# THE DETERMINANTS OF ACCESSIBILITY TO WATER IN SECONDARY SCHOOLS IN KAJIADO COUNTY, KENYA

**BY**

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**A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN PROJECT PLANNING AND MANAGEMENT OF THE UNIVERSITY OF NAIROBI.**

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# DECLARATION

This Research Project Report is my original work and has not been presented for award of degree in any other University.

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This Research Project Report has been submitted for examination with my approval as University Supervisor

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# DEDICATION

This work is dedicated to my wife Nancy Cherop for moral support. I also thank Mehret Gybreyesus and Haggos who made sure that my study is a successful. Finally to my family and Hilltop Bible study group of CITAM Ngong for their encouragement when I wrote this report. May the favour and Grace of God be with you.

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# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AMCOW | African Ministers of Council of Water |
| AMREF | African Medical and Research Foundation |
| ASAL- | Arid and Semi-Arid Lands |
| CSO- | Civil Society Organization |
| EWS | Early Warning Systems |
| FAO | Food and Agricultural Organization |
| GDP | Gross Domestic Product |
| GoK- | Government of Kenya |
| IEA | Institute of economic affairs |
| JMP | Joint Monitoring Programme |
| MEMR | Ministry of Environment and Mineral Resources |
| MDG | Millennium Development Goals |
| MWI | Ministry of Water and Irrigation |
| NEMA | National Environment Management Authority |
| NWP | National water policy |
| NCCRS | National Climate Change Response Strategy |
| NWCPC | National Water Conservation and Pipeline Corporation |
| NLC | National Land Commission |
| ODA | Overseas Development Assistance |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNICEF | United Nations Children's Fund |
| USAID | United States |
| WB | World Bank |
| WHO | World Health Organization |
| WASH | Water Supply, Sanitation and Hygiene |
| WRMA | Water Resources Management Authority |
| WRUA | Water Resource Users Association |
| WWF | World Wide Fund for Nature |
| WSP | Water and Sanitation Program |
| PTA | Parents Teachers Association |
| MP | Member of Parliament |

# ABSTRACT

Water access is crucial for socio economic development. Water is life and a right of every citizen. The access to water is still a great challenge to the government especially in arid and semi- arid areas. The MDGs which had a target of halve the population to have access to water by 2015 has so far been affected by various challenges in meeting its goals. The post millennium development goals had to be set up to ensure areas which MDGs did not meet are addressed to. One of the areas that is under review is to ensure access to water in schools by 2030.Water sectors has gone through various reforms with the aim of better transparency, water governance and accountability. The major developments in the sector have been faced with implementation challenges though efforts are in place. Water access in secondary schools in Kajiado County being a semi- arid area is a faced with many challenges. This research sought to identify the determinants of water accessibility in secondary schools in Kajiado County. The study sought literature on water access globally, regionally and locally on the study area and identified the independent variables as; the water provision services, water catchment and conservation, water policies and regulation, political leadership and economic activities. The study target population was 124 secondary schools and 66 secondary schools were registered private secondary schools and the rest public schools including two county water officers. The sample of 30% was selected for study hence 20 private secondary schools and 17 public secondary schools were selected for study making a total of 37 schools. The researcher also interviewed one county water officer. The study took descriptive survey research design. The sampling frame utilized stratified random sampling technique. The study data was collected using the instruments; interview on county water officers and two self- administered questionnaires per school. The data collected was analysed using statistical Package for Social scientist software and analysis on descriptive and correlations statistics using spearman rank coefficient correlation were done. The study findings were presented in tables. The study findings indicated that water provision services is still far from being achieved. The water services providers have low coverage hence most schools rely on borehole water and water tankers. The water catchment and conservation require management and maintenance. Water storage is still lacking due to insufficient storage facilities. Most of the schools have medium storage facilities for water storage hence cannot cope with demand especially in dry seasons and the student population. The study finding on water policies and regulations reveals that most schools do not recycle water. The study also shows that the water points need maintenance in order to reduce water pollution hence less treatment resulting in reduced waterborne diseases. The study reveals that political leadership has not done enough in access to water in schools. The CDF funds have not been sufficient to assist in access to water in schools. There is some involvement in donor funding to water access. The study also found the economic activities to have an influence in access to water. Livestock keeping has an impact on water access as it takes much of the water but not as irrigation agriculture which consume huge quantities of water. Sand harvesting is also doing a great impact on water access in secondary schools.

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# CHAPTER ONE
# INTRODUCTION

## 1.1 Background of the study

The study explored the determinants of access to water in public and private secondary schools in kajiado county, Kenya. The previous studies have concentrated on water access in household hence other areas have been overlooked and that was why the study focused on secondary schools as the study area. The proposed (WHO/UNICEF, 2012) post 2015 WASH targets is to attain universal basic drinking water in schools by 2030. In Kenya there are about 40 million people and about 43% do not have access to water due to various factors among them, the provision of water services, water catchment and conservation, water policies and regulations governing water sector, political leadership and economic activities. Access to safe drinking-water (Künzle, 2012) is a basic human right and essential to life. Nevertheless, a large number of people in developing countries lack safe drinking-water and therefore one target of the Millennium Development Goals of the United Nations is to halve the proportion of the population without sustainable access to safe drinking-water by 2015. Safe drinking-water includes both quantity and quality.

By 2030, 47 per cent of the world's population will be living in areas of water stress. Reducing by half the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015 is one of the global targets under the internationally-agreed poverty and social development vision known as Millennium Development Goals (MDGs), which have a 2015 achievement deadline. According to MDG report 2012, slightly about a billion people globally, are not in a position to access good drinking water from a good source. The water sources include house taps, the taps in the public domain, drilled boreholes, safe dug boreholes, safe springs and rainwater that has been harvested. In 2010, 89 per cent of the world's population was using safe drinking water supply, up from approximately 76 per cent in the year 1990 and 605 million people is estimated will still be without water supply coverage by 2015. In-case the

current situation persists, only 92 per cent of the world population will have water by 2015 (MDG, 2012).

According to the JMP (2012) report, Kenya has an access to water supply at 59% and only about 41% do not access safe water supply. The crisis still exists in rural as well as urban areas in both safe water and good sanitation. According to Onjala (2006), Kenya is categorized as a country with scarce water resources with per capita water estimated to be below the international benchmark of a thousand metric cubic. In 2005, the estimated per capita in Kenya was about 612 metric cubic for all uses. This condition is expected to get worst by the year 2025 when it is expected per capita is approximated to be about $235M^3$. It poses great threat to socio-economic development as well as integrity of national ecosystems of the country (IEA, 2007). Kenya faces challenges in water provision due to erratic weather patterns in the past few years which has led to severe drought and lack of water. Kenya also has no renewable water supply and is identified as a water scarce country. According to UNICEF (2013), Access to safe water and sanitation facilities in Kenya is limited. More than 15 million people – including more than half the rural population – are without access to safe water or sanitation facilities.

According to CoK (2010), states that water and sanitation are declared as a right. The right to water and sanitation includes:-availability of water, access to water and good water quality. The government of Kenya is expected to respect this right and protect as well as fulfil it. It is expected that an additional 16 million people are expected to benefit from accessing water. This is expected to bring the proportion of citizens with access to good water supply to about 81% while for excellent sanitation will make the new coverage to 82%. (WSP, 2011)

Kenya even though it is on track expected to achieve water set targets by MDGs, it is evident that regional disparities is found in the local level than country average coverage rate especially in Arid and Semi-Arid Land (ASAL). Currently overall coverage in Kenya stands at 59% while in the North Eastern province of Kenya it is less than 22% of the citizens who can access safe water. Kenya is not well endowed with water resources as observed by Wekesa and Karani

(2009), hence counted as a water scarce country 650 metric cubic less of freshwater per capita they concluded. The resources are vary a lot both temporally as well as scattered with drought, floods, especially in the ASALs, mostly seen with grievous outcome on the local and entire economy of the country. The trend is increasing on reliance on emergency water trucking because of lack of investment on water facilities and water resource management.

Over 70% of the population in Kajiado county being a semi- arid area suffers from occasional droughts mainly because of low rainfall patterns and inadequate access to water sources something that continues to define Kajiado resident's standard of living. According to AMPREF, degradation of natural resources is reported in Kajiado (AMREF, 2010). The main sources of water, particularly unsafe, is the fetching of water in the spring or river bed, the dug wells in the homesteads, springs which may not be safe, boreholes and lack of tap water in average potential places. The encroaching land settlements due to land subdivisions, bio degradation resulting in herders suffering from drought induced famine situations hence the cause of poor access to water in secondary schools. The observation made by Rutten (2005) reveals that the demand for water in Kajiado County is growing rapidly and is estimated to be around 223,000 $m^3$ daily, with some 31,000 m3 for livestock, 8,000 $m^3$ for wild animals, 15,000 $m^3$ for human consumption and 170,000 m3 for irrigation. Boreholes, natural wells and rivers have a daily maximum potential of 180,000 $m^3$. This works out at a daily shortfall of 40,000 $m^3$. Alternatives – such as shallow wells, dams and pans – are of crucial importance in balancing this deficit (Rutten, 2005).
The study was focusing on establishing the determinants of the accessibility to water in secondary schools in Kajiado County being Arid and Semi-Arid County.

## 1.2 Statement of the problem

In the year 2012, 59% of Kenyans were accessing safe water which shows that there still remains more than 40% still without access. The study attempts to provide the factors that influence the access of water to secondary schools in Kajiado County which is part of the 40%. The access to

water has a positive impact on both social and economic sectors. The study will attempt to shade more light on Water is life hence it has become one of the human rights. According to a report of USAID (2009) more than one a billion people do not have access to safe water suitable for drinking. In Africa less than half a billion people do not have access of safe clean water for domestic use especially water for drinking. It is therefore means that Africa has the lowest total water supply coverage of the other parts in the world. The study has a practical relevance where the schools can effectively pursue for the solutions on the factors influencing access to water. The community can initiate radical measures to curb the problems related to access to water.

According to the report on water (WB, 2012), Kenya is considered as water-scarce countries in the world, with a majority of the people are unable to access safe water at an affordable price. The price of water in Kenya is very high hence few can afford good quality water. The factors which influence the access to water have not been clearly addressed especially in Kajiado County. There is lack of political good will on water issues, and laxity on water policy issues, water services and water catchment and conservation factors. These factors create pressure on water resources hence lack of access to water. There is plenty of freshwater in the world for all people but it is distributed unevenly and too much of it is wasted, polluted and unsustainably managed. There is enough water for all Kenyans but the access to the water is the problem caused by both natural and man-made factors (UN-Water, FAO 2007). The latest World Water Development Reports (UN-Water, 2009, 2012) observed how the various global crises reported recently in climate change, energy, food security; economic recession and financial turbulence are related to each other and have impacts on water. The Reports reminded that water plays a role in all sectors of the economy and is essential. Although various studies have been done on similar issues on access to water elsewhere there is regional difference hence those research could suit only those regions.

According to Kajiado EWS monthly bulletin (2012), water availability for economic activities such as agriculture, livestock and domestic use was on downward trend. Surface water sources

including dams and others had less water but the levels were drastically reducing due to high temperatures experienced. According to the report, boreholes worked for long on especially October 2012 to satisfy the growing population. The increase was seen owing to the fact that most water sources were drying up. The piped water from Mount Kilimanjaro which could have helped the community has so far be the point of contention and for the last three years the water taps have been empty affecting the residents of kajiado. On the water catchment and conservation, climatic conditions have brought so much impact on drought patterns. The drought cycle used to take 10 years but now it is two years hence making access to water difficult. The rivers and other water sources are drying up creating more harm on access to water. The leadership in the political arena has not played its part well in solving the water issues. The water for production in areas mining, agriculture especially flower farming among others are drawing in much amounts of water. Sand harvesting is another economic activity contributing to lack of access to water. The lack of adherence to water policies and regulations has denied the community access to water. The implementation of policies is slow. Water service provision has been met with various challenges in terms of infrastructure and funding. Studies carried out by Belgium Administration for Development Cooperation on assessment of Water Users Associations (WUAs) in Kajiado County concluded that the general condition of the WUAs managed projects was between poor and pathetic (Koome, 2012). The boreholes in the area provide poor quality water as per earlier scientific research and no solution is forthcoming. It was with all the views expressed that this study was done on the determinants of accessibility to water in secondary schools in Kajiado County. The research took place between February and July 2013.

### 1.3 Purpose of the study

The research sought to establish the determinants of the access to water in secondary schools in Kajiado County, Kenya.

## 1.4 Objectives of the study

The general objective of the study was to establish the determinants influencing the access to water in both public and private secondary schools in Kajiado County in Kenya.

The objectives of the study were;

1. To assess the influence of water provision services on access to water in secondary schools.
2. To assess the influence of water catchment and conservation on access to water in the secondary schools in kajiado.
3. To assess the influence of the water policies and regulation on access to water in secondary schools.
4. To assess the influence of political leadership on access to water in secondary schools in kajiado county.
5. To assess the influence of the economic activities on access to water in secondary schools in kajiado.

## 1.5 Research questions

The following questions were tackled during the study.

1. What water provision services are available in the secondary schools for water accessibility?
2. How do secondary schools handle water catchment and conservation?
3. How do secondary schools deal with water policies and regulation as well as its implementation to ensure water accessibility?
4. How do the political leadership influence water accessibility?
5. What influence do the economic activities have on the water accessibility?

## 1.6 Significance of the study

The study sought to give various insights on access to water in Kajiado county secondary schools that can be used to address the water access problems in secondary schools in Kajiado. The access to water is paramount and the United Nations is adapting rights to water as part of the

human rights. The study can be used by policy makers and all relevant water authorities to evaluate and develop solutions for water access. The Kenya vision 2030 and constitution of Kenya (2010) recognizes water as a right. Any factor that hinder human race from accessing this precious commodity must be dealt with. Water deem to be the lifeblood of the world, and its state affects natural, social-economic systems mostly in ASAL areas. The government of Kenya has allocated funding to improve access to water on the water strategic plan towards vision 2030.if the implementation of this funding is done it will improve access to water and schools will be beneficiaries. In the year 2012 according to statistics, 59% of Kenyans were accessing safe water which shows that there still remains more than 40% still without access to water. The findings of the study address the key factors affecting secondary schools in access to water for various purposes in the schools. The recommendations of the study have helped by providing more information on the factors that hinder access to water in secondary schools in Kajiado County. The study has shed light by contributing on the post 2015 MDG goals on water where by 2030 schools should have access to water. The identified gaps in the access to water generate opportunities for the next course of action in reducing the gap of water scarcity. The areas that the research has identified can be pursued further by other research bodies. The other schools in arid and semi-arid areas can appreciate the findings of this study. The water institutions and water experts can also use the data obtained for further research on access to water. The environmentalist can utilise this research for planning and implementation of policies on natural resource conservation.

### 1.7 Basic assumptions of the study

The researcher assumed that the participants in this study would volunteer their time and filled the questionnaire with sincerity. The study also assumed that the respondents would not be forced to answer what they were not comfortable. The study assumed that the respondents understood the language that questionnaire was drafted.

## 1.8 Limitations of the study

The major limitations that were encountered in this research were the expected fear and confidentiality from the potential respondents to the questionnaire. The bureaucracies in the education sector highly limit the respondent's objectivity in answering the questions and responding especially on sensitive issues on political leadership. The study overcame these potential limitations, by establishing contacts and used an introductory letter from the university which gave confidence to the respondents. The respondents had limited time in answering the questionnaire because of other duties. Most headmasters had gone for annual head teachers' conference. The county was vast in size hence took time to traverse.

## 1.9 Delimitations of the study

The study dealt with the determinants to access to water in secondary schools in Kajiado County. The study was restricted to public and private secondary schools on what factors affect the accessibility to water. The period of the study was between February and July 2013.

## 1.10 Definitions of significant terms

**Water provision** – it includes the provision of safe and clean drinking water. It includes both rural and urban. It is done by water service providers. Management is important for effective service.

**Integrated Water Resource Management (IWRM) -** a multifaceted approach for integrating all aspects of water security and management so as to achieve desired economic, environmental, and social goals

**Dam** – A structure of earth, rock, or concrete usually built across a watercourse for impounding or diverting the flow of water in order to make a pond, lake, or reservoir.

**Groundwater** – Water which is held underneath the earth's surface in underground streams and aquifers.

**Surface water** – Water located on the earth's surface in the form of streams, rivers, lakes, wetlands or oceans.

**Water supply** – The amount of water that is accessible for a given demand and that can be delivered reliably and sustainably with respect to the environment or the finite resource base.

### 1.11 Organization of the study

The report has been divided into five chapters. The first chapter dealt with the background on the water access globally, regionally and locally. It gives statistical analysis on the global access to water. The other sub-section gives highlights on statement of the problem under study, followed by the objectives of the study and study questions. The second chapter of the study dwells on the literature review. The theoretical review, the global access on water, regional and water access in Kajiado County. It also looks at empirical literature on the independent variables which the study had identified. The third chapter elaborates on the research methodology of the study. It shows the research design, population of the study and sample, the data collection instruments. It also involves data analysis, reliability and validity. The fourth chapter is on data presentation, analysis and interpretation of the study findings from the field. The final chapter deals with the findings summary, discussions and recommendations and finally the study literature references and attachments closed the chapter.

# CHAPTER TWO
# LITERATURE REVIEW

## 2.1 Introduction

The purpose of this chapter is to set the suitable theoretical frame including empirical literature review for the research. This chapter is structured as follows; it deals the theoretical literature and empirical literature review on the access to water in the study population. It also examines the relationship between the dependent and independent variables which are developed into a conceptual framework of the study. The past literature has been critical for any academic research and this research is no exception. According to Hart (2010), literature review is an objective, the critical analysis and thorough summaries of available relevant research and non-research information of the research field under study. The study literature review is important in especially in delimiting the study problem. The chapter gives various variables under study that influence the access to water based on the findings from different authors. The chapter dealt with the water provision services, water policies and regulations and water catchment and conservation, the political leadership and economic activities.

## 2.2 Theoretical framework

According to (Cooper, 2011) he defines a theory as a set of interrelated concepts which can be used in the study, definitions, prepositions that have been put forth to explain or predict a scenario under study. The theoretical framework of this research proposal is based on the ideas of the resilience theory. According to (Anderies, 2011) the world is undergoing change; global warming, changing macro-environment and ecological conditions. Like hunger, deprivation in access to water is a silent crisis experienced by the poor and tolerated by those endowed with resources, the technology and the political power to end it. Lacking water and sanitation is a polite euphemism for a form of deprivation that threatens life in ASAL areas. It destroys the opportunity and brings down human dignity. Lack of water lead to no alternative to get water apart from any available water resource regardless of its purity. Kajiado County is not spared in

global warming and this has led to water access problems. The county experiences bi-modal rainfall pattern hence the ecosystem has to cope with it. There is, for better or worse situations and no fix normal situations. The water provision services are affected in one way or another. The water table may go down as well as the economic activities especially agriculture may take much water during dry seasons. The fixed functions that human being need to live, or generally want to maintain are basic needs as given by Maslow hierarchy of needs. In some parts of the world, the needs are taken care of while others not, but few would deny that providing such needs is a priority especially when it comes to water access. When water catchment is affected by natural and human factors basic need i.e water for this care it becomes hard to provide. There are situations in Kajiado county where the community practise charcoal burning hence it affects water catchments.

The study is grounded on resilience theory by Crawford Stanley Holling.The resilience thinking focuses on the magnitude of change that the system can cope with while still being able to function and to the ways in which social systems are capable of adapting to these changes. It emphasizes the dynamic interconnections between the ecological and social systems, which makes it useful for assessing environmental impacts on livelihoods. The water accessibility in the secondary schools in kajiado faces these dynamics in ecological and social system. The determinants of the accessibility to water which this study is focusing on are basically as a result of ecological effects. This includes global warming which is as a result of human activities. The activities include deforestation which affects water catchment. The provision of water services are affected by among others sand harvesting for instance in Kajiado.

### 2.3. Global Access to Water

According to UNDP (2006) report about 1.1 billion people are grouped as lacking access to clean drinking water use about less than 6 litres daily. One of the most important recent milestones has been the recognition in July 2010 by the UN is the human right to water. The UN recognized the right of every individual to have access to sufficient water for individual and common uses

estimated at less than 100 litres daily. The water must be safe, acceptable and one can buy easily. The water also should be easily accessed (UN water for life 2013).

The new study by UNICEF and WHO revealed that between 1990 and 2008, the proportion of the earth population with access to safe water sources increased from 77% and 87%. In the world, 8 in 10 people are without safe water sources stay in rural areas. Some countries are failing to increase access to safe drinking water sources in line with rising population. For example, 12 countries (mainly in Sub-Saharan Africa) have each seen an increase of more than 1 million people without water access since 1990, despite making great progress in providing safe water to millions of people and seeing increases in coverage between 1990 and 2008 (UNICEF/WHO 2011).

According to UNDP (2006) the world is not running out of water, but many millions of its most vulnerable people live in areas subject to mounting water pressure. About 1.4 billion people live in river basins in which water use normally exceeds recharge rates. The signs of much use are first rivers drying up, the groundwater tables mostly in ASAL areas are falling and water-based ecosystems are being rapidly reduced. The UN has long been addressing the global crisis caused by lack of water supply to satisfy basic human needs and growing demands on the world's water resources to meet human and agricultural requirements among others. The decade according to UNDP, in particular, has helped 1.3 billion people especially in developing countries gain access to safe drinking water the UNDP report concludes.

The UNDP report observed that population growth, expanding cities in the world and accelerating economic activities and increase the demand for food has created additional pressures on our limited water resource. The lack of integration of water in the development agenda and minimal investments in water are putting a serious brake on social and economic development in emerging economies while adversely impacting the most vulnerable groups and our environment (UNDP 2006). According to the report by UNICEF (2012) only 61 per cent of the people in sub-Saharan Africa have access to improved water supply. Over 40 per cent of all

people globally who lack access to drinking water live in sub-Saharan Africa according to UNICEF. The report confirms that in cases where water supplies are not readily accessible, the burden of carrying water falls on women. In many countries, the wealthiest people have seen the greatest developments in water access, while the poorest still lag far behind. The report further provides the latest update on rural areas across the globe, highlighting the need for greater attention both to water and sanitation. In rural areas in Least Developed Countries, 97 out of every 100 people do not have piped water and 14 per cent of the population drinks surface water—for example, from rivers, ponds, or lakes.

According to World Health Organization around 1.1 billion people in the world do not have access to safe water supply sources. During the 2011 World Water Day event in Cape Town, the Chairperson of African Ministers of Council of Water (AMCOW) said there is no life without water and that water is human right. In Africa, the struggle for access to clean drinking water is one of today's most obvious examples of how water scarcity leads to the stalling and reversal of human progress.

Water is essential for all (UN 2006) socio-economic development according to UN Water report. Water is a good lifeblood of the world, able to generate, sustained, and ultimately to unify life on earth (UNESCO-IHP 2009). Estimated 780 million people (UNICEF/WHO, 2012) drink water from safe sources, and millions more drink contaminated water from improved sources. Water use has grown at twice (UN 2012) the rate of population during the past century. 1.1billion people lack access to safe water, roughly one-sixth of the world's population, and 2.4 billion or 40 per cent of the world's people lack access to adequate sanitation services. By 2025, 1 800 million people (UN 2006) will be living in countries or regions with absolute water scarcity according to UN, and two-thirds of the world population could be under water scarcity conditions.

According to studies by UN-Water, as population increases and development calls for increased allocations of groundwater and surface water for use at homes, agriculture and industrial sectors,

and they put pressure on water resources which lead to tensions globally and conflict on users, and excessive pressure on the environment. Only 2.5 per cent of the water supply on earth is fresh water (ISDR UN2007) .The increasing stress on freshwater resources brought about by ever rising demand and use, as well as by growing pollution worldwide. The report indicated that poor access is due to lack of access to water services and inadequate infrastructure on water. Most of the nearly three billion people to be added to the world's population by 2050 will live in countries where water tables are already falling according to report (UNESCO, 2012).

Overall, 80 per cent of the world's urban population (UNICEF 2012) has piped water connections, compared to less than 30 per cent of people in rural areas. The rural-urban divide is particularly acute in Sub-Saharan Africa where the gap is 29 percentage points. In LDCs ninety-seven out of every 100 rural dwellers do not have access to piped water. UNICEF projects that in 2015 when the Millennium Development Goals are due, 605 million people will still not have this basic human right. Universal coverage of water supply and sanitation services must be a central development goal in the post-2015 period. UN-Water urges national governments to set realistic intermediate targets and goals. The framework for achieving the ultimate goal will need to accommodate both development targets and human rights targets at all levels, in line with the notion of access to water and sanitation services as a human right as stated in the UN General Assembly Resolution 64/292. Continued assessment and analysis of the enabling environment (policy frameworks, institutional arrangements, human resource base and financial flows) will allow the identification of critical bottlenecks.

The highest priority must be given to the 'bottom billion' people while addressing inequities in access to water, which are closely linked to energy security as well as food security. These people live in slums and impoverished rural areas without access to safe drinking water supply, adequate sanitation services, or adequate food and energy services. Addressing their water challenges and helping them out of extreme poverty must receive the highest priority and trigger action at all levels for a successful green economy. This is important from a humanitarian standpoint and for promotion of economic growth and social stability (UNEP, 2012).

Fourteen countries in Africa are already experiencing water stress; another 11 countries are expected to join them by 2025 at which time nearly 50 per cent of Africa's predicted population of 1.45 billion people will face water stress or scarcity. Nearly 51 per cent (300 million people) in sub-Saharan countries lack access to a supply of safe water and 41 per cent lack adequate sanitation. More than 80 of Africa's river (WWF, 2012) and lake basins are shared by two or more countries and many countries depend on water flowing from outside their national boundaries. Some large-scale water infrastructure projects including dams and may exacerbate the impacts of flooding and drought, threatening people's livelihood and further reducing their access to water. **(Fig.2)**

**2.4. Water Access in Kenya**

According to (MWI 2013) the Kenya Census of 2010, more than 35.4% of Kenyan households depend on point sources (springs, wells, and boreholes) while around 63.1% of rural population is relying on untreated (unsafe) water. Kenya is limited by an annual renewable fresh water supply (Momanyi, Quyen Le, 2005), of only 647 cubic meters per capita and is classified as a water scarce country. The new Constitution recognises water as a human right; this means that every Kenyan has a right to clean and safe water in adequate quantities. The right to water entails three elements ─ availability, quality and accessibility. The government is obligated to respect, protect and fulfil this right. In the Water Services (MWI, 2012) sub-sector, the government has spent over Kshs 60 billion in the last four years to upgrade water and sanitation services infrastructure countrywide, bringing improved and reliable water and sanitation services to nearly 7 million additional people . The Kenya economic survey 2012 indicated that government has built dams for water harvesting and to contain floods. The dams are expected to boost the access to water. As a water-scarce country, Kenya is critically exposed to the adverse effects of environmental degradation and climate change. In this regard, the government has prioritised the development of large-scale water storage infrastructure to mitigate water scarcity and control floods. A Water Storage Investment Plan has been prepared and is under implementation, with the construction of five large dams already underway. The Ministry of Water and Irrigation

(MWI) investment programmes contribute to the attainment of the Vision 2030 objectives and milestones, Medium Term Plan (MTP) flagship projects, the MDG goals and the Constitution of Kenya 2010. These programmes targets ensuring availability of adequate water for the various competing demands with a strong specific focus on providing services to the underserved urban and rural poor. To meet the water targets as per Vision 2030, a growth in the budget of 40% annually is required (WSP2011). Kenya is committed to the achievement of the Millennium Development Goals on water and sanitation as elaborated in the country's development blueprint, Vision 2030. The Ministries of Water and Irrigation (MWI) and Public Health and Sanitation (MPHS) are spearheading the drive towards attaining these targets through a devolved structure. (NWP2012)

According to the constitution (CoK 2010) it spells out, among other provisions that; water is vested in the people, water (supply) and sanitation (services) is a right, development of water resource (and national public works) is a function of the national government, along with implementation of specific national government policies on natural resources, as shall be informed by the National Land Commission (NLC); and environmental conservation as well as county public works and water and sanitation services provision including storm water management is the function of county governments.

**2.5. Water Access in Kajiado County**

Kajiado is one of 18 County that make up the Rift Valley Province. It borders the Republic of Tanzania to the southwest, Taita-Taveta district to the southeast, Machakos and Makueni districts to the east, Nairobi Province to the northeast, Kiambu district to the north and Narok district to the west. It lies between longitudes 36º 5' and 37º 5' east and 1º 0' and 3º 0' south.

It covers an area approximately 21,909.9 square kilometres and is divided into seven administrative divisions. Ngong division has the highest population density of about 50 persons per square kilometre while Magadi has the lowest at 9.5 persons per square kilometre (ALRMP2005).

Kajiado County entirely depend on groundwater reserves due to limited number of permanent rivers and reliable rainfall regimes. The major rivers (NEEMA 2009) in the County include; Athi, Ewaso Ngiro, Olkejuado and Noolturesh. In this case construction of water dams and pans, boreholes and shallow wells are important means of accessing water in the County. Boreholes and shallow wells remain the most widespread methods of accessing water in the County. Water supplied to the County is far short of the estimated demand for the county.

The water demand is calculated on the basis of the user categories i.e. domestic, livestock and commercial water use. Irrigation water demand and use of water from natural rivers, springs, pans/dams where treatment is required and is not in place it is not taken into account. The percentage of district population in household survey research by German Agro-Action has it summary on access to portable water in kajiado as given in the table:

**Table 2.1;** Access to water in Kajiado County

| Division | Water demand ($M^3$/day) | Water availability($M^3$/day) | Percentage coverage |
|---|---|---|---|
| **Central/ Isinya** | **61,108** | **2,644** | **43** |
| **Namanga** | **3,936** | **1,342** | **34** |
| **Loitokitok** | **10,518** | **2,358** | **22** |
| **Magadi** | **1,951** | **1,732** | **89** |
| **Ngong** | **15,569** | **8,498** | **55** |
| **Mashuru** | **4,309** | **1,986** | **46** |
| **Total** | **42,399** | **18,560** | **44** |

*Source; German Agro Action 2011*

According to German Agro Action (GAA, 2011) household baseline survey, the source of water varies markedly between the dry and rainy seasons. During the dry season households mainly collect water from shallow wells (34.3%) and boreholes (41.1%). In the rainy season however, this changes significantly and only 12% of households collect their water from shallow wells and only 9.1% from boreholes. This reflects the fact that, in the rainy season, earth dams tend to be abundant with water and hence 64% of households collect their water from earth dams in the

rainy season but only 3.4% do so during the dry season **fig.2** In addition, since households are required to pay for borehole water, this source would not be the first option for obtaining water, even though the water is perceived to be clean. The Millennium Development Goals (MDGs) have set a target that communities should be able to access water within a 1km distance from their homes which is not so in kajiado. It is evident, however, that this MDGs requirement is a long way off being met during the dry season.

**2.6. Water Service Providers and access to water**

Ministry of Water Irrigation, (2005-2007) conducted a study on the National water services strategy (NWSS) which was published and was prepared in accordance with section 49 and 50 of the water act 2002. The study found out that sound institutional frameworks to adequately carry out the water sector reforms were not properly functional. There were also improper design programs to carry out water facilities expansion to all areas in Kenya. The study found out that there were no enough strategies and funds to expand water to all underserved areas in the republic. There was no proper national monitoring and evaluation mechanisms on water service deliveries and no well documented investment programs in the water sector to carry out water reforms effectively. The study recommended that, for the success of the reforms in the country, there should be arrangements to come up with well-structured and working water institutions to ensure that at all times there, is in every area of Kenya, a person and institution providing water supply to the citizens at fair tariffs. The other recommendation of the study was the need to design programs to bring about the progressive extensive of water supply infrastructure to all the Kenya people.

According to (Kimotho 2012), 77% of the WSPs were faced with a problem of lack of planning departments hence no monitoring of strategic plans. The areas identified were operating department, lack of funds, lack of commitment by top managers, the dynamics in organizational group, lack of embracing change, new economic and technology challenges, cost of business operation on the overhead and operating costs, political and social influence, poor customer relations, poor planning mechanism, and poor geographical coverage adherence to

implementation timeframe and inaccurate data. The study recommended Act governing WSPs be amended to allow for business friendly practises for sustainability.

### 2.6.1 Poor Management of Water Supply and access to water

According to the study by (Marshall, 2011) for many years there has been an increased need for; funding, management and development of water resources in Kenya because of the increasing population as well as the country's increasing use of water for agriculture. However, the actions taken have not been effective because organizations in charge of managing water resources have failed in multiple ways. According to the Government of Kenya's National Water Development Report of 2006, Kenya's water resources have been mismanaged through unsustainable water and land use policies, laws and institutions, weak water allocation practices, growing pollution, and increasing degradation of rivers, lakes, wetlands, aquifers and their catchments.

According to Ngigi and Macharia (2006), Kenya's government devised a plan in 1974 to ensure safe water to all households by the year 2000. The government established many different plans along the way to manage water effectively, such as the National Water Conservation and Pipeline Corporation (NWCPC). By the year 2000 the NWCPC was managing piped water systems in urban and rural areas, which served about 3.8 million people. Other people benefited from the NWCPC, but it was not enough, as less than half the rural population had access to clean water and in urban areas only two thirds of the population had access to clean water. This can be explained through a process called "handing over." The government experienced budget problems in the 1980s and knew it would not be able to meet its goals by the year 2000. The government "handed over" rural water systems to people of communities and urban water systems to departments within local authorities, where they would take responsibility for controlling and preserving the water systems. The new water act 2012 will replace NWCPC with National Water Storage Authority.

According to Wafula (2010), a journalist for *Business Daily* (a newspaper published out of Nairobi, Kenya), discusses the lack of investment in water in Kenya. He noted that according to Julius Seloke of Westwood Management Ltd. (a brokerage firm in East Africa) "the view that

water is a human right has contributed largely to investors shying away" as investors fear that the government may interfere in business decisions, like dictating the price investors can charge. He also quoted Professor Mumma Albert stating that "the Water Act 2002 depends on State-based legal frameworks, its effectiveness in meeting the needs of the rural poor are limited, particularly given the limitations of technical and financial resources facing Kenya."

With regard to water development there are three significant legacies to the current water resource situation that provide key challenges to water resource management in Kenya. These are: 1) the availability, accessibility and reliability of water resources; 2) weak institutional infrastructure to manage both land and water resources and; 3) a lack of high prioritization of this sector on the government agenda, characterized by the low pace of water sector reforms in the country. The policy framework has been poor, planning has been weak and finances have not been forthcoming from government (WRMA, 2005)

### 2.6.2 Water Funding and access to water

According to (OECD 2012) report, in 2009-10, total annual average aid commitments to water and sanitation amounted to USD 8.3 billion, representing 7% of total sector allocable aid. The largest bilateral providers of development assistance in 2009-10 were Japan (on average USD 2.3 billion per year), Germany (USD 802 million) and France (USD 652 million). While aid to water supply and sanitation has increased in recent years, these contributions still seem insufficient considering the funding needs. In 2009-10, aid to water and sanitation targeted regions most in need of improved access to water and sanitation: Sub-Saharan Africa received 26% of total aid to the sector, and South and Central Asia 21%. The poorest countries received 40% of total aid. Many countries (WB 2012) seem to allocate insufficient resources to meet the Millennium Development Goal (MDG) target for sanitation and drinking-water. When compared with other sectors, particularly the other major social sectors of education and health, sanitation and drinking-water receive a relatively low priority for both official development assistance (ODA) and domestic allocations. The Kenya Water Sector Strategic Plan budget is US$ 627 million to be used from 2010 to 2015 as guided by the Vision 2030. In 2010/11 budget, Kenya shillings

32.8 billion was committed which was a 31.7% increment from Kenya shillings 24.7 billion in 2009/10. The water budget's compound growth rate for the last 10 years was 20.7%.

### 2.7. Water Catchment and Conservation and access to water

In the past water resources (DFID, 2003) planning has been supply driven. However, with water resources in arid and semi-arid areas becoming increasing scarce it is important that water demand and use is managed efficiently before new sources of water are developed. To manage water resources effectively, current and future water demand and use for all sectors should be estimated as accurately as possible. According to (WWF, 2012) 2.7 billion people around the world live in catchments that experience severe water scarcity for at least one month a year. According to research by Maurits Ertsen ( 2008) ,water conservation is a high priority in the drier areas of sub- Saharan Africa. Storage of water from the rainy season to the dry season, or even from wet years to dry years is highly important. People living in arid areas with highly variable rainfall, experience droughts and floods and often have insecure livelihoods. The groundwater dams obstruct the natural flow of water in wet seasons or periods, and provide storage of water during dry seasons or periods.

#### 2.7.1. Climate Variability and Water Resources Degradation

Drought is a recurring phenomenon and its impact on water resources is usually devastating. Floods lead to disasters particularly in low-lying areas. Occasionally floods have caused devastating impact on the sector. Both climate variability and environmental degradation has resulted into catchments degradation and drying up of rivers. Heavy siltation in dams and pans meant for water supplies and deterioration of water quality are other environmental degradation.

#### 2.7.2. Catchment Degradation

Catchment degradation results in increased runoff, flash flooding, reduced infiltration, erosion and siltation (UN WATER 2006).Catchment degradation is a major problem, which is undermining the limited sustainable water resources base in the country. The main causes of catchment degradation are poor farming methods, population pressure and deforestation. There is a lot of charcoal burning in Kajiado County which has affected the water catchment.

### 2.7.3. Water Resource Management

The Water Resource Management Authority (WRMA) is a state corporation under the Ministry of Water and Irrigation established under the Water Act 2002 and charged with being the lead agency in water resources management. Gazetting water schemes to be state and community owned, establishing Catchment Management Strategies (CMS) and Collecting water use and effluent discharges. In order for WRMA to undertake its stipulated responsibilities, the Act provides for decentralized and stakeholder involvement. This will be implemented through regional offices of the Authority based on drainage basins (catchment areas) assisted by Catchment Area Advisory Committees (CAACs). At the grassroots level, stakeholder engagement will be through Water Resource User Associations (WRUAs). Duties of WRMA include catchment protection and conservation, gazetting water protected areas and delineation of catchment areas.

Major sources of water pollution (UN-Water/UNSGAB, 2010) by chemicals include agricultural land run off, which can introduce excessive nutrient loads, as well as untreated industrial, agricultural and municipal waste water, uncontrolled solid waste disposal, and mining-related activities. Pollution from toxic chemicals contaminates salt- and freshwater bodies on the planet. Pollutants can be hazardous even at very low concentrations and cause long-term damage to humans and natural ecosystems. The technology and know-how needed to greatly reduce and eliminate water pollution do exist. Pollution prevention is always more economical than restoring contaminated waterways. Cost-benefit analysis and impact assessments, which factor in water pollution, are important tools and can be used to make a strong case for chemical pollution control. In addition, decision support systems, buttressed by effective collection of the data from various sources needed to inform a decision, can help assess the impact of economic incentives for pollution control. These tools should be used in advance of any action that could chemically contaminate water. Zero discharge approaches, which treat, recycle and reuse effluents instead of discharging them, are being pioneered and implemented by certain industries, leading to sustainable reductions both in pollution impact and in water consumption.

Also the use of pesticides (Rutten 2005) and fertilizers for cultivation is polluting the drinking water for both humans and livestock downstream. The Ewaso Ngiro South, for example, carries pesticide residues from the large scale wheat farms in the neighbouring Narok District. And, what will be the effect of the use of pesticides in the horticultural industry? Mining and small leather industry activities in Athi River also pollute the streams in Kajiado County. Animal and human waste pollution is common in the county. Communities need to be empowered to control contamination of their water sources by their animals and people.

### 2.7.4. Water Harvesting

Research shows that there is still a considerable amount of untapped rainwater potential in Africa that can be used to supply adequate water to an immense portion of the population (UNEP 2008). UNEP and other UN agencies have conducted pilot projects and workshops in Kenya to promote rainwater harvesting at national and local levels. Some bilateral development partners have also supported the use of this technology. Kenya's water policy takes into account all the relevant issues including water conservation and preservation of its quality. In this regard, mainstreaming of rainwater harvesting is very prominent. A rainwater harvesting (RWH) system is comprised of six general components: a catchment area or surface, such as a roof; gutters or pipes as a conveyance system from the catchment area to the storage tank; a roof washer, to filter major contaminants; a storage container; a method for distributing the water from the tank; and a process of purification, if the water is intended for human consumption (Kinkade-Levario, 2007). Falling rainwater is some of the cleanest naturally occurring water available and where it falls regularly there is scope to collect it, before evaporation takes place and before it becomes contaminated. Water is generally collected from pre-cleaned roofs, where it runs via guttering into a storage tank. However, using a clean surface water or groundwater source is often preferable as the quantity and quality are generally more reliable. Uncontaminated surface water supplies include small upland rivers, streams or springs. Rain water harvesting provide water when there is a drought or in summer season (Ferguson 2012).

## 2.8. National Water Policy

The Government of Kenya is committed to ensuring the realization of the constitutional requirement to 'the right to water' according to national water policy 2012. Nevertheless, through this policy and the collective commitment of water sector stakeholders, the government is determined to meet its obligations. This policy also takes into account obligations of the country with regard to regional and international arrangements related to water resources management and environment. The country has only five water towers (GOK 2012) which are faced with severe degradation due to anthropogenic activities. Without their protection and conservation the ecosystem services and water security in the country would worsen having a negative effect on the economic development of Kenya and the living conditions of its population. The government regulations on water include environmental which is administered by NEMA. Boreholes (MEMR, 2012) in Kajiado are dug at residences without consultations with NEMA. Before there were guidelines on how many boreholes can be dug at a certain place, but currently it is rampantly done. The water table is down and some water consumed has minerals that are not suitable for human consumption. Water use and development underpins the social and economic fabric of the Kenyan society. Improving the management and protection of water resources so as to ensure that water is available for equitable allocation for all the demands in the country including water for domestic and public use, industry, agriculture, energy, livestock, wildlife, tourism, ecosystems and other water uses is a high priority. In order to effectively manage and protect the water resources in a sustainable manner the Management and Development have been separated through enactment of the Water Act 2002.

An autonomous institutional framework comprising the Water Resources Management Authority (WRMA) and its Regional Catchment Offices is in place and the appointment of Catchment Area Advisory Committees (CAACs) and the establishment of Water Users Associations (WUAs) is on-going. The establishment of these institutions will allow for decentralization, participation and sustainability in the management of water resources. The present institutional arrangements for the management of the water sector in Kenya can be traced to the launch in 1974 of the

National Water Master Plan whose primary aim was to ensure availability of potable water, at reasonable distance, to all households by the year 2000. The Plan aimed to achieve this objective by actively developing water supply systems. To do so it required that the Government directly provide water services to consumers, in addition to its other roles of making policy, regulating the use of water resources and financing activities in the water sector. Indeed, despite the Government's ambitious water supply development programme, by 2000, less than half the rural population had access to potable water and, in urban areas, only two thirds of the population had access to potable and reliable water supplies.

### 2.8.1. The Reforms of the Water Act 2002

The Water Act 2002 has introduced comprehensive and, in many instances, radical, changes to the legal framework for the management of the water sector in Kenya. These reforms revolve around the following four themes: the separation of the management of water resources from the provision of water services; the separation of policy making from day to day administration and regulation; decentralization of functions to lower level state organs; and the involvement of non-government entities in the management of water resources and in the provision of water services. Further guidance is given to the Authority in deciding on allocation of the water resource as follows: That the use of water for domestic purposes shall take precedence over the use of water for any other purpose – including agricultural purposes - and, in granting a permit, the Authority may reserve such part of the quantity of water in a water resource as is required for domestic purposes. The water act 2002 was expected to improve management, conservation and protection of water resources (quality and quantity) contrary to these reforms it still had shortfalls hence necessitating a new water act.

Consequently according to (Albert, 2005) , community groups must obtain a licence in order to be able to continue or commence supplying water to their members. This is likely to have far reaching implications for member based rural water supplies, given the requirement for technical and financial competence, which are a precondition to obtaining a licence. Many such groups will likely have great difficulty demonstrating such competence, and this may result in water

service agreements being granted to well establish community groups and other organizations which have access to technical and financial resources to the detriment of local community – self –help - initiatives. The new water act 2012 is set to replace water act 2002 in conforming to the new constitution 2010. The new constitution regards water as a public land and the right to water by all.

### 2.8.2. Water Act Implementation and access to water

The study by (Sambu, 2011) has shown that while the water act 2000 water reforms have resulted in major gains in policy reforms, significant improvement in water access will not be achieved without addressing the systematic inequalities of water access caused by land alienation during the colonial rule. After independence, most of the land owned by the Europeans was not returned to the natives, but rather bought by the rich or converted to game reserves. In this case, the land tenure system that broadly disenfranchised the local population before independence continues to date. The study further shows that the WSPs were created to replace the government agencies in the provision of water services are not efficient and productive enough to meet the MDGs as envisioned by government plan. The implications and recommendations for water sector performance relate mainly to these WSPs. While the companies are still young and need time to mature, some challenges need to be addressed immediately.

Many WSPs still lose more than 50% of water as unaccounted-for-water. This is mainly due to a dilapidated infrastructure most of which was developed during the colonial period. In the absence of more (e.g., private sector) funding, this is unlikely to happen. Possible solutions include amalgamating smaller WSPs to increase their scale of operation. The study further outlined how some of the inefficiencies could be mitigated through benchmarking process. Weaker companies should be encouraged to emulate their benchmarked peers within the country, while stronger companies should be benchmarked with stronger companies in eastern Africa, Sambu concludes

### 2.8.3. Water Governance and access to water

Water governance addresses the principles for instance equity and efficiency in water resource and services allocation including distribution, water administration based on catchments, the need for integrated water management approaches and the need to balance water use between socio-economic activities and ecosystems. The water meant for wildlife, agriculture, drinking are important when policy making is done. Water governance deals with the formulation, establishment and implementation of water policies, legislation and institutions. The ministry of water is expected to spearhead this. Also the clarification of the roles of government, civil society and the private sector and their responsibilities regarding ownership, management and administration of water resources and services all falls under governance. This has been lacking when it comes to water access. Water governance involves price regulation and subsidies, the role of women in water management, water quantity and quality standards. The price regulation has not been taken keenly hence water consumers are paying high prices.

## 2.9. Political Leadership and access to water

The way water and politics (WWC, 2004) interact is critical for decisions on and implementation of water reforms. Politics, defined here as the process through which relations of power are constituted, negotiated and reproduced, is indeed in the background of all public decisions and action. According to (UN-Water 2013), water is a strong political campaign tool, but political leaders do not follow up their campaign trail promises. WASH is not a political priority in many countries or internationally. According to (Nyanchaga, 2011) politicians perceive WSPs as an asset belonging to a certain community and many a times identify WSPs with their community. They also perceive clustering of WSPs as a way of losing identity or sovereignty of the community to another community. Most WSPs also present opportunities to politicians to reward their supporters and they feel these opportunities will disappear when they merge with others. According to (UN Water2013), water resources are under considerable stress due to a number of factors, including demographic, social-economic and climate changes, which in turn can exacerbate political tensions. According to the article on kajiado county elections, Tim and

Odongo analysed the focus on dwindling land and water in battle for kajiado. They noted that water is particularly a big problem in kajiado coupled with population rising rapidly. They also observed that in kajiado town and surroundings have not had tapped water for the last three years. Also they reported that the residents rely on unsafe borehole water. The flower farming is accused of diverting all the water to the detriment of pastoralist. It concluded that the new leadership should take water issues seriously. (Daily Nation 2012)

### 2.9.1. Gender roles and access to water

The policy changes in land issues in Kenya (Kyalo 2010) led to transition of land ownership from communal to private ownership, creating a new institutional environment and abetting modification of institutions governing sharing of resources. Changing property rights from communal to individual holdings have forced communities to modify their indigenous communal institutional arrangements and renegotiate gender roles to cope with the changing property rights. As a result, women's workload has increased and their traditional control of resources has slipped; hence, they have sought new alternatives to meet traditional obligations. Therefore, they have negotiated new identities within family and community institutions. Men, on the other hand, are gaining from the private property rights regime. The change has affected water access because water which used to be owned communally is now in the hands of individuals. Kajiado County faces an acute water shortage due to low and unreliable rainfall, limited permanent water resources and pollution of water sources. On average, women travel between 10 and 15 kilometres to access water and are not included when water management decisions are made. Inadequate quality and quantity of water, seasonality in availability of water leading to conflict, poor institutional management in water sector, and poor co-ordination of water users and exclusion of women in decision making bodies are the key strategic challenges confronting the use of water resources in the County.

## 2.10. Agricultural production and access to water

Today, agriculture accounts for 70 percent of all water use globally, up to 95 percent in several developing countries. To keep pace with the growing demand for food, it is estimated that 14

percent more freshwater will need to be withdrawn for agricultural purposes in the next 30 years. A systematic approach to agricultural water productivity requires actions at all levels, from crops to irrigation schemes, and up to national and international economic systems, including the trade in agricultural products. Kitchen gardens, poultry keeping, zero grazing, biogas digester installations, manure harvesting, drip irrigation for horticultural crops production and fish farming are economic activities. In many cases, irrigated (UN-Water, 2006) agriculture has been a major engine for economic growth and poverty reduction. However, at the same time, poor communities have tended to suffer the greatest health burden from inadequate water supplies and, as result of poor health, have been unable to escape from the cycle of poverty and disease. Thus, growing scarcity and competition for water stand as a major threat to future advances in poverty alleviation, especially in rural areas. In semi-arid regions, increasing numbers of the rural poor are coming to see entitlement and access to water for food production, livestock and domestic purposes as more critical than access to primary health care and education.

In most countries, the agriculture sector is the predominant consumer of water. Historically, large-scale water development projects have played a major role in poverty alleviation by providing food security, protection from flooding and drought, and expanded opportunities for employment. The trend in the flower industry in the district has been significantly on the increase. This is attributed to available vast land and labour that is drawn from the neighbouring district. The industry is largely concentrated in Isinya and Central divisions.

### 2.10.1. Livestock keeping and access to water

Livestock production is a major component of the Maasai economy although this is changing due to land subdivision which is due to rise in population so does the need for more water both for people and livestock. The livestock contributes about 10 per cent of the gross domestic product (GDP). Over the years, patterns of land-use have changed in the ASALs from, principally, nomadic pastoralism to sedentary pastoral and agro-pastoral production, or to pure cultivation (Muriuki et al. 2005). This trend has in most cases adversely affected livestock production and the productive capacity of these lands in Maasai land especially Kajiado. Vast areas of these

lands are experiencing some degree of degradation due to human and environmental factors. This has been precipitated by unprecedented population growth in Kajiado County, and overgrazing. Overgrazing in Kajiado is impacting negatively on vegetation resources and biodiversity in general leading to desertification. The impact of desertification is limited supply of safe water hence schools are affected. Localised scarce supplies of water lead to overgrazing and trampling by cattle with a serious negative environmental impact.

### 2.10.2. Sand Harvesting and access to water

Sand harvesting is common in Kenya's arid and semi-arid areas, but left uncontrolled it depletes water catchment areas, and experts say there is need to promote sustainability by striking a balance between it and environmental conservation. Some of the most notable environmental effects of sand harvesting include the drying of aquifers, riverbank and riverbed erosion, water and air pollution, and the loss of valuable trees and animal species. Under the (NEMA, 2007) Environment Management and Coordination Act, sand harvesting can only happen after a proper environmental impact assessment has been carried out and with the approval of technical sand harvesting committees. Sand harvesting (GOK, 2009) remains one of the very competitive ventures under mining. There are vast deposits of the material in the district but its unsustainable harvesting technology is threatening the water resources as it reduces the opportunity for ground water

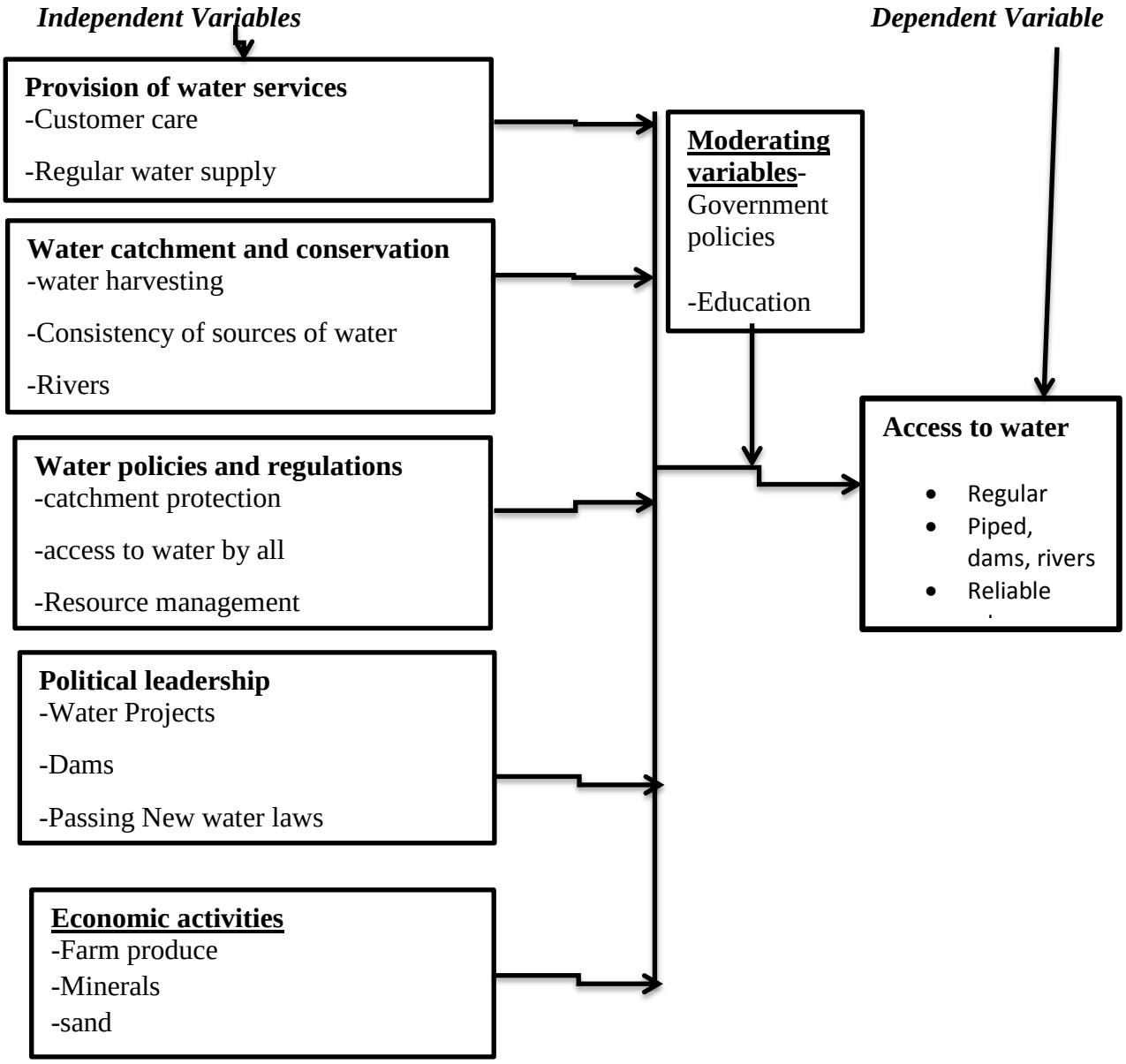
## 2.11. Conceptual Framework

Conceptual frameworks, according to educational researcher Smyth (2004), are structured from a set of broad ideas and theories that help a researcher to properly identify the problem they are looking at, frame their questions and find suitable literature. A conceptual framework (M. Haralambos, 2008) is a tool researchers use to guide their inquiry; it is a set of ideas used to structure the research, a sort of map that may include the research question, the literature review, methods and data analysis. Most academic research uses a conceptual framework at the outset because it helps the researcher to clarify his research question and aims. Researchers use a conceptual framework to guide their data collection and analysis. From the reviewed literature in

this study, the independent variables that were investigated on how they influence access to water were; water provision services, water catchment and conservation, water polices and regulation, political leadership and economic activities. This study conceptualized framework derived from theoretical review of variables is as shown in figure.

Figure 1 shows conceptual framework of this study.

**Figure 1**. Conceptual framework



## 2.12. Research Gap

MDG emphasizes crucial importance of water to so many aspects of human health, development and well-being led to the inclusion of a specific water-related target in the Millennium Development Goals (MDGs). The number of people using improved drinking water sources reached 6.1 billion in 2010, up by over 2 billion since 1990. The coverage remains very low in Oceania and sub-Saharan Africa, neither of which is on track to meet the MDG drinking water target by 2015. Over 40 per cent of all people without improved drinking water live in sub-Saharan Africa. All these MDGs statistics have been all revolving around household survey, there is no survey which has covered other areas like schools, health centres. Hence this research contributes to post MDGs goals of 2015.

## 2.8 Summary of literature review

Little research has been done on access to water in schools globally including the determinants that influence water access in schools. The literature that the study reviewed gave a good start on access to water because household survey on water access had dominated the existing research. They formed the good foundation which this research was built on. The MDGs have provided information on the building of this research. The water sector reforms has provided much information and formed a backbone of the study. Water act 2002 and 2012 has provided much information which was used in the study. The environmental protection under NEMA also works towards water conservation and catchment protection. The economic activities had been considered because of the social cultural development of the study area. The resilience theory also was part of the literature and it was evident that there is scarcity of water resources in the county. The water policies and regulation was still lacking behind in implementation. This is due to the water sector reforms and devolution of water resources to local levels. There is also political leadership gap to take water sector as a priority especially Kajiado County been an ASAL area. The sources of water were identified mainly as boreholes and water tankers and a small percentage by WSPs. If the Post MDGs is to be met by 2030 universal water access in schools then implementation of water act 2012 is key to attainment of post MDGS.

# CHAPTER THREE
# RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter details the methodology which the study took to enable achievement of the set objectives. The first part of this chapter details the research design, the research population, and the research sample that was used. Part two and three of this chapter describes the population and sampling frame respectively. The subsequent parts of this chapter cover the explanations of the proposed instruments of data collection, procedure of data collection, and data analysis. According to Saunders, Lewis and Thornhill (2009), they explained that choosing the effective method of study is weighty since the results of the study depended on the research method employed. The final part covered data collection and analysis and finally data validity and reliability formed the conclusion of the study.

## 3.2 Research design

The study used descriptive survey research design. In definition, descriptive survey is the only means through which views, attitudes improvements of educational practices and instruction can be collected. Research design is the way the study is organized, how the evidence will be collected, it talks of how evidence will be found and also interpreted. Study design is a bond that holds all the pieces of research together (Kombo & Tromp, 2006). According to Cooper and Schindler (2006) they defined research design as the plan and structure designed to obtain answers to study questions. Normally it is the main plan in framing the research techniques for the collection and analysis of data, leading to a structural approach for the requirement of the study.

The descriptive research design was chosen because it described more appropriately the nature of the study and examined actions as they were. The chosen method included research methodology and also procedures such as surveys and observation, self- reports and tests. According to

Mugenda and Mugenda (2003) said that descriptive research reports on behavior of things and also determined the characteristics of things.

A survey is described as an in depth study carried out of a particular situation under study rather than a sweeping statistical survey. The study involved a large population of schools in a vast area of Kajiado County where data was collected on factors influencing water access. It is described as a method used to scale down a very broad field of study into single easily researchable subject. Even though it will not answer a problem completely, it provides some indications and allows further expounding. Additionally, it is also useful for testing if scientific models and theory are possible in the real world.The study used both qualitative and quantitative research methods. Quantitative research is defined as a scientific investigation of the relationships of variables based on a collection of numerical and statistical data and must be organized. Specifically, the survey technique was used to collect data in this study. The research design for the study was based specifically on the philosophical assumptions and the source including type of data that was required in answering the research questions of the study taking cognizance of the resources that the researcher had in time of the study and cost. Generalizations obtained were limited to a particular group of individuals observed during the study.

### 3.3 Target population

According to Cox (2010) target population is the entire set of units for which the study data will be used to make inferences. The targeted population for the study comprised of all the 124 secondary schools in Kajiado County as at January 2013. The county water officers increased the total population target to 126.

Table 3.1 shows the category of schools and the total target population.

**Table 3.1: Category per schools of respondents**

| Category | Target Population | Percentage (%) |
|---|---|---|
| Public secondary schools | 58 | 46% |
| Private Secondary schools | 66 | 53% |
| County water officers | 2 | 1 |
| **Total** | **126** | **100** |

### 3.4 Sampling size and procedures

According to Kothari (2009), a sample is a representative of total population under study. Another definition is that a sample is a part of the whole population that is selected for analysis (Bryman & Bell, 2003). It is a chosen subgroup that is a sample of the whole population in terms of general characteristics. According to Orodho (2006) sampling is a procedure of selecting a representative of a population on which research can be conducted and inferential conclusion from the study can be applied in general terms to the entire population. It is a process of selecting a number of individuals in such a way that they represent the large group. Stratified random sampling was applied to ensure that all secondary schools were represented. The researcher used purposive sampling to identify who to give the questionnaire. Two questionnaires were administered in every school under study area. According to Cooper and Schindler (2006) stratified method of sample selection is appropriate when getting a sample from a heterogeneous population. According to Corchran (1977) 30% of the entire population can be taken as a sample population. The study took 30% of the population as sample. It included two water county officers picked purposively. The desired sample population was therefore 39. To arrive at exact number of secondary schools that were included in the sample, the following table describes how it was done.

Table 3.2 shows the number of secondary schools for the study and sample selected.

**Table 3.2 Number of secondary schools included in the sample**

| School | Number of schools | Sample |
|---|---|---|
| Public | 58 | 17 |
| Private | 66 | 20 |
| County water Officers | 2 | 2 |
| **Total** | **126** | **39** |

After arriving at the desired secondary schools numbers in each stratum, specific secondary schools were sampled using random sampling which involved giving a number to every subject or member of the accessible population. Random tables were be used in picking sample subject. The subjects corresponding to the number picked were included in the sample.

### 3.5 Data collection methods

Questionnaires are used to obtain important information about a population. Each item on the questionnaire is developed to address a specific objective, research question or hypothesis of the study (Mugenda and Mugenda, 2003). The researcher developed self-administered questionnaires which met the researcher's objectives. The questions were both structured or closed ended and unstructured or open ended and were distributed to various respondents.

An interview is an oral administration of a questionnaire or an interview schedule (Mugenda and Mugenda, 2003). The interviews are therefore face to face encounters. The researcher employed the use of interviews in carrying out the study as a tool of information gathering on the determinants of access to water, which involved face to face conversation with the Kajiado

County water officers. In order get accurate information through the interviews the researcher obtained maximum cooperation from the respondents. The interview helped to provide in-depth data on determinants of access to water which was not possible to get using questionnaires. The researcher prepared an interview schedule for county water officers. This was a set of questions that the interviewer asked during the interview.

### 3.6 Validity of Research Instrument

Validity is the ability of a test to measure what it is supposed to measure (Zikmund, 2010). Validity tests are applied to test whether the questionnaire measures what it aimed to measure. As part of the pilot test in this study, validity test was assessed based on the responds from the pilot test. In this study internal validity on control of extraneous variables were addressed by making the question simple, straight forward and free from ambiguity. For external validity, the model applied in this study was stratified random sampling to ensure representation of heterogeneous secondary schools and thus give credence to generalization.

According to Cooper and Schilder (2011) a pilot test should constitute at least 1% of the sample size. The questionnaire was pre-tested with 3 secondary schools, outside the 37 sample of the respondents, to test the reliability and validity of the questionnaire. The pilot test was aimed to show; the time it would take to fill one self- administered questions, for clarity and sequential flow of form and also confirm whether the questions were concise, and to test the questionnaire perfection. The outcome was not summed up to be part of this study even though it was repeated to check the reliability of instrument.

### 3.7 Reliability of Research Instrument

Reliability and validity are important issues in the measurement of research variables both concerned with the accuracy of measures or indicators, though it is virtually impossible to achieve perfect reliability and validity (Neuman, 2003). This study used Cronbach alpha to assess the construct reliability that is the extent of measurement error in a measure. Cronbach's alpha measures how well a set of variables measures a single one-dimensional latent construct

(Neuman, 2003). A scale is considered to have good reliability if it has an alpha value greater than .60. The study was tested and was 0.75. Cronbach's alpha test was generated by Statistical Package for Social Sciences (SPSS).

### 3.8 Data collection procedure

A cover letter describing the objective of the study and promising anonymity was availed to the sample respondents asking for their participation in the study. Zikmund (2010) suggests that a survey research must give an opportunity for direct participation by respondents. In this study, the possible primary data collection methods that were attained by direct participation were; the personal interview and the mail survey. The study used questionnaire and the respondents participated directly by filling the questionnaires. The respondents were assured of anonymity and the questions order was counter balanced. In the study the letter from the researcher's university together with researcher letter to respondents was used to make the respondents comfortable to respond on the understanding that the study was used purely for academic purposes.

### 3.9 Data Analysis

This section shows the techniques that were used in this study to analyze and test data and variables respectively. The data that was obtained from the field were in raw form and it was difficult to analyse. The data were cleaned, coded, keyed into the SPSS. Due to the type and the form of data that was collected, descriptive statistics were used. Data analysis was carried out by using a Statistical Package for Social Sciences (SPSS) the latest version No. 21. The reports in form tables were prepared from the Microsoft excel spread sheets. Descriptive statistics namely; mean, frequency and percentages were used

### 3.10 Ethical issues of the study

The research respondents were first introduced to the study by the letter from the institution where the researcher was. After the respondent read the introduction letter they were given the questionnaire with an explanation that the research was for academic purposes. In some

situations the researcher had to explain each and every objective to the respondent. The respondent's opinions were kept confidential.

### 3.11 Operationalization of variables

The table 3.3 gives the measurement between the variables and survey questions

Table 3.3.Operational definition of variables

| Research Objectives | Type of variable | Indicator | Measuring of indicator | Data collection method | Levels of scale | Tools of analysis | Types of analysis |
|---|---|---|---|---|---|---|---|
| Suitable water service provision<br>-Customer care<br>-Regular water supply<br>-affordability<br>-service impairment duration per incident<br>Access to water | Independent<br><br>dependent | -No complaints<br>-water on taps<br>-No debts<br>-no leakages | -No. of complaints<br>-No. times per week<br>-outstanding water bills<br>-Frequency of breakdown | -Questionnaire<br>-Interviews | Ordinal nominal | Mean percentage | Descriptive |
| Current state of water catchment and conservation<br>-water harvesting<br>-Consistency of sources of water<br>-Rivers<br>-water storage<br>Access to water | Independent<br><br>Dependent | -Water gutters<br>-Annual water supply<br>-Flowing river<br>-water tanks | -consistency<br>-No.<br>-No | Questionnaire<br>Interview | Ordinal<br><br>Nominal | Mean Percentage | Descriptive |
| Water policies and regulations<br>-catchment protection<br>-access to water by all<br>-Resource management<br>-community involvement<br>Access to water | Independent<br><br>Dependent | -consistent water supply<br>-State of water<br>-reduced pollution<br>-WRUAs | -Dry taps<br>-sickness reported<br>- frequency treatment<br>-Membership | Questionnaire<br>Interview | Ordinal<br>Nominal | Mean percentage | Descriptive |
| Political leadership<br>-Water Projects<br>-Dams<br>-Passing New water laws<br>-Donor funding<br>-Advocacy<br>Access to water | Independent<br><br>Dependent | CDF water projects.<br>-New dams<br>-National water policy 2012.<br>-Donor water projects.<br>-Meetings | No. of projects<br>-No. of new dams<br>-Implementation<br>-No. donor projects<br>-Frequency | Questionnaire<br>Interviews | Ordinal nominal | Mean percentage | Descriptive |

# CHAPTER FOUR

# DATA ANALYSIS, PRESENTATION AND INTERPRETATION

## 4.1 Introduction

This chapter contains the data analysis and presentation on the determinants of water accessibility in secondary schools in Kajiado County. The study was guided by the five determinants which are; provision of water services, water catchment and conservation, water policies and regulations, political leadership and economic activities. The results that were produced using the quantitative and qualitative research methods are presented for analysis and interpretation. The data was collected from sampled both public and private secondary schools in kajiado county. The respondents were the staff in the administration and the school board members. Also the kajiado county water engineer was interviewed.in total the target was 74 but the study managed 70 respondents. The interview also targeted 2 county water officers and it managed 1. The data from the field after it was collected, it was coded and analysed using the SPSS data software

The study covered the whole county in the month of June. During the time of study the county had just received the long rains and it was approaching the dry season. The response rate from the respondents was encouraging and those who needed helped to answer the questions were assisted. There were few incidences where the schools had break for the half terms and it was hard to find the respondents. The Kajiado County is vast and different parts of the county have different features.

Table 4.1 shows the response rate of those who filled the questionnaires.

**Table 4.1 Response rate**

| School | Target respondents | Actual respondents | % Percentage |
|---|---|---|---|
| Public | 34 | 34 | 100 |
| Private | 40 | 36 | 90 |
| County water Officers | 2 | 1 | 50 |
| **Total** | **76** | **71** | **93.4%** |

The response rate was 93.4% and this was due to the cooperation by the respondents. The female respondents were 31% in this study compared with the male counterparts.

Table 4.2 shows the gender for those who participated in the study.

**Table 4.2 Gender participation in the study**

| | Frequency | % Percentage |
|---|---|---|
| Male | 49 | 69 |
| Female | 22 | 31 |
| **Total** | **71** | **100** |

The results from table 4.2 show that the female participation in this study on the determinants of water accessibility in Kajiado County was satisfactory because it was 1/3th of the male respondents. There is a reawakening of the female roles in development of the county and they have a say when it comes to water issues.

Table 4.3 shows respondents' age in the sampled secondary schools in Kajiado County.

**Table 4.3 Respondent's age**

| Years | Frequency | % Percentage |
|---|---|---|
| 18-30 | 6 | 8.5 |
| 31-45 | 34 | 48.6 |
| 46-55 | 30 | 42.9 |
| **Total** | **70** | **100** |

The results obtained as shown in table 4.3 shows that the study had 34% of those of ages between 31 years and 45 and these are the people that the community depends for they are active. In this community where the study took place they are considered the morans who play key role in the community.

Table 4.4 shows the respondent education level.

**Table 4.4 Level of education**

| | Frequency | % Percentage |
|---|---|---|
| Secondary | 4 | 5.7 |
| College | 29 | 41.7 |
| University | 37 | 52.9 |
| **Total** | **70** | **100** |

The table 4.4 reveals that majority of the respondents hold key positions in the secondary schools in Kajiado County. They stand at 52.9% university graduates and 41.7% had reached college. The minority are secondary school leavers who had not proceeded for further training. The interpretation is that firm decisions on water issues can be dealt with since there are people holding various positions in schools. The impact of these graduates can bring change.

Table 4.5 shows the respondents position they hold in school

**Table 4 Position in the school**

| Position | Frequency | % Percentage |
|---|---|---|
| Headmaster/principal | 22 | 31.4 |
| Administrator | 32 | 45.7 |
| PTA member | 16 | 22.9 |
| **Total** | **70** | **100** |

The table 4.5 shows that majority of the respondents at 45.7% were school administrators. The minority of the respondents were PTA members at 22.9%. The main reason why the administrators were the one handling the questionnaires was that the headmasters had gone for the annual head teachers meeting. Management can be done by delegating the responsibility to the juniors for the smooth running of the organization.

Table 4.6 shows the category of schools

**Table 4.6 category of schools**

| category | Frequency | % Percentage |
|---|---|---|
| Day | 20 | 28.6 |
| Boarding | 50 | 71.4 |
| **Total** | **70** | **100** |

Table 4.6 shows that majority of the secondary schools under which this study was done were boarding schools at 71.4% and day schools stood at 28.6%. The interpretation of this study is that since there are many boarding schools there is a demand for water. The water is needed for various purposes for example cooking, sanitary, drinking, and washing among other uses.

Table 4.7 shows the category of students in the school

**Table 4.7 Category of students in the school**

| | Frequency | % Percentage |
|---|---|---|
| Boys | 14 | 20% |
| Girls | 22 | 31.4% |
| Mixed | 34 | 48.6 |
| **Total** | **70** | **100** |

Table 4.7 reveals that during the study majority of the respondents were in mixed secondary schools at 48.6%. The girls' schools stood at 31.4% higher than boys at 20%. The interpretation is that more water is needed to facilitate various facilities in a mixed school. Mixed schools will have separate facilities for example washing rooms, toilets and others hence the determinants under the study must be dealt with.

Table 4.8 shows the population of students in the schools

**Table 4.8 the population of students in the schools**

| | Frequency | % Percentage |
|---|---|---|
| 1-250 | 18 | 25.7 |
| 251-500 | 40 | 57.1 |
| 501- above | 12 | 17.1 |
| **Total** | **70** | **100** |

Table 4.8 reveals that most of the respondents indicated that 57% of the populations of the students were on the range between 251 and 500. Those with over 500 students were 17.1% and those below 250 students were 25.7%. This shows that the student population in the schools is high since over 75% have students over 250 students. The provision of water services must be adequate.

### 4.2 Data presentation, analysis and interpretations of the findings

The schools head teachers, administrators and PTA members of each school under the study were provided with a questionnaire. Each school filled two questionnaires by different respondents in order to meet the objectives of the research.

#### 4.2.1 Provision of water services and access to water

The researcher set up the questionnaire that was to meet the objective of the study. The researcher went ahead and collected data that were to answer the objective; the influence of water provision services on access to water in secondary schools in kajiado county. The county has protected piped water which is offered by various water service providers formed after enactment of the water Act 2002. They all fall under Tanthi water service board. They are; Olkajuado water and sewer services which runs parts of kajiado town and its environs; Oloolaiser water services operating in Ngong and its environs. Due to high demand for water this water companies are facing numerous challenges in delivery of service which include population pressure. The tankers which ferry water get their water from these companies. The county also has a unique pattern when it comes to water for example those from Loitokitok area they have springs and those from Nguruman too. The stretch between Kiserian and Magadi is a water scare area. In central kajiado all the way to the eastern part Mashuruu division they rely more on borehole water.

Table 4.9 shows the sources of water to sampled secondary schools in Kajiado County.

**Table 4.9 Sources of water to schools**

| | Frequency | % Percentage |
|---|---|---|
| Protected piped water | 24 | 34.3 |
| Protected Borehole | 32 | 45.7 |
| River water | 2 | 2.9 |
| Others | 12 | 17.1 |
| **Total** | **70** | **100** |

The results from table 4.4 from this study indicate that most schools at 45.7% use borehole water. The water service providers also have boreholes which they have drilled hence the water that is provided by a water service company is still borehole water. A visit to the three water service companies confirm that there are few options when it comes to water in Kajiado that one has to use borehole water. The protected piped water which the schools access apart from those in Loitokitok area are all borehole water. Those in Ewaso Ngiro and Loitokitok can access spring water and a few schools in Namanga.

Table 4.10 shows the water service providers to the secondary schools in Kajiado County.

**Table 4.10 Water service providers to secondary schools**

| | Frequency | % Percentage |
|---|---|---|
| Water service company | 18 | 25.7 |
| School borehole | 26 | 37.1 |
| Tanker/vendor | 26 | 37.1 |
| **Total** | **70** | **100** |

The researcher wanted to know the water service provider in the schools on study area and the results were that 37% water comes from school borehole and Tanker/vendors provide the same percentage. The water service company provides only 25%. This shows that when the government water Act 2012 needs further amendments because this service providers are expected to take a bigger portion.

Table 4.11 shows the sampled schools monthly water bill.

**Table 4.11 Monthly water bill**

| | Frequency | % Percentage |
|---|---|---|
| No monthly bill | 6 | 8.6 |
| Below Kshs 2500 | 6 | 8.6 |
| Kshs 2501 to 5000 | 30 | 42.0 |
| Over Kshs 5001 | 28 | 40.0 |
| **Total** | **70** | **100** |

The researcher found out that those who pay monthly water bill over Kenya shillings 5000 were 42% as shown in the table 4.6 , whereas those who do not have monthly water bills stood at 40%. The study is in agreement with the position of the schools with boreholes and those without who rely on water tankers and vendors as well as water service companies. According to the county water officer water in kajiado is expensive and the water companies are not financially able to lay piped water to schools which may reduce the cost.

Table 4.12 shows the current of water tariff in the schools under study.

**Table 4.12 Current water tariff is high**

| | Frequency | % Percentage |
|---|---|---|
| Definitely | 38 | 54.3 |
| Definitely not | 32 | 45.7 |
| **Total** | **70** | **100** |

When the respondents were asked whether the current water tariff is high, 54.3% said that it is high and 45.7% suggest otherwise. Water tariffs are high yet there is a regulatory authority. The rest of the respondents are not paying the water in their schools and may not be aware of this.

Table 4.13 shows the customer service satisfaction from a water service provider.

**Table 4.13 customer care service by water service providers**

| | Frequency | % Percentage |
|---|---|---|
| Excellent | 32 | 45.7 |
| Very good | 22 | 31.4 |
| Good | 16 | 22.9 |
| Bad | - | - |
| **Total** | **70** | **100** |

The study reveals that 45.7% of the respondents believe that the customer service is excellent whereas 22.9% believe it is good. Customer care is paramount in any business. The mismanagement in various organizations affects customer services. The low morale and poor incentives in the organization affects customer since the workers may decide to run down the organization. Since the water act was passed the water service providers were given mandate to provide water instead of the government and issues of mismanagement often arise. When the study was being conducted, the enumerators found a complaints note in one of the water service company where employees are complaining of poor pay yet the revenues are increasing.

Table 4.14 shows how frequently do schools get water

**Table 4.14 frequency of water availability in schools**

| | Frequency | % Percentage |
|---|---|---|
| Always | 48 | 68.6 |
| Very often | 14 | 20.0 |
| Fairly often | 8 | 11.4 |
| **Total** | **70** | **100** |

The study reveals that 68.6% of the respondents agreed that they frequently get water in the school against 11.4% who fairly not receive the water. The various boreholes in schools and supply by tankers/vendors ensure frequent supply. Though the respondents surpass half the mark of 50% still the climatic conditions which affect the county being one of the ASAL counties has a major setback on water. The drought which affects Kajiado County often led to lack of water accessibility. Currently there is no serious drought when this study was undertaken but the problem of water inaccessibility is real especially in the central, eastern and southern part of the county. The stretch along Namanga road one can easily see many dry rivers. These seasonal rivers have its source from Ngong hills where bio degradation had taken place.

Table 4.15 shows whether schools pay fix monthly water bill

**Table 4.15 does the school pay fixed monthly water bill**

| | Frequency | % Percentage |
|---|---|---|
| Definitely | 3 | 4.3 |
| Definitely Not | 67 | 95.7 |
| **Total** | | **100** |

Table 4.15 reveals that majority of the respondents 95.7% their school do not pay fixed water bill. The study shows that 4.3% pays fixed water bills every month. This revelation is interpretation is that water is not free it must be paid as per consumption. If water was paid at a flat rate then it will be hard to regulate its usage and waste will not be avoided. Since the day when the water 2002 act was passed and another act in 2012, water provision was decentralized hence consumer pays and polluter pays too came into force.

Table 4.16 shows the correlation analysis of water tariff and water bill

**Table 4.16 the Correlations on water tariff and monthly water bill**

| | | | Water tariff is high | The monthly water bill |
|---|---|---|---|---|
| Spearman's rho | Water tariff is high | Correlation Coefficient | 1.000 | .512** |
| | | Sig. (2-tailed) | . | .000 |
| | | N | 70 | 70 |
| | The monthly water bill | Correlation Coefficient | .512** | 1.000 |
| | | Sig. (2-tailed) | .000 | . |
| | | N | 70 | 70 |

**. Correlation is significant at the 0.01 level (2-tailed).

The table 4.16 shows the correlation analysis .512, using the spearman rank correlation analysis using 2 tail test. This shows some positive relationship between the respondents views on water tariff and monthly water bills. The study therefore means that the monthly water bills are high because of the water tariff.

### 4.2.2 Water catchment and conservation and access to water

The study seeks to know what influence does water catchment and conservation on accessibility and the respondents were given a set of questions. There are water catchment areas that the Kenya government has gazette and water act 2012 has included community as a stakeholder.

Table 4.17 shows the kind of water facilities available in secondary schools.

**Table 4.17 Water storage facilities in schools**

| | Frequency | % Percentage |
|---|---|---|
| Water tanks | 56 | 80 |
| Not available | 14 | 20 |
| **Total** | **70** | **100** |

The researcher sought to know whether there are storage facilities in secondary schools and the results were that 80% had water tanks. 20% of the respondents indicated that there are no available storage facilities. The study also found out that even though these water storage facilities are there they are 65% medium size water storage facilities, which are not adequate to store enough water. The interpretation to this finding is that there is a growing culture of water storage in schools. According to the county water officer in an interview, 200 water tanks were donated to schools in 2006. The initiative to have water storage should come from the school not vice versa. The development should come from the grass roots up to the government. The people should initiate development and that is why the national water policy 2012 encourages all

stakeholders' participation. At the moment there is no national master plan on water harvesting but it is been developed.

Table 4.18 shows the size of available storage facilities in schools

**Table 4.18 the size of storage facilities in the schools**

| | Frequency | % Percentage |
|---|---|---|
| Not available | 14 | 20.0 |
| Small size | 2 | 2.9 |
| Medium size | 46 | 65.7 |
| Large size | 8 | 11.4 |
| **Total** | **70** | **100** |

The table 4.18 revealed that 65.7% of the respondents had medium water storage facilities in their schools. Only 11.4% had large storage facilities and 20.0% do not have any storage facilities. The study interpretation is that even though many schools had water tanks they are mostly medium size and according to County water officer they can carry about 20,000litres which is not enough to serve the schools. The study had found out that mixed boarding schools are dominating in the study hence the demand for water for various functions is high. The medium water tanks even though it was a donation was meant to open up the administration to invest on water storage. The administration composed of over 50% university education members of staff who are capable of making policies towards water sustainability.

Table 4.19 show reliability of water supply from service provider

**Table 4.19 the reliability of water supply from service providers**

| | Frequency | % Percentage |
|---|---|---|
| Very reliable | 36 | 51.4 |
| Reliable | 26 | 37.1 |
| Not reliable | 8 | 11.4 |
| **Total** | **70** | **100** |

The majority of the respondents 51.4% in the study maintained that water from water service provider is reliable. Only 11.4% are of the contrary opinion. The interpretation is that the water service companies in Kajiado county are few and they supply only 25% to the schools compared with water tanker/vendors who supply about 37% , it is least expected that these companies must work hard to win the customers otherwise they will be out of business. Their operation coverage is limited due to low investment and lack of outsourcing the business.

Table 4.20 shows the correlation between water reliability in dry seasons and storage facilities.

**Table 4.20 Correlations matrix**

| | | | water reliability in dry season | water storage facilities |
|---|---|---|---|---|
| Spearman's rho | water reliability in dry season | Correlation Coefficient | 1.000 | .377** |
| | | Sig. (2-tailed) | . | .001 |
| | | N | 70 | 70 |
| | water storage facilities | Correlation Coefficient | .377** | 1.000 |
| | | Sig. (2-tailed) | .001 | . |
| | | N | 70 | 70 |

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.20 shows that the correlation between water reliability during dry season and the available storage facilities is 0.377. This shows that the relationship is positive but weak. This means that if the water supply reliability is increased the water storage facilities too should be increased.

### 4.2.3 Water policies and regulations and access to water

The study seeking to know the influence of water policies and regulations on water accessibility received various responses from the respondents.

Table 4.21 shows the respondents view on whether secondary schools in the study do recycle water.

**Table 4.21 Water recycling in secondary schools in Kajiado**

| | Frequency | % Percentage |
|---|---|---|
| Strongly disagree | 42 | 60 |
| Disagree | 10 | 14.3 |
| Undecided | 6 | 8.6 |
| Agree | 12 | 17.1 |
| **Total** | **70** | **100** |

Table 4.21 reveals that only 17.1% agree that the school had put in place water recycling mechanism. The majority at 60% strongly disagree that there are mechanism of recycling water. The interpretation to this is that water recycling is far from being achieved in schools. Water that has been used is release to the drainage and there is a great possibility of pollution because some

of the water emanate from school laboratories. The government is still to come-up with the regulations that promote efficient water use and water treatment and recycling as per draft water bill 2012.

Table 4.22 shows the need for improvement in maintenance of water points

**Table 4.22 if water points need improvement in maintenance**

| | Frequency | % Percentage |
|---|---|---|
| Need most improvement | 21 | 30 |
| Most improvement | 33 | 47.1 |
| Least improvement | 16 | 22.9 |
| **Total** | **70** | **100** |

Tables 4.22, majority of the respondents are of the opinion that the water points maintenance need improvement. Only 22.9 are of the opinion that the maintenance is somehow satisfactory. The maintenance of any project is key to the success of the project. There are mechanisms in the project which are worn out through wear and tear hence need maintenance. The borehole pumps need regular servicing to ensure effective service. Some organization of expect the machines to operate without taking them for service. The breakdown led to water inaccessibility. Service quality from the water service provider is the requirement as stipulated in water act 2012.

Table 4.23 shows whether the respondent agrees or disagree on water treatment by the school.

**Table 4.23 water is treated in school**

| | Frequency | % Percentage |
|---|---|---|
| Strongly disagree | 8 | 11.4 |
| Disagree | 8 | 11.4 |
| Agree | 38 | 54.3 |
| Strongly agree | 16 | 22.9 |
| **Total** | **70** | **100** |

Table 4.23, the study found out that 54.3% agree that there is water treatment in Schools inorder to make water safe for consumption. The majority of respondents 11.4 % had a different opinion that there is no water treatment in school. The interpretation is that, there are few cases of water borne diseases as 54.3% of the respondents agree. This is due to water treatment which donors have intervened to safe the situation of water borne diseases especially in Kajiado.

Table 4.24 shows cases of waterborne diseases are few in schools under the study.

**Table 4.24 there are few cases of waterborne diseases in schools**

| | Frequency | % Percentage |
|---|---|---|
| Strongly disagree | 6 | 8.6 |
| Disagree | 4 | 5.7 |
| Agree | 9 | 12.9 |
| Strongly agree | 51 | 72.9 |
| **Total** | **70** | **100** |

Table 4.24 reveals that majority of the respondents at 72.9% agree that there are few cases of waterborne diseases in the study population. 8.6% strongly disagree that there are few cases of waterborne diseases. The interpretation is that due to improved technology in water treatment it is possible to reduce water pollution. There are donor donations for the treatment facilities which include purification and chemical treatment. Protection of water sources which is supposed to be under water resource management authority after decentralization of water sector. There is access to improved medication and improved infrastructure has facilitated this.

Table 4.25 shows the correlation between management and maintenance of water point and water treatment in schools.

**Table 4.25. Correlation matrix**

| | | | Management and maintenance of water point | Water treatment in secondary schools |
|---|---|---|---|---|
| Spearman's rho | Management and maintenance of water point | Correlation Coefficient | 1.000 | -.110 |
| | | Sig. (2-tailed) | . | .363 |
| | | N | 70 | 70 |
| | Water treatment in secondary schools | Correlation Coefficient | -.110 | 1.000 |
| | | Sig. (2-tailed) | .363 | . |
| | | N | 70 | 70 |

Table 4.25 shows that the correlation between management and maintenance of water point and water treatment using Spearman rank correlation using 2-tailed test is -.110. This is a weak negative correlation. This means that management and maintenance of water supply is weak and that it affects the water treatment a lot.

### 4.3.4 Political leadership and access to water

Politics and water is a wide subject and most respondents did not feel comfortable with answering the questionnaire on political leadership. There are various allegations on lack of political leadership in the issues of water in the study area.

Table 4.26 shows the opinion whether political leadership has done good work on ensuring that there is water access in secondary schools.

**Table 4.26 Political leadership has done good work to avail water to schools**

| | Frequency | % Percentage |
|---|---|---|
| Strongly agree | 6 | 8.6 |
| Agree | 11 | 15.7 |
| Ambivalent | 6 | 8.6 |
| Disagree | 35 | 50 |
| Strongly disagree | 12 | 17.1 |
| **Total** | **70** | **100** |

When the respondents were ask about the good work the political leadership has done in ensuring that water is available in school, 50% disagree. Only 8.6% of the respondents strongly disagreed. The interpretation is that political leadership is good in giving promises to the electorate and once they win then they wait for the next turn. Politics and water in Kajiado has a long history because the county is vast in area and has many challenges ranging from cultural issues tied to livestock rearing. The political leadership are not able to marshal plan to increase funding on water sector. The decentralization of water has made the problem worse because it is the water service provider who is expected to deal with water.

Table 4.27 shows the extent of CDF funding of water issues in schools

**Table 4.27 extent of CDF in water funding in schools**

| | Frequency | % Percentage |
|---|---|---|
| Not at all | 34 | 48.6 |
| Low extent | 22 | 31.4 |
| Moderate extent | 8 | 11.4 |
| Very great extent | 8 | 8.6 |
| **Total** | **70** | **100** |

Table 4.27 shows that most respondents at 48.6% do not agree to the extent to which CDF has been used to fund water provision in secondary schools in the study population. 8.6% of the respondents agree that CDF has funded water in schools. The interpretation is that the priorities in the community development fund are other than water. The CDF was meant to benefit the community and the community was to have a say through representation. The county been one of the ASAL area, water is key to the citizens.

Table 4.28 show the Member of Parliament involvement in water activities in schools.

**Table 4.28 extent of Member of Parliament involvement on water**

| | Frequency | % Percentage |
|---|---|---|
| Not at all | 37 | 52.9 |
| Low extent | 24 | 34.3 |
| Moderate extent | 2 | 2.9 |
| Very great extent | 7 | 10.0 |
| **Total** | **70** | **100** |

Table 4.28 reveals that majority of respondents 52.9% does not agree that a member of parliament is involved in water issues in secondary schools. 10% of the respondents indicated that the involvement is to great extent. Members of parliament are elected to be people's representatives in parliament. They are expected to propose debate and pass laws that will be used to govern the country. They are supposed to debate on development issues one being water. Recently Kiserian dam which had taken more than 20 years was completed with the official opening by the political leaders. The political leaders in the county can involve themselves fully in water issues and schools will not have issues of accessibility to water.

Table 4.29 shows the donors/development partners involvement in water issues in schools

**Table 4.29 extent of donors/ development partners involvement in water issues**

| | **Frequency** | **% Percentage** |
|---|---|---|
| Not at all | 19 | 27.1 |
| Low extent | 22 | 31.4 |
| Moderate | 13 | 18.6 |
| Very great extent | 16 | 22.9 |
| **Total** | **70** | **100** |

Table 4.29 shows that majority of the respondents at 31% agree to a low extent that that donors and development partners are involved in water issues in the schools. 22.9% agree that donors play a great role in water provision in schools. The interpretation is that still donor funding is doing great work in provision of water to the schools. They provide technical support and

finances to ensure schools get water especially under WASH Programmes. The program has been in most cases sponsored by WHO and UNICEF and most children have benefited. There are community water projects that have been donated by the development partners hence accessibility to water by schools.

Table 4.30 shows the correlation analysis on whether political leadership has done good work in water access and MP involvement

**Table 4.30.Correlation matrix**

| | | | Political leadership has done good work in water availability | MP involvement on water issues |
|---|---|---|---|---|
| Spearman's rho | Political leadership has done good work in water availability | Correlation Coefficient | 1.000 | -.007 |
| | | Sig. (2-tailed) | . | .952 |
| | | N | 70 | 70 |
| | MP involvement on water issues | Correlation Coefficient | -.007 | 1.000 |
| | | Sig. (2-tailed) | .952 | . |
| | | N | 70 | 70 |

The table 4.30 reveals that the correlation between whether the political leadership has done good work in access to water and MP involvement on access to water in secondary schools is -.007. This reveals that it is a weak negative correlation. This means that the involvement on water access by the leadership is weak.

### 4.3.5 Economic activities and access to water

The various economic activities in Kajiado County coupled with the traditions and culture of the study area, led the researcher to assess its influence on water accessibility in the secondary schools. The researcher wanted to know the opinion of the respondents and the economic activity

they are involved in the school. The study also sought opinion on the sand harvesting activity in the study area.

Table 4.31 shows the impact of livestock on access to water.

**Table 4.31 Whether Livestock has impact on the access to water**

| | Frequency | % Percentage |
|---|---|---|
| Not at all | 12 | 17.1 |
| Low extent | 14 | 20.0 |
| Moderate extent | 4 | 5.7 |
| Great extent | 36 | 51.4 |
| Very great extent | 4 | 5.7 |
| **Total** | **70** | **100** |

The majority of the respondents at 51.4% agree that livestock as shown in table, has an impact on the access to water for in the secondary schools under study area most of them keep livestock.17.1% of the respondents indicated that livestock does not have any impact on water access. The interpretation is that livestock is given a cultural treatment in the Maasai community. They have big numbers of livestock. Their land is semi-arid and experiences much drought. The overgrazing by the livestock had led to biodegradation which result in climatic changes. The impacts of the climate change are interruption of rainfall patterns.

Table 4.32 show the impact of irrigation activities on water accessibility

**Table 4.32 whether irrigation activity has impact on the access to water**

| | Frequency | % Percentage |
|---|---|---|
| Not at all | 22 | 31.4 |
| Low extent | 10 | 14.3 |
| Moderate extent | 24 | 34.3 |
| Very great extent | 14 | 20.0 |
| **Total** | **70** | **100** |

Table 4.32 reveals that majority of the respondents at 34% are of the opinion that agricultural irrigation has an impact on access to water. While 31.4% of the respondents are of contrary opinion. Agricultural irrigation takes a lot of water especially in the sides of Nguruman and Loitokitok areas. The flower farms in the eastern side of the county along Kitengela-Isinya areas also consume a lot of water. The county water officer confirmed that the flower farms have their own boreholes which continue to draw water from underground storage.

Table 4.33 show the impact of sand harvesting activities on water

**Table 4.33 whether sand harvesting activity has impact on the access to water**

| | Frequency | % Percentage |
|---|---|---|
| Not at all | 15 | 21.4 |
| Low extent | 7 | 10 |
| Moderate extent | 21 | 30 |
| Very great extent | 27 | 38.6 |
| **Total** | **70** | **100** |

The study reveals that 38.6% of the respondents are of the view that sand harvesting contribute to water inaccessibility. 21.4% of the respondents do not think that sand harvesting in Kajiado County affects water accessibility. Sand harvesting is one of the major activities in kajiado. The sand that is being mine in parts of Isinya has been used to build houses in many parts of the county including Nairobi. Due to the demand for sand it has interfered with the flow of many rivers in the county since it is mined in the riverbeds.

Table 4.34 shows the correlations between the impacts of water for irrigation and water for flower farms on access to water.

**Table 4.34 the Correlations Matrix**

| | | | Impacts of water for irrigation on water access | Impacts of water to flower farms on water access |
|---|---|---|---|---|
| Spearman's rho | Impacts of water for irrigation on water access | Correlation Coefficient | 1.000 | .557** |
| | | Sig. (2-tailed) | . | .000 |
| | | N | 70 | 70 |
| | Impacts of water to flower farms on water access | Correlation Coefficient | .557** | 1.000 |
| | | Sig. (2-tailed) | .000 | . |
| | | N | 70 | 70 |

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.34 reveals that the correlation between the impacts of water for irrigation on water and water for flower farms is .557. This is a positive correlation. This means that the water for irrigation has the same impact as compared to water for flower farms on access to water in secondary schools in Kajiado County.

## 4.4 Conclusions

The chapter has provided the respondents views on the various views that were key to the study. The various findings have been tabulated for easy reference and interpretation using descriptive statistics using SPSS computer software. The information that the respondents had laid out is of

paramount importance to the increase to knowledge and for implementation from relevant authorities. The information can be used to assist in the implementation of water Act 2012 and implementation of national water storage master plan especially in schools. The respondent's views reflect the picture on the ground.

The main objectives that the study carried out were; to assess the influence of water provision services on access to water in secondary schools, to assess the influence of water catchment and conservation on access to water in the secondary schools in kajiado, to assess the influence of the water policies and regulation on access to water in secondary schools, to assess the influence of political leadership on access to water in secondary schools in kajiado county and to assess the influence of the economic activities on access to water in secondary schools in kajiado.

The study revealed that the major water service provider to schools is water tankers/ vendors service providers. The water service providers companies are few in the county hence could help in water service provision which will lead to more access to water. It was also established that most schools have boreholes hence could not pay water bills every month except to pay for electricity and fuel to pump the water. More boreholes are needed to cover the remaining schools. The ministry of water in kajiado has a tanker which they always used to provide water at the cost of Kenya shillings 6000 for 17000 litres. This is a temporary solution and the schools are the ones who should have water tankers to improve access to water. The study also established that the secondary schools have storage water tanks. The interview with the county water officer reveals that schools were given water tanks by the government in 2006 and it was totaling 200 tanks. The tanks were 10 to 24000 litres each. There have been donor donations towards water issues in the county, the county water officer says. The donors include AMREF, UNICEF, and Red Cross among the many organizations. More tanks are needed to improve access to water and rain harvesting techniques should be taken seriously.

The study also revealed on the water catchment and conservation, the water Act 2002 according to county water officer has made major changes in the water sector. The ministry of water and irrigation was left with supervisory and policy making leaving the water cartels to exploit the

public that has led to water been one of the expensive commodity. One the school was the venue of marking the world water day and this is one of the schools which has benefited with donor funding on water accessibility in schools. The western side of the Kajiado county especially Nguruman, there are rivers and springs hence there a lot of irrigation agriculture but for how long time will tell. Observation of NEEMA rules on environment conservation will increase access and sustainability of water resources.

On the political leadership most respondents do not believe that leadership is taking water issues seriously. The water catchment areas are exploited especially Ngong forest through illegal logging. The Noolturesh water pipeline which was to provide water to most parts of kajiado to-date is not working. The water is currently used in the southern part of the county and since water act 2002 was passed it is hard for the Ministry of water to intervene except to leave it in the hands of ineffective water service companies whose owners are unknown.

It was also established that economic activities has an impact on access to water. The economic activities in the county should use modern technology to ensure that it does not affect the water resources in terms of over extraction. Agriculture using irrigation method should use modern methods especially in drip irrigation. Modernizing agricultural irrigation methods will result in more access to water for schools. Livestock rearing should utilize modern Zero grazing techniques where the driving factor is the production of better yields from the livestock. Overgrazing has led to land bio-degradation which has impacted negatively on environment resulting in climate change. Embracing modern techniques in livestock rearing in Kajiado County will result in more access to water in schools.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATION

## 5.1 Introduction

The chapter gives the summary of the major findings, discussions, conclusions and recommendations of the research. The chapter provides the views of respondents as per the objectives of the study. The study was aimed at establishing the determinants of access to water

in secondary schools in Kajiado County. The main objectives that guided the study were; to assess the influence of water provision services in accessibility to water in secondary schools; to assess the influence of water catchment and conservation in accessibility to water in the secondary schools in kajiado; to assess the influence of the water policies and regulation in accessibility to water in secondary schools; to assess the influence of political leadership on the water accessibility in secondary schools in kajiado county and to assess the influence of the economic activities on water accessibility in secondary schools in kajiado. The analysis was done using the SPSS. Further studies are part of the chapter.

**5.2 Summary of the findings**

The study revealed that majority of the respondents 68.6 were males and 31.4 and the remaining 31.4% were females according to the data collected from the field. Those of ages between 31 years and 45 years dominated the research at 48.6% while those between 18 to 30 years old were the least and the rest 42.6% were those of the ages between 31 and 45 years.in the position the respondents held in school it was found out that administrators were leading at 45.7% while the PTA members stood at 22.9% and the remaining 31.4% were the school headmasters/principals. The education status of the respondents according to the study 52.9% were university graduates whereas 5.7% had secondary education and 41.4% had college education. The study also revealed that most respondents at 57.1% had student population between 251 and 500. Those with students between 501 and above were 17.1% and the rest 25.7% of the respondents had students between 1 and 250. There were 48.6% of the respondents been in public schools and the majority 51.4% of the respondents for private schools. The study also revealed that majority of the respondents 71.4% in boarding schools and 28.6% were in day schools. The study reveals also that 48.6% were respondents in mixed schools, 31.4% in girls' schools and the rest 20% in boys' schools.

The study data obtained shows evidence of water provision services has an influence in access to water in secondary schools in Kajiado County. The study found out that 45.7% of the

respondents of the schools on the study area had boreholes as a source of water and 34.3% rely on protected piped water and 2.9% on get water on the rivers. The study also revealed the 37.1% of the respondents had borehole water in schools and 37.1% submitted that they receive water from tankers/Vendors and the rest 25.7% from water service companies. On the frequency on of water availability in schools, 68.6% of the respondent said that it was always and 20% of the respondents noted it was very often while the rest 11.4% fairly often. The study also found out that 42.9% of the respondents said that schools pay monthly water bill over Kenya shillings 5,000. The study revealed that 40.0% of the respondents do not pay monthly water bills and 8.6% pay less than Kenya shillings 1000 and between Kenya shillings 1001 and 4999 respectively. Most of the respondents 54.3% believed that the water tariff is high and 45.7% on the contrary. The study also revealed that 88.6% of the respondents said that the schools had no outstanding water bill and 8.6% of the respondents submitted they have outstanding water bill. We observed that 95.7% of the respondents said that the schools pays fixed water bill. Only 4.3% of the respondents had a different view that the schools pay a fixed water bill.

The study also found that water catchment and conservation had an influence in access to water. Most of the respondents 80% said that schools had water tanks for storing water. The study also reveals that 20% of the respondents submitted that they do not have water storage facilities. Majority of the respondents 65.7% said that the schools have medium size of storage facilities. Only 11.4% of the respondents said that the schools have large water storage facilities and 2.9% said that they have small water storage facilities.20% of the sample said that there are no water facilities of any size in the school. The study also reveals that 51.4% of the respondents said that water supply to the school is very reliable while 37.1% had the opinion that water is reliable. Only 11.4% of the respondents disagreed that water is reliable.

The research data indicated great evidence on the water policies and regulations have an influence on water access in Secondary schools in Kajiado County. The study revealed that only 17.1% agree that the school had put in place water recycling mechanism. The majority at 60% strongly disagree that there are mechanism of recycling water. Majority of the respondents are of

the opinion that the water points maintenance need improvement. Only 22.9 are of the opinion that the maintenance is somehow satisfactory. The study found out that 54.3% agree that there is water treatment in Schools inorder to make water safe for consumption. The majority of respondents 11.4 % had a different opinion that there is no water treatment in school. The study observed that majority of the respondents at 72.9% agree that there are few cases of waterborne diseases in the study population. 8.6% strongly disagree that there are few cases of waterborne diseases in schools.

The study data had indication that political leadership had an influence in water access in secondary schools in Kajiado County. Most of the respondents when they were ask about the good work the political leadership had done in ensuring that water is available in school, 50% disagree and 17.1% strongly disagree. Only 8.6% of the respondents strongly agreed. Majority of the respondents at 48.6% do not agree to the extent to which CDF has been used to fund water provision in secondary schools in the study population. 8.6% of the respondents agree that CDF has funded water in schools. The study revealed that majority of respondents 52.9% does not agree that the Member of Parliament is involved in water issues in secondary schools. 10% of the respondents indicated that the involvement is to a great extent. Majority of the respondents at 31% agree to a low extent that that donors and development partners are involved in water issues in the schools. 22.9% agree that donors play a great role in water provision in schools. The study also revealed that when the respondents were asked their opinion on whether new leadership will improve access to water in schools 22.9% said not at all while 2.9% very great extent.

The research data indicated that economic activities have an influence in ware access in Secondary schools in Kajiado County. Majority of the respondents at 51.4% agree that livestock has an impact on the access to water to a great extent; while 5.7% said it is at a very great extent. The study also revealed that 17.1% do not agree that livestock had impact on water access. The research revealed that majority of the respondents at 34% is of the opinion that agricultural irrigation has an impact on access to water. While 31.4% of the respondents said not at all. The study reveals that 38.6% of the respondents are of the view that sand harvesting contribute to

water inaccessibility. 21.4% of the respondents do not think that sand harvesting in Kajiado County affects water access to schools.

### 5.3 Discussions of the findings

The accessibility to water in sub-Saharan is still the main challenge coupled with many factors and this study researched on water provision services, water policies and regulations, water catchment and conservation and political leadership and economic activities and access to water in secondary schools in Kajiado County. The results of the study have been able to point out the answers to the objectives of this research and its research questions using descriptive statistics and correlation analysis using spearman rank correlation.

**5.3.1** The provision of water services is influenced by the major sources of water, major water service providers, frequency of availability of water, customer care services, water tariff and monthly water bill. The study reveals that WSPs are facing inadequacy in provision of water services. According to (Kimotho 2012), 77% of the WSPs were faced with a problem of lack of planning departments hence no monitoring of strategic plans. The areas identified were operating department, lack of funds, lack of commitment by top managers, the dynamics in organizational group, cost of business operation on the overhead and operating costs, poor customer relations, poor planning mechanism, and poor geographical coverage adherence to implementation timeframe and inaccurate data. Kajiado County has unique characteristics due to various environmental factors in the county. In the eastern part of the county there is a lot of mining and flower farming activities which consume a lot of water. The study discovered that the flower farms have their own boreholes to continue their activities. The mining companies too have boreholes. The only problem is water pollution and polluter pays policy is not in force. The schools on Kajiado east which cover Mashuruu, Isinya and kitengela, mainly depend on borehole water as other sources are rare seasonal rivers. The southern part all the way to Namanga is

characterize by dry weather conditions except around Namanga there are springs which are drying up because of population growth and this was disclosed during an interview with the county water officer. The secondary schools here rely on both spring water and borehole piped water for the local water service company. The southwest part of the county in the areas around Loitokitok relies on river and springs. The schools have tapped water direct from these springs and rivers to their schools. The western part of the county in Nguruman also has springs and rivers hence most schools draw their water in these springs. The northern part relies mostly on boreholes.

The water provision services are facing various challenges that include the technology in water abstraction and delivery, the management concepts, ownership of assets and financing of the water service and delivery. The sustainability is a major challenge for instance the water springs in Namanga are slowly been exploited due to raising population. The same challenge is happening in parts of Ngong Magadi and Nguruman. There is no guarantee that in the next 50 years the natural resources will still be intact.

**5.3.2** The study found out that water catchment and conservation influence the access to water. The study looked at water storage and reliability of water. Research shows that there is still a considerable amount of untapped rainwater potential in Africa that can be used to supply adequate water to an immense portion of the population (UNEP 2008). The water catchment areas of Ngong hills have been destroyed hence serious repercussions on water which affect Magadi and all the eastern areas. The forests were supposed to feed Athi River, Isinya River and others. The Water Resource Management Authority (WRMA) is a state corporation under the Ministry of Water and Irrigation established under the Water Act 2002 and charged with being the lead agency in water resources management. Duties of WRMA include catchment protection and conservation, gazetting water protected areas and delineation of catchment areas. This means that if no one has been jailed then WRMA is yet to perform its role.The major problem with the schools is the water recycling mechanism which is lacking. According to (UN-Water 2013), safe

wastewater treatment and re-use will need to be managed so as to prevent pollution and contamination and protect the quality of precious water resources. The challenge is how to provide safe and clean water. Also the use of pesticides (Rutten 2005) and fertilizers for cultivation is polluting the drinking water for both humans and livestock downstream. The Ewaso Ngiro South, for example, carries pesticide residues from the large scale wheat farms in the neighbouring Narok District. There are always floods during rainy season but all the water is lost due to poor small storage facilities. There was no encounter on schools having dams because the water meant for drinking need to be safe. An estimated 780 million people (UNICEF/WHO, 2012) drink water from unimproved sources, and millions more drink contaminated water from improved sources. According to the interview with the water officer, Namanga area had springs before the population explosion. The NEMA rules have been in place for long and still its impact is expected in the ground especially on the water resource points of Ngong Hills and Loitokitok and Tsavo National park. There have been disputes on the water towers but amicable solution is the solution. The National Land Commission has a mandate over natural resources and water is considered one of the resources. Under Integrated Water Resource Management community participation and management of the water sources hence the schools are part of the stakeholders.

**5.3.3** The study found that the water policies and regulations are far from being implemented so as to help solve water problems. The water quality which was done by the Ministry of water has gone down and there are many upcoming water borehole whose quality nobody knows. Boreholes (GOK, 2012) in Kajiado are dug at residences without consultations with NEMA. Before there were guidelines on how many boreholes can be dug at a certain place, but currently it is rampantly done. Most schools have water borehole as a source of water. Also the water table is been interfered by unregulated water drilling activities according to county water officer. The study also found out that secondary schools selected for study treat water hence there is reduced cases of waterborne diseases. The water policies implementation is wanting. From the study the

consumers pay for inefficiencies and missing economies of scale by water service providers. The water service providers are not clean on cartels who exploit consumers. The regulations should be enforced to ensure water facilities are made to the standards with future projections and sustainability. The regulations will result in value for money and more transparent, accountable and good governance in the water sector and this will lead to water accessibility.

**5.3.4** The study results show that political leadership has not given priority to water access in secondary schools in Kajiado County. According to (UN-Water 2013), water is a strong political campaign tool, but political leaders do not follow up their campaign trail promises. Most respondents believe that leadership is the main problem. The political leadership have not organize for fund raising activities to raise money to enable each secondary school get access to clean and safe water. The CDF funds have not been utilized well to enable schools to get access to water. The meetings have not been organized to map out measures to eliminate water inaccessibility in the schools. Leadership plays a role in enacting laws that affect water sector as well. The county government is expected to deal with the county challenges and if leadership takes stand on water issues then solutions will be found. Politicians can play advocacy role on water issues and influence finances to water sector. The political leadership also if they are left out in the water service boards and water service companies then tangible solutions can be seen. According to (UN Water2013), water resources are under considerable stress due to a number of factors, including demographic, economic, social and climate changes, which in turn can exacerbate political tensions. Corruption has destroyed many sectors including water. Funds meant for water has been embezzled or directed to other areas and if political leadership enact laws to fight it then water sector can reform.

**5.3.5** The study found out that economic activities in Kajiado County require lots of water which in turn affect the water access in secondary schools. The observation made by Rutten (2005) reveals that the demand for water in Kajiado County is growing rapidly and is estimated to be

around 223,000 $m^3$ daily, with some 31,000 $m^3$ for livestock, 8,000 $m^3$ for wild animals, 15,000 $m^3$ for human consumption and 170,000 $m^3$ for irrigation. The economic activities depend on borehole water and the same borehole water is found in secondary schools. The water table is gradually going down and in some seasons few boreholes are shut down. The springs that are available are used to irrigate farming especially in Namanga, Loitokitok and Nguruman areas. Sand harvesting activities can contributed to water inaccessibility for the sand in mined in the rivers especially between Magadi and kajiado. According to Kajiado County water officer, flower farms in Kajiado County have their own boreholes. Water resources are the determinants of economic and social development as it keeps the ecosystem in place.

**5.4 Conclusions**

The study has revealed that water provision services are still not to the expected performance due to poor coverage. The water sources in schools are still far below the demand for water in school. The water policies and regulations are still below the expected out-put. The water recycling and water resource maintenance need more improvement. The water catchment and conservation is still a challenge in access to water. The water storage and rain harvesting is yet to be implemented. The political leadership has not done much on access to water by channeling of the resources to assist in water access. The economic activities consume much water hence affecting access to water.

**5.5 Study recommendations**

If the post millennium development goal where all schools must have access to water by 2030 then water policies and regulations that govern water services must be taken into consideration. I recommend this study to the policy makers in the water and environment ministry to be used to draft further policies on water provision services, water catchment and conservation and water policies and regulations. The WSPs do not have the capacity even to meet the MDGs goal by 2015 hence if post millennium development goals are to be achieved then institutional capacity must be put in place. All the stakeholders in the water sector including political leadership must be involved. The secondary schools need to be sensitized on the importance of water as a valued

commodity. The borehole water needs to be always monitored for water quality and safety. The water storage should be taken seriously by all institutions. Good storage facilities must be built to conserve water. The water recycling is important to conservation of water. Rain water harvesting should be harnessed. The experiences flood waters during rainy season. Those who rely on springs must make efforts to take care of the source to avoid pollution. This being a study based on post millennium development goals that by 2030 all schools should have water, the study can be done to cover all ASAL counties and other institutions as well.

### 5.6 Areas of further research

Further research need to be done to identify other determinants that hinder access to water in schools especially in ASAL counties for they each face different challenges. The research should cover all places not accessible places only. Water is universal. There is a need to do monitoring and evaluation on the progress made on water in the school's curriculum. The WASH school program was started and one of the issues was to deal with water.

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## APPENDICES

## APPENDIX 1: LETTER OF INTRODUCTION

Chesengeny Patrick Rono
P.O. Box 30197 -00100
Nairobi
30th May 2013

Dear Sir/Madam,

**RE: REQUEST FOR PARTICIPATION IN A RESEARCH STUDY**

I am a final year Masters of art student at the University of Nairobi. My area of specialization is Project Planning and Management. I am currently undertaking a research on "**DETERMINANTS OF ACCESSIBILITY TO WATER IN SECONDARY SCHOOLS IN KAJIADO COUNTY".**

I would appreciate if you could spare time for your busy schedule to fill the questionnaire. This questionnaire is used to collect data for academic purpose and all your response will be kept confidential.

Yours faithfully,

CHESENGENY PATRICK RONO

## APPENDIX 2: QUESTIONNAIRE

Questionnaire for Secondary Schools with the objective to get data towards the determinants of accessibility to water in Kajiado County

*Instructions: Kindly answer all the questions by ticking the option(s) and filling blank spaces provided.*

DATE……...
NAME OF SCHOOL……...
DISTRICT/ DIVISION----------

Section A: Bio data Please indicate (Tick as appropriate).

**1.** Gender

| | |
|---|---|
| Male | |
| Female | |

**2.** Age (Years): Kindly indicate the category of your age

| | | | |
|---|---|---|---|
| 18 – 30 | 31 -45 | 46-55 | Over 55 |

**3.** What is your position in the School (Tick as appropriate)

| | | |
|---|---|---|
| Headmaster/Principal | Administrator | PTA Member. |
| | | |

**4.** Your Level of Education

| | |
|---|---|
| Secondary | |
| College | |
| University | |

**5.** Description of Your Secondary School (Tick as appropriate)

Number of students-

| | | |
|---|---|---|
| 1-250 | 251-500 | 501-above |

(TICK)

| | |
|---|---|
| Public school | |
| Private school | |
| Day school | |
| Boarding school | |
| Boys school | |
| Girls School | |
| Mixed school | |

SECTION B: PROVISION OF WATER SERVICES

**6.** What is the major source of water to your school

| | |
|---|---|
| Protected Piped water | |
| Protected Borehole | |
| Protected Shallow well | |
| River water | |
| Spring | |

**7.** Which is the major water service provider to your school?
(Tick where Appropriate)

| | |
|---|---|
| Water service company | |
| School Borehole | |
| Tanker/Vendors | |
| Charity Project | |

**8.** How frequently do you get water in your school?
Always { } very often { } fairly often{ } almost never{ } never { }

**9.** How do you rate customer care services of your water service provider?

| | | | |
|---|---|---|---|
| Excellent | Very good | Good | Bad |

**10.** What is the current position of your school on the following;

| | Definitely | Definitely not |
|---|---|---|
| The current water tariff is high | | |
| The school has outstanding bill on water | | |
| The school pays fixed water bill | | |

**11.** What is your monthly water bill

1. Below Kshs 2500
2. Kshs 2501-5000
3. Over Kshs 5001
4. No monthly bill

SECTION C WATER CATCHMENT AND CONSERVATION

**12.** What size of water storage facilities are available in your school

Not available { }
Small size { }
Medium size { }
Large size { }

**13.** What storage facilities are available in your school

| | |
|---|---|
| Water tanks | |
| Underground storage facility | |
| Dam | |
| Not available | |
| Other | |

**14.** How reliable is the water supply from the service provider source e.g. during dry seasons? Tick the appropriate

| | |
|---|---|
| Very Reliable | |
| Reliable | |
| Not reliable | |

SECTION D: WATER POLICIES AND REGULATIONS:

**15.** How is the current water supply service in terms of the following:(please Tick)

| | Excellent | Very good | Good | Poor | Very bad |
|---|---|---|---|---|---|
| Taste | | | | | |
| Pressure | | | | | |

**16.** The drinking water point is well managed and maintained.

Strongly disagree [ ] somewhat disagree [ ] somewhat agree [ ] strongly agree [ ]

**17.** Please rank the following aspects of your water supply, Need Most improvement {1} to least improvement {3} (please tick)

| | 1 | 2 | 3 |
|---|---|---|---|
| Water reliability | | | |
| Billing system | | | |
| Service quality | | | |
| Maintenance | | | |

**18.** Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box.(1= strongly disagree 2= disagree 3= agree 4= strongly agree )

| | |
|---|---|
| The school has put in place mechanism to recycle waste water | |
| The school treat water in any way to make it safer to drink | |
| There are few cases of water borne diseases in school | |
| The school water taps rarely dry up | |

SECTION E: POLITICAL LEADERSHIP

**19.** The political leaderships has done good work to ensure water is available in school.

Strongly agree { } Agree { } Ambivalent { } Disagree { } Strongly disagree { }

**20.** For each of the following, in your opinion, to what extent does political leadership influence on accessibility to water in secondary schools in Kajiado County.
Use Likert scale of 1-4, where 4=Very Great extent, 3= Moderate extent, 2=Low extent 1=not at all

| | 4 | 3 | 2 | 1 |
|---|---|---|---|---|
| CDF funding towards water in your school | | | | |
| MP involvement of water related activities in your school. | | | | |
| Donors/NGO or governmental organizations involvement in water in your school. | | | | |
| Meetings by local leaders to discuss of water issues has been effective | | | | |
| Fund raising activities to assist the school on water by the local leadership has been successful. | | | | |
| The new leadership which was elected recently will to improve access to water in schools | | | | |

**21.** Kajiado county has good leadership and do you think it takes water issues as a priority?.....
.....

**22.** For each of the following issues related to water in Kajiado County, kindly indicate extent of agreement.

| | Strongly disagree | Disagree | Not Decided | Agree | Strongly agree |
|---|---|---|---|---|---|
| There is no political will to end water inaccessibility in kajiado county. | | | | | |
| Water related issues are top on the agenda on leadership meetings in the county. | | | | | |
| There is a lot of support by the political leadership to have schools get water | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| The political leadership has advocated for funds for the school to have water | | | | | |

SECTION F ECONOMIC ACTIVITIES

**23.** What is your opinion on each of the following, on the impacts of various economic activities has affected your school from getting access to water.
Use Likert scale of 1-5, where 5=Very Great extent, 4=Great extent, 3= Moderate extent, 2=Low extent 1=not at all

A) Water for livestock ☐
B) Water irrigation ☐
C) Water diverted to mining sites ☐
D) Water for flower farms ☐

**24.** What economic activity which the school engages in which require additional water?----------

**25.** The sand harvesting activities is common in kajiado county and does it affect water availability in your school?

Very Great extent { }
Moderate extent { }
Low extent { }
Not at all {

END OF QUESTIONNAIRE

*Thank you for taking your time to fill this questionnaire*

## APPENDIX 3:

## INTERVIEW SCHEDULE GUIDE

Name ----------

Position----------

Education qualification----------

1. What are the general factors that affect water provision services in Kajiado County especially those that affect education sector.
2. Discuss the water catchment situation in Kajiado County as it impact on water access.
3. What can be done about water conservation especially in schools to improve access to water.
4. Political leadership has been blamed for water related issues, do you think this is true.
5. Do you think the new National water policy 2012 will have an impact on access to water in kajiado and in what way
6. The various economic activities has been blamed for creating water in-accessibility, especially the flower farms, discuss this claim and what can be done.
7. What is the general water accessibility in kajiado for the time you have been in-charge and what are the challenges of water access in Kajiado County.

## APPENDIX 4: FIGURES

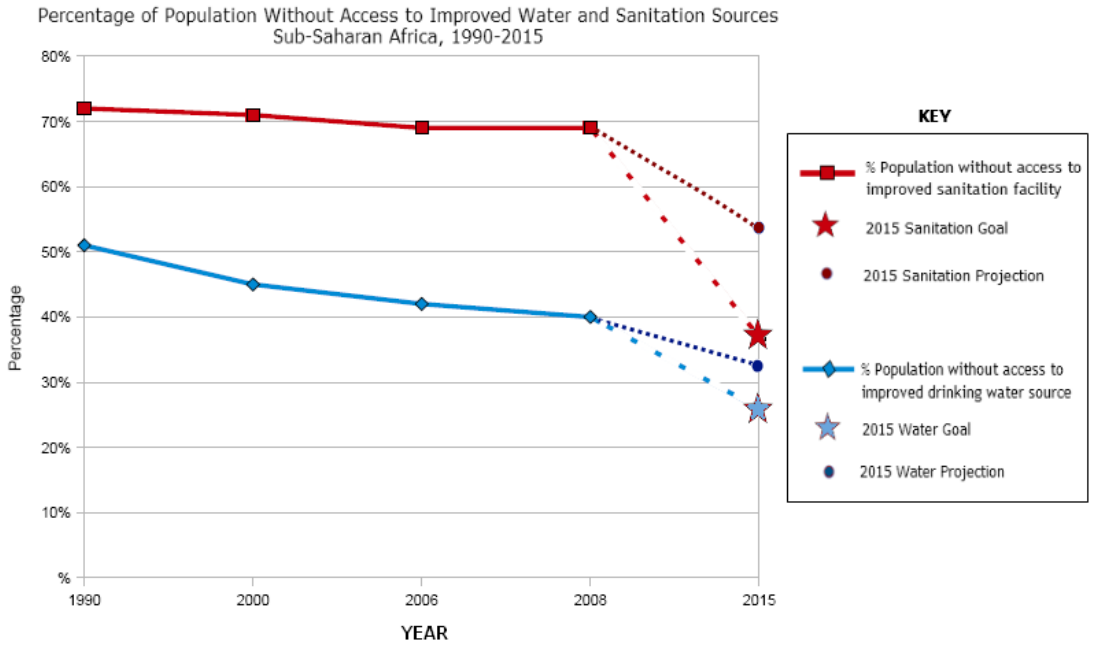



**Figure 2**. Current and Projected Proportion of sub-Saharan African Population without Access to Improved Water and Sanitation (World Bank 2010)

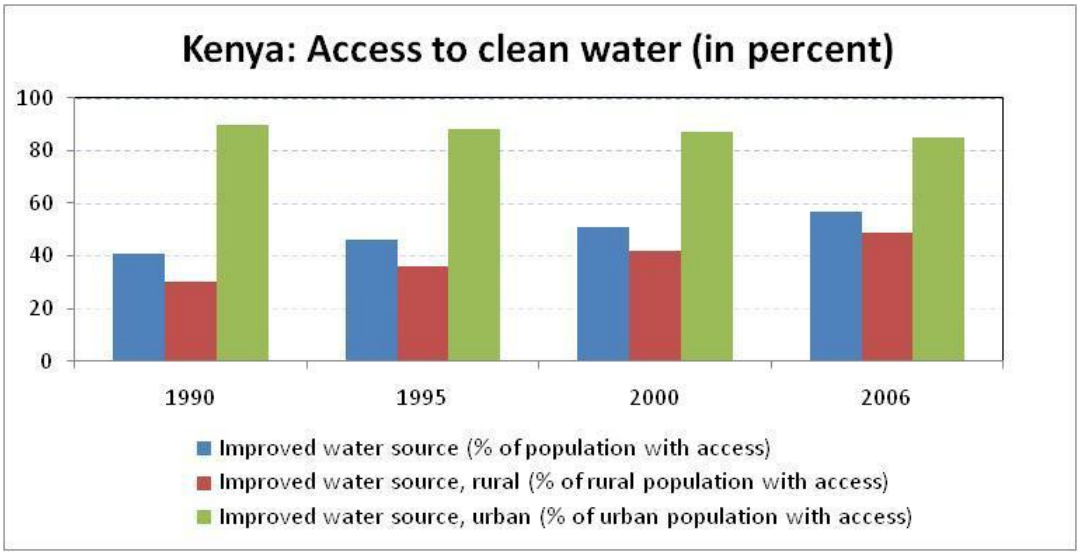



**Figure 3.** Access to Clean Water in Kenya
Source: World Bank (2010) *World Development Indicators*

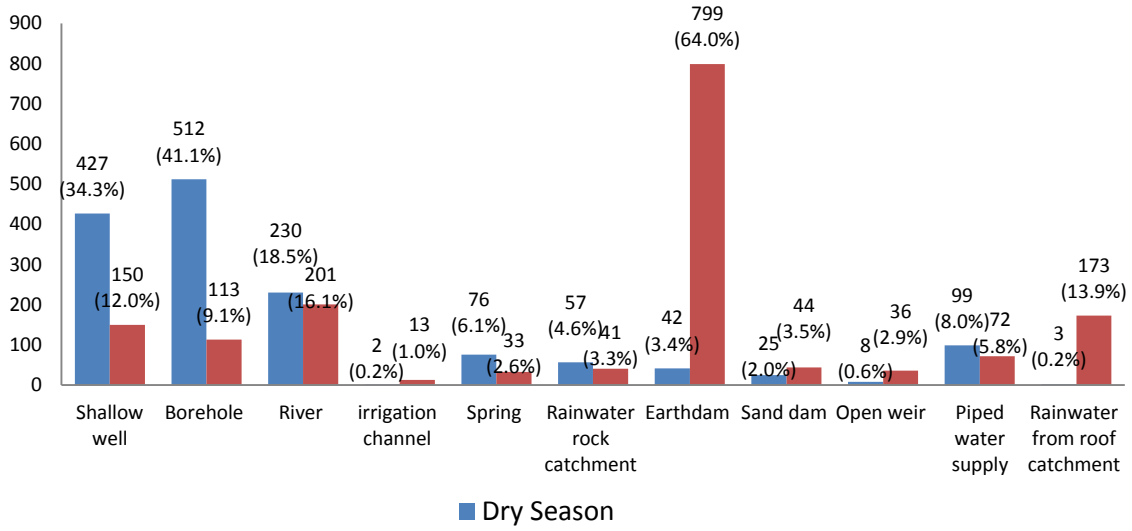
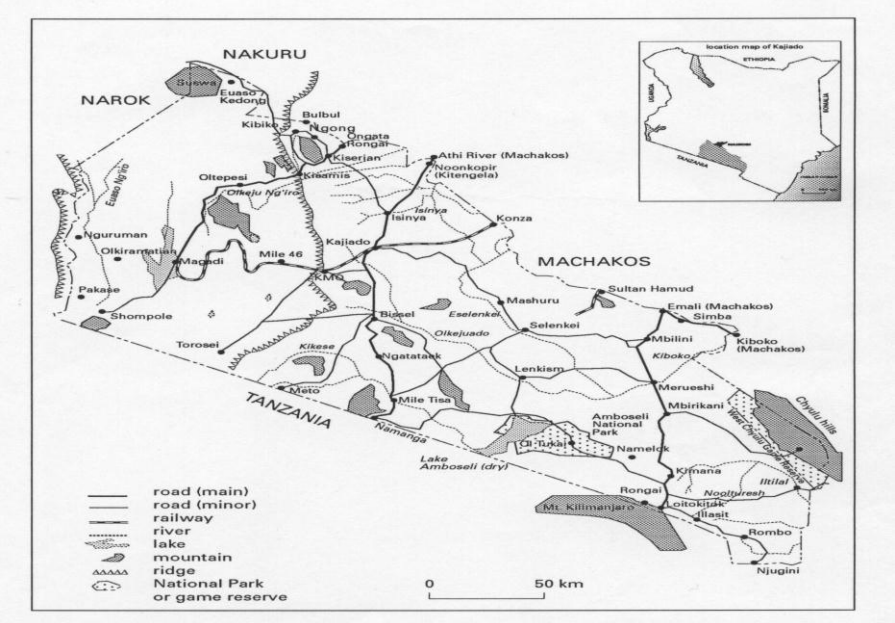



**Figure 4:** sources of water during the dry and rainy seasons in Kajiado County
*Source German Agro-Action 2011*




## Map of Kajiado County