

**IMPACT OF DROUGHT ON PRIMARY SCHOOLS LEARNING IN
LAIKIPIA WEST DISTRICT OF LAIKIPIA COUNTY, KENYA**

By

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ENVIRONMENTAL STUDIES (CLIMATE CHANGE AND
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DECLARATION

I hereby declare that this thesis is my original work and has not been presented for a degree in any other University or any other award

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DEDICATION

This work is fully dedicated to my late parents; Daniel Gitau Gitei and Edith Njeri Gitau who devoted all their meager resources to educate me and for giving me life that I now cherish. May the Almighty Lord rest their souls in eternal peace?

I also wish to dedicate this work to all those who believe in a green world.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASAL	Arid and Semi Arid Lands
ENS	Early Warning Signs.
FGM	Female Genital Mutilation.
FPE	Free Primary Education.
GOK	Government of Kenya.
GoN	Royal Netherlands Government.
IPCC	Intergovernmental Panel on Climate Change
KCPE	Kenya Certificate of Primary Education
KMD	Kenya meteorological department
LDCs	Less Developed Countries
MDGs	Millennium Development Goals
NEMA	National Environmental Management Authority.
SFP	Schools Feeding Programme
UNEP	United Nations Environmental Programmes.

ABSTRACT

Laikipia West district receives between 500 mm and 950mm of rainfall annually. It is therefore, classified as a semi arid region with harsh and fragile environment. The low and erratic rainfalls govern vegetation dynamics, animals' survival and the general human welfare. Frequent drought as a result of climate change has exacerbated and compounded the problem of provision of quality basic education in the district. This study was conducted to investigate drought prevalence and the impact it has on the learning of pupils in the district. The study was carried out between August to December 2011 in two different agro ecological zones; high agricultural potential area in Muhotetu and Sipili in the west as well as dry zones of Ol moran and Rumuruti in the north and eastern parts of the district respectively. Primary data collection was through the use of questionnaires and informal discussions with community members as well as education officers. Questionnaires were administered to both teachers and classes seven and eight pupils in twenty four out of the seventy two public primary schools in the district. Visits to the pastureland where school going children were looking after animals during school days, and interaction with communities in the district also formed part of the study. Rainfall and temperature data from meteorological department were used to reinforce schools attendance data. Indigenous knowledge from the elders of the communities and secondary data were used to corroborate the findings. The secondary data sources included review of published reports, journals, internet and books to identify existing information on the effects of drought on learning. The collected data were analyzed using descriptive qualitative and quantitative statistics such as percentages and frequencies. The results were processed; tabulated and analyzed using Statistical Package for Social Sciences (SPSS) Version 11(Students' version) to generate descriptive statistics. The findings indicated that, drought cases significantly impacts negatively on the learning of pupils in schools ($\chi^2=16.2761, df = 3, P=0.001$). The results indicated that, drought contributed to absenteeism at 33%, truancy at 17%, poor performance at 16% and both transfers and drop out at 21% Data from meteorological department for the period between the year 2000 and 2010 indicate low rainfall annually especially during the months of January to March and June to December. Temperatures range between 10.7°C to 25.25°C at Nanyuki substation weather station and between 7.8°C to 20.41°C in Nyahururu substation. The elders from Laikipia west communities had Indigenous ways to mitigate against the impacts of drought in the area though some negatively affected their environment. Due to the low rainfall in most parts of the district, the results of this study recommend that, policy makers ought to take decisive measures aimed at arresting the perennial suffering of both people and animals in the district by drilling boreholes, water harvesting during rainy seasons into reservoirs and a well sustained feeding programme in all the schools in the district.

CHAPTER ONE: INTRODUCTION

1.1. Background to the problem

Universally, education is seen as a tool to self-development. In 1948, the Universal declaration of Human rights laid down (article 26) that

“Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education should be compulsory”.
(<http://www.unesco.2012>)

At the World Conference on education for all, held in Jomtien, Thailand in March 1990, nations made strong commitments to the learning needs of young people. The goal was to accomplish not only access to education for all by the year 2000, but also the far more daunting challenge of learning achievement for all. This, unfortunately, was not achieved. Goal number two of the Millennium Development Goals (MDGs) aims at ensuring that by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. A report by the Ministry of Planning and National Development, Kenya, noted with a lot of concern that arid and semi arid (ASAL) areas, pockets of poverty and drought are far from achieving this goal.

According to the World Summit for Children Goals report (2000), by the end of the 1990s, Kenya had not managed to achieve universal access to basic education. This meant at least 80 per cent of primary school age children needed to attain primary education in order to bridge literacy disparities between boys and girls.

According to United Nations Environmental Programme (UNEP) stated in part that, the world is edging closer to universal primary education but too slowly to meet 2015 target. The report further indicated that, 72 million children worldwide were denied the right to education in 2007. Enrolment in sub-Saharan Africa has increased by 15 percent points between 2000 and 2007 but despite the break through, almost half of all children not attending primary schools live in this region (<http://www.unep> 2012).

In developing countries, total achievement of universal education to all school going children as spelt out in Millennium Development Goals (MDGs) still remain a pipe dream (<http://wiki MDGs.2012>). Education is meant to equip children to the best of

their ability for a lively, constructive place in the society and also fit them to do a job of work. (Callagan, 1976).

The Kenya government has committed a lot of resources in the education sector. In 1971 the government's expenditure in education was 3.93 billion and by 2010 the expenditure stood at 6.67 billion. The government has raised the amount to 8.36 billion in the last two years in order to cater for the increased demand for free primary education. Introduction of free primary school education in 2003 dramatically increased the number of children attending school (Omundi. internet search 2012). Though the Kenyan government increased the allocation of basic education financing to approximately 17 percent of the national budget from 2003 to date, the FPE program is still strongly supported by donor funding.

Basic education is the minimum provision of knowledge, attitudes, values, and experiences which should be made for every individual and which should be common to all (Hummel, 1976). Education should be aimed at enabling each individual to develop his or her own potentialities, creativity and critical mind both for his or her own fulfillment and happiness and for serving as a useful citizen and producer of quality knowledge for the development of the community to which he/she belongs. Though various measures are being put in place to ensure education is affordable to all, there have been some factors that have been an obstacle to the learning cycle of pupils in various schools.

Laikipia west district, which lies to the west of the leeward side of Mount Kenya, receives low rainfall. The average annual precipitation for most of the area is about 700 mm. The western and northwestern parts of the basin receive rain in a single season, between April and August, while eastern side has a clear, bimodal distribution with rainfall maxima in April and October (Kenya Meteorological dept, 2010). In this region, people commonly rely on rain fed agriculture for both livestock keeping and food crops growing. In most parts of the district, poverty is normally accelerated when the precipitation is elusive or when torrential rains bring with them floods. In either circumstances, lack of or excess of rain, the former has been the greatest impediment to peoples' livelihood in the district. This lack of enough rainfall has

contributed to drought, which has in turn affected the lives of the inhabitants of the district.

Drought is a multidimensional stress. In some environments and at times desperate situations, children's schooling is disrupted and in this context, government cannot hope to achieve universal primary education by 2015. Harsh climatic conditions like drought and floods do not spare infrastructure that have taken years to build. Some roads are rendered impassable when floods occur, classrooms are blown away by the winds and crops are destroyed by invading elephants. These impacts can be directly linked to climate change, which in turn contribute to the high drop out in schools.

1.2. Problem statement

The main purpose of education is to provide every individual with relevant knowledge, skills, attitudes, and ideals that will enable him/her to lead a more fulfilling, productive and satisfying life. In most cases than not, better standards of living are dictated by the level of education and the income per se. A child reporting to school hungry and with no hope of a meal after school, imagination of long hours of walk to fetch water after school, watching as the only animal the family owes die due to drought and finally death of family members due to famine are enough reasons for a child to fail to see the importance of education.

Drought and other climatic harsh conditions have negative impacts on the human well being as well as their daily structures. Frequent droughts in most parts of Laikipia County normally leave a trail of very devastating calamities to human as well as flora and fauna. Drought affects people's lives negatively. Among the areas that experience severe drought are the arid and semi arid (ASAL) regions. Laikipia West district is one such region with some areas that are perennially affected by drought. In these areas, learning is affected and some of the children who enroll in class one never remain in school for the eight years course. Extensive drought contributes to lack of food and pasture for the animals (Marlaine and Adrian, 1991). This was noted to contribute to a higher percentage of pupils drop out and subsequent migration to other areas with available food and pasture.

The few studies have concentrated on prevalence of drought in different areas and immediate mitigation measures thereby missing a very essential area of human development in the form of a child's education whenever drought occurs.

1.3. Research questions

- i. To what extent does drought impact on learning in primary schools in Laikipia West district?
- ii. In what ways does drought affect provision of learning resources?
- iii. Do communities in Laikipia West district have indigenous knowledge to mitigate against drought

1.4. General objective

The general objective of the study was to investigate the impact of frequent drought in the provision of education services in public primary schools in an ASAL region.

1.4.1. Specific objectives

- i. To determine the impact of drought on pupils learning in the semi arid region of Laikipia West district.
- ii. To investigate how drought affects learning resources.
- iii. To document indigenous strategies of adapting to drought in Laikipia West District.

1.5. Research hypotheses

- i. Drought negatively affects learning in Laikipia West district.
- ii. Laikipia West district communities have indigenous strategies for mitigating against drought incidences.

1.6. Significance of the study

It is the right of every child the World over to have access to basic education. The Millennium Development goal number two that spells out a period to all nations to

ensure that by 2015, all children everywhere would be able to complete the full course for primary education emphasizes this.

Apparently a research on the causes of drop out in primary schools as a result of drought conditions in Laikipia West district has not been done. This study aimed at investigating the impact of drought on schools attendance. The study intended to investigate contributing factors that negatively affected a child's learning and could also be associated directly or indirectly to drought. These include, family migration, lack of resources, transfers of both pupils and teachers and finally pupils dropping out of school. Since drought in Laikipia is a common and perennial phenomenon, this study aimed at investigating what impact it has on pupils' school attendance and learning. The research also aimed at investigating the impact of drought on the learning resources. Although drought influences negatively on vegetation and other natural resources, the impact of drought on the education sector has not been investigated in Laikipia west district. It is in this light that the researcher embarked on a study to investigate why most of the children from Laikipia West district do not complete their eight years of primary education despite the government's effort in providing the necessary resources. This study therefore endeavored to determine the impact of drought on learning in public primary schools in the district thereby filling the gap.

1.7. Scope of the study

The study was carried out in the vast parts of Laikipia west district, which is part of the larger Laikipia County. Laikipia West is one of the five districts that form the County. The others are, Nyahururu, Laikipia Central, Laikipia North and Laikipia East. Laikipia West district has seventy-two public primary schools. The district has two distinct agro ecological zones; high potential and low potential. This study was carried out in the two zones comprising of Muhotetu and Sipili within the high potential area while Rumuruti and Ol Moran comprise zones within the low potential area.

1.8. Limitation of the study

In the semi arid region of Ol Moran, the area is sparsely populated hence; the schools are located quite apart. The terrain in the area was also a challenge. These two factors forced the researcher to spend more time in data collection. However, the challenges were overcome by employing the services of a motorcycle rider who was able to locate shorter routes to the schools. Finance was another major challenge. This was overcome by working within the very tight budget.

1.9.1 Conceptual framework

Climate change caused by increase in the green house gases in the atmosphere has continued to wreak havoc in almost all sectors of human development. The impact causes both increases in precipitation as well as lack of it. In some areas, both crops and infrastructure are destroyed by floods whereas in other areas lack of rains for prolonged periods causes a lot of suffering to both vegetation and animals. These prolonged periods of drought bring with them diseases, loss of crops, animals and human life. In severe instances, people migrate to areas with available pasture and food when it is evidently clear that their lives are in danger. As they migrate, children are forced to drop out of school in order to join their parents in pursuit of greener pastures. In less severe instances, pupils are frequently absent as they are left behind to look after their younger siblings; animals and run errands as their parents go to look for food. Due to frequent absenteeism, the education sector is adversely affected. In turn, there is increase in the level of illiteracy, destruction of environment as communities continue to burn charcoal to earn a living, increase of soil erosion due to overstocking and competing for resources.

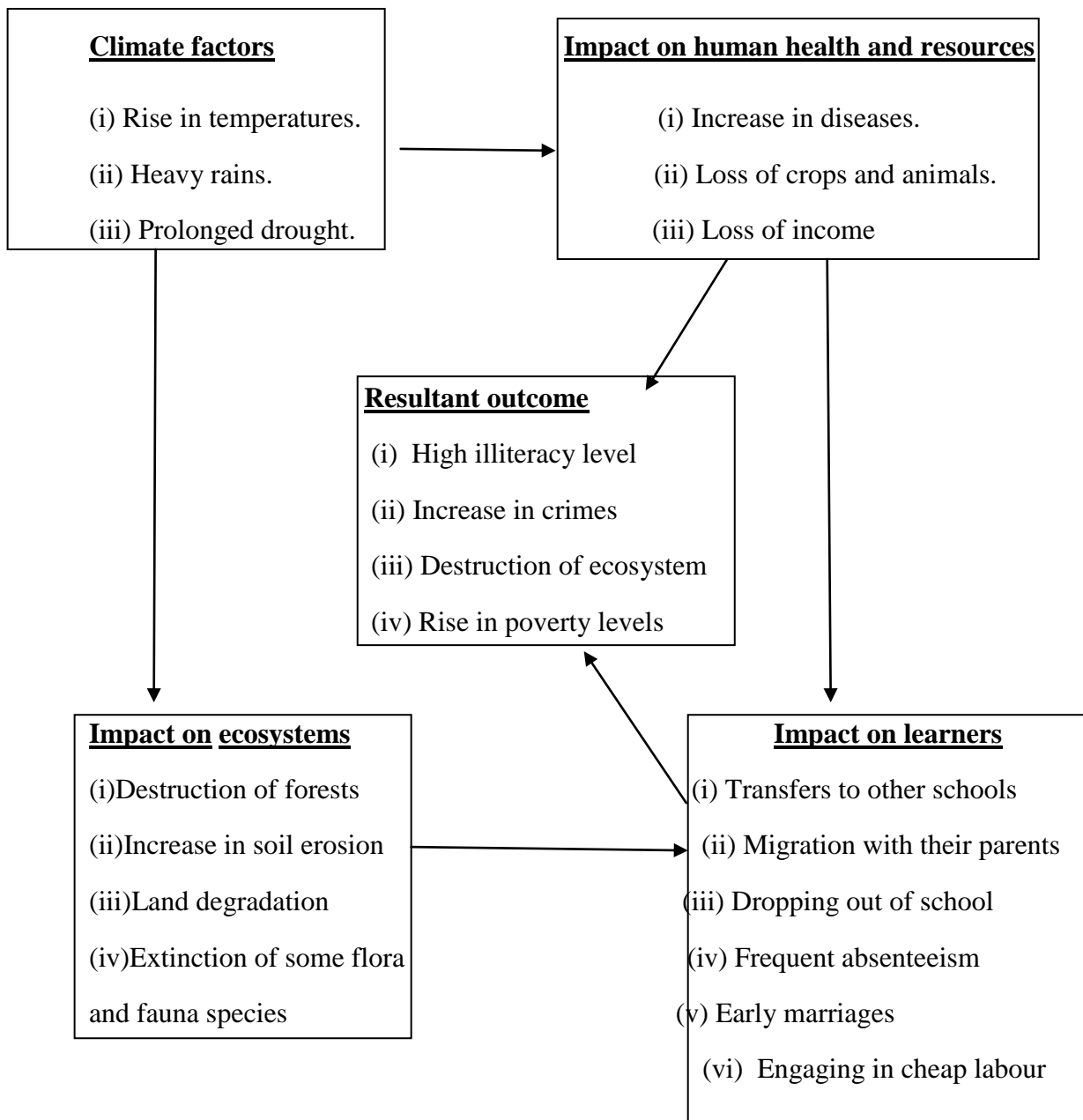


Fig 1.1: Effects of climate change on the learning of pupils

1.9.2 DEFINITION OF OPERATIONAL TERMS

Arid areas: Areas that receive less than 700 mm of rainfall annually. In the study area two such areas receive between 400 mm and 700 mm

Bimodal rainfall: Rainfall occurring for a stated period at two specific points in the year. Laikipia west district receives such rain between March to May and between July to September.

Climate: Climate is the pattern of variation in temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables in a given region over long periods

Drought: An unusual dry period with very low precipitation, sometimes characterized by high temperatures, high evaporation and lack of water. Drought occurs when water available for use in any system is significantly less normal water requirement by the system (Ogallo, 1997).

Floods: Floods are defined as high rates of discharge that lead to inundation of land adjacent to rivers and streams, damaging property and interfering with human activities and settlements because of quick flow rather than lose flow (Reddi, 1992).

Indigenous Knowledge: Local knowledge that is unique to a culture or society. It is at times referred to as traditional knowledge.

Learning: Learning is a very wide concept, but in this study, it refers to the acquisition of knowledge from teachers to pupils in a structured setting.

Semi-arid: The semi arid regions of the world are defined as transition zones between arid and sub-humid belts. Semi arid regions are also defined as areas where precipitation is less than potential evaporation, characterized by high temperatures (30-45°C) in the hottest months.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

All children worldwide have a right to basic education. Provision of education by any government agency, whether subsidized or fully aided is one thing; ensuring other factors that may hinder a child from achieving this education is yet another thing all together. Though the government of Kenya has enshrined the provision of free and compulsory primary education in its constitution, drought, though a natural attrition, has continued to negate government's effort in attaining this goal. In this chapter, the researcher gives an insight into the predicament faced in providing basic education due to the hostile environment characterized by frequent drought episodes in ASAL regions. The chapter also gives the rationale behind picking a natural occurrence and provision of education and tries to give an insight into the gap of knowledge.

2.2. Climate change

The earth's climate is now clearly out of balance and is warming. Many components of the climate system including the temperature of the atmosphere, land, ocean, the extent of sea ice and mountain glaciers, the sea level, the distribution of precipitation and the length of seasons are now changing the rates and the patterns that are not natural and are best explained by the increased atmospheric abundance of green house gases and aerosols generated by human activity during the 20th century. Global average surface temperatures, according to IPCC report of 2007, increased on average by about 0.6°C over the period 1956-2006. As of 2006, eleven of the previous twelve years were warmer than any others since 1850 (Cunningham & Cunningham, 2006).

Global warming is not something whose effect will be felt centuries later, it is already affecting our lives today. The scorching weather is sometimes not purely an act of nature. Humans are causing global warming and are suffering as a result and the consequences will get worse. Globally, climatic fluctuations have continued to negate the efforts being put by various sectors, namely: health, agriculture, economy, environment, education, in achieving the MDG's and attaining the dreams of vision 2030. Education, which involves development of human resource, has continued to

remain vulnerable to the consequences of drought. Gupta, (2004) stated that, poor people have fewer resources and capacity to act. These people are the most vulnerable to the impacts of climate change and heat related stresses.

Climate change continues to negate the gains made in various sectors. Over the centuries, different human communities have adapted to their particular climate; any large change to average climate tends to bring some stress (Houghton, 1994).

Climate change has continued to affect the lives of world population negatively. There are reduced infiltration rates; changed drainage network, efficiency and increased rainfall intensity due to climate change have contributed to increased food severity in many African cities (Leggett, 1990).

Adverse effects would likely present themselves either via available food supply or through physiological effect of heat balance. Should food stocks dwindle as a result of climate shifts, animals would be compromised and widespread drought would exact major losses. A major consequence of climate change is the migration of biota across the landscape. Communities will not migrate as units (Houghton *et al*, 1990).

Agricultural output in many developing countries may be reduced by climate change compared to what it would be without it. Additionally, climate change will have social and economic effects. Millions more poor people from rural areas are likely to relocate to cities, or seek to flee from their countries altogether (Maathai, 2009; Strzepek and Smith, 1995).

In other sectors, climate change will bring massive, ecological and economical challenges. Climate interacts on each other and therefore it involves also the response of plants and animals to these physical factors (Harlow, 1970).

2.3. Climate change and agriculture

Total crop failure may be ushered in by unfavorable weather conditions with little harvest realized being consumed at household level. Maize crops succumb to water stress at tasselling /milking stage (Weru, 2011). In Kenya, as in most other countries, agriculture is watered by rainfall rather than irrigation systems especially in small scale holdings. A change in climatic patterns would be a big blow to crop farmers in

all the areas that depend on rain fed agriculture. The reliance on rain fed agriculture throughout sub-Saharan Africa has created vulnerability for drought (Dinar and Keck, 2000; Maathai, 2009).

In arid and semi-arid areas of Kenya, majority of the people do not practice crop farming due to the harsh weather conditions. They rely on pastoral farming for their survival. It is only a few areas that people grow few crops. The vast dry lands of Africa are largely inhabited by livestock keepers who either specialize in animal husbandry or combine rain fed cultivation and herding (Frat kin and Roth, 1990).

Generally, a reduction in agricultural output and subsequent increase in prices would raise malnourishment (Strzepek and Smith, 1995). In most sub-Saharan countries, agriculture failure spells doom to most of the families and results in devastating effects on families and their resources.

2.3.1. Arid and semi arid regions

In sub Saharan Africa, arid areas receive less than 400mm of rainfall annually. While semi-arid areas receive between 400mm and 1000mm annually (NEMA, 2005). This low and erratic rainfall has exacerbated the desertification. The NEMA report further stated that, ‘ASALs which cover about 88% of the Kenyan state are characterized by strong variations in rainfall, high temperature and high vapor-transpiration rates, yet they support over 50% of the livestock and 80-90% of the wildlife.

The arid and semi-arid regions of the tropics already prone to seasonal or longer periods of drought are home to about 350 million people in some of the most poverty-stricken countries on earth. Major drought disasters are concentrated in the semi-arid, developing countries where they are often best described as “complex emerges” (Dinar and Keck, 2000). Adverse effects of drought are common in semi-arid regions where there is dependence, either economically or for subsistence purposes on dry land agriculture (Keith and Petley, 2009),.

Laikipia County, with a population of 399,227, (2009 census) is officially classified as a semi-arid region. Most of the region has a hot and mostly dry climate. In some of these dry regions, education for the children is not a priority to their parents. Some parents encourage their children to drop out of schools as the parents may be forced to

migrate to other places, and the children may take up herding roles or assist in looking for food for the family (Faure *et al*, 1972; Odunga and Singei, 2011)

In some rural areas, especially ASAL regions of the developing countries, are the zones with the lowest rates of school attendance and consequently with the highest rates of illiteracy. This could truly cause catastrophic results (Malassis, 1975).

2.3.2. Climate change and gender

Pupils and teachers have different genders, socio-economic levels and locations. These variables may affect the participation and performance of children in schools. While boys in many parts of the ASAL regions are denied education in order to be herders and provide cheap labour, girls are normally forced into retrogressive cultural practices such as Female Genital Mutilation (FGM) and early marriages which prevent the advancement of their education (Ngware *et al*, 2006).

Some African cultures do not value a girl's education when severe drought starts to take effect. Girls are more affected than boys as in some cultures, they have to drop out of school to care for their younger siblings as their parents travel long distances looking for food and pastures. Girls suffer familiar and societal handicaps that encourage parents to spend fewer resources on them as compared to boys; girls encounter special related problems that range from labor, sexual harassment, expulsion from school due to pregnancies and unfriendly learning environment among other gender obstacles (Miringu'uh, 2001).

When money is scarce, families in many countries are more likely to send boys rather than girls to school. Across Africa more than half of the children currently not enrolled in primary schools are girls (Ahn and Silvers, 2005)

Harassment from boys and the distance to school may have greater risks for the safety of girls than boys. The primary dropout rate in sub Saharan Africa stood at 8.6 for girls and 7.3 for boys. "Drop out influences family's decision to educate or not to educate a girl child" (Gradual, 2000)

2.4. Drought

Drought is known to cause severe damage to both flora and fauna. Sometimes when the expected rain season fails the gap that is left is automatically taken over by periods of dry weather that cause a lot of uncertainty. Drought remains a major challenge especially to all the farmers keeping animals and cultivating land and who, rely on rain fed agriculture.

Drought can occur anywhere, because it is an integral part of climatic variations, but it tends to be most important in semi-arid regions. Drought is a “creeping” hazard because it develops slowly and has a prolonged existence, sometimes over several years. Unlike most hazards, drought can be difficult to recognize especially in the early stages but can simply be defined as “any unusual dry period which results in a shortage of water”, drought occurs as a result of lower than expected amount of precipitation (Keith and Petley, 2009).

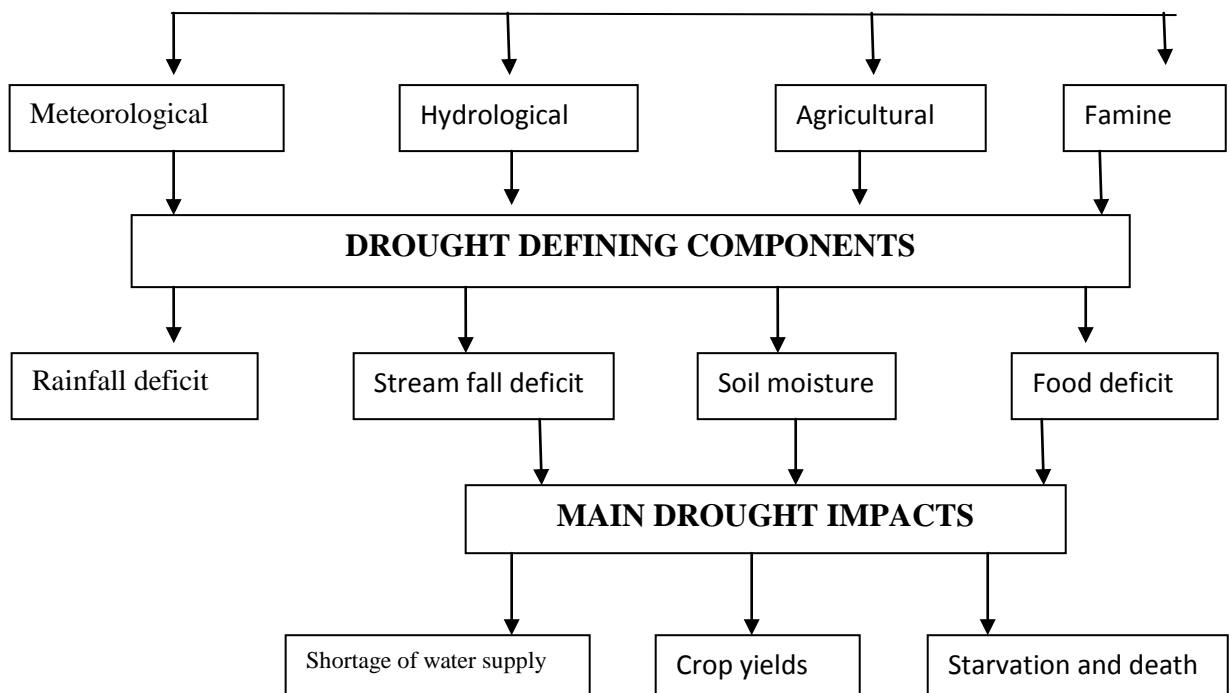


Figure 2.1: Environmental hazards. (Adapted from Keith S and Petley. 2009)

2.4.1. Drought and resources

Prolonged drought spells may spell doom to most resources. Livestock which form the back bone of people in ASAL areas' livelihood are never spared. Large and small scale farmers whose livelihoods depend on what grows in their farms are not spared either. Drought increases pressure on land resources. Over grazing, poor cropping methods, deforestation and improper soil conservation techniques may not create drought but they amplify related disaster (Strezepek and Smith, 1995).

2.4.1.1. Drought and pastoral farming

In most of the arid and semi- arid regions, (ASALs) people keep animals in order to meet their daily needs. Emergence of drought period to a livestock farmer brings with it very devastating impacts on their lives and those of their livestock. In a report by NEMA (2005), it was noted that areas affected by drought and dry spells have experienced reduced water levels leading to decline in human, livestock and wildlife populations.

Although epidemics and diseases have continued to strike both human and animal population, drought has perhaps been a greater scourge. Small stock, sheep and goats have become the mainstay of the herd in some areas for a variety of reasons; partly in response to disease and drought and it is the utilization of water points and the grazing areas that are tied to them that determine (Fratkineta et al., 1994)

2.4.1.2. Drought and crop farming

Rain fed agriculture is normally affected when there is not enough water as a result of drought. Drought not only threatens crops for human survival but also plants to feed animals. Drought continue to impact negatively on social life as there is shortage of food thereby contributing to decreased nutritional level, malnutrition and famines. Loss of life due to ravaging hunger, public safety from forest and range fires, conflict between water users, inequality in the distribution of drought relief food, decreased living conditions in rural areas, increased poverty, social interest population migration thereby learners dropping out of school (Wilhite, 2002).

In sub Saharan Africa, drought affects more people than any other environmental hazard. This is accelerated by the fact that most farmers rely on rain fed agriculture (Wilhite, 2002). Drought differs from other natural hazards. Lack of agricultural potential coupled with the recurrent droughts, has resulted in serious food insecurity and relief food has become a permanent feature of the region. Droughts in Australia and Indonesia during the El Nino episodes caused disastrous crop failures and forest fires (Strezepek and Smith, 1995).

2.4.1.3. Drought and deforestation

Forest ecosystems represent an important resource not only for timber, firewood, production and recreation, but also as centers of bio diversity. Drought is more severe in areas without vegetation cover as the rate of evaporation is equally high. Some of these dry areas in arid and semi arid regions have been deprived of this important cover through anthropogenic activities that have been taking place for a very long period. In turn, when the ground is left bare, soil erosion becomes evidently possible due to overstocking and overgrazing (Strezepek and Smith, 1995).

Extensive deforestation lead to drier climates and less sustainable agriculture. In arid and semi arid regions, degradation of watershed areas in the country is on the increase resulting in diminished water resources (Houghton, 1994)

The main causes of watershed degradation, stems from the abuse and poor management of forests and soils, overgrazing, extension of settlements into watershed areas, unsuitable felling of trees for fuel wood and other wood products. Children in ASAL areas may spend most of their valuable class time collecting fuel wood either for domestic use or for commercial purposes (NEMA, 2005).

Unfortunately, this rise does not only spell doom to the education of children, but also to our ecosystem and the world climate change. Desertification and deforestation through logging and slash-and-burn agriculture are decimating species, water supplies, grazing grounds and farmland and contributing to recurring flood emergencies (Heinman, 2009 and Houghton *et al*, 1990).

2.4.2. Drought and floods

Drought and floods are twin catastrophes, yet one is capable of taking care of the other. A long period of drought known as La Nina is related to periodic African drought while El-Nino is associated with excess rain (Ibe and Awasike, 1989)

Drought and floods affect many countries in both Eastern and Western Africa. Natural resources are being converted and extracted by powers outside the region with little regard for the long-term health of the environment or poverty reduction (Maathai, 2009). She further stressed that when rainwater runs downstream through lands that are extensively cultivated, it can cause massive soil erosion and sometimes flooding, which not only damages farms and food crops but also displace people from their homes.

A major drought in the late 1950's ended in the south by disastrous floods (Fratkin *et al*, 1994). In other instances, when drought extends for a long period, torrential rains follow and equal or severe disastrous damages occur. Instead of people migrating back to their settlements or children reporting back to school, the period of their absence is extended. Drought, floods, insects' outbreaks and other natural disasters cause crop failures and create food shortages (Cunningham and Cunningham, 2006).

Various measures have been suggested to offer solutions to the double catastrophes, which can be addressed to supplement the other; the volumes of surface runoff water are enormous and can be harvested for irrigation. Floods due to unusually intense or prolonged rainfall or droughts because of long periods of reduced rainfall (or its competent absence) can be even more devastating to human life and property (Houghton, 1994).

Globally, each year floods claim around 20,000 lives and adversely affect at least 20 million people worldwide, mostly through homelessness. Flood disasters are concentrated in the less developed countries (Keith & Petley, 2009).

2.5. Food and nutrition

According to FAO, (2012), 870 million people in the world do not have enough to eat. This number has fallen by 130 million since 1990, but progress slowed after 2008. The

vast majority of hungry people (98 percent) live in developing countries, where almost 15% of the population is undernourished. Food crisis is a major cause of alarm in all the developing nations. Like drought and famine, food and nutrition are somehow intertwined. They do complement one another. A synergistic reaction between protein- energy malnutrition and infection has been reported in several studies (Chen and Nevin, 1983)

Lack of food breeds may cause nutritional disorders. In a world of food surpluses, currently, more than 800 million people are chronically undernourished, and at least 20 million face acute food shortage due to bad weather or politics (Cunningham and Cunningham, 2006). They further stressed that, people who are malnourished and ill cannot work productively to obtain food, shelter, or medicine for themselves or their children who are malnourished and ill. In schools, children who lack food may opt to drop out of school and either join their parents in search of food or may opt to get married at a tender age. It has been noted that schools with feeding programs register a significant increase in school enrolment (Ndung'u, 2011).

2.5.1. Famine and starvation

Drought is a geophysical hazard whereas famine is cultural phenomenon. Famine results from acute food shortage. Famines are characterized by large scale food shortages, massive starvation, social description, and economic chaos. Starving people eat their seed grain and slaughter their breeding stock in a desperate attempt to keep themselves and families alive (Cunningham & Cunningham, 2006 and Smith & Petley, 2009).

In sub Saharan Africa, Kenya included, 2011 was the worst year of the last 60 years to be hit by such magnitude of drought. Four million Kenyans were facing starvation in the country during the year. It was noted that people had resorted to eating wild fruits and tubers due to lack of food while most schools in the country closed earlier due to lack of food and water while many pupils dropped out and followed their parents who had migrated elsewhere with their livestock (Abdi, 2011).

In Somalia, 29,000 children had died in the drought according to the United Nations. The chairman of the Red Cross in Laikipia said that, about 32,000 people were in dire

need of food and there were 50,000 starving residents. These families had now turned to wild fruits as they tried to fight hunger. Children in these regions had been turned into fruit gatherers instead of attending classes (Ndung'u, 2011).

2.6. Poverty and diseases

Drought and dry spells occur when the amount of overall rainfall at any one time is below the minimum required for fundamental ecosystems services to support crops and livestock production and human health.

Prevalence of drought incidence, especially in ASAL regions result in two double tragedies; poverty due to loss of crops and animals, diseases caused by the myriad problems ranging from nutritional imbalance, lack of clean water, water borne diseases, ingestion of contaminated water (e.g., cholera, hepatitis A), contact with contaminated water (e.g., leptospirosis) due to recycling of water, food poisoning, vector born diseases, mental stress, among others.

2.6.1. Poverty in drought prone areas

Poverty remains the single most critical barrier to the social-economic development of any country. It hinders access to basic needs such as health care, nutrition and education. NEMA (2005),in "*State of Environment*" report indicated that major causes of poverty include poor economic performance, low agricultural productivity, unemployment and low income. The report further stated that, poverty results in unsustainable use of natural resources and overall degradation of the environment.

The broad masses of the farmers are imprisoned in vicious circle of poverty, hunger and ignorance. In ASAL regions, families suffer most when they see the last of their animals die due to drought. Children are forced out of school since the only source of their livelihood is no more (Hummel, 1972).

Poverty levels, remoteness and isolation as they are already under economic pressure, parents may encourage their children not to remain in school beyond a certain level, but instead to leave school to work and to help alleviate the family's impoverished circumstances (Morton ,1983). During severe drought, therefore, many of the poor

people are squeezed out of the pastoral economy and forced to settle in towns to live on famine relief or from wages paid herders or laborers (Houghton, 2002).

Laikipia County is the home of some of the world's most expansive private ranches, plus luxurious tourist hotels and lodges, yet they are juxtaposed with the homes of some of the poorest societies on earth (Mwagiru, 2011). The county with expanse pieces of land being on the arid side is home to pastoralists who are always waging war against each other due to meagre resources. Maathai, (2009) noted that, lack of regular rainfall therefore, also undermines prospects for eradicating extreme poverty and hunger.

School children are the worst hit when poverty creeps in as they are forced to drop out of school, remain undernourished, cannot walk for long, and have no indigenous knowledge to fight off the pangs of drought. A child from a poor and illiterate home will have found his years at primary school difficult and will wish to escape from school as quickly as possible, a wish he will be supported by his family and social background. (Weidenfeld & Nicolson ,1975)

2.6.2. Human health in drought prone areas

Human health is dependent on a food environment. Many of the factors that lead to a deteriorated environment also lead to poor health (Houghton, 1994). He further stressed that the greater likelihood of extremes of climate such as droughts and floods, will also bring increased risks to health from variety of causes. A further likely impact of climate change on health is the increased spreading of diseases in warmer world. In drought prone areas, diseases are common as a result of malnutrition which increases mortality rates (NEMA, 2005).

Poor health, which is a consequence of either malnutrition or of common diseases, was found to be a constraint of schooling. In Kenya, where temperature increases have locked the global average, malaria epidemics have occurred in highland areas where cooler weather historically had kept down populations of diseases bearing mosquitoes. Highland malaria seems to be on the increase in the rainy season and when temperatures are high (Ngware *et al*, 2006)

Leggett, (1990), noted that, one hundred and fifty million children, less than five years, suffer from malnutrition and every year fourteen million children die from largely preventable causes of death. In areas characterized by water supply system problems, can easily contribute to spread of diarrhea and other faecal oral route related diseases. These have far reaching effects on the well being of a school going child. This is so because a hungry and sick child can never go to school and if circumstances dictate that he goes, and then his performance is dismal.

The health status and access to adequate food, clean water and other resources are more compromised among poor persons in developing nations where the impact of climate change has fallen disproportionately. Poverty and poor health create conditions of low adaptive capacity in most developing countries (Watsome, 2001).

2.7. Land degradation in ASAL regions

Land is one of the three pillars of development, besides capital and labor. Land therefore provides the basics on which social and economic activities are carried out to cater for the well being of mankind. Land is the basic commodity that supports all life forms. In Kenya, for instance, most people consider land as the only source of endowment. Land encompasses; soils, surface topography, underlying deposits, climate, water, plant and animal communities (NEMA, 2005).

Any change of the factors, such as land use has potential to impact on factors such as flora and fauna. Frequent fires due to drought, soil erosion due to lack of vegetation and unreplenished natural resources have been a common phenomena in most of the arid and semi arid regions, ASALS. This land degradation has been the main cause of ever increasing causes of famine in these regions.

Most frequent and intensified drought can exacerbate land degradation. In heavy precipitation; events can increase flooding, landslides and mudslides. The destruction from which can set back development efforts by years in some instances (Watson, 2001).

Land degradation is the key to most of the challenges facing mankind especially sub Saharan Africa. Lack of top soil for growing crops and fodder, will lead to the land creeping slowly to a desert. Loss of vegetation and biomass consequent upon drought

would lead to a reduction in fuel for cooking and heating water, thus further promoting the spread of diseases (Leggett, 1990).

Potential and global climate impacts associated with landscape changes can affect the well being of people (Cotton and Pielke 1995). Small scale subsistence settlements are also spreading with pastoralists inhabiting the northern region mainly a harsh and fragile environment where widespread overgrazing, soil erosion and general land degradation are quite rampant (NEMA, 2004).

Activities carried out in a certain locality, dictates the kind of land degradation. With diminished resources, majority of pastoralist farmers normally opt to migrate to better places. This action has negative effect on the education of children as they too have to leave school and join the parents (Houghton, 1994).

2.8. Transhumance

A general warming that may approach average change in temperature of the earth of the order of 0.1-1.0°C per decade exceeds by factors of 100-1000 or more the capacity of natural communities such as forests without their replacement. Species will be lost as climate and habitats migrate out from under them (Leggett, 1990).

In such a scenario, soil moisture will decline as the continents warm. When the ecosystem is replaced by shrub land and the soils can no longer provide food crops, people will result to migration in search of fertile and sustaining land. This migration of people results in pupils dropping out of schools as their families re-locate to other areas. Fratkin *et al*, (1994) argued that, it is the utilization of water points and the grazing areas tied to them that determine transhumance, the selective and regular movement of stock and sometimes entire settlements from place to place.

Famines often trigger mass migrations as starving people travel to refugee camps in search of food and medical care (Cunningham & Cunningham, 2006). Sometimes, herdsmen are forced to migrate into the most insecure areas after animals have exhausted vegetation in low lying areas. School drop-outs have increased significantly with male pupils abandoning learning to become migrant herders (Strzepek & Smith, 1995).

In all these circumstances, the education of children is compromised as they may be forced to repeat or completely fail to acquire a place in a school within the new environment. Repetition lowers a pupil's self esteem and attitudes towards schooling and this increases likelihood of dropping out. A school environment that is not conducive to effective learning may lead to under achievement which results to repetitions, a precursor for drop out (Chimombo, 2000).

2.9. Education and culture

Everywhere in the world, under development is found side by side with under development in education: low school attendance rates at all levels and high rates of repetition and drop out. It is by education that young people are gathered to the fold, formed in a particular mould and integrated with the social system (Hummel, 1972).

Education and culture are closely linked. They are two facets of one and the same reality. It is impossible to determine where the educational one leaves off and the cultural one begins. Hummel, (1972) further stated that, education transmits culture from generation to generation, and that it is also education which opens the way to culture.

Cultural transmission includes both the transmission of traditions from one generation to the next and the transmission of new knowledge or cultural patterns from anybody who knows to anyone who does not (Foster & Sheffield, 1973).

Adult education programs should be made compulsory in ASAL areas because the elders spend their days idling while the children who ought to be in school perform the duties that the elders ought to perform. Once the elders go to school, they will awaken to the benefits of education and therefore, be more likely to encourage their children to go to school over time (Ng'ang'a, 2011).

In most of the ASAL regions, education of children is not highly regarded as compared to livestock production. Pastoralist's societies in Africa share similar problems of economic production, despite inhabiting a wide variety of environments and owning various types of livestock. It is worth noting that education has been a process which has not been limited with respect to time and space. A research document published by UNESCO (1983) entitled *Learning needs and Problems in*

Primary Education hinted that, for children to succeed, their educational needs ought to be valued by the child's culture. The report further stated that in societies where education is not adequately supported, participation, retention and completion rates in education are low, while incidence of problems and difficulties is higher (Fratkin *et al*, 1994).

2.10. Education and societal expectations

Education everywhere in the world is meant to seal the gap between the vacuum of unknown to what is either taught or learnt. Education has always been going on throughout life; in the family, in clan, through initiation rites, the church, in school, in corporation, in the market, myths and legends and in conversations. Today, children are taught in a structured setting with a well defined curriculum in a school.

Every education system embodies a vision of man, a project of society and an idea of knowledge. Furthermore, it is by education that we have a hold on the future. Education which stimulates social awareness and public participation to tackling communal problems helps to increase the ability of each people to produce new ideas and create new resources and techniques. It also facilitates the latter's utilization in the interests of society as a whole. Education should play a key role in preserving or giving fresh significance to people's relationship with their environment and with the communities to which they belong (Hummel, 1972).

Melville, (1948) described schooling to be "*those processes of teaching and learning carried on at specific times, in particular places outside the homes*". This is a clear cut between the roles of the school and education in general whereby education goes beyond the four corners of a classroom. Dempster, (1973) stated that, children acquire a varied wealth of opportunities to build up the experience upon which his knowledge of environment will be based. Francois, (1968) questioned, of what avail will it be, to teach children who, living in an illiterate world will all soon revert to the ignorance that surrounds them. This shows that, a child's environment plays a pivotal role in shaping their destiny.

The society should strive to know a child's educational needs and what they learn. The society has a great role to play in supplementing what a child learns in school.

Lack of communication between primary schools and the communities' further the difficult of adjusting what is taught in the classroom to requirements of the community (Obonyo, 1982).

On the other hand, schools need to know the needs of the community they are serving. If some societal expectations are not met, then the parents do not see the need of a child remaining in school. Pastoralists' communities for example, believe in education geared towards developing a child who values livestock. Livestock pastoralism in Africa is predominantly a household enterprise in which labor is recruited from the local family group. Household members must perform a variety of tasks essential to the well being of their livestock (Fratkin *et al.*, 1994).

In most of these communities, work is organized around age and gender roles. Adolescents herd animals and young children assist in firewood collection, herding, nursing stock or running errands .Some families "borrow" or foster children from relatives to do their herding, as among the Samburu (Sperling, 1985 and Fratkin *et al.*, 1994).

Younger children, particularly girls, assist married women in many tasks. Girls at the age of four to five provide firewood, order children between six and twenty two years of age, spend most of their time in livestock task, especially daily herding. Most of the arduous herding labor is performed by order children. Adolescents and members of the warrior age set (Fratkin and Roth, 1990).

Boys between six and eleven years of age watch over young and infant camels grazing near the settlements while girls help with child care, gather firewood and tend to young small stock near the domestic settlements (Fratkin *et al.*, 1994).

About 250 million children mostly in Africa and Asia and some as young as four years old are forced to work under appalling conditions weaving carpets, making ceramics and jewelry, or working in the sex trade. Growing up in these conditions lead to educational, psychological, and developmental deficits that condemn these children to perpetuate this cycle (Cunningham & Cunningham, 2006).

2.11. Education and development

Education is a cornerstone of economic and social development. Primary education is its foundation. It improves the productive capacity of societies and their political, economic, and scientific institutions. It also helps reduce poverty by mitigating its effects on population, health and nutrition and by increasing the value and efficiency of the labor offered by the poor (Marlaine and Adrian, 1991).

Francois, (1968) stated that, no genuine social progress is possible without the development of education. He further said that, no effective development is possible without corresponding social progress and increased respect for human rights.

Article 26 of the universal declaration of human rights, recognized education as a tool that can develop an individual to full potentiality. It was noted that, education programs should not be too narrowly conceived: Education is about values as well as about literacy and jobs.

Unlike many animals which seem to be able to fend for themselves, almost from the first, the human child is strongly helpless and needs care, comfort, and the education to develop (Dempster, 1973).

Maybe, for the rural children, their education is far from being geared towards white collar jobs but essentially, the education obtained showed aim at shaping their destiny and change lifestyles, value for human life, correcting mistakes of yester years and directing their efforts towards manageable animal farming and families.

2.12. Drop out in public primary schools

Children enter class one with a lot of enthusiasm and high spirits of better lives and a better school life. There are various reasons why a child's hopes of joining primary school are high; to join older siblings, to escape from pre-school routine, to learn new things and to meet older peers. Nyerere, (1967) stated that the purpose of education is to transmit from one generation to the next the accumulated wisdom and knowledge of the society and the active participation in its maintenance and development. In developing countries, many pupils nearly half, drop out in the course of their first or second year of primary schooling. At the end of the cycle, only about a quarter of those who started are left (Francois 1968).

Although the potential of children to learn and to benefit from education is enormous, such potential is nowhere near to being fully realized in many countries in the region. A research carried out on learning needs and problems in primary schools indicated that even when access to primary education is available, participation rates are alarmingly low (Ahn and Silvers,2005)

There are various factors that contribute to the drop out in primary schools as the research indicated dropout rates from primary education has been found that it is associated with poor economic conditions at home, pressure to leave school to help support the family. Negative parental attitudes which consider education to be ungainful. At the same time, unresolved learning problems cause high dropout rates which imply enormous personal and economic wastage (Ahn and Silvers, 2005).

A child who is absent from school and comes irregularly, performs poorly. These children may be forced to repeat. Repetition leads to dropping out of school. Repetition lowers a pupil's self esteem and attitudes towards schooling and this increases likelihood of dropping out of school (Chimombo ,2000).

2.13. Indigenous knowledge

In traditional African societies, education development was stimulated by study through observation and participation of the role of the extended family and the community as a whole of its accumulated wisdom as translated through proverbs, songs and legends. Indigenous education consists of the different traditional processes of socialization, peculiar to each indigenous nation (Heribert, 1999).

The similarities between western education and indigenous education are that indigenous education was strongly adapted to the environment and its aim was to conserve the cultural heritage of the family, clan and ethnic groups, to adapt children to their physical environment and teach them how to use it (Sifuna, 1986).

The transmission of a culture from one generation to another in the long history of man has been chiefly a matter of learning by example and by rote learning (Vaizey, 1975),

In arid and semi arid regions, people have their own ways of fighting off the impacts of drought. In Sahel, they practice herd diversification as a strategy to 'cope' with a

'normal' drought. During years with abundant rainfall, the tribes would increase their herds for food storage and as such an insurance against drought. De stocking takes place early in the drought cycle to prevent ecological damage to the grazing land (Morton and Borton 2002; Wilhite ,2002)

Education should help to conserve and to rehabilitate African culture in such a way that it is planned to enable the child to acquire socially desirable values. Education should prepare the African child to use the best elements out of his tribal environment and to transform it by bringing into it what he had received from western education to enable the child acquire socially desirable values (Makulu,1977).

A child had to learn the climate features related to the physical surroundings. These dictated the nature of economic activities that were carried out which embraced cultivation, hunting, fishing, gathering and pastoralism. Quoting (John Dewey 1859-1952), Sifuna stated that education should be seen as the reconstruction or re-organization of experiences and which increases the zeal to direct the course of subsequent experience (Sifuna, 1986).

Cultures contain the seeds of own change with which they come in contact. That new ways of life are generated primarily by diffusion of ideas, by face invention within a culture (Piltock, 1978).

In conclusion, studies have identified various types of droughts and the areas that are commonly affected. The previous studies have given suggestions on what ought to be done to areas that are consistently affected by drought. These studies lack the aspect of attainment of education by pupils in the verge of drought catastrophe. This study, therefore, intended to explore ways in which the education of pupils will not be compromised because of drought situation in the study area.

CHAPTER THREE: METHODOLOGY

3.1. Introduction

The chapter discusses the methodology that was used in the study, the research design, location of the study position and size in relation to Laikipia County and Kenya, population of the study, sampling procedures, sample size, instruments, data collection and analysis procedures.

3.2. Research design

This study followed a multiphase approach as explained by (Churchill 1991). Such an approach involved interview schedules, questionnaire survey and piloting which assisted to refine data collection instruments before they were administered. Kathuri and Pals, (1993), indicated that survey research usually use questionnaires in order to determine the opinion, attitudes, preferences, and perception of groups of people of interests in research. Both qualitative and quantitative data were obtained. Qualitative data collection aims at gathering in-depth understanding of events, occurrences and behaviors of the group under research (Mugenda & Mugenda 2012). Quantitative data provided factual information on the target schools being researched. Mugenda & Mugenda, (1999) stated that, quantitative data provides factual information on a target group. Meteorological data on rainfall and temperature ranging from the year 2000 to 2010 was also used to reinforce the information on the weather patterns.

3.3. Location of the study

The study was conducted in two zones, high potential agricultural lands which do not have high prevalence of drought; Sipili and Muhotetu as well as semi arid regions of Rumuruti and Ol-moran of Laikipia West district. Twenty four schools out of seventy two in Laikipia West district were selected. This represents thirty percent of the total population of the schools in the district.

3.3.1. Relative position of the study area and rainfall patterns

Laikipia West district is one of the five districts of Laikipia County. Laikipia is a high altitude plateau in Central Kenya. Laikipia occupies 9,723 square kilometers and is located between latitudes 0° 17' south and 0° 45' north and between longitudes 36° 15' east and 37° 20' east. Altitudes range from 1,500 to 2,611 meters above sea level.

Laikipia's eastern border is the western foot of Mount Kenya (5,199 meters). To the southwest, Laikipia is bordered by the Aberdare Mountain Range. The western edge of Laikipia is an escarpment which leads into the Great Rift Valley. The area is generally dry. Rainfall ranges from 365 mm to 1000mm per year. The annual precipitation for most of the basin is about 700 mm. The County is divided into two agro-ecological regions namely, high agriculture potential area and low potential area. The area closer to mount Kenya receives some seasonal rains, while the northern part of the plateau is arid. The western and north western parts of the basin receive rains in a single season, between April and August while the eastern side has a clear bimodal distribution with rainfall maxima in April and October (Fig 3.1). Laikipia plateau, otherwise comprising of upper Ewaso Nyiro North basin is a zone of transition from wetter to drier parts of the eastern Kenya highlands (Esipisu, 2010).

3.3.2. Infrastructure

Laikipia west district has no railway link and the only tarmac road ends at Rumuruti Township. The vast parts of Sipili and Ol-Moran have no reliable all weather roads. The roads are in poor state during the rainy seasons and very dusty during the dry seasons.

3.3.3. Drainage and water resources

Most of the streams are seasonal apart from river north Aiyam and south Aiyam both of which are tributaries of Ewaso Narok from eastern region of Rumuruti. Rumuruti is within the altitude of 6464 feet whereas Sipili is 6848 feet above sea level. Rumuruti to Ol-Moran is within high altitude level (Kenya Government, 1991). There are several reservoirs that have been dug within this region but the issue of proper maintenance has not been properly addressed. During heavy rains, most of the soil in Ol-Moran is swept away due to the unchecked gradient of the sloppy land and the flood water is not adequately harvested.

3.3.4. Economic activities

The inhabitants of Laikipia West district are the Kikuyu, Samburu, Borana, Kalenjin, Turkana, Meru, and Somali thus giving the district a cosmopolitan outlook. Small scale subsistence settlements have been spreading with pastoralists inhabiting the

northern region, mainly a harsh and fragile environment, where widespread overgrazing, soil erosion and general land degradation are quite rampant. Pastoralism and subsistence farming are the main economic activities of the general population.

3.3.5. Vegetation

Most of the eastern and northern parts can be described as dry bush savanna. (Pratt and Gwynne, 1997). The areas are characterized by shrubs and thorny thickets. On the fertile parts of western and southern parts of the district there are plantations of trees that form huge canopies. This area is characterized by green vegetation, a complete opposite of the former region within the same district.

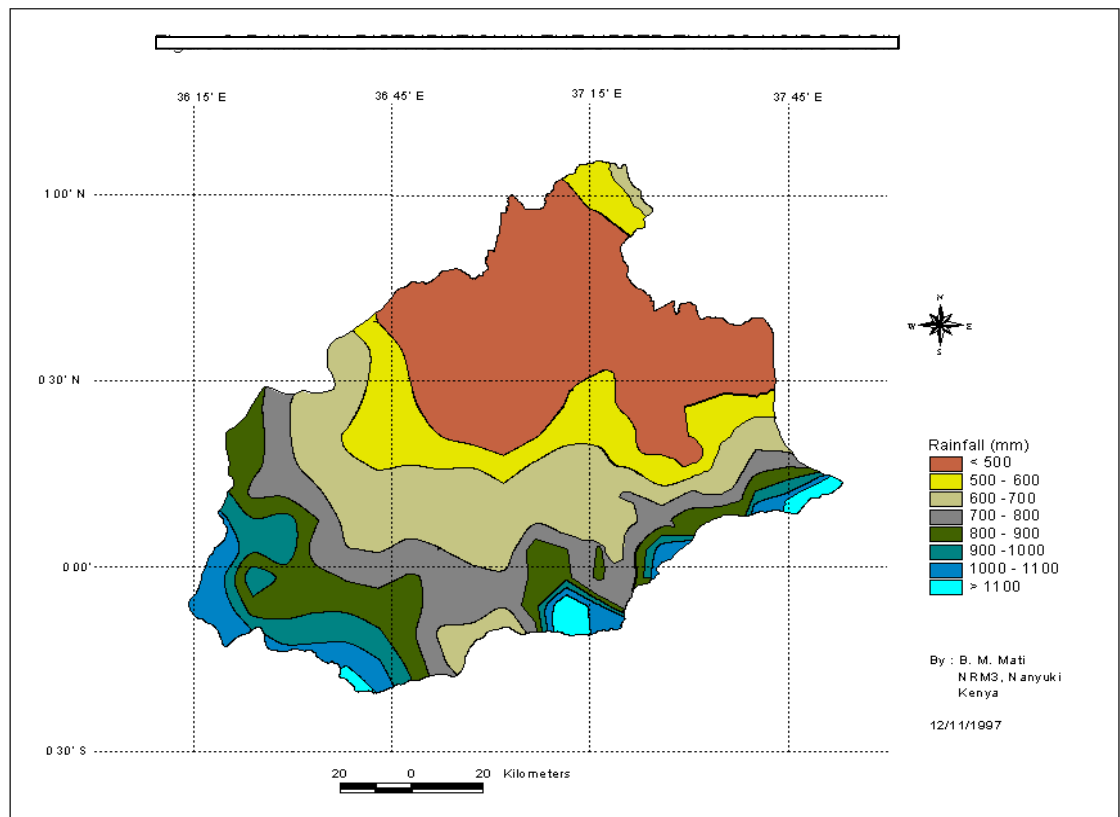


Figure 3:1 Rainfall distridution in Laikipia County (Adapted from Mati,B.M: 2007)

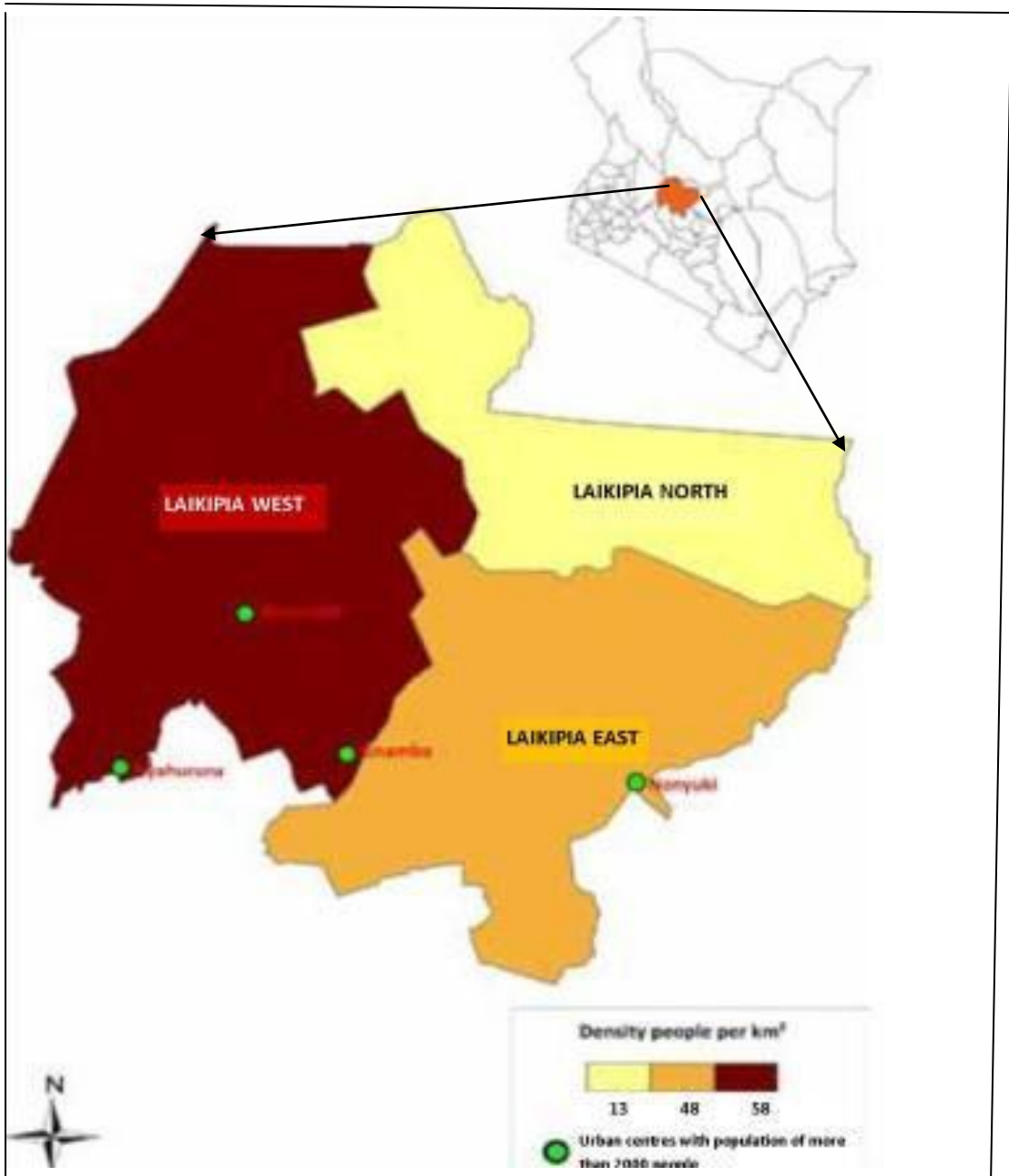


Figure 3:2 Laikipia County and her relative position in Kenya (Source: *Internet 2012.Kenya Mpya*)

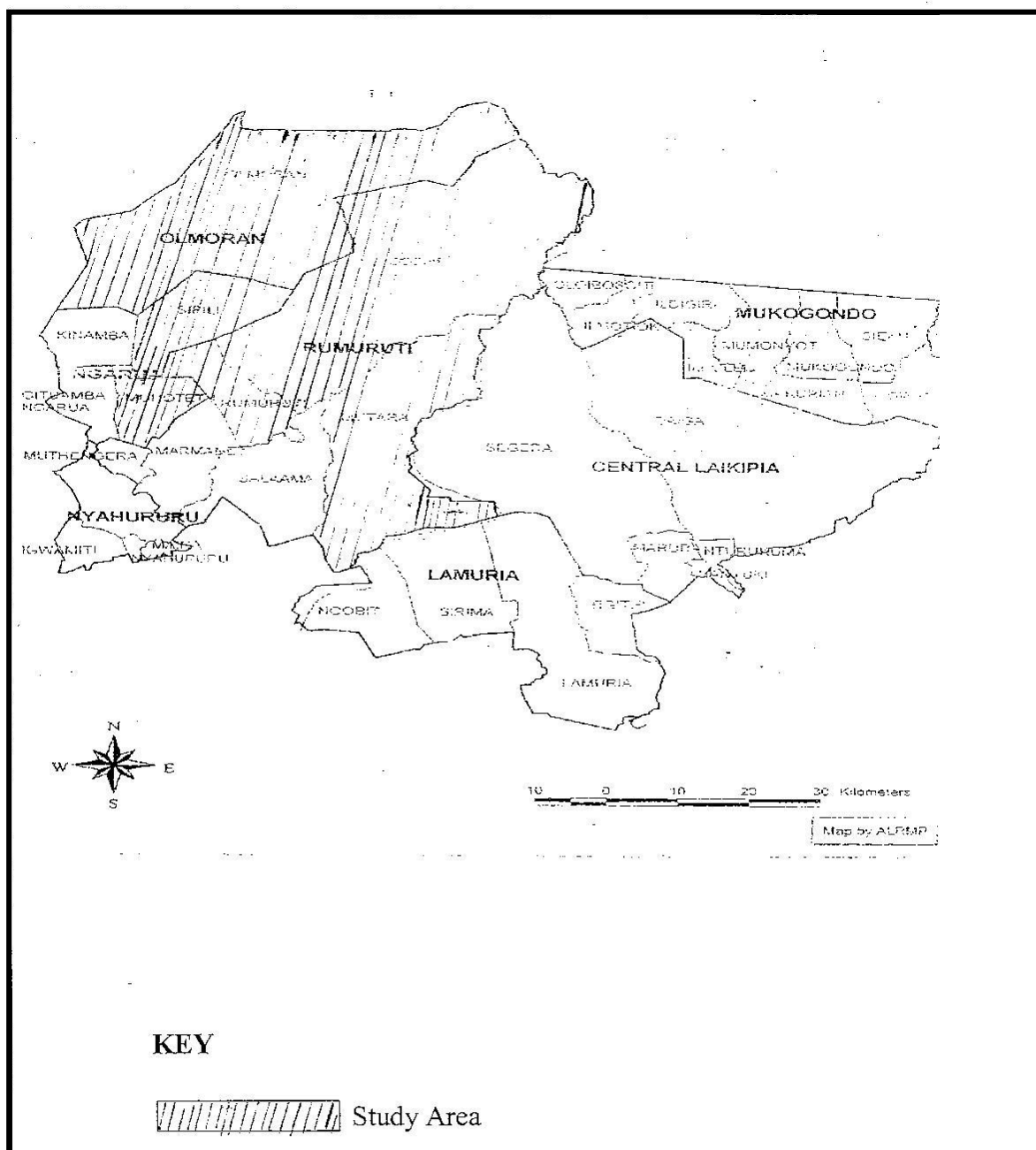


Fig 3.3 Map of Laikipia County showing the study area

(Source: Ministry of Planning)

3.4. Population of the study area-Laikipia West district

The research was carried out in each of the two zones, agricultural area as well as semi arid zone. Pupils were randomly selected in the classes seven and eight in responding to the questionnaire while at least four teachers were given the teachers' questionnaire from each of the twenty four schools. In each of the randomly selected schools classes seven and eight pupils were put together then a total of eight pupils were randomly selected. In selecting, the issue of gender was considered. In each of the sampled schools, four teachers were also requested to participate in answering the teachers' questionnaire. Gender issues among teachers could not be adequately addressed as some of the schools had a gender imbalance. A total of 190 pupils and 94 teachers responded to the questionnaires. Interviews were conducted on three educational officers and four elderly community members from Kikuyu, Pokot, Samburu and Kalenjin communities.

3.5. Sample and sampling procedures

Simple random sampling involves giving a number to every subject of the accessible population (Mugenda and Mugenda, 1999). Random sampling gives all cases equal chance of being selected for inclusion in the final sample.

According to Cohen (1976) a minimum sample size of 30% is sufficient for comparison purposes in most studies. However, a sample should be large enough to be representative of an entire population under study.

Laikipia west district has a total of seventy two public primary schools. The researcher decided to take a sample of thirty percent of the total population which was twenty four schools. The twenty four schools were randomly selected taking an equal number in each of the two zones; high potential agriculture zone and the low potential ASAL region. Four pupils from each of classes 7 and 8 were put together and with the assistance of teachers, questionnaires were distributed to the eight pupils who had been randomly selected from each of the sampled schools. The head teacher was one of the respondents. The total number of respondents was 190 pupils and 94 teachers making a total of 284 respondents.

In Merigwit, there was an excess of one respondent due to an error in distribution while in Mithuri, there were six pupils who responded since the rest in classes 7 and 8 had already left for their homes. Therefore, instead of the anticipated 192 pupils, the number reduced by two to 190 whereas 94 teachers responded instead of the anticipated number of 96, thereby making the difference by two teachers.

3.6. Instrumentation

The researcher used two sets of structured questionnaires with some open ended and others close ended. Before the tool was administered, the pupils were first explained by the researcher on how they were to independently respond to the questionnaire. A piloting of the tool had been done in four schools in Nyahururu district prior to administering in the twenty four schools in Laikipia west district in order to find out whether the questionnaires:-

1. Would provide the data needed for the study.
2. Would identify any challenges that may be faced by the participants in responding.
3. Would determine clarity of each instrument to participants.

The instrument was then administered in twenty four schools and explanation in simpler terms was done to some pupils who were unable to comprehend the presented information. Gender of the respondents was also put into consideration.

3.7. Data collection procedures

A research letter was obtained from the Graduate School of Kenyatta University and also Department of Environmental Education. In order to administer the questionnaire in the field, it was necessary to get clearance from the Ministry of education and Laikipia West district Commissioner's office. An introduction letter was presented to various offices to reinforce the permission that was being sought in every school.

The researcher proceeded to each of the sampled schools as earlier planned. With the head teacher's permission, the classes seven and eight teachers helped in administering the instruments to the pupils who were randomly selected. The teachers and pupils were informed of the purpose and significance of the study before the

instrument was administered. Information gathered from the field education officers and local community was used to corroborate the research findings.

3.8. Data analysis procedures

After fieldwork, all collected data were organized, edited, explored, transferred from note books and questionnaires. Raw data were first tabulated in excel spreadsheet prior to analysis in SPSS. Data were first subjected to descriptive statistics then summary statistics and finally data interpretation. Qualitative data were collected through questionnaire and was grouped according to research questions. Content analysis was conducted after editing and summarizing the data. This facilitated a better way of discussing the findings, drawing conclusions and making recommendations.

Version 11 (students' version) of statistical package for social sciences (SPSS) was used to generate the required test statistics and for display of results.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1. Introduction

This chapter presents the results analysis and discussions of the findings of the study that was carried out to investigate the impact of drought on pupils learning. It covers the respondents' age, length of stay in the area and how often they missed food. An attempt has been made to investigate the severity of drought in the area the gender that is mostly affected and subsequently drops out of school.

4.2. Teachers and pupils responses

The results of the structured and unstructured questions were analyzed, tabulated and discussed as shown in the tables and figures. It was administered to 190 pupils and 94 teachers.

4.3. Demographic information of the respondents

Teachers and pupils demographic information ie. Gender, ages and duration of stay of the teachers in same school were considered.

4.3.1. Gender of the respondents

The findings on gender distribution indicated that, majority of the teachers (77.7%) were males as compared to lady teachers (22.3%) drawn from ASAL regions. This big difference was mostly noted in the low potential zones of Ol moran and Rumururti.. In most of the schools in these marginal areas, only male teachers are posted there. Information from the education office and local elders indicated that, the reasons why female teachers are not posted to some schools is because of the distance involved from their residence to the school. Some cover twelve kilometers to school and equal distance in the evening. According to the local community, conflicts for pasture among pastoralist communities scare away teachers from some schools.

Similarly majority of the pupils who were selected as respondents (51.1%) were male pupils while 48.9% were female pupils in this area. This shows that, gender parity is not a big challenge in this area as almost an equal number have access to basic education.

Table 4.1: Gender of the respondents for both teachers and pupils

Gender	Teachers		Pupils	
	Frequency	%	frequency	%
Male	73	77.7	97	51.1
Female	21	22.3	93	48.9
Total	94	100	190	100

4.3.2. Respondents' age

Teachers who were in the age group of between 31 – 50 years were (53.2%), 26.6% were between 31 – 40 years. Those between 41– 50 were (26.6%) years while 25.5% were between 26 – 30 years old. According to these findings, majority of the teachers are in the middle ages and in the prime age of their career.

Table 4.2: Age distribution of the teachers

Age (Years)	frequency	%
Below and equal to 25	9	9.6
26 – 30	24	25.5
31 – 40	25	26.6
41 – 50	25	26.6
51 – 60	11	11.7
Total	94	100

4.3.3. Age distribution of the pupils

Majority of pupils in classes 7 and also those in class 8 are in the age bracket of 13 to 16 years. However, it was also noted that there were a few 1.1% and 6.8% that entered school at an early age; hence they were 11 and 12 years respectively. Of great concern were those who were beyond primary school age at 15-18 years. This could

be attributed to many years of changing from one school to another especially whenever drought episodes occur.

Table 4.3: Age distribution of the pupils

Age (Years)	frequency	%
11	2	1.1
12	13	6.8
13	39	20.5
14	49	25.8
15	34	17.9
16	34	17.9
17	14	7.4
18	5	2.6
Total	190	100

4.4. Duration as a teacher in the same schools

The researcher noted that there were some teachers who had taught in the same school, 68.1% for 1 – 5 years, and 19.1% for 6 – 10 years while the rest had been in the same school for more than 10 years. The head teachers in an informal interview were in agreement that there was a government directive to transfer those teachers who had been in the same station for more than eight years apart from the sick, aged (almost retirement age) and the nursing mothers. This contributed to the fact that there were teachers who had been in some stations for between one to five years as they had transferred from other stations where they had overstayed previously.

Table 4.4: Duration as a teacher in the same school

Duration (Years)	Frequency	%
1 – 5	64	68.1
6 – 10	18	19.1
11 – 15	6	6.4
16 and above	6	6.4
Total	94	100

4.5. Parents' occupation

Majorities (74.7%) of the parents of the sampled pupils were either hawkers or engage in small business. The businesses in reference were the ‘jua kali’ self employment as well as market vendors. Only 1.1% of the parents were employed on contracts. At least 24.2% are employed as casual labourers in the nearby shopping centre and farms. The unpredictable nature of the parents’ ways of earning a living dictated their livelihood. When the parents were unable to earn a daily living, the children had no other option other than assisting in looking for ways to put a plate on the table. This involved walking long distance to obtain food from another region where they battered their energy for food by working throughout the day. Those children who confessed that their parents were employed were certain of uninterrupted periods in school.

Table 4.5: Occupation of the parents

Occupation	frequency	%
Casual labour	46	24.2
Hawking / small business	142	74.7
Working on contracts	2	1.1
Total	190	100

4.6. Pupils' absenteeism and the parents' employment

To be out of school by the pupils was significantly associated to one of their parents being employed ($\chi^2 = 2.206$, $df = 1$, $P < 0.05$). 51.1% of those whose one of their parents are employed had never been out of school during school days while 61.4% of those who had none of their parents employed had been out of school.

Table 4.6: Pupils' absenteeism

Any of parents employed	Have been out of school during school days		Total
	Yes	No	
Yes	22 (48.9%)	23 (51.1%)	45 (100%)
No	89 (61.4%)	56 (38.6%)	145 (100%)

4.7. Gender and pupils' absenteeism

More (43.0%) female respondents had been out of school for 3 – 4 days in a term than male respondents (40.2%). Majority of the male pupils (59.8%) were only out of school 1 – 2 days in a term.

Table 4.7: Number of days the pupils were absent from school in a term

Number of days pupils were out of school						
Gender	1 – 2		3 – 4		Total	
	frequency	%	Frequency	%	frequency	%
Male	58	59.8	39	40.2	97	100
Female	53	57.0	40	43.0	93	100

4.8. Pupils rate of absenteeism

The issues raised for pupils' absenteeism were diverse. Frequent absenteeism was an easy way that prepared pupils to drop out of school. When the issue was left unaddressed by both the school administration and the parents, the child may likely feel it is acceptable. Parents' duties should be detached from the roles given to learners especially during school days. Pupils faulted this as a reason that made some pupils to fail to complete their eight years of learning.

Table 4.8: Reasons for the pupils to be out of school during school days

Reasons	frequency	%
Sickness	2	1.8
Lack of food	22	19.3
Parents' migration	32	28.1
Death of a family member	20	17.5
Family errands	36	31.6
Other reasons	2	1.8
Total	76	100

4.9. Pupils' siblings who had dropped out of school

The research established most of the family members who had left school were males (48.2%). These family members mainly left school in upper classes. After these pupils left schools and failed to secure places in secondary schools, they got involved in casual jobs. The community preferred these school drop outs as they offered readily available cheap labour. This was noted to fail to provide a role model within the community. Girls easily became easy targets to elderly men who after paying dowry would go for the girls.

Table 4.9: Sex and activities of pupils who had left school before KCPE

Gender	Activities after school		Casual labour		Marriage	
	Frequency	%	Frequency	%	Frequency	%
Male	26	48.2	34	62.96	4	7.41
Female	10	18.5	9	16.67	32	59.26
Both	18	33.3	11	20.37	18	33.33
Total	54	100	54	100	54	100

4.10. Frequency of lack of food at home

The respondents shared different views depending on where they hailed from. Pupils from high potential areas had not experienced unavailability of food while those who come from the arid region had frequently missed food. For learning to take place as well as school attendance, learners had to be certain of a meal either in school or at home. Frequent episodes of drought had been the greatest impediment to food assurance. In these areas, the pupils heavily relied on relief food from the government as well as NGOs and well wishers.

In a week, majority of those who had missed food twice were (21.1%), while 14.2% missed 3 times, 10.5% missed once while 3.7% of the pupils missed food at least 4 times.

Table 4.10: Number of times in a week, pupils' missed food at home

Number of times pupils missed food	Frequency	%
None (majority from high potential areas)	95	50
Once	20	10.5
2 times	40	21.1
3 times	27	14.2
4 times	7	3.7
5 times	1	0.5
Total	190	100

4.11. Crops production and animals' death in the study area

Due to low precipitation, it was noted that, most of the crops withered before maturity. These triggered long periods of drought that mostly continued until the next planting season. Consequently, due to lack of rain, pastures for the animals become unavailable. This caused death to many animals and this in turn affected most of the families' income. Apart from the low income families migrated to areas with available food as well as grazing land for their animals. When migration occurred, most of the families moved with their entire family members as well as their animals. Most of the respondents indicated that the animals that were mostly affected by drought were domestic animals.

Table 4.11: Crop failure and death of animals in some farms

	Crops failure		Animals' death	
	Frequency	%	Frequency	%
Yes	158	83.2	152	80.0
No	32	16.8	38	20.0
Total	190	100	190	100

4.12. Animals affected by drought

The research indicated that, most of the animals affected by the pangs of drought were domestic animals like cattle and goats though drought also affected other animals.

The affected domestic animals form the livelihood of majority of the inhabitants of Laikipia West district as they rely heavily on livestock for their daily living. This is because majority of the inhabitants are pastoralists while others practice mixed farming.

Table 4.12: Classification of animals affected by drought

Animals dying of hunger	Frequency	%
Cows, Sheep and goats	139	73.2
Poultry	4	2.1
Wild life	11	5.8
None	36	18.9
Total	190	100

4.13. Water in the households

Most of the study area had few rivers. Some households relied on reservoirs and wells. Scarcity of water contributed to long distance walk to water points in the region. Children were mostly involved in fetching water after school. The long distances to the water points affected pupils learning as the distances covered took time.

Table 4.13: Sources of water used at home

Source of water at home	Frequency	%
Reservoirs	60	31.6
Tap	15	7.9
Well	50	26.3
River	55	28.9
Tank	10	5.3
Total	190	100

4.14. Distance to the water point

When collecting water for use at home, 50.5% of the homes used 30 minutes to the water point, 31.6% used up to 1 hour while 14.2% spent up to 2 hours. The distances covered to water points contributed highly to high rate of absenteeism as children were forced to join their parents in search of this important commodity. The distance and exhaustion had a negative impact to school attendance.

Table 4.14: The distance covered to the water points.

How far water source was (time)	Frequency	%
Walk for 30 min	96	50.5
Up to 1 hour	60	31.6
Up to 2 hours	27	14.2
More than 2 hours	7	3.7
Total	190	100

4.15. Impact on crops production, drop out and distances covered to obtain food

The respondents were required to indicate their understanding and opinion of the items using either strongly agree, agree, disagree or strongly disagree. When asked whether rain water destroy crops near their homes, 53.7% of the respondents agreed that sometimes rain water destroy crops near their homes. This indicated that in this area, majority of the homes are affected by floods. It was agreed by the majority respondents that parents normally cover long distances to obtain food at 79.5 %. Quite a good number had witnessed pupils dropping out of school before they sat for the eight years summative exam, Kenya Certificate of Primary Examination (KCPE).

Table 4:15.Opinion on floods, food and drop outs

	SA	%	A	%	D	%	SD	%
1. Destruction of crops by floods	59	31.1	43	22.6	47	24.7	41	22.6
2. Distance covered to obtain food	92	48.4	59	31.1	18	9.5	21	11.1
3. Pupils dropping out before KCPE	110	57.9	42	22.1	13	6.8	25	13.2

SA.....Strongly agree, **A**....Agree, **D**....Disagree, **SD**.....Strongly disagree

4.10.1. Drought cases within the school vicinity

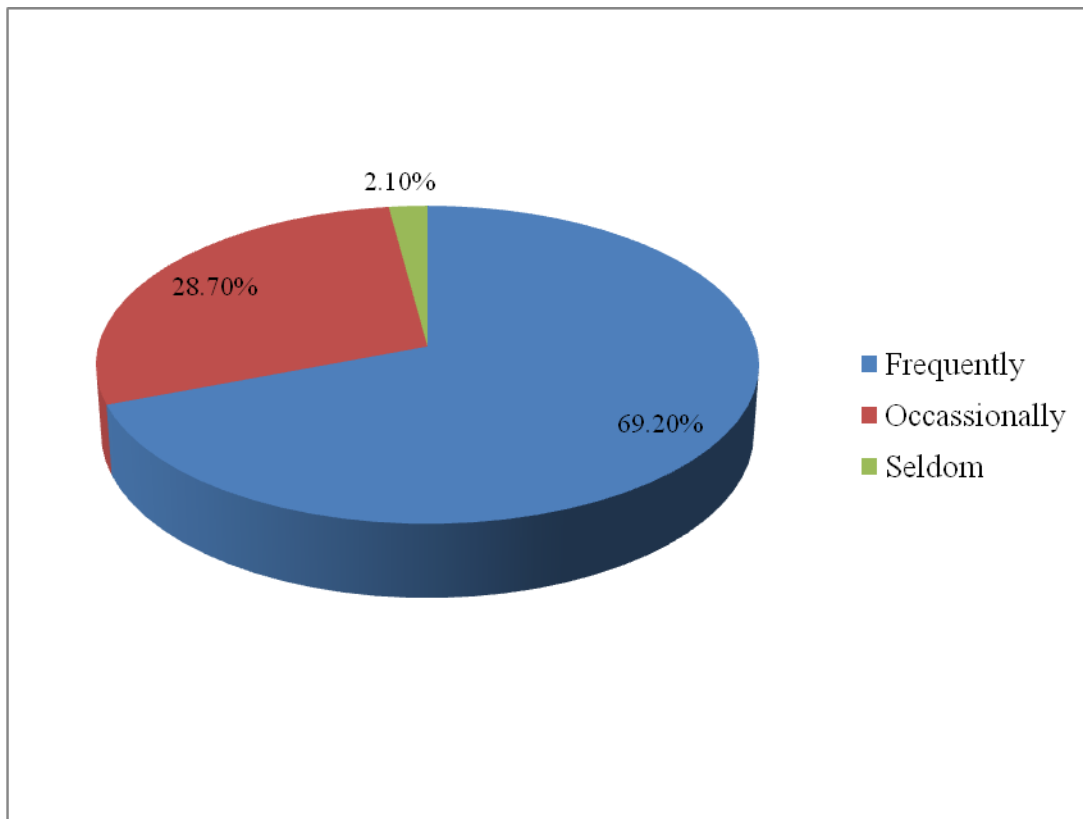


Figure 4.1: Teachers' views on frequency of drought.

Most of the teachers (69.2%) had frequently experienced drought cases within the school vicinity. 28.7% of the teachers, however occasionally experienced drought cases while 2.10% seldom experienced any drought cases. This is also supported by the meteorological data presented in **figures 4.3** and **4.4** shown below. According to the meteorological data collected from two substations Nanyuki and Nyahururu the temperatures and rainfall were varied. Due to the region's proximity to the leeward side of Mt Kenya, the mean temperature in Nanyuki for the period between 2000 to 2010 was 25.25⁰C maximum and 10.70⁰C minimum. During the same period, the mean rainfall as recorded in the substation was 633.9mm. In Nyahururu substation, the temperatures for the same period were 20.41⁰C maximum and 7.8⁰C minimum. The mean annual rainfall was recorded at 979.9mm.

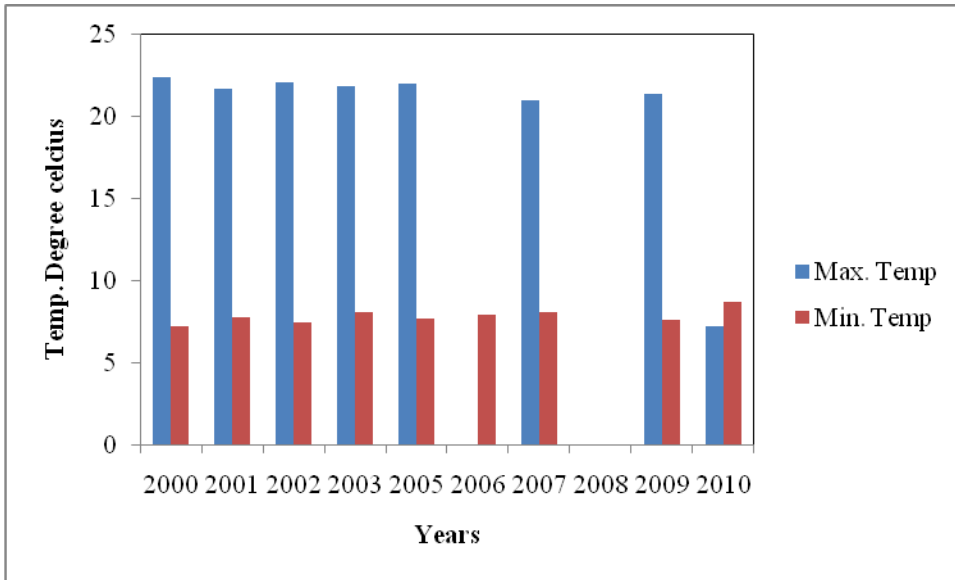


Figure 4.3 :Mean temperature for Laikipia West (Source KMD-Nyahururu sub station -2012).

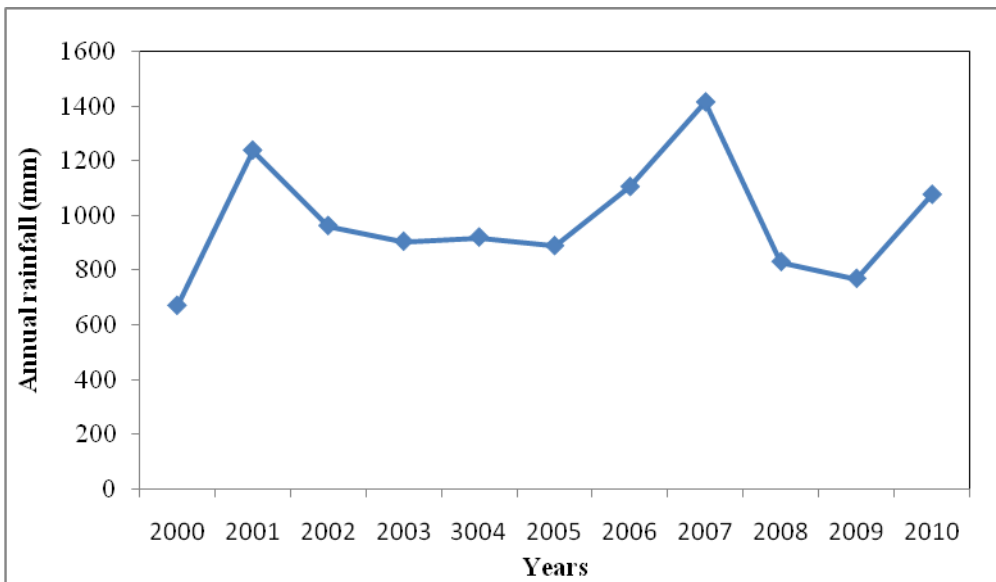


Figure 4.4: Mean rainfall for Laikipia West (Source: KMD,Nyahururu sub station)

4.16. Implication of drought in schools

Teachers (69.2%) stated that there are some implications of drought that had also affected the schools. This high percentage of the respondents was an indicator of the severity of drought. Drought equally, affected the local community within the schools' vicinity. This was a clear indicator that the lives of pupils were severally affected by drought even after school hours and this resulted to high rate of

absenteeism and subsequently dropping out of school before the completion of eight years primary education

Table 4.16: Teachers response on effects of drought within the school vicinity

Opinion	Frequency	%
Yes	65	69.2
No	29	30.8
Total	94	100

4.17. Effects of drought on learning

Main effects of drought on learning as indicated by the teachers were absenteeism, drop out coupled with transfers to other locations/schools, syllabus coverage, poor performance, high rate of drop out and truancy. According to the records obtained in the schools and teachers responses, majority of the pupils dropped out of school and engaged in cheap labour while others transferred to other areas with food as they continued to engage in income generating activities. The distribution of the outcome indicated that schools' programmes are totally affected due to drought and the lives of pupils in schools are affected.

Table 4.17: Effects of drought on learning

Consequences of drought	frequency	%
Transfers of pupils	12	12.8%
Truancy	16	17.0%
Both transfers and drop out	20	21.3%
Absenteeism	31	33.0%
Poor performance	15	16.0%

4.10.4 Dropout rate as a result of drought

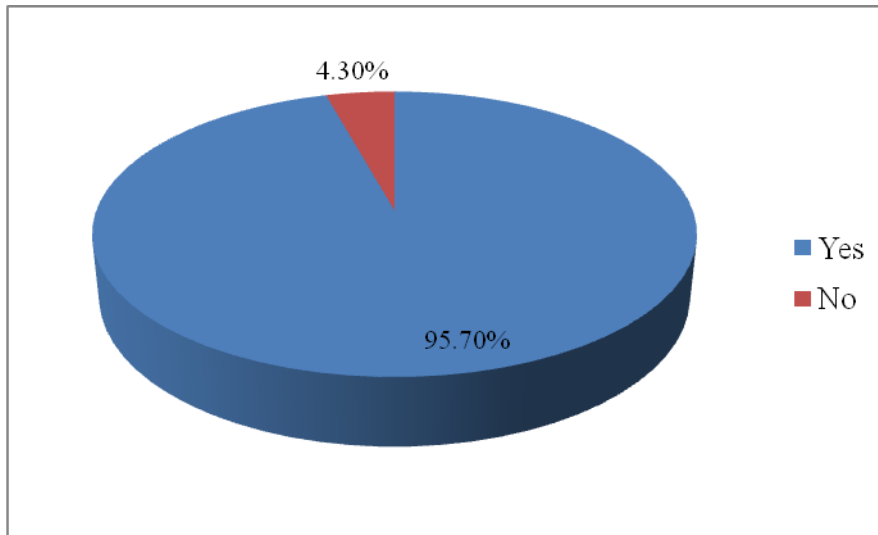


Figure 4.5: Responses on pupils drop out

The findings indicated that, once drought occurred within Laikipia West district, majority (95.7%) of the school children do not report back to school. This was also confirmed by attendance registers that showed the rate of attendance at different times. During times of severe drought less pupils attended classes while availability of schools feeding programme always coupled with return of children in school. Where the programme was well sustained, the pupils' attendance was noted to be higher compared to areas without.

4.18. Period pupils remained away before resuming classes after the drought.

Majority of teachers 55.3% felt that, the period when pupils report back was diverse, some taking longer than others. Some pupils (13.8%) took between two terms to a whole year before they resumed back to school. It was only 16.0% who felt the pupils take between a few days and a term before they reported back. This is a clear indication that, once drought struck the area, education to the young pupils lost meaning and they opted to remain away. The above findings showed that absenteeism and dropping out were viewed as the norm in this semi arid region so long as the school lacked food. In some schools, parents and teachers were converting money meant for infrastructure into buying food in order to maintain pupils in schools.

Table 4.18: Pupils absence from school.

Duration (Months)	frequency	%
1 – 3 months	15	16.0
4 – 6 months	13	13.8
7 – 12 months	13	13.8
Never	1	1.1
Varied *	52	55.3
Total	94	100

- **Varied:** Pupils’ reporting back to school is varied and is not given in the provided range.

4.19. Season when pupils drop out of school

Floods are known to cause some schools to be closed down in some parts of the country but in Laikipia West district, floods contributed to 4.3% of cases of drop out while 95.7% dropout cases happened during the dry season and this was associated with drought prevalence. This item confirmed that, drought highly contributed to high rates of drop out in schools.

Table 4.19: Teachers observation on season when pupils drop out of school

Season	Frequency	%
Dry season	90	95.7
Wet season	4	4.3
Total	94	100

4.20. Communities preparedness to drought occurrences

Communities' preparedness in mitigating the impacts of drought drew close to equal reactions. Those who felt there were measures towards addressing drought impacts were 44.7% while those who felt there were no adequate mitigating measures were 55.3 %. What came out clearly is that, due to the many years of the same menace, some communities had adaptive strategies while others only relied on donor support.

Table 4.20: Communities preparedness to impacts of droughts

Prepared	Frequency	%
Yes	42	44.7
No	52	55.3
Total	94	100

4.21. Mitigation measures against drought

Planting of drought resistant crops like sorghum, cassava, sweet potatoes, millet and Katumani maize had become common in most parts thus attracting 31.9%. while those who engaged in charcoal burning in order to improve their well being were 25.5%. Some migrated 20.2% in search of pasture for their livestock and food for their families. Only 6.4% preferred keeping a small herd of animals while 16% relied on relief food. Activities that impacted don the destruction of environment were only counterproductive as these only accelerated drought menace in the region.

Table 4.21: Communities mitigation measures against drought

Mitigation measures	frequency	%
Migration	9	9.6
Planting drought resistant crops	30	31.9
Relief food	15	16.0
Keeping animals	6	6.3
Charcoal burning	24	25.5
No mitigation measures.	10	10.6
Total	94	100

4.22. Teachers' opinion on drought mitigation

Teachers and administrators had diverse opinions with majority 35.1% believing that the lasting solution was to engage the local communities in harvesting water and later using it in irrigation. Projects that can generate income and which were environmentally friendly should be initiated 30.9%. Suggestions were that, the much effort put in supplying relief food should be re-directed to offering grants in order to start small scale enterprises. A 21.3% believed in multi approach rather than one particular approach. It was only 3% who believed in continuity of supply of relief food as a method to address drought situation while 9% thought the challenge could only be addressed by pooling resources together and investing as a group. Irrigation as an adaptive measure raised the concern of increasing sustaining the reservoirs. Reducing the number of livestock by pastoralists was a measure raised in adaptive farming.

Table 4.22: Teachers’ opinion on drought mitigation.

Opinion	frequency	%
Farming and irrigation	33	35.1
Gainful projects	29	30.9
Co-operation	9	9.6
Relief food	3	3.2
Multi approach	20	21.3
Total	94	100

4.23. Challenges facing teachers as a result of drought

Teachers expressed concern on lack of syllabus coverage as the greatest obstacle they were facing due to drought (34%). Most of the pupils’ turn up was very low, 29.8% as children opted to remain away from school. A 20.2% cited drop out as a challenge faced by teachers and only 8.5% and 7.4% expressed concern on interruptions of the school systems and a combination of challenges respectively. Drought continued to affect both teachers and pupils in their urge to progress in their academic pursuit.

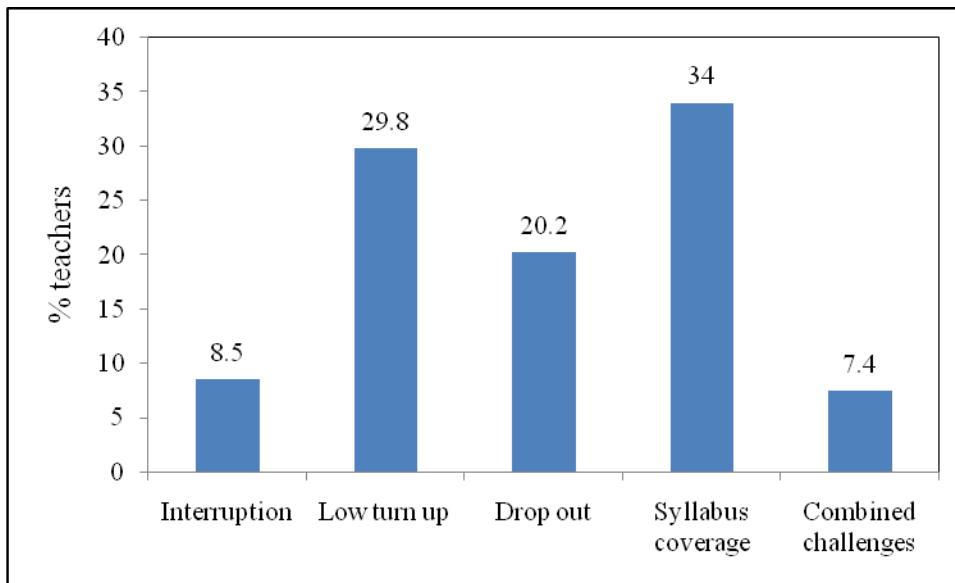


Figure 4.6: Challenges facing teachers as a result of drought

Hypotheses tested.

The researcher accepts the hypothesis “Drought negatively affects learning in Laikipia West district as all the teachers noted that they normally have pupils drop out of school before the end of the full eight years primary education” since the respondents experiences of drought cases significantly impacts negatively on the school. ($\chi^2=16.2761, df = 3, P=0.001$)

Ho₂: Based on the research findings on the stated mitigation measures; 31.9% of the community plant drought resistant crops, 6.3% do keep animals that can withstand drought, 9.6% migrate to areas with pastures while 25.5% result to the burning of charcoal, the researcher therefore accepts the hypothesis, “Laikipia West district communities have indigenous strategies for mitigating against drought incidences”.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

The district is one among those classified as a semi arid due to the low annual rainfall and high temperatures in most of the parts. Vegetation dynamics also dictate the life styles of the inhabitants. The district experiences prolonged periods of drought perennially which in turn leave a trail of very devastating impacts.

The sole component of drought can be defined as the balance of moisture in the soil from the amount of rainfall received minus the amount lost through surface run off and deep drainage (Mwarey, 2001).

According to the research, the district has only one single boarding school for boys. This was noted to contribute to majority of pupils failing to report back to school when food was unavailable. Absenteeism of pupils was significantly associated with the parents' employment status.

Among the major impacts of drought in this district are; drop out, transfer of pupils to other areas, absenteeism and seeking of casual labour. This in turn affected syllabus coverage and poor performance in schools. Almost an equal number have different opinion on the availability of indigenous knowledge on drought mitigation.

This research relied heavily on the data collected from the field, The Kenya Meteorological department, field study, literature from books, magazines and the internet. The findings have been presented in graphs, charts, plates, and discussions have been made after the analysis.

5.2. Conclusions

1. The research established that drought played a major role in determining the period the pupils remained at home before they resumed back to school. Gender of the pupils was not a major issue especially when it came to absenteeism as both were equally affected by the pangs of drought.
2. The research also established that, obtaining water was equally a big challenge and substantial time is spent by both pupils and their parents in fetching.

3. The research also established that majority of pupils migrated together with their parents and livestock whenever drought occurred. This contributed to frequent absenteeism and subsequently dropping out of school in severe conditions.

Conclusively, the area has frequent drought episodes that have in turn affected the water levels as well as food and nutrition. These negative effects have affected the development of the schools infrastructure. It is also worth noting that majority of the rural people especially in the semi- arid regions are pastoralists who keep large herds of cattle which they are not prepared to part with for the sake of their children's education.

5.3. Recommendations

1. This study noted that there are several water reservoirs dug in most of the semi arid parts of Laikipia West district. This region's increased productivity will depend on how harvested water will be utilized during the dry season. When there is heavy rain, there is a lot of water that goes to constructed reservoirs. Introduction of new seeds, use of fertilizers and agricultural machinery, improved infrastructure and irrigation systems should be enhanced as a measure to ensure the region has food security and thereby give children an assurance of periods of uninterrupted learning.
2. The study noted that some parts of Ol moran had good arable soil that had been washed away by runoff water. This can be arrested by several mitigation measures such as terracing, agro forestry, cut off drains and check dams.
3. The local administration needs to work closely with the schools administration and village elders in order to ensure boys who have been turned into herders and the girls who have been turned into wives ought to be given a decent chance to acquire education. These children are normally faced with this choice when drought throws them out of school. These children's stay in schools can only be assured if there is a sustained school feeding programme in all schools in these semi arid regions.
4. There is a need to start more and more boarding schools in order to increase school retention rate of children in this region. Local constituency development

fund (CDF) committee should set aside some funds to start boarding schools. This will increase schools retention.

5. Nomadism is common among the Turkana, Samburu, Kalenjin and Pokots of Laikipia. Mobile schools should be started. The families can always re-unite when the adults return.
6. The pastoralists' communities in this region need to be encouraged on the destocking when there is emergence of drought. Such smaller herds act as food security during severe dry seasons and for strategic continuity for those that survived the drought. Destocking should take place early in the drought cycle to prevent ecological damage to the grazing lands.
7. Drought resistant crops and crops varying production cycles that make it easier for rural communities to exist from one cropping season to another need to be vigorously promoted in these droughts prone regions. Crops like, sorghum, millet, sweet potatoes, cassava and yams need both government backup as well as nongovernmental organizations.

5.4. Areas for further research

The study focused on the primary schools attendance but did not address the plight of children in the rest of the county as well as other parts of the country with similar challenges.

1. More focus should be on the cognitive aspect of learning which was not addressed by this research.
2. Similar studies should be done in other ASAL regions experiencing similar challenges.

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APPENDIX 1

Sampled schools and the total number of respondents per school

	Frequency	Percent	Valid percent	Cumulative percent
Merigwit	8	4.7	4.7	4.7
Magandi	8	4.2	4.2	8.9
Survey	8	4.2	4.2	13.1
Ndunyu	8	4.2	4.2	17.3
Githima	8	4.2	4.2	21.5
Island	8	4.2	4.2	25.7
Mathira	8	4.2	4.2	29.8
North tetu	8	4.2	4.2	34.0
Gatami	8	4.2	4.2	38.2
Mithuri	6	3.1	3.1	41.4
Lelematesho	8	4.2	4.2	45.5
Magomano	8	4.2	4.2	49.7
Karaba	8	4.2	4.2	53.9
Kiamariga	8	4.2	4.2	58.1
Mutarakwa	8	4.2	4.2	62.3
Miharati	8	4.2	4.2	66.5
Kahuho	8	4.2	4.2	70.7
Mutara	8	4.2	4.2	74.9
Muthanji	8	4.2	4.2	79.1
Ol-moran	8	4.2	4.2	83.2
Chereta	8	4.2	4.2	87.4
Kabage	8	4.2	4.2	91.6
Manyatta	8	4.2	4.2	95.8
Munyu	8	4.2	4.2	100.0
TOTAL	190	100.0	100.0	

APPENDIX 2

RAINFALL AND TEMPERATURE IN LAIKIPIA BETWEEN 2000 TO 2010

Station_ID	Station_Name	Element_Name	Year	1	2	3	4	5	6	7	8	9	10	11	12
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2000	26.2	27.6	28	26.6	25.8	24.9	24.6	24.5	26.2	25.1	23.6	24.8
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2001	26.4	28	27.6	26	25	24.4	23.8	24.9	26.4	26	22.6	24.6
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2002	26	28.2	27	24.7	24.9	25	25.4	25.2	26.8	25.8	22.8	24.2
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2003	26.4	28	28.1	26.1	24.5	24.2	24.3	24	25.3	25.3	23.4	24
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2005	27.3	28.5	28.4	26	24.2	23.9	22.7	24.6	24.9	24.5	24.7	26.5
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2006	26.8	27.9	27.1	24.4	24.5	25.3	24.3	24.6	24.5	25	23	23.5
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2007	25.4	27	27.2	25.2	24.3	23.8	22.9	23.3	24.5	24.1	24.2	25.2
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2008	26	27.1	27.2	24.9	24.7	24.6	23.7	24.5	25.9	23.9	23.5	25.2
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2009	26	26.9	28.2	26.7	25.5	26	24.6	25.3	26.5	24.4	24.3	24.2
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily maximum	2010	25	25.6	25.1	24.3	24.3	23.9	22.9	23.9	24.7	24.5	23.5	26.1
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2000	7.8	8.3	9.9	11.1	11.5	10.8	10.5	10.8	10.2	11.1	11.9	10.7
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2001	11.7	9.8	11.2	12.2	11.9	10.2	9.6	10.4	9.2	10.6	12	9.7
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2002	9.7	9.5	10.9	11.9	11.7	9.7	9.6	10.2	10.1	10.8	11.3	12.2
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2003	8.6	9.7	10.5	11.8	12.8	10.6	9.8	10.5	9.7	10.3	11.5	8.9
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2005	9.9	9.5	11.1	11.8	12.4	10.9	10.4	10.4	11	10.5	10.3	9.1
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2006	9.1	9.9	11.2	11.9	10.6	10.6	10.8	10.9	10.2	11.2	13.1	12.2
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2007	9.4	10.2	10.1	11.3	11.4	11.3	10.6	10.7	10.7	11.2	11.2	9.2
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2008	9.2	9.8	11	11	10.9	9.7	11	10.5	10.4	12.1	11.4	9.1
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2009	9.6	10.4	11.2	11.5	11.7	10.4	10.6	10.5	10.5	12.5	11.6	11.8
8937022	LAIKIPIA AIRBASE (NANYUKI)	Temperature; daily minimum	2010	10.8	12.2	13.5	12.6	12.6	11.3	10.6	11	10.1	11.2	10.5	8.6
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2000	24.6	0	2.8	44.1	21.8	6.9	33.7	23.6	4.2	64	50.1	11.3
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2001	94.9	0	131.7	76.2	45	32.8	77	36.9	25	84.4	144.3	3.7
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2002	12.6	0	61.8	137.2	103.2	19.4	34.9	12.4	18.1	66.9	61.1	109.6
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2003	7	8.2	50.9	222.5	145.1	13.4	63.8	123.6	19.2	56.1	85.8	30.5
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2004	58.9	28.5	55.9	116.5	56.8	47.8	86.6	56.8	40.5	37	108.4	16.6
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2005	3.2	0.4	10	168.2	86.5	28.1	74.5	40.2	140.3	54.1	18.1	6.8
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2006	3.8	7.4	79.7	102.5	45.9	12.7	9.6	124.6	31.6	49.8	106.8	48.1
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2007	30.9	28.7	19.9	122.1	56.7	105.2	45.9	112.8	57.4	71.9	23.7	19.6
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2008	14.5	4.6	51.6	52.8	25.6	13.6	51.3	25.2	96.3	76.3	95.8	32.7
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2009	23.6	5.6	0	48.3	47.3	28.3	19.6	49.7	13.8	93.5	38.3	100.6
8937022	LAIKIPIA AIRBASE (NANYUKI)	Precipitation; daily total	2010	14	81.3	171.1	110.9	84.6	32.5	342	365	321	749	839	12.3
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2000	24	24.7	24.8	24.6	23.1	21.5	20.3	19.4	21.7	22.1	20.8	21.6
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2001	21.8	24.5	23.5	22.1	22.1	20.6	19.8	20.6	21.9	22.6	20.1	21
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2002	22.1	24.4	23.4	22.7	21.8	21.7	22	20.3	22.7	22.6	21.1	20.6
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2003	21.8	24.8	24.8	23.4	21.3	20.4	20.2	20.6	21.2	22.4	20.8	21.1
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2005	23.6	24.8	24.7	22.9	21.1	20.5	19.6	20.5	20.7	22.1	21.3	22.6
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2006	22.9	24.5	23.4	21.5	22.4	21.7	20.1	20.1	21.4	22.2	19.4	19.8
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2007	20.8	22	23.1	22.1	22.4	20.2	19.1	19.6	20.5	20.7	20.4	21
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2009	22.7	23.8	25.1	24.3	22.5	22.8	21.7	22	23.6	21.9	21.1	21.1
9036135	NYAHURURU AGROMET STATION	Temperature; daily maximum	2010	20.8	21.9	21.3	22	21.9	21.1	20.1	19.9	21.3	22.2	21.2	22.7
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2000	5.7	5.5	6.9	7.8	7.7	7.3	8.3	7.2	5.7	6.7	9.7	8.3
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2001	8.7	6.6	7.6	8.6	7.8	7.2	7.1	8	6.1	7.5	9.5	8
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2002	7.4	6.5	8.1	8.6	8.3	6.7	5.9	6.5	5.3	7	8.6	10.4
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2003	6.8	6.7	7.5	8.9	9.4	8	8.6	8.2	8.4	8.6	8.9	6.7
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2005	7.2	6.6	8	8.3	9	7.9	7.5	7.4	7.3	6.9	8.5	7.6
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2006	6.7	7	8.4	8.9	7.5	6.8	8.4	7.8	5.7	6.9	10.8	10.5
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2007	8.5	8.1	7	8.3	7.6	9.6	8.1	7.8	7.8	7	8.8	7.8
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2009	7.1	7.1	7.8	8	8.9	5.7	6.1	7	6.9	8.6	8.7	9.2
9036135	NYAHURURU AGROMET STATION	Temperature; daily minimum	2010	8.3	9.7	10.3	10	9.3	8	8.9	8.2	7	8.9	8.4	7.4
9036135	NYAHURURU AGROMET STATION	Precipitation; daily total	2000	0	1.8	0	12.8	77.9	113.6	81.7	151.9	60.3	68.1	52.1	50.1
9036135	NYAHURURU AGROMET STATION	Precipitation; daily total	2001	80.5	0	174.8	188	93	128.5	105.8	245	34.6	55.4	104.2	28.1
9036135	NYAHURURU AGROMET STATION	Precipitation; daily total	2002	71.2	0.5	97.7	112.7	123.2	52.6	27	127.3	6.8	42.4	55.8	245
9036135	NYAHURURU AGROMET STATION	Precipitation; daily total	2003	6	0	37.3	105.1	121	89.5	190.3	201.2	49.9	17.5	49.2	37.8
9036135	NYAHURURU AGROMET STATION	Precipitation; daily total	2004	91.4	27.7	52.9	146	67.5	76.3	76.3	160.1	28.5	52.8	104.6	35.9
9036135	NYAHURURU AGROMET STATION	Precipitation; daily total	2005	26.6	33.5	41.2	110.3	177.7	69.3	154.4	90.2	143.6	7.8	22.9	11.5
9036135	NYAHURURU AGROMET STATION	Precipitation; daily total	2006	12.7	28.7	120.6	121	29.4	108.8	110.3	158	46.8	75.1	138.3	155.2
9036135	NYAHURURU AGROMET STATION	Precipitation; daily total	2007	37.5	61.5	26.4	70.2	112.9	232.2	265.6	234.3	299.1	28	41.5	4.9
9036135	NYAHURURU AGROMET STATION	Precipitation	2008	33.6	18.6	104.7	24.7	62.6	38.2	28.1	120.1	103.5	201.4	86.7	8.1
9036135	NYAHURURU AGROMET STATION	Precipitation	2009	4.2	3.5	0	37	144.6	28.6	89	96	22.8	73.9	97.8	171.5
9036135	NYAHURURU AGROMET STATION	Precipitation	2010	87.8	0	194.1	189	116.5	89.5	29.75	212.5	85.1	53.2	18.7	0

APPENDIX 3

PUPILS' QUESTIONNAIRES

Instructions to pupils

- a) Do not write your name in this questionnaire
- b) The information you will give will be treated confidentially.
- c) Indicate your choice by use of a tick[✓] where applicable.

1. School
2. Age
3. Class
4. Gender. Male []. Female []
5. With whom do you stay with? Father only []. Mother only [].
Both parents []. Relatives []. others.....specify.
6. Are any of your parents employed? Yes []. No []
7. If yes, state occupation of the parents.....
8. Have you been out of school during school days? Yes []. No [].
9. If yes, state (i). Number of times in Term 1.....Term 2 Term 3.....
(ii). Reasons (a). Sickness { } (b). No food { }. Parents moved { }.
(d)Death of a family member { }.(e) parents gave me work at home { }. (f)
Others.....
10. Has any other member of your family left school before doing KCPE. Yes []. No [].
11. If yes, state (i). Class left
- (ii). Sex of pupils who left, Male []. Female []. Both [].
- (iii). Number of pupils in the family who left
- (iv). What do they after they left school.....
12. Are there times you miss food at home? Yes []. No []
13. If yes, (i). How many times in a week?
(ii) Do you report to school the following day? Yes []. No [].

14. Do the small farms around your home sometimes fail crops completely? Yes []. No []
15. If yes, name the crops that failed.....
16. Have you seen animals dying of hunger around your home? Yes []. No []
17. If yes, name the animals that died.....
18. What is the source of water used in your homes, Dam [] Tap []. Well []. River []. Tank []
19. How far away is the water source; walk for 30 min, up to 1 hour, up to 2 hours, more than 2 hours.

SECTION B.

Indicate; **strongly agree, agree, disagree, strongly disagree.**

1. Sometimes rain water destroys crops near our home.
Strongly agree []. Agree []. Disagree []. Strongly disagree [].
2. My parents sometimes walk long distances to fetch food.
Strongly agree []. Agree []. Disagree []. Strongly disagree [].
3. There are many of my classmates who have left school since we started class 1 together.
Strongly agree []. Agree []. Disagree []. Strongly disagree [].
4. Girls more than boys are given more work at home.
Strongly agree []. Agree []. Disagree []. Strongly disagree [].
5. More boys than girls drop out of school because of lack of food.
Strongly agree []. Agree []. Disagree []. Strongly disagree []

APPENDIX 4

TEACHERS' QUESTIONNAIRE

Dear colleagues, as we are aware of the impact of Climate Change globally, it is indeed my pleasure to investigate the influence of drought as an effect of Climate Change on the education of pupils in your school. Your contribution will be highly valued and all the ethical considerations will be put in place as you respond to these questionnaires.

SECTION A

1. Gender. Male [] Female [].
2. Age. Below 25 [], 26 – 30 [], 31- 40 [], 41-50 [], 51-60 [].
3. Category of the school. Boys []. Girls []. Mixed [].
4. Taught in this same school for. 1-5 years []. 6 -10 years []. 11- 15 years [].16 and over[].

SECTION B

5. How often do you experience drought cases within the school vicinity?
Frequently []. Occasionally []. Seldom []. Never [].
6. Are there some implications of drought that have also affected the school? Yes [].No[]
7. If the answer to number 6 is **yes**, (please specify).....
8. Within the school locality, are there some negative impacts that have also affected the school? Yes []. No [].
9. When drought incidences occur, what do the children normally do?.....
10. a). Do you normally have children who leave school due to drought conditions? Yes []. No []
b). If the answer to **10 a** is **Yes**, do they ever come back.....
c). If the answer to **10 b** is **Yes**, how long do they take before they resume classes
.....

d). Who between boys and girls are more affected if the answer to **10 a** is **Yes**

.....

11. Does the school have school feeding programme? Yes []. No [].

12. If the answer to number **11** is **No**, where do they get their lunch from?.....

13. During what season do children mostly drop out of school?.....

14. In your own opinion, do the communities around the school's environs have ways to deal with droughtHow (Please briefly explain).

15. What challenges do teachers face as a result of drought?.....

16. Are there interventions measures taken to address drought situation adequately in the area.....

17 who takes charge of the mitigation measures? Government [].Churches []. individuals.[].NGOs [].

18. Do you experience parents' inability to cater for their children's needs during the dry seasons? Yes [] No []

APPENDIX 5



Plate A.1: A semi arid section in Rumuruti (2011) Plate A.2: A semi arid section in OI Moran 2011



Plate A.3: Reduced school attendance after drought (Oct 2011) Plate A.4: Dilapidated classrooms in OI Moran (Oct 2011)



Plate A.5: Farming challenges in Rumuruti (Sep 2011) Plate A.6: Expected bumper harvest in Muhotetu (Sep 2011)



Plate A. 7: School Feeding Programme in Ol Moran



Plate A.8: A young Herd's boy milking into his mouth



PlateA. 9: Plenty of water after heavy rains(Sep 2011).



Plate A.10: The dry dam after two months.(Nov 2011)



Plate .A:11 Pupils involved in Ol moran Livestock auction (Oct 2011)



Plate A. 12: A young boy herding during a school day in Oct 2011.

[The above photographs were taken between September and December 2011]