its importance, and interpret its meanings (Patton 1999; Bailey 2007). The analysis of data helps to structure the production of the final manuscript.

FINDINGS AND DISCUSSION

Changes in Rainfall Patterns

Majority of the participants were aware of a shift in the seasons as the rain season is no longer predictable residents expressed the view that farming was now done based on trial and error. Planning was virtually impossible given the nature of rainfall patterns. The 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 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 faming a high-risk business. More importantly, the community is also unable to predict either they should embark on early farming or late farming. One participant indicated:

> *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 produces. But now the rains start in January here in this area … but in the olden days we used to herd cattle putting sacks for raincoats … but now you never need a raincoat. 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.* [Occupation: Farmer, Age: 70, Gender: Male].

Information from the study participants shows that the actual and potential impact of climate change on subsistence farming is large and wide ranging, affecting many aspects of their everyday lives of the participants. This is supported by observations that many climate models predict negative impacts of climate change on agricultural production, food security, and human health as well as changing seasonal rainfall pattern in parts of Africa (IPCC 2007; Mugambiwa & Tirivangasi 2017). Increased temperature, drying up of soils, increased pest, and diseases pressure

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Challenges in The Crop Production as a Result Of Change in Rainfall Patterns

All the participants mentioned that their crop production is affected by lack of enough rainfall. Rainfall shortage was regarded as the most pressing challenges in the crop production. It is mentioned that the most immediate consequence of drought is decline in crop production, due to inadequate and poor rainfall. This situation has negatively impacted production of crops which is marked by poor harvest. To that effect, one of the participants indicated that:

> *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 is 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.* [Occupation: Farmer, Age: 58, Gender: Male].

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 rain is presently starting late and lasting for a shorter period which makes is difficult to sustain the crops. Twenty-three participants also noted that in previous years the community had rain in September. The World Bank (2008) asserts that the developing world needs to be taught how to deal with environmental problems such as water shortages and how to diversify to remain relevant in responding to changing climatic conditions. From the participants' observation, this rain is becoming unpredictable which signifies a change in climate processes. The farmers lack irrigation equipment and knowledge which means that the sustainability of the agricultural projects was highly questionable (Boko et al. 2007). One participant mentioned:

> *We used to periodically perform traditional ceremonies which involve offerings of millet beer to the spirits concerned, Mafuwe, small libations are poured, and the remainder is consumed by the gathering, amid singing and dancing. Sacrifices may occasionally be offered to ancestors and territorial spirits but are regularly offered to Mwari (God). But these days, our elders are no longer taking a lead in doing this because our community is now a combination of Christians and those who still believe in traditional way of doing things. So yes, few are still gathering and performing the traditional ceremonies, but some are resistant because they have turned their souls to church.* [Occupation: Farmer, Age: 55, Gender: Female].

Indeed, the findings from respondents claimed that the climate change impact shows that there is a need and it is very important in restoring their Shona cultural practices which was attested by some of the respondents above. Such practice like *mafuwe* in Shona culture is necessary therefore, conforms to the Afrocentric paradigm's idea of the substance of African regeneration (Asante, 1998). This means that the effects of climate change are positive for the Shona cultural practices restoration. Climate change is serving as an alarm to let people about the need to revisit their Shona culture as norm that some of the activities being done have repercussions to their communities. This position is also supported by Asante (2000)'s idea that African people should be returned to their history. According to Asante (2000) African issues need to be approached using African lenses/glasses rather than using other theories which were designed to solve issues completely different from African problems. Asante wrote a lot about Afrocentrism as the best approach ever in solving African issues, though he shuts himself from the worldview. Asante is supported by

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Collins (1990) who asserts that African phenomena are best understood using African methods of analysis. The African methods of analysis are ways of looking at African matters which analyse them (African matters) within the African context.

Changes in Environmental Conditions

All the respondents were aware of changing environmental conditions which are impacting negatively on their livelihoods. They reported that they are experiencing warmer days than cold days, which results in less rainfall in the community and their livelihood is at risk. Most importantly the farming activities are ceasing and water sources like dams and rivers are dry. The following observation was made by one of the participants:

> *We are very worried about the environmental conditions of this community. We used to have better feature to predict the upcoming of the new season, we used to believe and rely much in in natural feature from the fig trees. If you see the fig tree blooming, it meant summer is approaching, but to date, the myth is no longer relevant because even if the trees bloom, we are not receiving rain at all.* [Occupation: Farmer, Age: 60, Gender: Male].

The above observations are supported by Roncoli (2006), West el al. (2007), Hague et al. (2012), Nhemachena et al. (2014) as they alluded that indeed the problem of understanding climate change is one of the major challenges confronting Africans. The local communities are aware of change in climatic conditions in the form of increased temperature and erratic rainfall patterns which lead to less rainfall expectations. 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). Ashton (2002), De Wit and Jacek (2006) assert that African rural communities are facing increasing water scarcity and stress with a subsequent potential increase of water conflicts as almost all the river basins in Africa are transboundary.

Changes in Temperature Patterns

All the participants indicated that the area is highly experiencing more hot days than nights which are affecting the community particularly the rainfall pattern. The community members indicated that these changes in temperature are a major blow to their wellness. They expressed that these changes are posing a threat to their sources of physiological needs such as water sources and agricultural setback. Having been exposed to such conditions means that the agriculture sector will deteriorate due to water shortages in sustaining farming activities as well as water for human use is a major blow to the community. The community is experiencing shortage of water in its reliable sources, to sustain the community. The following are some of the points which were made by one of the participants:

> *Yes, we are experiencing more hot days than cold ones and it is forever hot these days and the signs of rainfall, but it will not rain at all. And this is impacting our water sources such as dams and rivers are not full, in fact they are dry as we speak even our borehole are not supplying water at all*. [Occupation: Farmer, Age: 52, Gender: Female].

Indeed, the participants indicated how much their welfare was greatly affected as a community due to water shortages. This concurs with the fact that African rural communities are facing

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increasing water scarcity and stress with a subsequent potential increase of water conflicts as almost all the river basins in Africa are transboundary (Ashton 2002; De Wit & Jacek 2006). This is supported by the official government release when they report that, in rural areas, water coverage was 75 per cent in 1999, but by 2010, a third of the rural population was estimated to lack access to improved drinking water. Approximately 65 per cent of the water facilities in the rural areas are non-functional (GoZ 2010). Zimbabwe's water and sanitation infrastructure are generally aged and therefore more expensive to maintain, thereby compounding any challenges presented by reduced availability of rainwater.

CONCLUSION

Considering the major findings mentioned above, the researchers concludes that the impact of climate change is real on the socio-economic life of rural communities in Zimbabwe. The researchers consider climate change to have negative impacts on subsistence farming which is climate dependent. The participants' adaptation measures are limited by several factors including lack of climate change and adaptation knowledge. The study has established that most of the villagers in Mutoko are aware of climate change and its effects. Most notably, the effects of climate change in Mutoko are seen in the way climate change severely affects subsistence farming. There has been reduced crop yield due to persistent dry spells or drought. It is also important to note that despite the challenges that climate change poses on mainly farming activities; communities in Mutoko are devising adaptive mechanisms to counteract the effects of climate change. These mechanisms include a shift in cultivation patterns and the growing of crops near river basins.

The researchers recommended the need for awareness campaigns against climate change. The researchers aver the most important pointers derived from the study i.e. the Metrological Service department in collaboration with the ministry of rural development should design outreach programs specifically on climate change adaptation so that that it will be known in each corner of the community. Further, the government should develop climate awareness campaigns aimed at government (especially councilors), civil society and the general public (especially farmers) in planting more trees in each community; and also consider climate information in Community Based Adaptation (CBA) projects, including scientific data and local knowledge about climate trends and changes. Furthermore, researchers should undertake participatory vulnerability and adaptation assessments from grassroots level across a variety of sectors in both rural and urban areas. Share the results openly to foster cross-scale learning between the public, government, and civil society.

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