

**FARMER-PASTORALIST CONFLICT IN KILOSA DISTRICT, TANZANIA: A
CLIMATE CHANGE ORIENTATION**

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ABSTRACT

Farmer-pastoralist conflicts have been reported in many parts of Africa, often presented as being driven by resource scarcity. In Tanzania, the two groups have for a long time, found themselves in deadly clashes, most of which resulted in loss of lives and destruction of properties. The main resources causing the conflicts are water, land and pasture. This study is therefore conducted to assess the extent of climate change induced farmer-pastoralist conflict in Kilosa District. A cross-sectional research design is adopted for this study. A simple random sampling technique was used to select wards and villages which are home to farmers and pastoralists. A total sample size of 120 respondents was drawn. Data were mainly collected using the questionnaire survey. Statistical package for social science (SPSS) and excel program were used in analysing the data. Findings show that climate change, land and water resources were the major sources of farmers-pastoralists' conflict in Kilosa District. The study found out that prolonged drought, lack of grazing land and cattle thefts are among reasons for farmer-pastoralist conflict. The study concludes that there is conflict between farmers and pastoralists due to scarce resources, particularly water, land and pasture. Based on the findings, various stakeholders including the government, non-governmental organisation (NGOs) and communities should identify new, and improve existing strategies for the conservation and management of natural resources.

DECLARATION

I, Denis Israel Mwasha, do hereby declare to the Senate of Sokoine University of Agriculture that, this dissertation is my own work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

Denis Israel Mwasha

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Date

The above declaration is confirmed

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Date

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DEDICATION

I dedicate this valuable work to my parents, Mr. Israel Mwashha and Mrs Martina Pangani.

Also, special dedication to God by giving me beautiful and lovely daughter Faith D.

Mwashha

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LIST OF ABBREVIATIONS

CC	Climate Change
FGDs	Focus Group Discussions
IPCC	Intergovernmental Panel for Climate Change
LEAT	Lawyers Environmental Action Team
LGA	Local Government Authority
LHRC	Legal and Human Rights Centre
LRRRI	Land Rights Research and Resource Institute
NGOs	Non-Governmental Organisation
SCCCAPS	Strauss Centre for Climate Change and African Political Stability
SPSS	Statistical Package for Social Science
UNFC	United Nations Framework Convention on Climate Change
URT	United Republic of Tanzania

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Conflict is not a new story and has existed for many years. We are now seeing an increase of intra conflicts in Africa due to the scramble for resources such as areas for grazing and cultivation. Farmer-pastoralist conflicts have been reported in many parts of Africa often presented as being driven by resource scarcity (Norman, 2013). In countries such as Nigeria, Kenya and Tanzania, to mention a few, the two groups have for a long time found themselves in deadly clashes, most of which resulted in loss of lives, destruction of properties and turning the areas into war zones as they try to clinch the right to use the land (Benjamin *et al.*, 2009). When conflict is mismanaged, it can cause great harm to a relationship, but when it has been handled in a respectful way an opportunity to strengthen the bond between two people or groups could be obtained (Smith, 2005; Harbom and Wallensteen, 2005). Although the emphasis on conflict management or resolution seems to be a vain discussion, it has been attempted to indicate through practice measures that have been taken to solve or manage the various conflicts manifested in Africa.

In Africa, farmer-pastoralist conflicts have been caused by different factors. Deutsch (1991) and Zartman (2005) suggest that access to resources, beliefs, values, or the nature of the relationship are factors that cause conflict. On the other hand, Signer (1996) identified territory, religion, language, ethnicity, self-determination, resources accessibility, dominance, equality, and revenge as the major factors that cause farmer-pastoralist conflict. Many factors impact on the probability of armed conflict between farmers and pastoralists. Also poverty levels, natural resource endowments, population

characteristics, ethnic and religious fractionalization, education levels, geography, as well as previous conflicts, are factors that constrain or facilitate farmer-pastoralist conflict.

In recent years, increasing attention has been paid to the linkages between climate change and conflict, prompted by concern that the environmental effects of climate change, especially the depletion of natural resources, will create conditions that increase the risk of violent conflict (Brown *et al.*, 2009). Climate change acts as a 'threat multiplier' that makes existing concerns, such as water scarcity and food insecurity, more complex and intractable. It plays a key role in human insecurity, and is expected to do so even more in future as its impacts manifest themselves (Barnett *et al.*, 2007).

In Tanzania, conflicts between farmers and pastoralists have been recurring for a long time claiming lives of many innocent people from the two communities and creating major economic impact to the nation. Areas such as Kilosa and Kilombero Districts in Morogoro Region; Kilindi and Handeni Districts in Tanga Region and Mbarali District in Mbeya Region are some of the places that have experienced resource conflicts between farmers and pastoralists which have been said to be caused by climate change. This is following the fact that climate change together with increasing demand lead to shrinking of available resources (Barnett *et al.*, 2007).

Trends show that clashes in Kilosa District have occurred since 1960s, which makes it the leading District with conflict between farmers and pastoralists in Tanzania. In the late 1990s, over 40 people were killed and others were seriously injured, livestock injured or killed, properties and crops were destroyed (URT, 2005). Furthermore, in 2000 clashes claimed tens of people's lives causing irreparable losses and damages to properties. In 2008, the media reported the erupted fights in Mabwegerevillage in Msowero ward

involving Mambegwa sub-village that inhabits pastoralists and farmers of Kikenge village. Further, reports suggest that six people were killed and properties burnt to ashes, dozens of cattle stolen, hence people were internally displaced within the area. A total of 832 peasants took refuge in neighbouring villages for fear of being slaughtered by pastoralists on revenge (Bahaet *al.*, 2008). This study aimed at generating information on how climate change engineered farmers and pastoralists conflict in Kilosa District. At the heart of the conflict/climate change relationship was the issue of natural resource scarcity and competition. The study considered both how climate change affected natural resource availability, and how natural resource availability affected conflict dynamics.

1.2 Statement of the Problem

Studies have been conducted in Kilosa District related to farmer-pastoralist conflicts (Benjaminsenet *al.*, 2009; Bahaet *al.*, 2008; LHRC, LEAT and LRRRI, 2008). However, there was no linkage that climate change might cause conflicts between farmers and pastoralists. Most researchers assert the causes of these conflicts as insufficient allocation of pastures allocated to pastoralists, leading pastoralists to search for pasture and water outside pastoral village areas. Other factors are legacy of centralization of powers, the absence of land use plans, excessive stocks of livestock, resentment between both parties, influx of people in the area, and corruption were the main reasons for the conflict between farmers and pastoralists in the region. Little is known about climate change impact as a factor, which may facilitate farmers and pastoralists' conflicts in Kilosa District. This study aimed at generating relevant information on how climate change impact influences farmers and pastoralists' conflict in Kilosa District.

1.3 Justification for the Study

The study aimed at understanding of the influence of climate change on farmer and pastoralist conflicts, which has prompted attention by the media, local and central governments, researchers and human rights activists to find lasting solutions for the problems. Besides of efforts by different actors towards finding solutions to farmer and pastoralist conflict but still conflicts persist and advancing year to year. This study is of great importance to civilians, public sectors, academicians, and the Tanzanian government by contributing to the body of knowledge for better understanding of the conflicts between farmers and pastoralists. Moreover, the government, policy makers and legislative organs can use these results in formulating and implementing appropriate mechanisms in solving farmer-pastoralist conflicts which still exist today.

1.4 Objectives of the Study

1.4.1 General objective

The general objective of this study was to assess the extent to which climate change influences farmer-pastoralist conflicts in Kilosa District.

1.4.2 Specific objectives

- i. To examine the extent of the farmer and pastoralist conflicts in a study area
- ii. To identify causes of farmer and pastoralist conflicts
- iii. To examine accessibility to water, pasture and land among farmers and pastoralists
- iv. To examine the perception of farmers and pastoralists of climate change and conflict

1.5 Research Questions

- i. To what extent does farmer and pastoralist conflict in Kilosa District?
- ii. What are the factors cause farmers and pastoralist conflicts in the study area?
- iii. How often did droughts, floods, shortage of rainfall and high temperature occur in the area?
- iv. What were the perceptions of farmers and pastoralist on climate change and conflict?

1.6 Conceptual Framework

The study's conceptual framework (Figure 1) shows the relationship among variables. Climate changes can impact the availability of water access, fertile land, and pasture/grazing land. Thus, it makes the areas with fertile land, good temperature; sufficient pasture and accessible water become scarce. This prompted pastoralists and farmers to move in search of these four basic needs. In doing so, they tended to clash in the midst of their quests resulting in conflict lack of peace, death of people, destruction of properties, and stolen livestock and ultimately economic decline.

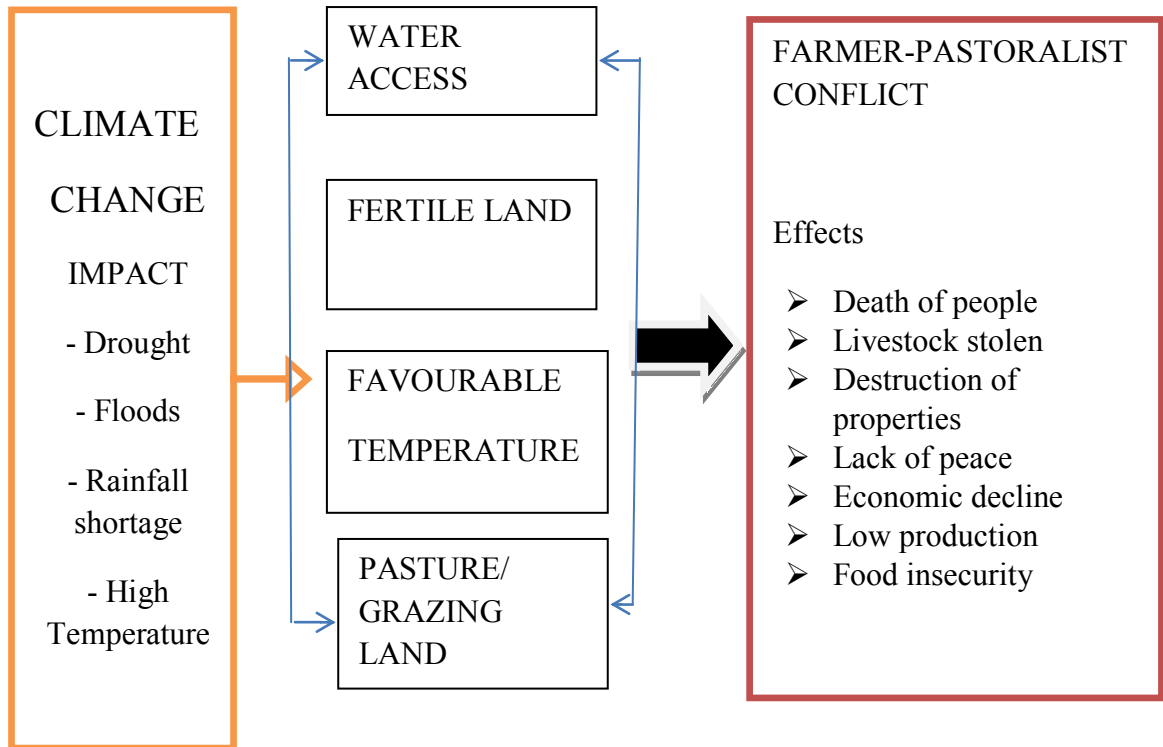
Independent variables**Dependent variable**

Figure 1: Conceptual Framework of the farmer –pastoralist conflict over resources

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptualization of Key Terms

2.1.1 Climate Change

According to Nsikabasi *et al.* (2008) define climate change as the long-term shift in weather patterns globally including precipitation, temperatures, cloud cover, and so on. Climate change is caused by human activities that have resulted in an increased concentration of greenhouse gases in our atmosphere, including carbon dioxide, water vapour, methane, ozone, and nitrous oxide. Human activities that result in the release of these greenhouse gases well beyond natural levels include things like deforestation, burning of fossil fuels, changes in wetland construction, and so forth. Furthermore, Nsikabasi *et al.* (2008) mentioned climate change impacts such as increased surface temperatures, rises in sea levels, retreat of glaciers and melting of sea ice, changes in precipitation, Increases in intensity of extreme weather events such as heat waves, tornadoes, hurricanes, and heavy rainfall, longer, more severe droughts, species endangerment and extinction and loss of biodiversity, drops in agricultural yields, spread of vector-borne diseases because of increased range of insects and acidification of oceans creating drops in fishing yields and death of coral reefs.

2.1.2 Conflict

Conflict may be defined as a struggle or contest between people with opposing needs, ideas, beliefs values, or goals and also as a result of scarce resources. As such, conflict is normal, ubiquitous, and unavoidable. It is an inherent feature of human existence. It is even useful on occasion. It is difficult to conceive of a situation which is conflict-free. Indeed, the very presence of conflict is at the heart of all human societies (Bercovitch and

Langley, 1994). Deutsch (1991) and Zartman (2005) assert factors that generate conflict can be grouped into five basics: control over resources, preferences and nuisances, beliefs, values, or the nature of the relationship. Climate change can contribute to conflicts that are related to resource competition. For example, climate change can adversely impact the availability of water access, fertile land; pasture/grazing land as well as affecting the temperature. Thus, resource scarcity prompts farmers and pastoralists to move in search of areas with fertile land, good temperature, good pasture and accessible water.

2.1.3 Farmer

A farmer is a person engaged in agriculture, raising living organisms for food or raw materials. The term usually applies to people who do some combination of raising field crops, orchards, vineyards, poultry, or other livestock. A farmer might own the farmed land or might work as labourers on land owned by others, but in advanced economies, a farmer is usually a farm owner, while employees of the farm are known as farm workers, or farmhands. The word farmer was originally used to describe a tenant paying a leasehold rent (a farm), often for holding a lord's manorial demesne (FAO, 2014).

2.1.4 Pastoralist

Pastoralists are people who live mostly in dry and remote areas. Their livelihoods depend on their intimate knowledge of the surrounding ecosystem and on the well-being of their livestock. Pastoral systems take many forms and are adapted to particular natural, political and economic environments. The types of livestock kept by pastoralists vary according to climate, environment, water and other natural resources, and geographical area, and may include camels, goats, sheep, yaks, horses, llamas, alpacas, reindeer and vicunas (IFAD, 2009). In this study, a pastoralist is one who only keeps animals as the main economic activities.

2.2 Theoretical Perspective

In order to live and attain well-being, humans need certain essentials. These are called human needs or basic human needs. Human needs theorists argue that conflicts and violent conflicts are caused by unmet human needs. Violence occurs when certain individuals or groups do not see any other way to meet their need, or when they need understanding, respect and consideration for their needs (Burton, 1990). This framework insists that violence is a tragic expression of unmet human needs, implying that all actions undertaken by human beings are attempts to satisfy their needs. Using this paradigm to explain Kilosa confrontations, farmers and pastoralists are scrambling for scarce resources which are fertile land, green pasture, water and areas with favourable temperature to fulfil their basic needs.

2.2.1 Environment security theory

Environmental security examines threats posed by environmental events and trends to individuals, communities or nations. It may focus on the impact of human conflict and international relations on the environment, or on how environmental problems cross state borders. It considers the abilities of individuals, communities or nations to cope with environmental risks, changes or conflicts, or limited natural resources. For example, climate change can be viewed a threat to environmental security. Human activity impacts CO₂ emissions, impacting regional and global climatic and environmental changes and thus changes in agricultural output. This can lead to food shortages which will then cause political debate, ethnic tension, and civil unrest. The theory further stresses that population growth in developing nations and the accompanying competition for control of resources and transboundary migration, could result in severe conflict (Floyd, 2014).

2.2.3 Population theory (Malthus theory)

Malthus argued that population multiplies geometrically while food and other resources multiply arithmetically; therefore, the population eventually outstrips food and other resources supply. He wrote that population growth occurs exponentially, so it increases according to birth rate. To avoid such a catastrophe, Malthus urged controls on population growth. According to Malthus, there are two types of 'checks' that can reduce a population's growth rate. Preventive checks are voluntary actions people can take to avoid contributing to the population. Because of his religious beliefs, he supported a concept he called moral restraint, in which people resist the urge to marry and reproduce until they are capable of supporting a family. This often means waiting until a later age to marry. He also wrote that there are 'immoral' ways to check a population, such as vices, adultery, prostitution, and birth control. Due to his beliefs, he favored moral restraint and didn't support the latter practices. Positive checks to population growth are things that may shorten the average lifespan, such as disease, warfare, famine, and poor living and working environments (Elwell, 2011).

2.3 Empirical Evidence

2.3.1 Climate change and conflict

Previous studies have identified a number of areas in which climate change may contribute to a worsening of conflicts (Brown and Crawford, 2009). According to the Strauss Centre for Climate Change and African Political Stability (CCAPS, 2011), between 1990 and 2009, Africa experienced nearly 6300 social conflicts including strikes, coups, riots and protests, which were more common during "extremely wet and dry years than in years of normal rainfall." This suggests that climate change induced drought, desertification and floods can lead to violent conflicts, and African countries and other developing countries will be greatly affected because of their limited capacity to adapt. Burke *et al.* (2009)

emphasized that there are strong historical linkages between civil war and temperature in Africa, with warmer years leading to significant increases in the likelihood of war. When combined with climate model projections of future temperature trends, this historical response to temperature suggests a roughly 54 per cent increase in armed conflict incidence by 2030, or an additional 393 000 battle deaths if future wars are as deadly as recent wars.

Several studies express concerns that climate change could overwhelm the adaptive capacities of societies and contribute to their destabilization, possibly leading to security risks and violent conflicts (Scheffran and Battaglini, 2011; Scheffran *et al.*, 2011; Nordås and Gleditsch, 2007). Some studies show that shared river basins and variables such as rainfall and temperature variability are positively linked to conflict (Solomon and Turton, 2000; Hendrix and Glaser, 2007; Burke *et al.*, 2009). Other researchers seem to agree that it is unlikely that climate and environmental factors alone will lead to conflicts (Gleditsch, 2011; German Advisory Council on Global Change, 2007), but will rather feed into or exacerbate existing social, political or economic drivers of conflict. However, it is non-climate factors such as poverty, governance, conflict management, regional diplomacy, etc, that will largely determine whether and how CC moves from being a development challenge to presenting a security threat (Oli and Alec, 2009). In addition to this multi-causality, some argue that it is more likely that conflicts related to climate change will take place at a local level such as, ethnic groups, rather than lead to interstate conflicts (German Advisory Council on Global Change, 2007; Theisen and Brandsegg, 2007). It is from this thrust that this study is concentrated.

2.3.2 Land and water access

Access and use rights to land are a key feature in most situations where climate change has contributed to natural resource conflicts so far. Climate change can intensify existing conflicts over land, as land becomes less fertile or is flooded, or if existing resource sharing arrangements between different users and land use practices are disrupted. Agriculture is the main user of water. It is responsible for 70 per cent of global freshwater withdrawals in developing countries; the share of water used by agriculture, as estimated in the 2008 World Development Report, is even higher 85 per cent. Within the agriculture sector, most of the demand for water comes from irrigation, which has been expanding significantly in the last decades. It is estimated, for example, that the world total irrigated area increased by 100 million hectares between 1962 and 1998 (Smaller and Mann, 2009). Observational records and climate projections provide abundant evidence that water resources are vulnerable and have the potential to be strongly impacted by climate change, with wide-ranging consequences for human societies and ecosystems (Bates *et al.*, 2008). This may intensify existing competition for access to water at intra-state and/or sub-national levels.

2.3.3 Migration and displacement

Migration patterns due to chronic drought conditions initially follow pre-established labour migration patterns, and may not differ in intensity from areas with established high rates of temporary, circular migration (Lambinet *et al.*, 2003). In comparison to other disasters where few victims consider permanently changing location, the percentage of people considering migration was highest in drought areas (Perch-Nielsen, 2004). In some cases, increased scarcity of and competition over access to water and arable land may contribute to internal or regional migration, and disasters such as floods may lead to temporary or long-term local displacement. This may, in turn, strengthen conflicts between host societies/communities and migrants looking for access to new land and resources.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Description of the Study Area

The study was conducted in Kilosa District, Morogoro Region. Kilosa is one of seven districts of Morogoro Region. It covers a total area of 1424500 ha of which 536590 ha are suitable for agriculture, 483390 ha are under natural pasture and 323000 ha cover Mikumi National Park (URT, 2010). More than 80 per cent of the population is engaged in agricultural production activities. Approximately 93 per cent of land used for farming is under subsistence crop production and livestock, while 7 per cent is used for cash crop production. According to the National Population and Housing Census of 2012, Kilosa District had 438175 people (URT, 2012). The area was chosen purposively based on the fact that it has experienced farmer-pastoralist conflicts (Attito *et al.*, 2008).

Kilosa District is bordered to the north by the Manyara Region, to the northeast by the Tanga Region, to the east by Mvomero District, to the southeast by Morogoro Rural District, to the south by Kilombero District, to the southwest by the Iringa Region and to the west by the Dodoma Region. The district is about 270 km from Dar es Salaam and situated between 6-10° South of equator and 35° E with an altitude ranging between 300-600 metres above sea level (a. s. l). The main ethnic groups include Sagara, Kaguru, Kwiva, Vidunda, and some few Gogo tribes (URT, 2001). According to Benjaminsen *et al.* (2014), the highest farmer-pastoralist conflicts in Tanzania are found in Kilosa District, Morogoro Region. Therefore, the District served as the best area for the study on the farmer-pastoralist conflicts. The main event in this conflict took place in Rudewa Mbuyuni village at around 5 a.m. on 8 December 2000 when a number of Maasai warriors attacked the village, killed thirty-eight villagers and wounded many others.

Kilosa District has three agro ecological zones, which include the flood plain, the plateau and the mountains, or upland zones and where land form is generally controlled by the geology of the area. The flood plains consist of a flat and undulating topography that extends to the foot hills at about 550 M. The biophysical environment is categorised into climate, topography and soil type. The district receives an annual rainfall ranging between 600-1200mm and temperature between 25-30⁰ Celsius. However, in the flood plain the annual rainfall may range between 1000-1400mm. Soils vary from poorly drained vertisols in the central part of the flood plains to alluvial fans in the western part which consists of black fertile soils.

3.2 Research Design

This study employed a cross-sectional research design, which gives a greater degree of accuracy in social science research studies than other designs (Casley and Kumar, 1998). The rationale for the choice is based on the fact that the design allows collection of in-depth data on different groups of respondents at one point of time (Ritchie and Lewis, 2003; Given, 2008). Moreover, the design is useful because it allows the use of various survey methods to collect a body of qualitative and quantitative data within a reasonable period of time (Agresti and Finlay, 2009).

3.3 Study Population

The study population was all households involved in crop production and livestock keeping. All farming households and livestock keepers in the districts, constituted the study population. In addition, two ward executive officers, four village executive officers and two village chairmen were also involved during the in-depth interviews to supplement on the information collected. The unit of analysis was the household.

3.4 Sample Size and Sampling Techniques

The target sample for the study was 120 households randomly selected. Purposive sampling may also be used with both qualitative and quantitative research techniques. A simple random sampling technique was used to select two wards and four villages for the study. Thirty households in each village were selected randomly. Purpose sampling was employed to select key informants, one ward executive officer from each ward, and one village executive officer from each village and one extension officer from each village. Focus group discussion (FGDs) was conducted in a group of 7-12 participants with different age and sex. The choice of the purposive sampling is fundamental to the quality of data gathered to ensure reliability and competence of the informant (Tongco, 2007). On the other hand, a sample determination formula by Kothari (2004) was used to arrive to the sample size for this study.

$$n = \frac{z^2 pq}{d^2} \dots\dots\dots (1)$$

Where:

n =sample size in the study area when population > 10 000.

z = Standard normal deviation, set at 1.96 (2.0 approximate) corresponding to the 95% confidence interval level.

p = Proportion of the target population (50% if population is not known).

q = 1.0 – p (1-50) (1-0.5) = 0.5

d = degree of accuracy desired, (set at the 95% equivalent to 0.05).

Therefore:

$$n = \frac{(2)^2(0.5)(0.5)}{(0.05)^2} = 4 (0.25)/0.0025 = 400$$

Based on the above calculation, the sample size for this study supposed to be 400 respondents, but due to resource limitation in terms of time only 120 respondents were involved. According to Adler and Adler (1987), it is suggested that sample size should range between 30 and 60, with 30 being the minimum total respondents, but more respondents may be involved in the study when sub-populations are discernible within the setting and it is likely that members of these groups have varied perceptions, roles, statuses, problems with, or decisions about the scene.

3.5 Data Type, Collection Method and Tools

Both qualitative and quantitative data were collected for this study. Primary data was collected using a pre-structured questionnaire (Appendix I) with open and close-ended questions. The primary data focused farmers-pastoralist conflict effects and climate change impact. In addition to the above, FGDs, and in-depth interviews were used to compliment information about farmers-pastoralist conflict effect and climate change impact. FGDs and in-depth interviews were guided by FGD/ interview guides (Appendix II) with open-ended questions to provide more details on the subject matter. Four FGDs was conducted (i.e. 1 FGD in every village) and 8 in-depth interviews were conducted (i.e. 2 ward executive officer, 4 village executive officer and 2 for village chairmen). During the FGDs and in-depth interviews the researcher led the interview by asking questions and researcher assistants were recording the responses.

3.6 Data Processing and Analysis

Both quantitative and qualitative data were analysed. The quantitative data was coded and summarized before entering to SPSS. Descriptive and inferential statistics were used in the analysis. The rationale for using both methods is relevant since it provides more complete and accurate information (Kessy, 2001). Content analysis was used for qualitative data

collected from focus group discussion (FGDs) and key in-depth interviews. For inferential statistics, alikert scale analysis was used to measure perception.

3.7 Ethical Considerations

Each individual was entitled to privacy and confidentiality both on ethical grounds and in terms of the protection of their personal data. Farmers and pastoralists' participation in the study was voluntary, and no farmer or pastoralist was coerced to participate in the study. The details of the research were explained to the farmers and pastoralists before the interviews. Participants were informed of their rights; assured of confidentiality and participants were informed that their identity would be kept anonymous. Animals were not used in this study and therefore the study posed no risks to animals as only human participants provided information in this study. Entrance into the different areas was pre-arranged in conjunction with the Regional Administrative Secretary in collaboration with the respective Districts' Administrative Secretary (DAS), Ward executive officer (WEO), Village executive office (VEO) and village chairperson working in the respective areas. Therefore, risks towards researchers were also minimal. Data collected, analysed and report prepared will be shared with those involved in the study (i.e. pastoralists, farmers, village/District and regional administration). Sharing of the report prepared will be shared with the concerned through the Regional Administrative Secretary in order to find permanent solution on farmers-pastoralists conflict in the study areas.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This chapter summarizes the findings on the farmer-pastoralist conflict in Kilosa District under the scenario of climate change. The results presented in this chapter include demographic characteristics of respondents and background variables, the extent of the farmers and pastoralist's conflicts in the study area, causes of farmer and pastoralist conflict, accessibility to water, pasture and land among farmers and pastoralists, and the perception of farmers and pastoralists on climate change and conflict.

This chapter is divided into eight main sections. Section one presents the socio-economic characteristics of respondents. Section three covers respondents land uses and ownership, while section four describes the occurrence of conflicts. Section five presents the main causes of farmer-pastoralist conflicts, while section six also presents the economic impact of conflict. Moreover, section seven shows the respondents accessibility to water, favourable temperature, pastures and fertile land, while section eight describes respondents' perceptions on climate change and farmer-pastoralist conflicts.

4.1 Socio-economic Characteristics

This section discusses socio-economic characteristics of the respondents. Later, the relationship between these characteristics and conflict is discussed. Households' background information described in this section include: general characteristics of respondents (sex, age, education level and marital status) and residence duration, source of income, as well as land use and ownership.

4.1.1 Age

The age distribution of the respondents presented in Table 1 shows that there was difference in percentages by age categories. Age of the respondents ranged from 18 to above 61 years. About 40.0% of the respondents were in the age categories of 29-39 years, while 20.8% of the respondents were at 18-28 and 40-50 years old respectively. The age structure implied that most of the respondents are in the active working group. The results conform to those reported by Basnayake and Gunaratne (2002) who observe that the age of a person usually is a factor that can explain the level of production and efficiency. It influences individual's experience, wealth and decision making.

4.1.2 Gender

For the distribution of gender, male respondents accounted for 45% and 55% were females as presented in Table 1. Majority of interviewed respondents (55%) were women which can be due to the mobility of men who are absent from homesteads as they are pasturing their livestock and other economic activities among pastoralist and farmers households respectively. Hence social and economic differentiation in the community likely influence access to and use of ecosystem goods and services from pasture, farm and water resources (OXFAM, 2008). According to IFAD (2010) women are resourceful in finding ways to ensure that their households' basic needs are met despite the many challenges they face. For example, pastoral women are particularly disadvantaged by the limitations from within their own societies in owning property or participating in decision-making processes (*ibid*). According to key informants, water use conflicts are often related to the gender division of labour where men, women and youth and have different roles and use rights of resources. For instance, men are responsible for taking care of livestock and farming, while women are responsible for household chores and farming.

Table 1: Demographic characteristics of respondents

Parameter	Frequency	Percent
Age (in years)		
18- 28	25	20.8
29- 39	48	40.0
40- 50	25	20.8
51- 61	13	10.8
> 61	9	7.5
Total	120	100.0
Sex		
Male	54	45.0
Female	66	55.0
Total	120	100.0
Education Level		
Informal education	20	16.7
Attained adult education	30	25.0
Attained primary education	63	52.5
Completed form IV	7	5.8
Total	120	100.0
Marital status		
Single	9	7.5
Married	87	72.5
Divorced	10	8.3
Widow	13	10.8
Separated	1	.8
Total	120	100.0

4.1.3 Education Level

The findings in Table 1 show that the majority(52.5%) of respondents had attained primary level education; while very few (5.8%) had attained secondary level education. These findings suggest that many people had attained the basic level of education, which is important in comprehending various technological innovations that could be extended to farmers and pastoralists in the study area. According to Maro (1995), primary education is enough to foster basic comprehension and creativity for adoption of new interventions pertaining to climate change and resource use, thus facilitating readiness to integrate innovations into traditional systems of land use and management.

4.1.4 Marital status

The findings in Table 1 show that majority (72.5%) of the respondents were married, while very few (0.8%) were separated or widowed individuals. These findings reflect that in Africa context particularly in rural setting where marriage is considered as an important aspect as it makes the couple to live together for the purpose of having a family that will be the main source of labour for farm activities. These results are in line with findings by Pangani (2007) in which it was found that 78.8% of the respondents were married.

4.1.5 Residence duration

The findings in Table 1 revealed that the majority(58%) of the respondents had stayed in the area for more than 24 years; while very few (5%) had been in the area for less than 5 years. Thus the majority of the respondents had lived in their respective homesteads for more than five years without proper land use plans between different land users. Persistence of farmer-pastoralist conflict is the result of lack of village land use plans that clearly shows grazing areas (rain and drought seasons) and areas for crop production. Long residence duration is also a factor of population growth that result into high land

demand for both grazing and crop production. The current study is in line with the study by Mwamfupe, (2015) conducted in Kilosa, Kilombero, Kiteto and Rufiji which reported that the persistence of farmer-herder conflicts is also a result of villages lacking land use plans and growing rural population.

4.1.6 Land use and Ownership

Table 2 shows the general picture of land use, acquisition and ownership in the study area. Many respondents (90.8%) acquired and owned land. This shows that majority of the respondents in the study area engaged in agriculture activities. However, few of them (9.2%) neither owned nor had acquired land. With regard to land use, 56.7% of the respondents used land for cultivation (crop production) and 35% for grazing purpose. Few (8.3%) respondents used the land for other purposes apart from grazing and crop production. This implies that land use is for two major groups, farmers and pastoralists, and thus any conflict in the study area was counted as farmer-pastoralist communities. According to Baha *et al.* (2008), carrying capacity for land in the district has been declining due to excessive stocks of livestock, which are concentrated in Morogoro and Kilosa in particular. Census data of livestock numbers are notoriously difficult to collect, but despite this, official data from the district council estimate there are about 247515 stock units which graze on 483390 ha, which is not sufficient. Sustainable carrying capacity is estimated at 495030ha suggesting a shortfall of 11640 ha.

4.1.7 Sources of income

According to study results in Table 2, socio-economic aspects of respondents investigated were five. These include salaried jobs, farming, business ownership, farm wage labour and animal keeping (pastoralists). The study findings show that out of the 120 respondents, 55 (45.8%) were involved in farming activities as the main source of income, while 38.3% report livestock production as their main economic activity. However, 7.5% of them

depended on business and very few (1.7%) respondents depended on selling their own labour for farm activities. From these findings, one could say that the presence of more farmers and pastoralists in the same area may lead to conflict between them. This is due to the fact that the two groups compete highly for the same resource for which each depends on for their households' livelihoods.

Table 2: Residence duration, land use and ownership and income sources

Parameter	Frequencies	Percentages
Residential Duration (in years)		
0-5	6	5.0
6- 11	17	14.2
12- 17	13	10.8
18- 23	14	11.7
Above 23	70	58.3
Total	120	100.0
Land ownership		
Farmer owns land	109	90.8
Do not own land	11	9.2
Total	120	100.0
Land used for		
Cultivation	68	56.7
Grazing	42	35.0
Other use	10	8.3
Total	120	100.0
Source of income		
Salaried job	8	6.7
Farming	55	45.8
Own business	9	7.5
Farm wage labour	2	1.7
Pastoralist	46	38.3
Total	120	100.0

4.2 The Extent of Conflicts between Farmers and Pastoralists in the Study Area

The extent of conflicts between farmers and pastoralists is described in terms of type of conflicts, duration of the conflicts, effects of farmer-pastoralists conflict, enmity existence and solutions (various interventions made).

4.2.1 Types of conflict existed in the study area

According to the findings in figure 2 the majority (87%) of the respondents reported that farmer-pastoral conflict was the main type of conflict that has ever happened in the study area, while 3.3% of the respondents reported farmer-farmer conflict and very few (2.5%) reported pastoral-pastoral conflict. A high percent of farmer-pastoralist conflict was the result of lack of enough land. The land, according to Attito *et al.* (2008), was smaller (483 390 hectares) than its capacity, and thus it could not have the ability to support the excessive influx of livestock from different parts of the country by pastoralists in search for pasture and water for their livestock. According to key informants, land was a major issue which caused farmer-pastoralist conflicts. Moreover, the problem of lack of pasture as the result of drought emanating from climate change impacts forces pastoralists to feed on farmer's crops while still in the fields before harvesting. Likewise, pastoralists tended to graze on fallow lands where important perennial crops were grown.

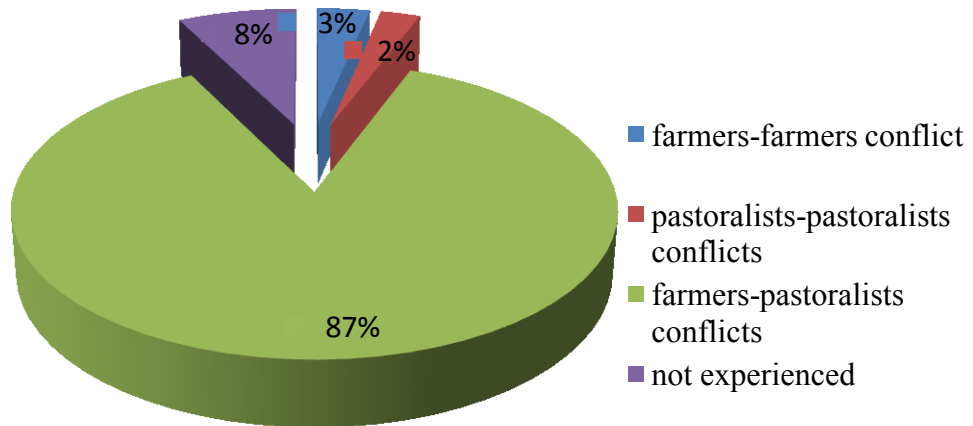


Figure 2:Types of Conflict observed in Kilosa District

4.2.2 Time period (duration in years) offarmer-pastoralist conflict

About 72% of the respondents assert that, farmer-pastoral conflict has been there for more than 10 years, while only 10% reported the duration of farmer –pastoralist’s conflict to have been existed for time period of 1-3 years (Table 3). The majority state that conflicts had existed for long period of time, which indicates the extent of the problem within study area.

“According to the key informants the number of people killed as the result of the conflicts had been increasing. This implies loss of peace among the communities within the district due to farmer-pastoral conflict”.

Table 3: Duration (years) of the farmer-pastoralist conflict in study area

Duration of conflicts	Frequency	Percent
1-3 years	12	10.0
4-10 years	22	18.3
More than 10 years	86	71.7
Total	120	100.0

4.2.3 Existence of farmer-pastoralist conflicts in the study area

Farmer-pastoralist conflict has existed for decades; however, the intensity of the conflict has increased with time, thus resulting in uncertainty for local communities. From the study findings (Table 3), it has been revealed that the same conflict still exists as it is reported by majority (75.8%) of the respondents. This implies that various efforts of conflict resolution made in the study area have not resulted in permanent resolution. It is also reported by Bahaet *al.* (2008) that although resentment between both parties had been made farmers are dissatisfied with the way cases that involve pastoralists are handled as sometimes it takes a long period of time for a court ruling, rising suspicious of malpractice.

According to key informants, both farmers and pastoralists claim to be the first to settle in the area claiming that the other party had invaded their land leading to dispute. Hence, the legitimacy over resource use hinges on who came first in the area with each group claiming to be the native of the area and hence the legitimate user of resources. On the other hand, pastoralists feel that leaders in villages that border their areas are the major source of conflict as they allocate disputed land to those individuals migrating into their villages. This claim, to some extent, is true as many of those who were caught amid the struggle and passed away were not native to the area (Bahaet *al.*, 2008).

Table 4: The existence of farmer-pastoralist conflicts

Existing of enmity among farmers and pastoralists	Frequency	Percent
Yes	91	75.8
No	29	24.2
Total	120	100.0

4.2.4 Farmer-pastoralist conflict solutions in the study area

About 54% of the respondents reported that there had been no reliable and sustainable solution to the conflicts between farmers and pastoralists, while very few (0.8%) had the contention that the reduction of number of livestock by pastoralists had been one of the solutions to overcome the problem (Table 5). These findings imply that there has been a trend of decreasing pasture as more land is opened by peasants for crop production causing an increase in conflict between land users and loss of the lives of vulnerable groups i.e. children and women. This shows that farmer-pastoralist conflict is not a new story in a study area since it still exists and has occurred for more than ten years. Persistence of farmer-pastoralist conflict has led to major problems like crop damage by pastoralists, cattle corridors and grazing lands encroachment, and blockage of water points by farmers all of which predominantly manifested persistence of the conflicts.

The findings by Williams (1998) has similarly observed that, farmland expansion involving encroachment of large areas of CPRs such as forests, wetlands and rangelands with farmers overriding and ignoring the traditional use rights of other groups to these resources has heightened conflicts between farmers and pastoralists in semi-arid West Africa. For example, findings from in-depth interview conducted with village chairmen reveal that conflicts emanated from climate change impacts that resulted into shortage of green land for pasture and arable land for farming within the District. These conflicts had been the fight for survival between pastoralists and farmers causing great losses of lives and destruction of properties with the emergence of lack of security among the communities due to the continuous desire for vengeance by the parties involved.

Table 5: Multiple response results showing the solutions to farmer-pastoralist conflicts

Conflict solutions ever made	Frequency responses	Per cent of response cases
Reduce number of animals	1	0.8
Buy additional food	28	23.3
Migrate to other open land	26	21.7
No adequate solution	65	54.2
Migrate to other places with pasture/fertile land	44	36.7
Remain the same place(no migration)	47	39.2
Buy pasture/new fertile land	6	5.0
Feed animals to farmers land	23	19.2

4.3 Causes of Farmers and Pastoralists Conflicts

Findings presented in Fig. 2 majority of respondents (50% and above) reported three major causes of farmers-pastoralists conflict that includes prolonged drought, lack of grazing areas and cattle theft.

4.3.1 Drought due to climate change

Figure 3 show that majority (97%) of the respondents reported that prolonged drought as impact of climate change result into lack of pastures hence cause conflict since pastoralist tend to graze their animals to farmers land/plots. Prolonged drought result into water scarcity whereby farmers and pastoralists fight for the little water available hence cause conflict.

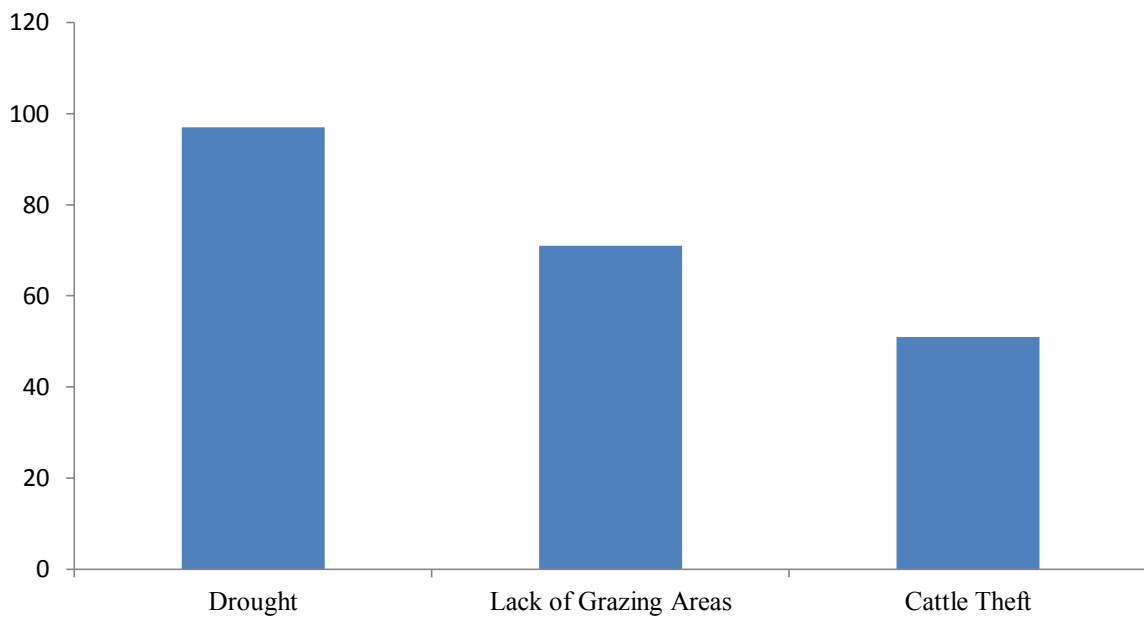


Figure 3: Causes of Farmers-Pastoralists Conflicts

The findings of this study is in line with Audu (2013) who asserts that climate change exacerbates water scarcity which creates conflicts in some parts of sub-Saharan Africa, especially in the semi-arid regions. The study postulates visible signs that show intensification of water scarcity including hitherto flowing rivers running dry, wells going deeper to reach water, lakes shrinking, diminishing rainfall, shrinking arable lands for farmers, and less pastures and the drying up of drinking water sources like rivers and streams for pastoralists. In this study it was observed that the availability of water as a major resource needed for agriculture in Kilosa, it is decreasing as a result of changes in climatic conditions which results into creating competition in resources between farmers and pastoralists.

Farmers and pastoralists are almost wholly dependent on water resources to sustain their vocation. One key informant said: *“In recent times, access to water has become more competitive and has led the farmers and pastoralists into violent conflicts on a regular*

basis". This is a worrisome trend because both have coexisted inter-dependently for centuries, sharing the same fields for farming and grazing with a manageable level of tolerance and accommodation. From this study, it can be projected that as the population increases further and the effects of climate change continue to change seasonal patterns, increase temperatures and the frequency and intensity of drought, water resources are likely to become less available. During one FGD, it was said that *"herd is our life because to every pastoral life is worthless without his cattle. What do you expect from us when our sources of water threatened? The violation of grazing fields and routes by farmers is a call to conflict between farmers and pastoralists"*.

4.3.3 Lack/Competition of grazing land

General findings of this study presented in figure 3 reveal that 71% of the respondents strongly agreed that climate change had resulted in a shortage of land for pasturing their animals, resulting in enhanced mobility of pastoralists to farmers' fields to feed on their animals. Some of the impacts of climate changes noted by farmers and pastoralists include reduction in soil fertility. In addition to the changes observed above that directly affect agricultural production (both livestock keeping and crop production) in a negative way; soil fertility negatively affects crop production and livestock keeping to a large extent. Most farmers and pastoralists agreed that soil fertility has been declining over the years. This has resulted in reduced land for pasturing and crop production in the area. Results of this study imply that inadequacy of grazing resources is a result of climate change that has reduced the availability of livestock feed resources.

Farmers also believe that pastoralists deliberately bring cows to feed on their crops instead of grass. Mobility of pastoral and semi-pastoral communities is part of their climate change adaptation and herd management strategies. Mobility is the basis of the traditional

coping strategy, based on opportunistic movements within and across geographically distributed grazing units, which are composed of those households that depend on common permanent water sources (Angassa and Oba, 2008). It is perhaps the most common and seemingly natural response to environmental risks which pools and distributes risks across space.

From the findings of this study, it can be clearly noted that pastoral adaptations in Kilosa District depend entirely on access to wide tracts of land to make full use of a resource base that is generally poor and unevenly distributed. This enhances conflicts between farmers and pastoralists.

From this study, it can be noted that the decreasing availability of good agricultural land and animal husbandry could create a condition of “simple scarcity”, “group identity” and “deprivation” in the area that may provoke violent conflicts of high magnitude due to population movements and a scramble for available resources.

In this process, they come in contact with settled population who take to crop cultivation on particular “fertile land” that produce good vegetation. The scramble for pieces of land by both pastoralists and the farmers explains the cause of their conflicts. Climate change which eventually results in droughts and shortage of green land pasturing scarcity and consequent migration of pastoralists to where there was a greener pasture was the strong inclination of this conflict pattern. This study’s findings, therefore, agrees with Okpi (2010) who asserts that climate change had caused pasture portions already allocated to herdsmen that dried up and therefore made the herdsmen to invade farmland destroying crops and streams that communities use as drinking water.

4.3.4 Increasing rate of cattle theft

Another cause of farmer-pastoralist conflicts is the increasing rate of cattle theft. Findings of this study reveal that climate change has caused subsequent hunger and death of animals which results in an increase of cattle theft. Results of this study (Fig. 3) showed that about 51% of the respondents agree that climate change had indirectly caused the cattle theft especially by pastoralist societies. According to de Haan (2002), theft of cattle is often accompanied by violence. This calls for concerted efforts to improve adaptation strategies to cope with climate change to improve livelihoods. There is a need to train pastoralists not to depend on cattle only and to engage in livelihood diversification. Both farmers and pastoralists openly blame each other, categorically stating that in the past, the boundaries between farmers and pastoralists were well-defined. Findings of this study revealed that the influx of cattle and other livestock into the study area had created a wave of cattle thefts. This is exacerbated by the Maasai belief that all cattle belong to them so they have the moral right to recover cattle from other tribes (Attitoet *al.*, 2008).

4.4.1 Trends of farmer-pastoralist conflict caused by drought due to climate change

Findings presented in Fig.3 indicate that there has been an increase in farmer-pastoralist conflicts over the four years period since 2011-2014, whereby for every year the conflicts between the two parties have been increasing by about 5.5% as shown by the trend line equation, $y=5.494x + 11.26$. For example, in the years 2011-2013, the percentage of conflict incidences between the parties was 15%, 23% and 34% respectively. This is supported by farmers who report the rise in conflicts (section 4.2.2 and 4.2.3).

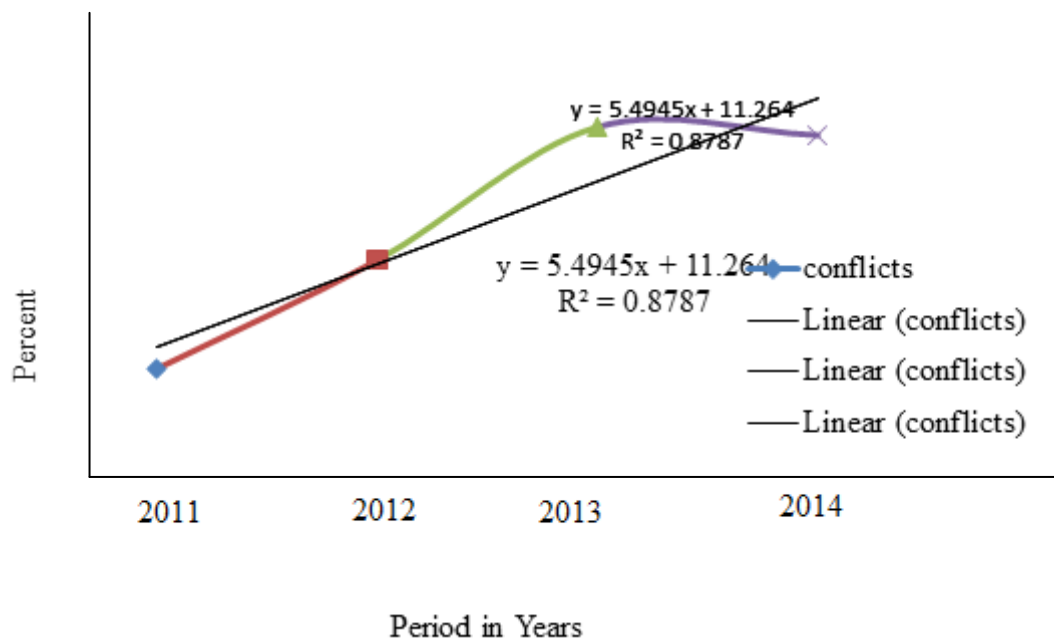


Figure 4: Trend of farmer – pastoralist conflicts in Kilosa District from 2011-2014

4.5 Accessibility to Water, Pasture and Land among the Farmers and Pastoralists

4.5.1 Access to pasture and fertile land by farmers and pastoralists

Study results on accessibility to pasture and fertile land by households (farmers/pastoralists) are presented in Table 6. Findings show that access to land and pasture was significantly related to type of income generating activity (being a farmer or pastoralist) ($\chi^2 = 8.231$; $p = 0.041$). This implies that in order to access land or pasture the respondent has to be either a farmer or pastoralist. Findings show that 43.5% of the pastoralists claimed to have little access to land and pasture while very few of them (4.2%) reported having full access to the same resources.

On the other hand, farmers who reported having little access to land accounted for 43.5% while only 14.9% of them had full access to land. According to these results (Table 6) about 26% of the pastoralists had no access to land at all, whereas farmers who had no access to land resource were 32.4%. This implies that both groups have land access problems, which may be due to poor land use plans by the responsible authorities and the

influx of pastoralists or expansion of land by the farmers as strategies for coping with climate change variability impacts.

Table 6: Access to pasture and fertile land by farmers and pastoralists

Occupation	Water accessibility to pasture and fertile land												Total
	Have Access			Little Access			No Access			Don't Know			
	Count	%	% of	Count	%	% of	Count	%	% of	Count	%	% of	
	within	Total	within	within	Total	within	within	Total	within	within	Total		
Pastoralism	2	4.3	1.7	20	43.5	16.7	12	26.1	10.0	12	26.1	10.0	46
Farmer/Other Activities	11	14.9	9.2	32	43.2	26.7	24	32.4	20.0	7	9.5	5.8	74
Grand Total	13		10.8	52		43.3	36		30.0	19		15.8	120

Chi-square (χ^2)= 8.231; p=0.041

4.5.2 Access to water by farmers and pastoralists

The chi square test results on pastoralists/farmers access to water in the study area are presented in Table 7. This study findings show that households' access to water had no significant relationship with the type of LGAs the household was engaged in (Chi-square ' χ^2 '= 1.743; p=0.627) this probably explained that water was a public resource of which every individual has an equal right to access irrespective of being a farmer or pastoralist. From Table 8, findings show that pastoralists and farmers who had little access to water are 52.2% and 54.1% respectively, while full access to water for the two groups was 8.7% and 13.5% respectively. Alternatively 39.1% of the pastoralists had no access to water while 31.1% claimed to have no access to the same water resource. This implies that the two groups (the farmers and pastoralists) had water problems which could also have been contributed by an increase in population, and climate variability impacts may have raised the demand for irrigating farms by farmers and the need to feed animals by the pastoralists. According to statistical test results, it implies that water access is neither

pastoralist nor farmer dependent. Thus, both categories have equal chance to access the same resource within the community.

Table 7: Access to water by the pastoralists and farmers (n = 120)

Occupation	Water Accessibility for animals, irrigation and home consumption												Total
	Full Access			Little Access			No Access			Very Little			
	Count	%	% of	Count	%	% of	Count	%	% of	Count	%	% of	
	within		Total	within		Total	within		Total	within		Total	
Pastoralism	4	8.7	3.3	24	52.2	20.0	18	39.1	15.0	-	-	-	46
Farmer/Other	10	13.5	8.3	40	54.1	33.3	23	31.1	19.2	1	1.4	0.8	74
Activities													
Grand Total	14		11.7	64		53.3	41		34.2	1		0.8	120

Chi-square (χ^2)= 1.743; p=0.627

4.6 Attitude of Farmers and Pastoralists on Climate Change and Conflict

The findings show that there are 14 statements used for attitude testing of the individual respondent's perception of climate change and farmer-pastoralist's conflicts. A five-point Likert scale that makes a typology of statements was administered in an interview from structured questionnaire. Study findings presented in Table 8, show that the maximum percentage score for positive respondents' perception was 62.5% for statement number two (there had been a trend increase in drought within study area), while the least positive score (3.3%) was on tenth statement (have never experienced drying of the rivers, and dams which led to water scarcity during dry season). These imply that farmers were aware of the effects of climate change which lead to reduced water resource as well as the pasture for the livestock.

Moreover, findings show that there is greater migration to Kilosa by both groups compared to 10 years ago as claimed by 60.8% respondents. This shows that migration of farmers and pastoralists has been among the major cause of conflict as they compete for available

resources like water, land for grazing and farming. On the other hand, the contention of inadequate rainfall that results in poor grazing pasture/crop land is a problem perceived by many (58.3%) respondents, as it was perceived by many (55.8%) that there had been noticeable changes in climate compared to 10 years back. However, 20% respondents positively perceive the farmers-pastoralists conflict as happening in any season (wet and dry seasons). Pastoralists graze in farmers' fields/areas during the dry season, implying that a large proportion of conflict occurs when resources are not enough to accommodate the needs of the two (farmers and pastoralists). This is the dry season when water and pasture are very scarce resources. Other findings are as presented in Table 8.

Table 8: Likert Scale results for respondents' perceptions of climate change impacts and farmer-pastoralist conflicts

S/N	Statement	Respondents' perception for each statement (%)				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	Have noticed great changes in climate compared to 10 years ago.	1.7	3.3	15.0	24.2	55.8
2	Drought is increasing in kilosa district.	2.5	8.3	10.0	16.7	62.5
3	Most farmer-pastoralist conflict occurs during dry season.	3.3	8.3	19.2	23.3	45.8
4	Occurrences of floods which lead to farmer/pastoralist migration and conflict.	19.2	40.0	23.3	12.5	5.0
5	Inadequate rainfall results in poor grazing pasture/crop land.	2.5	5.8	10.8	22.5	58.3
6	There is no shortage of fertile land for grazing/cultivation in Kilosa.	15.0	26.7	33.3	16.7	8.3
7	Farmers-pastoralist conflict will not end if climate change is not taken into account	3.3	10.8	20.0	33.3	32.5
8	Increasing farmer-pastoralist migration to Kilosa compared to 10 years ago.	3.3	6.7	10.0	19.2	60.8
9	Pastoralists never graze in farmers' farms/areas during dry season	50.8	25.0	13.3	5.8	5.0
10	Have never experienced dry rivers, dams and water scarcity during dry season.	45.0	32.5	8.3	10.8	3.3
11	The changes in climate/weather surely do not cause or increase farmer-pastoralist conflict.	26.7	27.5	25.0	15.0	5.8
12	The impact of climate change will increase farmer-pastoralist conflict for future generation.	0.8	4.2	6.7	44.2	44.2
13	Increase in drought doesn't increase farmer-pastoralist conflict.	48.3	25.0	7.5	8.3	10.8
14	Famer-pastoralist conflict may happen in any season(wet and dry seasons)	39.2	10.0	20.0	10.8	20.0

The issue of increased drought is supported by the one key informant who affirms that *“rainfall has become less predictable and the rainfall margin between a good year and a total failure is narrow.”* He further added that *“the impact of such changes on agricultural production, livestock rearing, water supply and hydropower generation is*

substantial". Study findings suggest that climate change would increase the risks of conflict and instability.

4.7 Findings Implication to the Existing Theories of Farmer-pastoralist Conflict

The current study found out three major causes of farmers-pastoralist conflict that includes prolonged drought, lack of grazing land and cattle theft. Therefore, prolonged drought in the study area is linked with environment security theory which states that climate change impact (drought is among) can be viewed as a threat to environmental security. Lack of grazing land in study area is linked with human needs theory which argues that conflict and violent conflict are caused by unmet human needs. Pastoralist and farmers are competing on the available scarce land hence conflict. Furthermore, cattle theft is linked with Malthus population theory which states that population multiplies geometrically while food and other resources multiplies arithmetically; therefore, the population eventually outstrips food and other resources supply. Scarcity of resources such as water, arable land due to rapid population growth contributes to production is considered as the factor of people in study area to opt stealing others' cattle.

Based on the findings, the author recommend that study area should introduce two different areas for dry season grazing and rain season, whereby wet land areas to be reserved for dray season grazing and highland areas for dry season grazing. Also, the author recommend introduction of strictly village land policy that will clearly demarcate areas for crop production and livestock keeping. Furthermore, the author recommends rain water harvest could be part of the solution to water scarcity.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

This chapter presents conclusions and recommendations based on the key findings of the study objectives on farmer-pastoralist conflict in Kilosa District, Tanzania under a climate change perspective.

5.1 Conclusion

Based on the study objectives, findings reveal that Kilosa District has a lot of conflict among its communities. These are farmer-farmer, pastoralist-pastoralist and farmer-pastoralist conflict. Among these the dominant one (87%) is conflict between farmer-pastoralist which has cost the lives of people and peoples' assets. The extent of conflicts between farmers and pastoralists is described in terms of types of conflicts, duration of the conflicts (that is how long the conflicts existed), effects of farmer-pastoralists conflict, enmity existence and solutions to the conflicts.

Findings reveal that the root cause of conflicts is the lack of enough land to accommodate farmer and pastoralist income generating activities, coupled with excessive influx of livestock from different parts of the country by pastoralists in search for pasture and water for their livestock. The major driving force is climate change effects, droughts in particular. It is also revealed that farmer-pastoralist conflict is historical having existed for more than ten years. It is an outstanding problem, which has yet to be resolved. A lack of peace and harmony among the pastoral-farmer communities will continue as a result. Lack of land use plans for rural communities, poor livestock husbandry practices, and shifting cultivation, as well as lack of land rights are key factors. Government interventions so far have not been successful in ending the conflict, which are increasing by 5.5% per year.

The District is facing long drought events emanating from climate change and there are longer periods of temperature than for rainfall. The result is a decline in water resources, pasture and fertile land for crop production. All of these have resulted in pastoralists and farmers migrating to other areas to sustain their livelihood activity, which, in turn, generates conflict with their hosts in the new settlements. Water is an important resource to both pastoralists and farmers, thus having large numbers of animals in a place where there are farms elicits conflict. The issue of climate change signals intensification in water scarcity for various water sources, which are important to both pastoralists and farmers. Findings indicate that persistence in conflict will paralyse household income, generation, peace, food security, and increase poverty among the communities and consequently affect the national economy as people will not have time to engage in productive activities.

The study findings reveal that land access is a significant problem ($p < 0.05$) compared to water access among these communities, is not significant implying that water access is neither pastoralist- nor farmer- dependent; hence, both categories have equal chance to access the same resource.

Farmer and pastoralist perception of climate change and conflicts reveal that more than 60% of the farmers and pastoralists are aware of the increase in droughts, and that climate change was the main cause to the problem. Findings also reveal an increase in farmer-pastoralist migration to Kilosa compared to 10 years ago as claimed by 60.8% of respondents which indicate that migration of farmers and pastoralists has been among a major cause of conflict both parties compete for the available resources. Furthermore, rainfall is inadequate and results in poor pasture/crop land.

5.2 Recommendations

Recommendations are based on the conclusions made from the study findings.

- i. Because pronounced farmer-pastoralist conflict continues to persist without resolution, it is recommended that land laws and district by-laws to end the problem should be ratified and enforced by relevant authorities such as the Parliament, government, judiciary, and local government. Farmers and pastoralists should be advised and educated by various stakeholders like extension agents and NGOs on best practices for crop and livestock production to ensure sustainable land use and pasture production.
- ii. Since it has been found that there is increasing demand for water, pasture, and fertile land for farming, this study recommends that capacity building should be given to both the farmers and pastoralists by the government and NGOs to build relevant infrastructures for rainwater harvesting so that they can use for various purposes (livestock, domestic, irrigation and pasture production). Farmers should avoid expanding land by using improved crop varieties and inputs in crop production, and pastoralists educated to keep fewer animals while diversifying into other economic activities to limit their movement to other peoples' land in search for green pastures. Resolving farmer-pastoralists conflict is not a political issue, hence, should not be taken as a political agenda. Conflict should be resolved using the land laws, and relevant authorities should make sure that the rights of the people are protected and anybody who contravenes with the present country laws is dealt with accordingly.

- iii. Since it has been found that climate change is the main cause of drought and water shortages leading to farmer-pastoralist conflicts, it is recommended that farmers be given assistance to cope with the situation, by first educating them on the presence and continuity of climate change and its variability impacts and then need to change the life styles, production systems and general ways of earning incomes in order to adapt to the prevailing situations. Second, farmers and pastoralists should be given input subsidies in order to use land resources economically. The two parties should be advised to form cooperatives through which they will have the bargaining power of increasing their product prices and market them for profit which will increase their household incomes.
- iv. Since it has been found that access to and control over land access is significant problem ($p < 0.05$) when compared to water access among farmer and pastoral communities, the government should look into ways of releasing some part of its protected lands for human use where livestock keepers can be given a place to graze their livestock. Additionally, since more than 60% of the farmers and pastoralists perceive that climate change is a real problem and that they are aware of the increase in droughts, and that rainfall was inadequate for the grazing pasture/crop land, it is recommended that concerted efforts to minimize climate change impacts should be made by all the stakeholder such as the pastoralists, farmers, local government authorities (LGA), NGOs and researchers. Each should play its roles aiming to reduce the effects of farmers-pastoralist conflict. This will promote peace and harmony in the communities.

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APPENDICES

Appendix 1: Questionnaire

SOKOINE UNIVERSITY OF AGRICULTURE

DEVELOPMENT STUDIES INSTITUTE

QUESTIONNAIRE FOR FARMER-PASTORALIST CONFLICTS IN KILOSA DISTRICT

QUESTIONNAIRE FOR RESPONDENT

Division.....Ward.....Village.....

Questionnaire No..... date.....

SECTION A.

General information

1. Name of respondent
2. Sex of respondent a. male b. female
3. Age of respondent
4. Highest education(put number of years)
5. Marital status a. single b. married c. divorced d. widow e. separate
6. Ethnicity
7. Length of residency (write number of years e.g. 10 years)
8. What is your household size (write number of household members e.g. 4 hlds)
9. What are your main economic activities? a. salaried job b. own farm c. own business d. farm wage labor e. Non

SECTION B.

Land use and ownership

1. Do you own land? a. Yes b. No
2. If yes qn 1 above, what size of land do you own? (in acres)
3. How did you acquire land? a. purchase b. rented c. inherited d. allocated e. others (specify).....
4. How long have you been using that land? a. less than 1 year b. 1-3 years c. 3-6 years d. 7 and above
5. How do you use land? a. cultivation b. grazing c. both cultivation and grazing d. others (specify).....
6. Is land you own adequate for activities mentioned above? a. Yes b. No
7. If land is not adequate how do you manage such scarcity? a. reduce crops b. reduce number of animals c. buy additional food d. migrate to other open land e. others (specify).....
8. How much additional land you need and can manage?.....(acres)

9. Is the land a major issue in farmer-pastoralist conflict? a. yes b. No

10. If yes, above in which land do these farmer-pastoralist conflicts are commonly occurring?

- a. Communal grazing lands b. Fallow lands c. Harvested fields d. Open access lands e. Others.....

SECTION C.

CONFLICT

1. Have you ever experienced conflict in this area? a. Yes b. No
2. If yes 1 above, which type of conflict have you experienced mostly? a. Farmers to farmers conflict b. Pastoralist and pastoralist conflict c. Farmers and pastoralist conflict d. Others
3. If farmers-pastoralist conflict, for how long have you experienced? a. Less than 1 year b. 1 -3 years c. 4-10 years 4. More than 10 years
4. How often do farmer-pastoralist conflicts occur in this area? a. very rarely b. sometimes c. never d. very often e. Others.....
5. What are the main causes of farmer-pastoralist conflict?
 - a.....
 - b.....
 - c.....
 - d.....
 - e.....
6. How farmer-pastoralist conflict affected your economic? a. Destruction of properties b. Death of household members' c. Destruction of crops d. Death of animals' e. Others.....
7. When always farmer-pastoralist conflicts happen? a. Wet season b. Dry season c. Any season d. Both dry and wet season e. Others.....
8. What did you do when the farmer-pastoralist conflicts occurred? a. Remain here (at home) b. run away from my place c. I fight against d. Others
9. Do the farmer-pastoralist conflict solved in this area? a. yes b. No
10. Is there any enmity existing between farmers and pastoralist? a. Yes b. No

SECTION D.**Accessibility to water, favorable temperature pastures and fertile land****WATER ACCESS**

1. Do you have access to water for consumption (e.g. for animals, irrigation, home consumption)? a. Strongly access b. little access c. No access d. Others.....
2. What is your source of water?
 - a. Tape water b. Dam water c. River water d. Ground water e. Others.....
3. Is there any problem with your accessibility to water? a. Yes b. No
4. If yes 3 above, what problem have you experienced?
- (If NO 3 above skip to qn 6)**
5. Have you experienced shortage of water? a. Yes b. No
6. If yes 5 above, which seasons mostly do you experiencing water shortage?
 - a. Dry season b. Wet season c. Both wet and dry seasons d. Shortage throughout the year e. Others.....
7. What do you do with shortage of water during that time?
 - a. Migrate to other places with access to water b. Remain the same place (no migration) c. buy water d. go to sources of water e. others.....

FEVORABLE TEMPERATURE

1. What is annual temperature of your area? a. Don't know b. Hot days are increasing c. Cold days are increasing d. Normal temperature e. Others (specify).....
2. Is the area temperature suitable for your activities? a. Yes b. No
3. . If No, how do you do to overcome the situation? a. Migrate to other places with favorable temperature b. Remain here (no migration) c. don't know e. Other.....
- (If YES 2 above skip to qn 5)**
4. What do you think is a source of a temperature change?
 - a. don't know b. High grazing c. Bad agriculture practice d. cutting down trees e. Other.....

5. How can you differentiate the temperature from 10-15 years back to date?
 - a. Now days hot days are increasing
 - b. now days cold days are increasing
 - c. No different
 - d. don't know
 - e. Others (specify)
6. Have you ever migrated from one place to another looking for good/favorable condition (temperature)?
7. a. many times b. sometimes c. very rarely d. never e. don't know
8. do you think migration/ looking for good/favorable temperature will cause farmer-pastoralist conflict?
 - a. yes but sometimes
 - b. yes but very rarely
 - c. never
 - d. don't know.

FERTILE LAND AND PASTURE (Cycle one if is pastoralist or farmer)

1. Do you have enough access to pasture/fertile land? a. Strongly access b. little access c. No access d. Others.....
2. What do you do with shortage of access to fertile land/pasture?
 - a. Migrate to other places with pasture/fertile land
 - b. Remain the same place (no migration)
 - c. buy pasture/new land
 - d. feed animals to farmer land
 - e. others.....
3. Have you experienced shortage of pasture/fertile land? a. Yes b. No
4. If yes 3 above, which seasons mostly do you experiencing shortage pasture?
 - a. Dry season
 - b. Wet season
 - c. Both wet and dry seasons
 - d. Shortage throughout the year
 - e. Others.....
5. When often do you experience shortage access of fertile land/pastures? a. dry seasons b. wet seasons c. both dry and wet seasons d. throughout the year e. don't know
6. Do you think during accessing fertile land/pastures may cause farmer-pastoralist conflict? a. several times b. sometimes c. very rarely d. never e. don't know

SECTION E

PROBLEM OF DROUGHT AND FLOODS

1. Have you ever experienced severe drought in your area in 10-15 years ago? a. many times b. sometimes c. very rarely d. never e. don't know
2. If you experienced, what did you do?

3. a. Migrate to other places b. Remain here c. Looking for good pasture/Cultivating land d. Others.....
4. Did you ever experience farmer-pastoralist conflict during drought periods? a. many times b. sometimes c. very rarely d. never e. don't know.
5. Have you ever experienced severe floods in your area in 10-15 years ago? a. many times b. sometimes c. very rarely d. never e. don't know
6. If you experienced floods, what did you do?
a. Migrate to other places b. Remain here c. looking for good pasture/Cultivating land d. Others.....
7. Did you ever experience farmer-pastoralist conflict during floods periods? a. many times b. sometimes c. very rarely d. never e. don't know.

SECTION F

Perception on climate change and conflict

(Please TICK an appropriate box).

S/N	STATEMENT	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	You have noticed that climate/weather changed or is changing compared to 10 years back.					
2	Drought is increasing in Kilosa district.					
3	Most farmer-pastoralist conflict occurring during dry season.					
4	There are several occurrences of floods which led farmers/pastoralists migration and conflict.					
5	There is inadequate of rainfall which resulting into poor grazing pasture/cultivating land.					
6	There is no shortage of fertile land for grazing/cultivation in Kilosa.					
7	Conflict between farmers and pastoralists will not be solved if climate change is not taken					

	into consideration					
8	There is increasing of farmer-pastoralist migration to Kilosa compared to 10 years ago.					
9	Pastoralists never graze to farmers farms/areas during dry season					
10	You never experienced dry rivers, dams and water scarcity during dry season.					
11	The changing of climate/weather surely do not cause and increase farmer-pastoralists conflict.					
12	The impact of climate change will increase farmer-pastoralist conflict to the future generation.					
13	Increasing in drought is not resulting into increasing in farmer-pastoralist conflict.					
14	Famers-pastoralists conflict may happen in any season(wet and dry seasons)					

THANK YOU

Appendix 2: Check list questions for focus group discussion**A. Causes of farmers-pastoralist conflicts**

1. what are causes of farmers-pastoralist conflict
2. Which group frequently instigate the conflicts than the other?
3. Why these conflicts are outstanding in this area?
4. What internal and external catalyst to farmer-pastoralist conflicts?

B. Perception of climate change

1. How do you perceive climate change?
2. How does one know that there is climate change (indicators)?
3. What are socio-economic impact of climate change to farmers and pastoralists?
4. Which group is mostly affected by the climate change?
5. How climate change may cause farmer-pastoralist conflict?

C. Resolution and management

1. What are the solutions to the farmer-pastoralist conflict at grassroots?
2. What measures to be considered in solving the conflicts at high level (district, region national)?
3. Which measures are experienced to be effective?