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WATER RESOURCE CONSERVATION AND CONFLICTS PREVENTION IN EMBOBUT FOREST ELGEYO MARAKWET COUNTY, KENYA

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF POST GRADUATE DEGREE IN INTERNATIONAL STUDIES FROM THE INSTITUTE OF DIPLOMACY AND INTERNATIONAL STUDIES, UNIVERSITY OF NAIROBI

September, 2019

DECLARATION

I hereby declare that this is my original work and has not been submitted for any diploma or degree award at any other university.

Signature…… Date……...……

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The research project has been submitted for examination with my approval as the university supervisor.

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ABSTRACT

Highland forest areas play a crucial role in the supply of freshwater to humankind. The forests comprise the upstream part of the rivers beneath it, and the fresh water is used for domestics use, e.g. drinking and other purposes such as irrigation, watering animals, generating hydropower and transportation. Population growth and immigration ultimately puts natural resources, and in particular water under strain. This creates a fertile ground for conflicts between protagonists of the resource. The main objective of this study was to assess the complex ecological and socioeconomic dynamics prevailing in the highland-lowland system of the Embobut East, Elgeyo-Marakwet County. The specific objectives of the study were to assess the ecological changes, socioeconomic dynamics, and nature of the conflicts prevailing in the highland-lowland system of Embobut East with a bid to formulate a multi-level strategy for mitigating imminent conflicts over water resources. The study was based on the neo-Malthusian view, where rapid population growth, environmental degradation, resource depletion and unequal resource access combine to exacerbate poverty and income inequality in many areas of the world. The study area was confined to the physical area of Embobut East forest area that comprise, both the forest area, the escarpment and the lowland (valley) of Marakwet East sub-county. The researcher adopted descriptive research design. The study was carried out in Chebilil, Chesegon and Tots town ships and its environs. The study targeted all the 1018 households living in the escarpment and the Valley East of Embobut forest as per the 1999 KNBS census. Probability sampling was chosen, where Krejcie and Morgan (1976) was used to obtain the sample size. Stratified and systematic sampling was adopted for the study. Households were selected using simple random sampling in their various categories. Purposive sampling was used to select 18 officers drawn from state and NGO's. Questionnaires that were structured plus interview guides were utilized to obtain the primary data. Secondary data comprised a collection of recordings from meteorological stations and river gauge stations. The data was analyzed using standard hydrological statistical methods (NRMT, 2004) and SPSS. The findings of the study will aid a blue-print towards mitigating conflicts arising from water resource.

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CHAPTER ONE

INTRODUCTION

1.0 Background to the study

Water is always considered critical for all living thing. No living thing will survive minus water. The human body is largely composed of water and our physical well-being requires it. Human beings require water for other important aspects such as agriculture, transport and industrial use.[1] According to Jayyousi, access to safe water for drinking and domestic use is significant for the growth of human beings. It is unfortunate that not everybody have access to sufficient volume of water. In the year 2003, over 1.2 billion people failed to acquire adequate water supply and over 2.4 billion didn't access adequate sanitation.

Over 2.4 million people each year die from water borne diseases and it's because of lack of qualitative save supply of water[2]. What worries the experts is that water crisis is going to be bigger within the next 20 to 30 years. The world water forum that took place in Istanbul in the year 2009 reiterated that, giving assurance to drinking water that is safe and for sanitation purposes is definitely one of the most difficult undertakings on the agenda of all the nations. Lack of secure access to water for production and consumption especially in Sub Sahara Africa (SSA) is a major hindrance towards poverty reduction.

Faures and Santinin stated that water is among the most significant asset for production for millions of small scale farmers herders and fishermen in SSA and securing reach, control and management of these waters is important in boosting their livelihoods.[3]

Mountain and highland forest areas play an important part in supply of freshwater to human beings who are in both mountainous forest and also in lowlands. Over 50 percent of humans

[1] Ohlsson J.A (1995) Earnings,book values and dividends in equity valuation.
[2] Jayyousi (2007) land, water and development.
[3] Faures and Santinin (2008) Food and Agriculture Organisation of the UN.

depend on fresh water from mountainous forests for irrigation, livestock, drinking, domestic use, transportation hydropower and industry. The forested and mountainous highland areas usually have few river basins upstream but as one proceeds downstream the rivers become larger. Most case studies that have been done, shows that forested highlands and mountainous areas especially in humid areas gives a third to two thirds of the downstream fresh water. Weigartner and Lineger et al, Lineger et al and Viviroli et al indicated that the value increase from 70.0% to 95.0% in arid and even to semiarid environments.

There are many scenarios of conflicts revolving around highland-lowland system and other catchment areas, in which conflicts arise because of continued demand for the scarce resource. Management or mitigation of conflicts in such instances may require giving priority to and implementing improved strategies on control of water resources within the mountain and away downstream parts. Rababa'a hints that the Middle East region faces abundant difficulties in the war of water, which have been highlighted by many studies, which have analyzed and stated that the Middle East suffers the scarcity of large water quantities for various uses. The Middle East states include Jordan, Syria, the Palestine territories and Egypt.[4]. Because of this, the middle East has profound difference with Turkey having built a series of large and mammoth dams along the Euphrates, which who will hold water flowing into the Syria as well as the Nile., The dwindling water of the River Nile has had deep effect on inter-country relations of Ethiopia, Sudan and Egypt. This has given rise to water conflicts stirred by increasing population. This situation is fueled by the fact that half of the waters are

[4]Lineger,H., Gikonyo, J., Kiteme, B., and Wiesmann, U.(2005). Surveying and Managing ScarceTropicaMountain Water Resources: The Case of Mount Kenya and the Semiarid Upper EwasoNg'iroBasin. Vol. 25, No. 2 (May, 2005), pp. 163-173 Accessed on: 14-11-2018 17:01 UTC https://www.jstor.org/stable/3674677

located in progressive states while the Arab world is located in tropical regions that are characterized by dryness with 90.0% of its springs passing through other countries[5].

In East Africa, the Nile Basin water control has for quite some time been challenged within the ten African riparian states that sit inside the broader catchment area. In pioneer times, Nile utilization was controlled by settlements proclaimed and upheld under British standard. Egyptian was favored and, to a lesser degree, Sudanese power in controlling the incredible stream in these understandings. The circumstance were tested in the 1960's with after the finish of provincial standard in the locale, and these difficulties have now again been reestablished as of late with the restoration of the East African Community. Kagwanja, claims that the individuals from the EAC, Tanzania, Kenya and Uganda, have a typical enthusiasm for encouraging the monetary improvement of the Basin of Lake Victoria, and by doing this it gave them the motivating force to handle the long-standing issues over the administrative gadgets administering utilization of the Nile waters.

Two local Kenyan cases include conflicts in Upper Ewaso Ng'iro Basin and the adjoining Mount Kenya and the Mau water tower in Narok County. Mount Kenya, which form a highland-lowland system with existence of conflicts arising from scramble for water. Liniger et al claims that Mount Kenya shapes an asset rich island in a savanna-ruled condition, particularly toward the Northern and Western parts of the massive volcanic mountain. The marshes - comprising of the dry Samburu Plains and semiarid Laikipia Plateau—are very reliant on the water flows that originates from its diverse environmental zones and the Mountain and the woods belt[6]. With the passage of time, horticulture farming

[5]LinigerH.P., Welngartner R. (2000). Mountain woodlands and their job in giving freshwater assets. In: Price MF. Butt N, editors. Woods in Sustainable Mountainkangwana(2007) calming the waters:The African Community and Conflict over the Nile Resources , Journal of East Africa Studies, 1:3, 321-337, DOL: 10.1080/17531050701625565

[6]Lineger, H., Gikonyo, J., Kiteme, B., and Wiesmann, U.(2005). Assessing and Managing Scarce Tropical Mountain Water Resources: The Case of Mount Kenya and the Semiarid Upper EwasoNg'iro Basin. Vol. 25,

emerged and intensifies in the root zone of the mountain. In this scenario, compounded by insufficient farm planning policies has prompted wide scopes of issues identified with the use of water as a natural resource. The most significant of these issues included abuse of the water upstream[7].

On the issue of Mau forest, the government's move to evict encroachment into the water tower created conflicts, which led to the fighting between the two main communities in around Mau that included the Kipsigis and the Maasai . Maasai community was fully behind the action since they saw the influx as a direct threat to their livelihood that greatly depends on the Mau[8]. Two major communities the Kalenjin and Maasai are pointing fingers at each other. The Maasai community feels that Kalenjins are responsible for the wanton destruction of the forest, thus affecting their source of livelihood. The Kalenjin community says they were cheated into purchasing land that did not exist by the group ranches that did not exist[9].

Embobut forest, comprise part of the Cherangany hills forest. The forest is a crucial water tower and has been a source of livelihood for the Marakwet sub-ethnic group of the Kalenjin for many decades. Marakwets were issued with permits to graze in the forests during the dry season but move out when pasture was available in their native land, and as such permanent residence or habitation was not allowed. In fact, no agricultural activity took place except for grants of limited access to licensed grazing.

No. 2 (May, 2005), pp. 163-173 Accessed on: 14-11-2018 17:01 UTC
https://www.jstor.org/stable/3674677

[7]Wiesmann, U., Gichuki FN, Kiteme BP, Lineger HP. 2000. Migating conflicts over scarce water resources in the highland-lowland system of Mount Kenya. Mountain Research and Development 20(1):10-15.

[8]Letoo, S. (2018).The Genesis of the Mau forest crisis. Citizen digital, 24th July, 2018

[9]Koech, G.(2018). Mau evictions may have led to deadly clashes in Narok. The Star newpaper, November 2018. https://www.the-star.co.ke/news/2018/09/12/mau-evictions-may-have-led-to-deadly-clashes-in-narok_c1816728

However, over the years, the population of the forest dependent community has grown substantially; putting immense pressure on the forest from grazing, permanent settlements and farming which led to massive degradation of the forest and rivers feeding the down-stream communities started drying[10]. In deed by 2008 16,000 hectares of its 21,000 hectare had been destroyed. This triggered an outcry from the downstream communities hence creating a conflict, here in called the first phase conflict, between the upper and lower catchment communities. To mitigate and respond to this conflict, KFS issued a vacation notice in 1st April 2009 complemented by Marakwet Leaders who convened a meeting on 4th April 2009 at Kapsowar and passed a unanimous decision that all people encroaching into the forest to leave immediately and be temporally settled in seven glades. A taskforce was established to investigate profile and determine genuine landless community members removed from the forest and make recommendation of their permanent resettlement.

Several ethnic communities live around the Embobut Forest and they include the Marakwets constituted by different clans that includes Almoo, Talai, Cherangany, Sengwer/Kimaala), Endoow, Markweta, Sombirir (Borokot) and Kiptaani. Other ethnic tribes includePokots and Turkanas. These varied ethnic groups are supported by different economic activities which explain the presence of tension between them and conflict between upper and down-stream communities. With this behind now, there is imminent phase two post conflict that is likely to erupt because of this varied economic activities that puts water in high demand both for the lower and upper communities and this is the reason why this study will be keen to assess the ecological and socio-economic complexities and propose a multitude of strategies to quell the impending conflict.

[10]Kamau,journal published wed January 31st 2018.

1.1 Statement of the Research Problem

Embobut forest in Elgeyo-Marakwet county Kenya is recuperating from years of degradation as a result of encroachment that saw rivers feeding the down-stream communities drying up. The first phase of the conflict was triggered by an outcry from the downstream communities, hence creating a conflict between the upper and lower catchment communities. Through mass expulsion of the population who had settled in the timber and the conflict has faded away. As the downstream rivers are slowly coming back to live, there is a scramble for the scarce water resource from the highlands. In a bid to get livelihoods the growing populations in the escarpment are creating furrows and diverting water into their homesteads and farms for animals to drink and irrigation. As a result, a great majority of the occupants of the lowlands comprising Chesongoch, Tot, Chesogon and its Environs are set to face extreme challenges earning a living because they too need water to irrigate their farms and for use by their livestock, given that semiarid conditions of their land. Against this background, a phase two of major conflicts over water resources is expected and this study seeks to develop strategies for preventing water resource conflicts water resources in Marakwet East, ElgeyoMarakwet County.

1.2 Research Questions

1. What ecological changes prevail in the lowland-highland arrangement of the Embobut East?
2. What social and economic dynamics prevailing in the lowland-highland arrangement of the Embobut East?
3. What is the nature of the conflict for resources associated with water in the lowland-highland arrangement of the Embobut East?
4. What multi-level strategies can be adopted for mitigating the rising clashes over water resources?

1.3 General Objective of the Study

The general target of this study was to evaluate the complex environmental and socio economic dynamics in the lowland-highland arrangement of the Embobut East and consequent conflicts in the area.

1.4 Study's General Objectives

The overall goals of this project were to:

1. Evaluate the ecological changes Embobut East
2. Evaluate the social and economic dynamics occurring in the lowland-highland arrangement of the Embobut East
3. Examine the nature of the conflict for resources associated with water in the lowland and highland communities of the Embobut East
4. Analyze the impacts of a multi-level strategy for mitigating the conflicts that emerge from water resources in the highland lowland system of Embobut East

1.5 Literature Review

1.5.1 Introduction

The depletion of the resources, climate change and environmental degradation poses threats to security of human beings. Yayha claims that separately or in combination with some other factors other. They can affect the ecosystem negatively, undermine development and peace and also destabilize livelihoods. The causes of environmental scarcity include natural resources demand that exceeds supply, natural resource degradation thereby supply is reduce and unequal access to natural resources .Cases of conflicts have been brought into the lime light in various parts of the world. Conflicts can be intrastate, that is within a country or interstate, that is between states. For instance disputes such as those in the study area are

intrastate since it involves one or more entities of a state such as communities. On the other hand history shows that competition, disputes and conflicts for water has been there[11].

1.5.2 Ecological changes highland-lowland system

Embobut Forest is situated in Elgeyo/Marakwet County and covers an area of approximately 21, 000 ha. The strategic importance of this forest as a critical water tower and as Marakwets source of livelihood was first recognized by the British Colonial Powers in 1893.The varied ethnic groups that lived around here are supported by different economic activities that are carried out by members of the community that live between upper and down-stream communities. The downstream communities who reside along the Kerio Valley and the escarpment mostly keeps beef zebu cows goats and grows sorghum, cassava, millet, fruits and vegetables(mostly oranges and mangoes) and heavily depend on water which flows from the Embobut forest. Any negative impact by the upstream communities on the forest such as the degradation would have grave consequences to the survival of the downstream community.

1.5.3 Socio economic dynamics in the highland-lowland system

According to Unites states Institute of peace, economies are highly highly depend on agriculture, which definitely depend on resources which are natural such as water and land. (USIP). In a study to done in Capiap'o valley, Chile, South America, water is becoming scarce because of the exploitation of the Aquifer. There was competing interests in water use between agriculture, mining and human consumption. This led to conflicts between these sectors of the economy, thereby necessitating what was termed as the water negotiation table.

[11]Gleick, P. (1993). Water in Crisis: A Guide to the World's Freshwater Resources. New York: Oxford University Press.

Other basins within the valley were likely to incubate similar conflicts[12]. According to OECD , a cultural socioeconomic and political factor determines whether the violence was brought by these tensions. The 1996 case of water conflicts between, Syria, Iraq and Turkey has been cause by socio-economic factors rooted in agricultural production[13].

The various uses of land in the upper part of the Ewaso Ng'iro basin is connected to the economic and social development, which are visible in those parts of Mount Kenya.., Kenya. The utilization of land the Ewaso Ng'iro basin have happened basically because of once-nomadic pastoralists moving to sedentary ways of life (because of numerous determinants that are favorable and simultaneously unfavorable). The move brought about increments infecting, too much consumption of grass, fragmentation of habitats and more live stocking of animals. All these activities have negative ramifications on wild life including livestock management[14].Utilization of land that is visible includes the one that spans from the crop land to Savannah. The large scale farms subdivision to little scale ranches has brought a huge escalation of agriculture. Cropland has nearly doubled between 1984 and 1995 at the footsteps zones of the Aberdares and Mt. Kenya. This expansion occurred at the expense of majorly grassland and grassland with the trees. Until 2012 a consistent increment can be seen in croplands at the foot zones of the Aberdares and Mt. Kenya. Another change is the transformation of forest into cropland. Over the year 1984 to 1995 natural forest lost about one tenth of its zone. The expansion of the cropland affected mainly the grassland with and without trees which reduced in size as time went by 2012, there has been consistent increment being visible at the foot zones through croplands being cultivated in Mount Kenya and the Aberdares. Another change is transformation of forest into cropland. Over the year

[12]Eduardo, B., Pedro, R., & Marcelo, V. (2011). Water Management Problems in the Copiapó Basin Chile: Markets, Severe Scarcity and the Regulator.
Universidad Adolfo Ibáñez

[13]OECD (2005).Mainstreaming Conflict Prevention. Development Assistance Commitee

[14]Ojwang', G. O., and Wargute, P.W. (2009). The population trends and distribution of large herbivores inLaikipia district. Department of Resource Surveys and Remote Sensing, Nairobi.

1984 to 1995, natural trees cover lost about 10.0% of its cover. This took place, first downstream, where the backload vegetation cover offered paths to the cultivated farms besides the streams on the river. These footpaths brought about erosions in the river bank. By the year 1998, these clearing of the cover had extended into the mountainous zones of the forest. This prompted the Mount Kenya National park to protect, through powers conferred to them through a policy that permitted them to do so.

A third change is the transformation of wetlands to croplands. Thenya et al. Caution that with no mediation wetlands would vanish from the zone in a couple of years.
Sensible measures of wetlands still exist. The declining wetlands, not withstanding, likewise have an effect on the hydrology including the biodiversity of this catchment. Swamps comprised refuges in which creatures cohabited during the dry spell. On the other hand, the wet lands played the role of a sponge in which the creatures will take refuge during the floods. Other than the wet lands diminishing, the croplands also transformed through a decline in fertility which is caused by the oxidization of soils. .

Another change that has taken place is the development of urban centres in the catchment area, which have expanded by 300.0% in the year interval 1984 and 1985. However, there was evidence of data that reveals a slow pace of increment in the urban area between the year intervals of 1995 to 2012. According to GOK, and GOK, the population registration of the year 1999 and 2009 demonstrate a population increment of Nanyuki of just 0.079 % every year somewhere in the range of 1999 and 2009. Further, another evolution in land utilization in the catchment is the change from being a natural forest comprising of natural trees to one that has exotic and the commercialized trees, that is, plantation forest. Through the shamba system, in which forest areas were cleared consistently, to pave way for cultivation of crop,

the outcome has been supplanting of exotic species of trees, such as eucalyptus and pine, thereby such areas developing into plantation forests. [15].

1.5.4 Nature of Water resources conflicts in Lowland and Highland Communities

Yahya indicated that, besides conflicts being triggered, escalating or being sustained because of violent conflicts, abuse of high-esteem natural resources in the lowland and highland (counting oil, gas, minerals and timber), there is likewise expanding competition and conflict for reducing inexhaustible resources, for example, water and land. The most common form of conflict is competition for scarce water resource. Eduardo highlights conflicts that have arisen because of exploitation of waters in Capiap'o valley in Chile, where there was competition for use of water resource majorly between the agriculture and the mining sector[16].Riperio et al , opinionated that water is a rare resources with zero substitute, however has a consistent, quick and developing interest on the planet, which is the reason resources clashes will turn out to be increasingly visit and serious. This is because, the utilization of the natural resource by one nation usually sways neighboring riparian, a situation that aggravates inadequacy in another country. This is even made worse by the shortcoming created by global law. [17].

1.5.5 Multilevel procedure for mitigating the rising clashes over water resources

Yahya , in a guide to practitioners on dealing with conflicts, he suggests partnership in which the national stakeholder's capacity is built through the development and implementation of a

[15]Notter, B., MacMillan, L., Viviroli, D., Weingartner, R., Liniger, H. P. (2007) Impacts of environmental change on water resources in the Mount Kenya region. Journal of Hydrology 343(3–4):266–278.
[16]Eduardo, B., Pedro, R., & Marcelo, V. (2011). Water Management Problems in the Copiapó Basin Chile: Markets, Severe Scarcity and the Regulator.
Universidad Adolfo Ibáñez
[17]Riberio, W. C. &Sant'Anna, F.M.(2011). Water security and interstate conflict and cooperation.São Paulo University.

vital multi-organization project, which concentrated on the, the framework of UN and EU of keeping natural resources including land from adding conflicts that are brutal. The organization was likewise intended to improve strategy advancement and program coordination between the 3 main Notes on Guidance of preventing and addressing conflicts emanating from management of natural resources[18].

1.5.6 Research gap

The literature discussed so far has focused much on water conflicts between riparian countries (national disputes) who share a water basin on its international borders or the basin crosses the border. Some studies such as those by Wiesmann et al have dealt on intra-community conflicts, but their scope is a mountainous forests. This study shifts from previous literature by not only focusing on intra-community water resources conflict but in highland lowland system spanning an escarpment and valley (Great Rift Valley).

1.6 Study's Limitation

The study focused is based on the fact that the parties to the conflict have animosities which have built over time and this may impact on the preliminary analysis of primary data. Where secondary data was involved the nature and the orientation of the conflict may be different and any strategy proposed may not reflect on practical solution to the conflict, rather it can be a guide.

1.7 Justification of the Study

The study would be important as it is meant to fulfill the partial requirement in postgraduate diploma in strategic studies. Secondly for the inhabitant of the area, this has been devilled by cattle rustling over the past decade. Mitigating or preventing this imminent conflict will alleviate the suffering of the communities in the lowlands which is already grappling with

[18]Yahya, M (2008). Guidance notes for Practitioners. UN-EU Partnership. The United Nations Interagency Framework Team for Preventive Action

deteriorating peace in the whole area of Marakwet East sub-county., both at the escarpment and the highland. The market approach is whereby each riparian country seeks after individual increases from the commitment in a basin wide bartering game.

1.8 Theoretical Framework

It is envisaged that the study would be important because it fulfilled. According to this view, rapid demographic development, degradation of the environment, depletion of resources and unfair access to resources merge to aggravate earnings inequality and poverty in many parts of the world. These deprivations are readily converted into grievances, dangers of insurrection and community conflicts are increased. Malthus clarified that the population is increasing in the order of 1, 2, 4, 8, 16, 32... While survival is limping at a pace of 1, 2, 3, 4...As illustrated by an economist of Stanford, Nathan Rosenberg, there are several factors at play with regard to population growth and use of natural resources[19]. First, population growth directly affects consumption in a situation where there are fixed resources. Secondly, when population increases, the consumption of each of the member of the population falls, thereby following the diminishing returns law. Third, a growing population depicts a case in which a bigger base comprises of children who are both non producers and consumers. This brings about lessened per capita output. In addition, the growth in the demographics changes savings on investment and investment from human capital development into subsistence. The assumption to this logic (also known as ceteris paribus) presumes that factors are fixed and constant in the logic equation. That hypothesis makes Malthus' theory to be valid. This theory is applied to the study because water as a natural resource or the ecosystems that generates it is scarce or is getting depleted as a result of the growth in population. This

[19]Wolfgram, A. (2017). Population, resources and Environment.The Catholic Family and Human rights Institute. The Catholic University of America

scenario is compounded by the factor that the same growing populations are keen to pursue economic freedom through socio-economic activities that directly affects the environment[20].

1.9 Research design and methodology

1.9.1 Introduction

This section highlights: Target population, research Design, the Sample size and Sampling Techniques. Also discusses are the Research Instruments, Data Collection procedures and Techniques, Data Analysis methods and presentations and lowland system of the Embobut in Elgeyo Marakwet County.

1.9.2 Research design

Descriptive research design was used by the researcher. This involved predictions with narrations of facts based on individual or a group. The design was effective because it helped in collecting descriptive data.

1.9.3 Location of Study

The project was conducted in Chebilil, Chesegon and Tots town ships of Elgeyo-Marakwet County, which comprise the area of study that lies in Embobut East. The study area comprises the escarpment and the valley parts with communities living in it doing farming and animal keeping for their livelihoods.

1.9.4 Target population

The study targeted all the 1018 households living in the escarpment and the Valley East of the Embobut forest. The households that were investigated lived in Chebilil, Chesegon and Tot town ships of Elgeyo-Marakwet County.

[20] Ibid

Table 1.9.1 Target population and Sample

Sno.	Locality	No. of households	Sample
1	Chebilil	406	111
2	Chesegon	364	100
3	Tot	248	68
	Total	**1018**	**279**

1.9.5 Sampling techniques and Sample size

Sampling is a method of choosing a part or subdivision of population on which research was carried out to guarantee that the study findings were distributed to the whole population. In selecting a sampling procedure, the probability sampling was chosen, where Krejcie and Morgan (1976) was used to obtain sample size. Systematic and stratified sampling will be adopted for the study. In the first stage, the overall population of members of communities' household in Kerio valley was stratified into three districts according to the geographical location of the study area, Pokot, Keiyo and Marakwet. The population of the study was stratified into three categories, those that live in the escarpment, on the lower eastern part of the forest and those that live in the valley. Stratified random sampling enabled the proper identification of the subgroups in the population based on their locality or ecological zone. Households in each category was identified and numbered. Systematic sampling was applied every fourth household was selected and its household head interviewed. The starting point (household number one) was determined. Random selection ensured the statistical regularity law stating that if the sample selected is random on average, the sample would have similar16 features and composition of the universe. The respondent in every household was head of that household but in his/her absence, the spouse or elder child was selected to respond. Where both parents were absent, another visit was organized. Kerlinger states that a sample

size of a study should be considered to be adequate so long as it is large enough to allow for reliable analysis of cross-tabulation, provide desired level of accuracy in estimates of the larger population, and test for significance of difference between estimates. Finally, purposive sampling was used to select 18 officers, all of whom are attached to the Ministries of Agriculture, forest, Water, Livestock, officers from non - governmental organizations (NGOs) and Organizations at community level.

1.9.6 Data Research Instruments

Open interviews and structured questionnaires was utilized to obtain information on community members ' background, tasks, composition, operations, opinions and roles, and the type of disputes in the Embobut forest resolved through eviction. The study also covered the community members of the 3 catchments - Embobut, Siga and Weiwei.

1.9.7 Data Collection Procedure

The daily data records and charts, which were captured and achieved from the 1960 to 1980, were used. The data comprised records of river gauges and meteorological stations of the three catchment areas that included the upper stretch of the Embobut, and depicted the dynamics of the availability of water use since 1960. The river flow monitoring was performed using O.T.T R.16 water recorders. The water recorders recorded the levels of water discharged and out of this; the discharge rating curves (also called NRMT) were calculated. Embobut, Siga and Weiwei rivers were evaluated for the present study. Full inventory that covered 92 abstraction points in 1997 and in 2009, 224 abstraction points. The secondary sources included government publications, textbooks, internet, journals and other unpublished and published works. Primary data included key informants among them, acknowledged authorities within the area of the study who provided valuable information used to compliment and validate that from other sources.

1.9.8 Data Analysis Techniques

The data stored in a database was analyzed using standard hydrological statistical methods. Both qualitatively and quantitatively were analyzed using the descriptive statistics with the aid of SPSS. Presentation of the research findings was done using pie charts, distribution tables and graphs in data presentation.

10.0 Chapter Outlined

10.1 chapter one introduction to the study, background of the study problem of the study, objectives of the study, literature review, limitation of the study, justification of the study, theoretical framework and research design and methodology

10.2 chapter two covers ecological changes prevailing in the area of study, ecological changes in highland lowland, socio economic dynamics in the highland lowland system.

10.3 chapter three covers nature of conflicts over water resources in the highland and lowland communities, conflicts at the community level and water and conflicts a case of upper ewaso ngiro north basin

10.4 chapter four covers multi-level strategy for mitigating the emerging conflicts over water resources impact of international water treaties on transboundary conflicts, reconciling conflict by transforming security concerns into equity concerns, the role of international

Community, community based water management.

10.5 chapter five covers data presentation and analysis

10.6 chapter six covers summary of key findings, conclusion and recommendations.

CHAPTER TWO

Ecological changes highland-lowland system

2.1 Introduction

The threats that underlie human security include but not limited to; change in climate, exhaustion of resources and deterioration of the environment. They can destabilize livelihoods, either in combination with other factors or separately. All the aforementioned factors affect the ecosystems negatively and at the same time may undermine development and peace. As economic growth and population rise, so does conflict potential and the demand for unavailable of resources The causes of environmental scarcity include natural resource demand exceeding supply, natural resource degradation hence reducing supply and unequal access to natural resources[21]. Cases of conflicts have been brought into the lime light in various parts of the world. Conflicts can be intrastate, that is within a country or interstate, that is between states. For instance disputes such as those in the study area are intrastate since it involves one or more entities of a state such as communities. But then, there has been history of interstate disputes, competitions and conflicts over water were present[22].

2.2 Ecological changes highland-lowland system

Embobut Forest is situated in Elgeyo/Marakwet County, which stretches an estimated area of 21,000 hectares.. The Embobut forest strategic importance as a critical water tower and as Marakwets source of livelihood was first recognized by the British Colonial Powers in 1893.The varied ethnic groups that lived around here are supported by different economic activities that are carried out by members of the community that live between upper and

[21] Yahya, M (2008). Guidance notes for Practitioners. UN-EU Partnership.The United Nations Interagency Framework Team for Preventive Action

[22]Gleick, P. (1993). Water in Crisis: A Guide to the World's Freshwater Resources. New York: Oxford University Press.

down-stream communities. The downstream communities (along the escarpment and the Kerio Valley) mainly rare zebu cows for beef, goats and cultivate cassava, millet, sorghum, fruits (mostly mangoes and oranges) and vegetables and are heavily dependent on water from the Embobut forest. Any negative impact by the upstream communities on the forest such as the degradation would have grave consequences to the survival of the downstream community.

An ecological zone is connected via ecological processes, the most essential being related to Embobut river and its distributaries. Often tributaries that emanate from the forest, form rivers that has guaranteed seasonal river fluctuations due to high water holding capacity, low evapotranspiration and excessive rainfall, making such rivers important for the lower zones[23]. The conversion of systems and patterns of land use in the high and low land systems has been characterized by very high rate of population growth, primarily due to agro-pastoral smallholders' immigration. The increase in population obviously meant that the demands of natural water resources had also increased, particularly water resources[24]. Moreover, land was divided into small parcels for agro-pastoralists, who emigrated mainly from the valley because of insecurity caused by rustling cattle. These changes in uses of land and land systems were a pre-cursor of the current patterns of how land is utilized in the study area. In the foot zone of the forest, are established small scales farming areas which are dense and partially invaded the forest belt[25].

[23]Wiesmann et al (2000). Mitigating Conflicts over Scarce Water Resources in High and Lowland System of Mt Kenya
[24]Ibid 2
[25] Ibid 2

2.3 Socio economic dynamics in the highland lowland systems

According to Unites states Institute of peace, economies depend heavily on agriculture and are definitely heavily dependent on other natural resources such as land and water. A study to done in Capiap'o valley, Chile, South America, water is becoming scarce because of the exploitation of the Aquifer. There was competing interests in water use between agriculture, mining and human consumption. This led to conflicts between these sectors of the economy, thereby necessitating what was termed as the water negotiation table. Other basins within the valley were likely to incubate similar conflicts[26]. According to OECD, socio-economic, cultural and Political factors determine if such tensions result in violence. The 1996 case of water dispute between Turkey, Syria and Iraq has been caused by socio-economic factors rooted in agricultural production[27].

According to the proceedings of The Hague based conference, Klem and Hilderink reported that developing nations are significantly challenged by the social consequences as a result of a scarcity of employment in relation to the number required due to rise in population. Failing to meet these challenges creates opportunities for the incredibly vile political. The loss of livelihood arising from environmental scarcity of arable land and water, essential for agriculture, forms a case in point on the growing importance of water and other natural resources. Even though almost a dozen of the human population now lives in cities at the turn of the century, livelihoods and income is still dependent on agriculture. However agriculture as a sector is currently unable to integrate the ever-increasing population in rural areas in most developing countries (especially Africa), resulting in rapidly increasing environmental scarcity[28].Arable land's environmental scarcity was one of the factors at work that allowed

[26]Eduardo, B., Pedro, R., & Marcelo, V. (2011). Water Management Problems in the Copiapó Basin Chile: Markets, Severe Scarcity and the Regulator.
Universidad Adolfo Ibáñez
[27]OECD (2005).Mainstreaming Conflict Prevention. Development Assistance Commitee
[28]Klem, B. and Hilderink, H. (2003).Dealing with scarcity and Violent Conflict. Conference proceeding. Hague, Netherlands

Rwanda's genocide committers to mobilize a bigger proportion of the population to play the role of being perpetrators during the first full-blown genocide after the Holocaust. Such perpetrators remain a leading force in the ongoing conflicts of livelihoods to mobilize the foot soldiers of many, if not most. International conflict has been brought about by water and competition for scarce water resources.

Conclusion

This chapter has attempted the literature reviewed in subsequent chapters as per the objectives of the study. In particular, the ecological as well as the socio-economic evolution that has taken place in the study area resulting from forest encroachment since the colonial period are described. From the review, environmental degradation is not a problem in study area. However, it traverses other parts of the Embobut region and internationally. This degradation has caused change in livelihoods, conflicts, which in some cases have escalated into violence.

CHAPTER THREE

NATURE OF DISPUTES OVER WATER RESOURCES IN THE LOWLAND AND HIGHLAND COMMUNITIES

3.1 Introduction

Yahya stated that, in addition to conflicts that are triggered, sustained or escalated as a result of violent conflicts, the exploitation of natural resources such as gas, oil, timber and minerals is increasing competition for the scarce renewable resources, such as water and land and causing tensions. For this reason, the chapter devotes to discuss the nature of water resource conflict between the lowland and highland communities living around the Embobut forest.

3.2 Nature of disputes over water resources in the lowland and highland communities

Competition for scarce water resource is the usual form of conflict. . Eduardo highlights conflicts whose nature arises as a result of water resource exploitation in Capiap'o valley in Chile, where there was competition for use of water resource majorly between the agriculture and the mining sector[29]. Riperio et al, indicated that water is a rare resource without a replacement, but it has a steady, instant and rising demand worldwide, hence water resource disputes will become more common and more severe, as water use in one nation can no longer assist but affect adjacent riparians, a condition exacerbated by poorly established global legislation[30]. They also suggest that lack of access, and subsequently its natural, unequal allocation and its use through several distinct methods are disputes that arise with respect to water. Conflicts that occur between states have loosely been termed water politics or hydro politics. However, Warner & Wegerich indicated that there has always been the

[29]Eduardo, B., Pedro, R., & Marcelo, V. (2011). Water Management Problems in the Copiapó Basin Chile: Markets, Severe Scarcity and the Regulator.
Universidad Adolfo Ibáñez

[30]Riberio, W. C. &Sant'Anna, F.M.(2011). Water security and interstate conflict and cooperation.São Paulo University.

definition that is not clear in the vast literature about water resources. Regardless of these, Waterbury typically refers to it as the magnitude that pertains to the association among nations that transcend a boundary river basin. On the other hand, conflicts arise when infrastructures such as electric powerhouses, flood control reservoirs and irrigation canals are constructed to capture and use water resources.

The consequences of such constructions are massive in that they take charge over resources that are local, displace populations, as well as internationally they affect water users downstream and cause dislocations to the economy. Moreover, they also affect unresolved political issues and worsen conflicts between economic groups and ethnic entities between metropolitan and people in rural areas and across boundaries. [31]. Tensions may occur from water and water allocations which may cause conflicts between or within states.

On a local level, there may be clashes over water, for instance, water point privatization.[32]. Notable interstate water conflict includes those in the Middle East countries such as Syria and Iraq and Turkey. Water conflicts have existed specifically between Syria and Iraq and Turkey. The two countries have advocated closing down of Turkey's Greater Anatolia Project (GAP) irrigation schemes, thereby portraying the feeling that Syria and Iraq are exploiting the issue on the international platform, and as ammunition against Turkey in the Islamic World[33].The Euphrates and Tigris come from Turkey. Never the less, Turkey has used only a tiny portion of this water resource for geographical purposes (its industrial center and population is in the north other than the south). By comparison, Iraq's water demands depend almost entirely on rivers, Tigris and Euphrates flow, with Syria being strongly dependent on later.

[31]Riberio, W. C. &Sant'Anna, F.M.(2011). Water security and interstate conflict and cooperation.São Paulo University.
[32]OECD (2005).Mainstreaming Conflict Prevention. Development Assistance Commitee
[33]Mustafa, E(1996). Water Conflict in the middle East. Intellectual Associations, Series 17.

Another form of conflict relate to water quality rather than its quantity. Water quantity and quality are closely linked. According to OCED, Reducing water concentrate contamination and degradation of water quality exacerbates deficiency. With the capacity for severe risks to human health and environment, degrading of water can lead to conflicts between people who trigger it and those parties impacted on. Additionally, the OECD provides that allocation may be irregular in terms of water amount. However, there must be a difference between "economic" scarcity and physical scarcity. Whole in all, local violence overwater can spill over into wider-scale conflict due to all these forms of conflict.

Haftendorn gives draft taxonomy of different water disputes, their triggers, their regulatory and/or solution opportunities and the position of global organizations. The types of conflicts include relative distribution, conflict by usage, distribution conflicts and absolute pollution. . Nevertheless, a dispute on usage can be discovered within a scenario where, on one hand a country, for instance using for purposes of waterways, conflicts between itself and another government quoting environment issues created by the other country through its activities. Kasymon demonstrated that one-side water strategies have demonstrated a reduction in the position and outlook on agreements over sharing systems or water agreements and have contributed to conflict that are in most cases political[34]. According to Klem and Hilderink, conflicts arising out of water conflicts are also referred to as livelihood conflicts because it affects livelihoods of people[35]. Irrigated agriculture is much dependent on water and unequal distribution will bring livelihood conflicts. There is currently an increasing agreement that

[34]Kasymov, S. (2011). Water Resource Disputes, Conflict and Cooperation in drainage basins. Professors World Peace Academy Vol. 28, No. 3, pp. 81-110. Russia
[35]Klem, B. and Hilderink, H. (2003).Dealing with scarcity and Violent Conflict. Conference proceeding. Hague, Netherlands

water scarcity will not generate conflicts between countries, but will lead to loss of living in irrigated cultivation, which in turn can generate the hideous survival possibilities conflicts[36]. Aarts identifies different forms of conflict that exist in the basin of Upper Ewaso Ng'iro. They include intra-group disputes, for example, disputes within a single group of water users, disputes between water user organizations and authorities, disputes between water user organizations and personal enterprises, and disputes between people and wildlife. Homer-Dixon, argued that economic conflicts in nations that are less advanced, the environmental disputes probably occur due to the fact of high populace increase and excessive dependency on sustainable resources. Thus, administration of limited resources is often management of disputes. Homer-Dixon moreover believed that tensions that emanate from competition for limited resources are induced with the aid of failures in governance, such as free riding problems and unequal access to resources. In new administrative strategies, policy developers are trying to comprehend how well to deal with increasing cases of water scarcity. There are two options that have often been proposed. The first option is tasking government agencies with the duty to take action instead of living it to the citizens. The option number two comprises privatizing provision of water services so that use of market during distribution. Nonetheless, Ostrom indicated that the perplexity of managing water is not simply resolved. Neither, does the best system for governing water resources exist since it is pegged on a range of factors. Faures and Santini concurred with Ostrom, and additionally recommended the adoption of diversified ways of improving livelihoods. Totally different contexts and wishes need differing orientation of investments in order to guide selection for distinct interventions. Abundance of issues which arise as a result of water resources management are believed to spring out from the actual fact that water is a universal resource. Common pool resources are also in hand by native governments regional or national as a public product.

[36]Klem, B. and Hilderink, H. (2003).Dealing with scarcity and Violent Conflict. Conference proceeding. Hague, Netherlands

The perception that water is a common pool resource makes it to be utilized as a mutual property. Companies or individual people use it as a personal product and as a result it as misconstrued to mean that water is open to access. Garreth Hardin (1968), in his science paper, cites an example where, person may use the pastoralist's pastures just because they are not used, despite such pastures place being controlled by customary law. The law has indeed put this land aside to be used throughout the times of dry season grazing. Additionally water sources, that are extremely common or personal property allowed pastoralist to manage grazing fields that are communal within their neighborhoods. If common pool resources were owned by no group, institution or person or regulated, they may be utilized as free access resource. Once water is employed as a resource that is easy to access, issues in water management are bound to occur. This scenario of openness to access, result if there is no alternative groups', persons' or institutional property.

Because the resource lack restrictions or there exist dearth of the same, the supply may soon get finished, thereby creating the calamity of the commons. The calamity then clearly is a consequence of the common pool resource mentality, especially when the resource is overseen as open to access. This may sometimes result in rising contest of the resource, thereby making it to be limited. At this point, every one may not have access to the resource any longer. Therefore, there is need for resources that are common such as water to be managed in a expertise manner and particularly in cases where the demand and supply is not balanced. One of the foremost well-known actor is the state or government. However, the government alone may not be able to solve all the environmental issues Eastern Africa has encountered high pressure on accessible water resources. In current decades, the destruction of aquatic resource base has increased the competition for water. This can be owing to inflated human activities including: soil erosion, deforestation, industrial and domestic

pollution, etc. These are some of the determinants that have caused the decline of water catchment volume and led to additional extreme flooding and dry spell conditions. Combination with the phenomenon of worldwide warming, the unavailability of water within the Eastern African region is developing at a shocking rate. The diminishing water resource within the region, the increasing population, the inflated demand and utilization of sustainable water resources are increasing competition, disputes, under-development and inequalities.

An array of water disputes occur throughout history, although seldom are ancient wars conducted over water solely. Ideally, water has traditionally been a supply of tension and only one of several factors when conflicts break out. Nevertheless, water disputes occur for many reasons, including a fight for resources, territorial disputes and strategic advantage. Despite the actual fact that conflicts between international boundaries can occur over salt water, most of them occur over freshwater. This is as a result of freshwater resources is vital for everyone, still very restricted. They're the center of water conflicts happening out of the necessity for potable water, nonetheless inconsistently distributed. Thus, its accessibility typically affects the economic and living conditions of a region or a nation.

Water disputes happen as a result of the need for potable water and water resources extending way far beyond the quantity of freshwater truly accessible. Parts of a water emergency could place pressure on affected groups to get additional shared water resource, inflicting diplomatic tensions or utter dispute. The potential of water conflicts in the EAR region is correspondingly high because of water is not only life, but essential for correct sanitation, industrial services, and therefore the production of commercial product. This makes it easier for numerous parties to be involved in a water dispute. For instance, company entities could dirty water resources that are share by communities or governments may reason and dictate

over who should have access to water courses on inter boundary or inter-state boundary..

There are many types of conflicts in the Region including:

3.2.1 Tribal conflicts

In the EAR, most of water clashes in the past happened in the dry areas, that is, arid and semi-arid lands (ASAL), which are inhabited by nomadic pastoralists (Nyaoro, 2010). For instance, communities living in Southern Ethiopia, Northern Kenya and along the fringes of Kenya/Somalia, Kenya/Uganda and Ethiopia/Kenya have encountered frequent tribal conflicts over access to decreasing pasture and water assets. In these areas, a little drop in precipitation may result in loss of domesticated animals if water plants and other Sources get exhausted. With livelihoods in danger, pastoralists are constantly ready to battle any other individual so as to gain admittance to water for their domesticated animals. Downstream/upstream utilizers (inter-basin disputes). Conflicts and deadly conflicts between client parties are routinely revealed along significant stream basins. For instance, loss of the icecap on Mt. Kenya, which is the wellspring of NaroMoru River, has transformed the one-time enduring waterway into an occasional stream. Because of increased cultivating exercises upstream, the downstream populace (typically pastoralists) once in a while receives satisfactory water for domesticated animals. Frantic nomadic herders have raided water points upstream, blocking admissions for farm irrigation water system frameworks. This has caused grisly conflicts between the domesticated animals keepers and farmers. In addition, the usage of water from the Tana River has been the centre of the contention between two communities who each claim ownership of the land along the river.

3.2.2 Domestic disputes

The waning water assets present another type of contention at the family unit level. Sexual orientation and defenselessness appraisals of Lake Victoria uncovered that because of the measure of time that women take at the water sources, disputes emerge among married

couples. Women trek up to around 10 km one way, every day, looking for water for household use. The water in rural zones is principally gotten from shallow wells burrowed on dry riverbeds and most water sources are mostly unprotected and open to pollution.

3.2.3 Human-wildlife disputes

The reducing water assets have additionally prompted human-wildlife clashes, where wildlife invades the sources that are utilized by humans, bringing about destructive battles between the two. For instance, a conflict over water between parched monkeys and occupants of towns in Kenya turned fatal when it left 8 apes dead and 8 individuals hospitalized; also in the Kilimanjaro area of Tanzania a clash arose between thirsty elephants and the villagers, ending in several elephants being killed.

Eastern Africa has encountered expanded pressure on accessible water assets. In recent couple of decades, the debasement of oceanic asset base has escalated the battle for water. This is a direct result of expanded human exercises including: deforestation, soil disintegration, industrial and domestic contamination, among others. These are a portion of the components that have added to the decline of water catchment limit and prompted increasingly extreme flooding and dry season conditions. Combined with the phenomenon of global warming, the inaccessibility of water in the Eastern African area is developing at a disturbing rate. The decreasing water asset in the locale, the increasing populace, the expanded interest and employments of inexhaustible water assets are increasing challenge, clashes, imbalances and underdevelopment.[37]

A wide scope of water clashes show up from the beginning of time, however once in a while are conventional wars pursued over water alone. Rather, water has truly been a

[37] Gladyse Wekesa (2010) Preventing water related conflicts.

wellspring of pressure and only one of several factors when conflicts break out. Nonetheless, water clashes emerge for a several reasons, including a fight for resources, territorial disputes and strategic advantage. Despite the fact that conflicts between international boundaries can occur over salt water, most of them occur over freshwater. This is on the grounds that freshwater assets are vital for everyone, yet extremely constrained. They are the centre of water conflicts emerging out of the requirement for potable water, yet unevenly circulated. Along these lines, its accessibility regularly affects the living and financial states of a nation or a region.

3.2.4 Trans-limit water disputes

As rivalry heightens, disputes emerge between countries that divide transboundary freshwater saves. The region is spoiled with intense water conflicts and grisly/destructive clashes. including: Lake Victoria conflict (Migingo) between Kenya and Uganda, Mara River Basin struggle among Kenya and Tanzania, the Omo River between Kenya and Ethiopia, the disputes over the water assets of the River Nile among others.

3.3 Conflicts at the community level

Conflicts often spring up at the community level because of water resources. For instance in early August 1971 amid the dry times, in Tanzania, there rose a contention in the village over the utilization of a shared water asset which was for the most part depended by utilizers of waterway Mlali. In this contention, local clients especially pastoralists and women squabbled because of deficiency of water for their necessities. The fundamental issues that made these groups be in struggle were firstly water contamination for example defilement of water and decimation of the water quality by the domesticated animals which were taken to the stream basin to drink water; and furthermore the inclination of the domesticated animals managers to esteem the requirements for their animals more than the local requirements for water.

For this situation, domesticated animals attendants when at the waterway basin, paying little mind to water lack let their animals expend all the accessible water and did not ration it for household users. Because of this situation, domestic utilizers precluded domesticated animals attendants from taking their cows to the river to drink water. Since the river water was the main and for the most part reliable wellspring of water in the village, at that point livestock attendants did not concur with what household utilizers wanted.

3.4 Water and conflict in Upper Ewaso Ng'iro North Basin

The basin is situated in the Northern part of Mount Kenya. It forms a significant spring or well of water for the people, agriculture, tourism and wild life. This basin spans an area of 15,200 km2, which comprise about 6.0% of the Ewaso Ng'iro basin drainage basin. Modifications have been witnessed in subsequent years in the interest of streamlining supply of water. The basin has withstood significant rollover of changes in the most recent couple of decades in its socio-economic situation because of fast populace increase. The population change has grown so fast because of immigration and natural causes. This has consequently changed the patterns in land use. These progressions have brought about a general public where different partners allow access to nearby natural assets. The competition pitting Pastoralists, commercial livestock ranches, small and large scale farmers, and the tourist industry over inadequate water and land assets.

Recorded examinations of waterway stream information show declining quantity of water. In spite of the fact that precipitation figures don't demonstrate a debasing design, the beginning of the downpours is by all accounts becoming less forecast able and extremes in atmosphere are progressively articulated. Among ten WRUAs, in-depth interviews were done in fieldwork. A family unit review was done in Nanyuki, central Ewaso Ng'iro, Sirimon and

Ngusishi WRUAs. As indicated by the 150 families interviewed, the biggest issue is the intense interest for stream water because of an ascent in activities, which are agriculture based. The chances of contentions because of water are going to escalate as the interest for its use had developed while the scarce commodity is diminishing.

3.4.1 The development of WRUAs

The formation of Water registered users Association (WRUAs) happened somewhere between 1998 and 2010. The association is administered by fifteen individuals who represented different groups of water users within the region where WRUAs covered. The 15 individuals formed an administration council which has a treasurer and secretary. These two are chosen from inside the council. The coming up of these community based structures and boards were necessitated by increase in contentions among the clientele. External help such as those from NGO's and large scale farmers were regularly expected to convene meetings. WRUA projects have focused on conflict prevention and management of water. Expanding on this uplifted mindfulness among neighborhood individuals, NGO workers associated with provisioning of water are getting it simpler to clarify the explanations behind the water-management measures being undertaken. Execution of water-rationing can effectively be done by WRUAs in the dry season.

3.4.2 The effects and functioning of WRUAs

Many people who got interviewed indicated that WRUA controls and manages their water resources well, which normally leads to increased availability of water. They also indicated that WRUA meetings aimed at raising awareness resulted in increased participation. WRUAs are in this way emphatically affecting the accessibility to water resources in their general vicinity. Authorities from the national Water Resource Management Authority (WRMA) expressed that WRUAs effectively support small-scale family unit water

preservation projects and are advancing the efficient utilization of water. These two exercises strengthen the potential accessibility of water at household level. Expanding on this increased mindfulness among local individuals, NGO representatives engaged with water provisioning are getting it simpler expounding on purposes behind the water-management measures being undertaken. Consequently, WRUAs can effectively actualize water-rationing plans in the dry season.[38] A survey carried out in the field demonstrated that there are 3 principle reasons behind the WRUAs ability to resolve or if nothing else decrease numerous water-related clashes. Right off the bat, the WRUAs go about as gatherings that resolve disputes, and have been an open stage that effectively discuss issues that emerge when user discontent. They are also readily at hand to to organize these talks and solve disputes through discourse, because their membership is drawn from the local network. Lastly, the WRUAs have made awareness among the downstream and upstream individuals from their interconnectedness inside the community. On account of upstream individuals, the WRUAs advance productive water utilization and water stockpiling and these individuals understand that their use designs straightforwardly impact individuals living downstream. Also, downstream individuals are being instructed that arrangements other than clashes are accessible at moments of water deficiencies. Rather than getting to be engaged with physical battles with users who are upstream, the authorities of WRUAs utilize their local inclusion to settle such challenges. Overall, the general population surveyed indicated that WRUAs have positively influenced on water accessibility and strife relief yet they likewise referenced that shortage and clashes are right now more serious than ten years prior and that they anticipate a further ascent in disputes.

[38] OECD (2005).Mainstreaming Conflict Prevention. Development Assistance Committee

3.4.3 Challenges

Some difficulties still exist. Most of the WRUAs still lack adequate levels of professionalism both in dispute resolution and prevention as well as in the department of water management. There is a serious lack of implanting capacity and also most of the WRUAs require extra financial resources. Consequently, numbers of WRUAs have not been able to establish all measures required. The above challenges could be overcome if WRUAs got additional financial support and training.

Conclusion

This chapter explains the nature of conflicts resulting from natural resources, especially water. This chapter has explained the various forms of conflicts over water that includes competition, access, distribution, blockages or diversion of water ways and quality. The diminishing water resources pose a kind of dispute at household level as well as Trans-boundary. Conflicts that occur between communities often escalate into violence among factions of water consumers and the wildlife and government. Conflicts that occur between states also loosely termed water politics or hydro politics has mostly been about the quality of the water rather than the quantity. The chapter also highlighted the case of the Upper Ewaso Ng'iro Basin and formation of WRUAs, which is Water Resource User Associations.

CHAPTER FOUR

MULTI-LEVEL STRATEGY OF MITIGATING EMERGING WATER RESOURCES CONFLICTS

4.0 Introduction

This chapter presents multi-level strategies that exist and have been developed over time. Multi-level strategies include negotiations at the table expert led conflict resolution is also presented. Cases of best practices in particular scenarios have been mentioned and include Brazil-Peru-Bolivia, where water governance and Lesotho Highlands and Senegal River basin.

4.1 Multi-level strategies of mitigating water resources conflicts

In a guide to practitioners on dealing with conflicts, Yahya, suggests a partnership in which focus is put on building the capacity of the national stakeholders through the development and subsequently implementation of strategic projects that are multi-agency conducted. The projects more often than not, focused on the system of the European Union and the United Nations to prevent natural resources and land from contributing to conflicts that occasionally become violent. Other than implementation of the projects, EU and UN partnership were also designed to enhance the development of policy and coordination of programme amongst the key actors in the field. In the project, inventories of tools and capacity within the UN were developed to gauge UN system capacity and a set of 3 Guidance Notes in addressing management of natural resource and prevention of conflicts[39]. The training module of the programme was also undertaken for the European Union (EU) and United (UN) field staff, including local partners. The module training was meant to improve the skills and knowledge needed to comprehend, prevent, anticipate, and mitigate conflicts or its potentiality arising from natural resources and land.. The training's expectation was to

[39]Yahya, M (2008). Guidance notes for Practitioners. UN-EU Partnership.The United Nations Interagency Framework Team for Preventive Action

enable participants acquire skills to operationalize preventive measures and formulate strategies relating to the management of conflicts being caused by natural resources, referred to as (NRM). .

Absence or Lack of policy may enhance political woes, because there are no rules to regulate its use. Riberio, reiterates that the absence of regulations pertaining to water on the international scale permits the natural resource to be commercialized on a wider scale. This policy absence triggers conflicts and tensions between nations with regard to use and access, which may comprise a threat to international water security and environment. Riberio , adds that issues that involve water security ought to be regulated politically so as to ensure a democratic process[40]. Sant'Anna analyzed the Amazon River basin, and stressed that in the Bolivia- -Peru-Brazil and Ecuador and Peru (Napo River) border regions (Acre River) , civil society had created initiatives that orient as governance formulations to manage river basins that are transboundary[41]. This point to use of policies and regulation to manage and mitigate conflicts that may arise due to conflict for water. Jarvis and Wolf asserted that water management constitutes fundamentally management of conflict.

Another strategy that has been employed to deal with conflicts over water resources is bringing together stakeholders on board to negotiate ways of dealing with conflicts by way of seeking solution that will make the scarce resource sustainable. In Chile, an initiative dubbed "the water negotiating table" brought the authorities in charge of the sector for a gathering to seek solutions to the conflicts. Among the solution suggested was desalination of water by mining companies so that exploitation is eased[42]. In a study seeking to address some of the

[40]Riberio, W. C. &Sant'Anna, F.M.(2011). Water security and interstate conflict and cooperation São Paulo University.

[41]Sant'anna, F. M. (2012). "Tensões e conflitosnagovernança dos recursoshídricosamazônicostransfronteiriços".Geousp (USP), 31, 132-145.

[42]Eduardo, B., Pedro, R., & Marcelo, V. (2011). Water Management Problems in the Copiapó Basin Chile: Markets, Severe Scarcity and the Regulator.
Universidad Adolfo Ibáñez

challenges arising from intensive competition for water resources that are apparently scarce between agriculture, mining and human consumption a basin for the future, the water negotiating teams suggested policies to be implemented. They included including social costs in to the market prices to deal with issues pertaining to exploitation. Additionally, transactional costs, market powers, lack of information and other symptoms of market failures, could have been eliminated. The other strategy included isolating and zoning of the aquifer followed by it being declared a scarcity zone, which made it to deal with the Transition Phase. Also, there was need to address the legal and institutional frameworks that will have allowed a proper management of water in general[43].

Yet another strategy that can be coined out of water use negotiations is ensuring that sharing of water resources is done in an equitable manner. Daoudy pointed out the benefits of sharing as a methodology to avoid conflicts, and at the same time, create chance for togetherness in international river basins. Daoudy believed that highlighting the advantages whose outcome is from the utilization of water resources in shared basins is critical, and he defined benefit sharing as an act designed to shift benefit and cost cutting associated with cooperation[44] . The principle of benefit-sharing had been applied in Water Project in Lesotho Highlands, between South Africa and Lesotho. It has also been applied in the covenant between the United States and Canada on the Columbia River. Further, the benefit-sharing has also been applied in the Senegal River basin and outlines that benefit-sharing comprise a multidirectional nature and will only be a reality if the upstream and downstream dynamics that take centre stage the majority of the associations in a shared river basin is surpassed by

[43]Eduardo, B., Pedro, R., & Marcelo, V. (2011). Water Management Problems in the Copiapó Basin Chile: Markets, Severe Scarcity and the Regulator.
Universidad Adolfo Ibáñez

[44]Daoudy, M. (2010).“Getting beyond the environment-conflict trap: Benefit sharing in international river basins”. In: A. Earle, A. Jägerskog, and J. Öjendal (eds.). Transboundary Water Management: Principles and Practice. London: Earthscan, 43-55.

countries occupying the river shores in order to fight poverty, prevent conflicts, and promote social- economic development. The sharing principle has been necessitated by international laws. Such laws may include but not limited to the United Nations' principles on Convention on the Law of the not using water for Navigational International Watercourses, regional agreements for specific transboundary river basins, or ground water and the need for human rights to water.

Lautze et al points out that the governance of water has sprung up as perhaps the most significant subject in the international water, at least in the 21st century, because it moderates conflicts a great deal. Despite the widespread of acknowledgement and appreciation of the importance of governance of water the application of the concept can be fuzzy and wide, and not reliable in utilization and interpretations are common[45]. OECD hints that the methodology of how water is administered and governed may be a key factor of its influence on conflict dynamics. Participatory and Broad dialogue, coordinated by civil society groups, which are effective, goes a long way in helping mitigate tensions that arise from the way that the resource is allocated and used[46].

Haftendorn, indicated a number many strategies that have proved as particularly effective in resolving water conflicts. They included integrating the conflict in a non-negative interactive complex, the improvement of exchange of information and confidence promotion. ; Construction of linkage strategies by creating package solutions, and use of mediation, arbitration, and intervention. Ashton, suggests that, the water resource management strategy of each country requires to be harmonized with that of its neighbors so that prosperity and peace is maintained and conflicts are avoided in any region of Africa. Brown and Keating

[45]Lautze, J. et al. (2011). "Putting the cart before the horse: Water governance and IWRM".Natural Resources forum, 35, 1-8.

[46]OECD (2005).Mainstreaming Conflict Prevention. Development Assistance Commitee

suggests way of overcoming resource disputes which are national or sub-national; engaging an internal and external actors with regard to sovereignty of the actors on the national level. He hints that the international community may not have legitimacy or any mandate to make intervention in what is basically state concerns. Consequently, the community ought to approach interventions with a lot of caution, and its basic role must be to support the abilities of the protagonists to engage and resolve their natural resource disputes on their own. The international community also should also capacity building the locals where possible, but provide unbiased mediation services appropriately. The mediators and mediator to the conflict need to have analytical competencies, process competency, which involves being able to craft effective processes, to coordinate, to negotiate, to communicate with the stakeholders and to work in varied teams and finally, management competency, and leadership which comprises skills of leadership that is collaborative, mediation and facilitation.. The mediator usually has little, coercive powers in such a way to force convergence into agreement pact. Therefore, it is required to build some consensus among the stakeholders at national level on the importance of resolving disputes arising from resources, and provide the techniques that can assist them do reach to an agreement.

Kasymon suggest that to avoid conflicts over natural water, state or nation's policies need to have the goal of eliminating situations in which there is inequitable access and distribution to clean drinking water. In addition, there is need to aspire to increase the commodity for populations along and away from the river basin based on their daily needs so that secure and long lasting peace plus stability is guaranteed[47]. However, such policies should not be unilateral because such unilateral directing of water flows can start wars amongst riparian nations or regions because fresh water is ever on demand and is always rising. Again, the

[47]Kasymov, S. (2011). Water Resource Disputes, Conflict and Cooperation in drainage basins. Professors World Peace Academy Vol. 28, No. 3, pp. 81-110. Russia

practices of water diversion in a unilateral manner can bring about a situation of inequitable distribution of the valuable resource, which is water amongst nation or states around and within a basin, which forms a concrete ingredient for everlasting conflicts[48]. Kasymon identifies two approaches to resolving conflicts; the social planner approach and the market regulation approach. The social planner approach is an approach in which a structure that is supranational is created in a bid to take care of the affairs of water amongst riparians. Responsibility and delegation of authority is assumed by the state parties to, say, an organization, which is intergovernmental and formed by their collective and mutual agreement[49]. Carpenter, Baldwin and Cole, highlights a history of legal regime in Kenya right from pre-colonial to post-colonial. Throughout the 20th century, the prevailing approach all over the world was to enact and promulgate legislations that centralized and consolidated the governance of water[50]. The governance of water has progressed from a decentralized to a centralized one, also called polycentric, which can be defined as a technique of governance where multiple and semi-autonomous points of making decision operate bonded by a set of rules that are common[51]. Responsive Flexible and flexible governance of water for irrigation was needed in order that both balance demands which compete under this scenario, resilience is provided in the face of uncertainties in climatic conditions.

Central or federal states and governments have inclined towards dominance in the governance of water for a myriad of reasons. While inter-community water disputes requires the intervention of national level agencies to solve intercommunity conflicts, international

[48]Kasymov, S. (2011). Water Resource Disputes, Conflict and Cooperation in drainage basins. Professors World Peace Academy Vol. 28, No. 3, pp. 81-110. Russia

[49]Kasymov, S. (2011). Water Resource Disputes, Conflict and Cooperation in drainage basins. Professors World Peace Academy Vol. 28, No. 3, pp. 81-110. Russia

[50]Krister P. Andersson&ElinorOstrom, Analyzing Decentralized Resource Regimes from a Polycentric Perspective, 41 POL'Y SCI. 71, 72 (2008).

[51]Paul D. Aligica&VladTarko, Polycentricity: From Polanyi to Ostrom, and Beyond, 25GOVERNANCE: AN INT'L J. OF POL'Y, ADMIN., AND INST. 237, 250 (2012).

level agencies are obliged create national level regimes of governance[52]. Carpenter et al, indicated that by centralizing and consolidating the governance of water, the postcolonial and even the colonial governments had sought to address the conspicuous shortcomings of the doctrine possessed by riparian countries. The governments sought to restrict and allow the ambiguous and ordinary use of water, as long as the use didn't interfere with the privileges and rights of the users downstream[53]. The governments also sought to restrict use of water at personal levels by the issuance of licenses and permits. The Kenyan government enacted and brought into force a new Water Act of 2002, in which the Water Resource User Associations (WRUAs) based at the local community were legally registered and recognized as a body to manage water at the community level. [54]. As to whether, WRUAs will solve Africa's water problem, Aarts says that in the absence of WRUAs, there would certainly be more and more conflicts. Thus, WRUAs may still be seen as very important and helpful organizations within the resolution and prevention framework of conflicts.

4.2 Influence of International Water Treaties on Trans-boundary Conflicts

Fresh water is considered to have greatest level conflict potential, giving advantage to the perspective that basins are specifically vulnerable to the water wars. Most studies that have been cited originate from the Middle East, and are located in areas such as Indus, Euphrates and the Jordan, basins. These river basins have history of insecurities. It is contained in a report by the International Institute for Sustainable Development (IISD) that, the single and top most security threat to climate change is increase in competition for water resources that

[52]See generally EranFeitelson&ItayFischhendler, Spaces of Water Governance: The Case of Israel and Its Neighbors, 99 ANNALS OF THE ASS'N OF AM. GEOGRAPHERS 728, 730 (2009).

[53]Carpenter, S., Baldwin, E. and Cole, D. (2017). A case study of Kenya's evolving legal regime for irrigation waters
. Natural Resources Journal. Vol. 57, No. 1 (Winter 2017), pp. 101-138

[54]Aarts, J. (2012). Will Community-based Water Management Solve Africa's Water Problems? RadboudUniversiteit Nijmegen.

are scarce, which is envisaged to further complicate peace pacts[55].

Treaties are in particular an essential component of the management of trans-boundary lakes, because they reduce significantly the impacts of conflicts and at the same time enhance cooperation amongst riparian states[56]. Where cooperation is founded through pacts, it can last between hostile states[57]. Lakes and rivers overlooks politically created boundaries and most often fluctuates in space and time depending on use and climate change. Water is tied to almost everything, and this fact result in water being capable of bonding countries when nothing else would[58].While 71.0% of Earth's surface is covered with surface water, 97.5% comprise salt water; leaving a smaller 2.5% percent as fresh water surface[59]. In total lakes contain an estimated 67.5% of the total surface freshwater on earth making lakes as one of the largest genesis of available fresh water surface.[60]. There exist estimated 27m natural lakes covering a surface area more than 1 hectare and 500,000 lakes which fall in the artificial category with an estimated area greater than 1 hectare[61]. Research in transboundary waters have focused on rivers, because of the fact that are the main sources of freshwater available to human for domestic use and many other uses[62]. It is suggested that, research ought to be conducted on trans-boundary lakes, since; they are the biggest freshwater reservoirs available on the earth's surface[63]. Whole in all, there is missing data with regard to international trans-boundary management of lake as well as information on water quality and quantity. . Trans-boundary waters, reservoirs, lakes, rivers, streams, or aquifers, are collectively referred as

[55]Lubner, V. (2015).The Impact of Intern. Water Treaties on Transboundary Conflicts

[56]Brochmann, M., &Hensel, P. R. (2009). Peaceful management of international river claims. International Negotiation, 14(2), 393-418.

[57] Ibid 70

[58] Wolf, A. T. (2007). Shared waters: Conflict and cooperation.Annu. Rev. Environ. Resource., 32, 241-269.

[59] United States Geological Survey (USGSa). (2014). The Water Cycle: Freshwater Storage. Retrieved from: http://water.usgs.gov/edu/watercyclefreshstorage.html

[60]Global Water Security.Intelligence Community Assessment (ICA). 2 February 2012.

[61]Transboundary Waters Assessment Programme (TWAP). 2014. Retrieved from: http://www.geftwap.org/twap-project

[62] United States Geological Survey (USGSb) (2014). "How much water is there on, in, and above the Earth?" Retrieved from: https://water.usgs.gov/edu/earthhowmuch.html

[63] Ibid 76

water that is shared by or traverses between nations, economic sectors subnational units that are political, or interests[64].

Trans-boundary water bodies cover 70.0% of the surface of the Earth's[65]. There exist 455 trans-boundary aquifers, more than 1600 trans-boundary lakes, 276 trans-boundary rivers and 55 marine ecosystems in the world[66]. More than 40.0% of the earth's population lives in trans-boundary water basins[67]. Due to new increase in countries, trans-boundary water bodies have also increased over time. A case in point is that in 1978, there were two-hundred and fourteen international river basins, and in 2006 there existed two hundred and sixty three international river basins[68]. There are an estimated one hundred and forty five states located in trans-boundary river basins and over thirty countries whose location is exclusively within trans-boundary water basins[69]. The TWAP's, which is led by the International Lake Environment Committee (ILEC) had aimed to provide an comparative assessment of the contemporary state of trans-boundary waters using stakeholder's information and existing data[70]. The International Lake Environment Committee (ILEC) had regional, national, and international bodies who shared this goal. The TWAP included 159 trans-boundary lakes and/or reservoirs which were eligible for funding from the Global Environmental Facility Only 47 lakes and reservoirs were not eligible for GEF funding. GEF funding. TWAP, not only collects data, but analyzes for an estimated 206 reservoirs and lakes.

[64] Beach, H., Hamner, J., Hewitt, J. J., Kaufman, E., Kurki, A., Oppenheimer, J., & Wolf, A. (2000).Transboundary freshwater dispute resolution: Theory, practice, and annotated references. New York: United Nations University Press.
[65] Ibid 73
[66] Ibid 73
[67] Watkins, K. (2006). Human Development Report 2006-Beyond scarcity: Power, poverty and the global water crisis. UNDP Human Development Reports (2006).

[68]MacQuarrie, P. R., Viriyasakultorn, V., & Wolf, A. T. (2008). Promoting cooperation in the Mekong region through water conflict management, regional collaboration, and capacity building. GMSARN International Journal, 2(2008), 175-184
[69] Ibid 81
[70] Ibid 73

Global Environmental Facility is a cooperative partnership which is international and 183 countries work alongside institutions, private companies, civil society organizations (CSOs), to look in to global environmental issues. The aim of the project has been to give guidance to other organizations and GEF on ways of properly allocating funding for the conservation and management, of the projects. GEF concluded that, on a global scale, there is a "lack of systematized data" with regard to trans-boundary water bodies[71]. Because of the minimal data available on reservoirs and lakes, a Geographical Information System (GIS) based analyzes was the primary outcome of the study, and was scheduled to be released in June2015.

The "2nd Assessment of Trans-boundary Lakes, Rivers, and Ground waters" studied the trans-boundary bodies of water in Asia, Europe and within the region of United Nations Economic Commission for Europe (UNECE). 40.0% of this region is covered by trans-boundary waters, and consists of not less than 50.0% percent of the Asian and European population of United Nations Economic Commission for Europe (UNECE)[72]. The aim of the report was to highlight the state of trans-boundary waters in the UNECE area. It presented an analyzes of tension that existed on the state of quantity and quality and supply of trans-boundary impacts and the predictions of the future[73]. Trans-boundary lakes are a source of numerous challenges for governance and management. . One of the reasons was that trans-boundary waters did not go hand in hand political boundaries. Trans-boundary water resources are under strain because of increased pollution, unsustainable water consumption, over exploitation, low water use efficiency and poor implementation of management

[71] Ibid 73
[72]Lipponen, A., Chilton, J., Faloutsos, D., Del Pietro, D., van Kempen, C., Dodson, L. (2011). Second Assessment of transboundary rivers, lakes and groundwater
[73] Ibid 86

practices [74]. As the scarcity of water becomes more and more prevalent, management of water need to adapt and provide sustainable supply of freshwater even in the midst of changing climate, Which has been indicated above, trans-boundary lakes have become a challenge to govern and the outcome has been the lack of effective document or a global governing organization. With a myriad of communities and countries, and ethnic groups using shared water resource, distinct ways on the most efficient method to administer the water resource, trans-boundary waters which has been believed to be related to international conflicts[75]. The differences in regulatory frameworks amongst countries have resulted in challenges of successful resource management and efficiency. Political boundaries seldom follow similar pathways as watersheds, and the result has been difficulties in creating water policy that is effective[76]. A solution to effective governance of these important resources may be International water treaties. On 17 day of August 2014, the agreement on Non Navigation of International Water Sources was ratified by thirty-five states and it entered operation. The agreement was originally created in 1997, and had the mandate of governing trans-boundary freshwater resources such as rivers, lakes and groundwater[77]. The agreement provided a framework focused on reasonable and equitable utilization of water, including taking care not to harm other users of the trans-boundary waters[78]. Additionally, the Convention section, Article 10, states that, if conflicts occurred, its resolve will be dependent on the situation. Mahamdo states that, whereas the Convention is an action in the best move in establishing policy of water internationally, there has been criticism that it is vague, thereby leading to

[74]Uitto, J. I., &Duda, A. M. (2002). Management of transboundary water resources: lessons from international cooperation for conflict prevention. The Geographical Journal, 168(4), 365-378.

[75]Hensel, P.R. (2008). American Journal of Political Science, Conflict Management and Peace Science, International Organization, International Studies Quarterly, Journal of Conflict Resolution, Journal of Peace Research

[76]Gleick, P. H. (2000). A look at twenty-first century water resources development.Water International, 25(1), 127-138.

[77]Mohamoda, D. Y. (2003).Nile basin cooperation.(No. 0280-2171).

[78] Ibid 91

inadequate direction for the governance of water bodies that are trans-boundary[79]. In particular, the agreement lacks empirical regulations for distribution of water which comprise the basic aim of majority conflicts of water. Moreover, there exist inadequacies of guidelines which are enforceable internationally for trans-boundary lakes. The Convention comprises only the first agreement with regard to the governance of rivers, lakes and groundwater.

The Geosciences department of Oregon State University (OSU), undertook the challenge to compare conflicts for trans-boundary water bodies and cooperation with particular focus on rivers. The research project, which was dubbed Trans-boundary Fresh water Dispute Database (TFDD), aimed at quantifying the conflict events and cooperation on a scale from +7 to -7, also known as the BAR scale. Negative seven was considered the event which was most confusing while positive seven was considered the event that was most cooperative[80]. From the outcome of the study, TFDD concluded that, there were not less than 400 agreements and treaties that are water related, which were promulgated between 2007 and 1820. These treaties that were analyzed corresponded to water being a consumable resource or scarce, an ecosystem that needs to be maintained and improved, a quantity that required to be managed. The conventions also need to be focused on water allocation, water rights, food control, water pollution, and general issues of environmental[81]. Thus, most treaties did focus on fishing rights, navigation tariffs and rights, but one thing that was excluded was the delineation of rivers. . It emerged that; ground water was often disregarded in international trans-boundary water treaties and agreements. Whenever groundwater was mentioned in the agreement, it was usually regarded to contamination rather than allocation or water use.[82].

[79] Beaumont, P. (2000). The 1997 UN Convention on the Law of Non-navigational Uses of International Watercourses: its strengths and weaknesses from a water management perspective and the need for new workable guidelines. International Journal of Water Resources Development, 16(4), 475-495.

[80]Yoffe, S., Wolf, A., & Giordano, M. (2003). Conflict and cooperation over international freshwater resources: Indicators of basins at risk. Journal of the American Water Resources Association, 1109.

[81] Ibid 70

[82]Gleick et al. 2012 – The World's Water Volume 7: The Biennial Report on Freshwater Resources

The United Nation's Food and Agriculture Organization (FAO) established not less than 3600 treaties that were water related and focused mainly on water bodies that were international as early as 805AD to 1984. In the establishment, most of the treaties focused on water navigation (FAO, 1987; FAO, 1984). According to the analysis by TFDD, trans-boundary waters were negotiated during the twentieth century in which 145 treaties were negotiated. Basically, the water supply focused on hydropower and accounted for one hundred and ten of the one hundred and forty-five treaties analyzed[83]. In addition, another important conclusion was that 80.0% of the treaties had no mechanism of enforcement, and only 54.0% provided some monitoring types. . If the monitoring or enforcement was included in the treaties, it would be rudimentary[84]. In addition, 86.0% of the pacts are bilateral, and this leaves only 14.0% being multilateral. It is worrying that such a percentage, which is quite low of treaties being multilateral, despite the most of the basins (rivers) analyzed being many riparian nation, resulting to inadequate comprehensive management of water resources between riparian countries within the basin[85].

Despite the fact that there exist inadequate monitoring mechanisms combined with the fact that the most of the treaties are bilateral, at least according to, OSU TFDD's project, it has been shown that treaties allows previously hostile countries to engage in cooperation on matters regarding management of water resources. According to the project, relations on international clean water resources were exclusively supportive and joint a number of issues ranging from including water quality, water quantity, hydropower and single management. [86] When there is established cooperation between riparians states through treaties, these treaties become resilient over a long time[87].

[83] Ibid 70
[84] Ibid 96
[85]Ibiid 73
[86] Ibid 94
[87] Stefano, L. De, Duncan, J., Dinar, S., & Stahl, K. (YEAR) Mapping the resilience of international river basins to future climate change-induced water variability, (15)

The conclusion that was made by Wolf et al. is that cooperation had dominated conflicts in trans-boundary rivers in the past 10 decades mainly for the implementation and signing of treaties. From 1948 to 1999, 1831 water events were enlisted, both cooperative and conflictive. Out of these events, only 28.0% were conflicting, 4.0% were neutral while 67.0% were cooperative. [88].

Existing water agreements play a crucial function in peaceful management, and also as analyzing the effects of those conflicts. Other than treaties, there are other determinants that could lead other countries not to take part in conflict and cooperate. The relationship and quality between countries, the geographical typology of water bodies, and the political regime of the states all have influence as to whether riparian states will experience conflict and cooperation[89]. The quantity of water in trans-boundary lakes is expected to decrease following change of climate as well as exponentiation growth of population. This creates a huge demand for water resource, leading to potentiality of conflicts of water resource[90].

Education, low level of health poverty and high growth of population is connected to increase in conflicts[91]. The UN approximates that, 300 potential conflicts that existed over water on earth today, computed by a lot of trans-boundary river systems in the world[92]. Water conflicts have been previously used to achieve political and military goals, with infrastructure and water systems being one of the targets of most military objectives. The Vice President of the World Bank, Ismail Serageldin, said that the war fares of the coming centuries will be caused by water conflicts, as reported in the New York Times in 1995[93].

[88]Yoffe, S., Wolf, A., & Giordano, M. (2003). Conflict and cooperation over international freshwater resources: Indicators of basins at risk. Journal of the American Water Resources Association, 1109.
[89] Ibid 102
[90]Wilner, A. (2005). Freshwater scarcity and hydropolitical conflict: Between the science of freshwater and the politics of conflict. Journal of Military and Strategic Studies, 8(1)
[91]Klare, M., Smith, M., &Turton, A. (Winter, 2009/2010). The Big Question: Will Global Conflict Flow from the Quest for Water Security? World Policy Journal. 26(4), 5-8.
[92] Ibid 106
[93] Ibid 96

As water scarcity continues to escalate, there will be no or little room for resolution of conflicts and management amongst riparians[94]. Of the one hundred and five treaties documented, the TFDD project indicated that only fifty-two pacts address resolution of conflict with the parties involved, whether governments or states. The remaining treaties, which were fourteen in number refers to disputes to a 3rd party, and fifty-nine treaties either were incomplete regarding dispute resolution methods or had no conflict resolutions. [95]. One task that is indeed difficult and quite possibly unfeasible is establishing a resource and water conflict management legal framework that is international"[96]. Despite this and as demonstrated by TFDD project together with the FAO covenants, international oriented legal frameworks have been a successful, but these agreements seldom included adequate mechanism for conflict resolution. It is reported that, there has been only 1 war of water in the past 4500 years[97]. It is worth mentioning that, treaties aren't the only mechanism that is utilized to determine whether states will violet resolutions or cooperative over trans-boundary water bodies. Factors that have been shown to significant influence occurrence of conflict included environmental, economic, and political. [98]

Extreme changes and sudden changes in economic, political, environmental dynamics have had the greatest effect on conflicts. For instance, the construction of a big dam along a river comes a profound change physically leading to increase in conflicts[99]. Additionally, rapid change or changes in the institutions governing water resource is likely to bring about conflict. Treaties have comprised an important and integral component to co-operation amongst riparian countries in basins. Prior research had shown that, there is inadequate global

[94] Ibid 105
[95] Ibid 98
[96] Ibid 105
[97] Ibid 103
[98]Raleigh, C., &Urdal, H. (2007). Climate change, environmental degradation and armed conflict. Political Geography, 26(6), 674-694.
[99] Ibid 103

data with regarding to trans-boundary water bodies. Cooperation has become dominant conflict with regarding to trans-boundary water bodies, and conflicts may spring up over water resources, with predicted population growth and the climate change.

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4.3 Conflict Reconciliation through Transforming Security Concerns

Two things have prevented the global North from the influence of the global challenges. One is the deeply entrenched post-colonial power differentials and the second is economic disparities. However, through June 2015, this situation has dramatically changed, when Europeans came across two crucial world challenges terrorism, mass migration and first-hand. The violent conflict and atrocities caused by the Islamic State of Syria and Iraq. (ISSI) within the larger Euphrates and Tigris basin, has displaced hundredths and hundredths of persons. Refugees in their hundreds and thousands had forced their way into Europe, only to be blocked. Most European Union member states are discarding deep cultural values and the so called the identity of the European founded on equity and solidarity, by blocking their borders on the reasons that they are protecting the affairs of the Nation[100].

The neo-Malthusian assumptions become fruitful during and after COP 21. The assumption underpins the discourse on climate change. The assumptions implored that scarcity of resources increase will undoubtedly propel society towards violent conflict and inevitably exacerbate insecurity. [101]. Therefore, in this case, the influence of the water cycle was considered specifically important. The projections of Intergovernmental Panel on Climate Change (IPCC) suggests that, the effectst on water resources manifests itself when sea level rises, there is shift in patterns of weather accompanied by an increase in extreme weather

[100] Ibid 67

[101]Gizelis, T.-I.; Wooden, A.E. Water resources, institutions, & intrastate conflict. Political Geogr.2010, 29, 444–453.

events and increased stress water[102]. This phenomenon was referred to as a threat multiplier[103].

In 2007, IPCC released its fourth annual report, and this made a turning point as far as securitization of global change in climate. This called for was when the extraordinary responses in policy[104]. Studies suggest that, there is likely incidence of resolution of conflict happening at trans-national level, usually connected to trans-boundary waters[105].

Majority of the disputes on water resources are resolved amicably through established managerial structures; community groups controlling irrigation channels, legislative processes, e.g. legislation and new mining, judicial action, e.g. land courts mediation or arbitration, e.g. resolving internal disputes over grazing issues, or national processes such as the new constitutional changes. It is envisaged that, if administered properly, the natural resources management framework can support livelihoods, promote trust of the community, harden the relationship, provide justice and support stability. Consequently, even the most "risk violence" nations typically have some cultural mechanisms of surviving with regard to the resolution of disputes. For instance in Somalia dispute, despite being branded a state which has failed, it has mechanisms that are locally drawn in which settling over disputes resource is functioning. One of the customary legal frameworks, the *Xeer* system, was developed in Somalia in the 17th century. It has lived long, both before the disintegration of the Somali nation in 1991 and the European colonization[106]. Under this system (*Xeer)*, no

[102] Solomon, S. Climate Change 2007—The Physical Science Basis: Working Group I Contribution to the FourthAssessment Report of the IPCC; Cambridge University Press: Cambridge, UK, 2007; Volume 4.
[103]Commission of the European Communities. On Implementation of Council Directive 91/676/EEC Concerning the Protection of Waters Against Pollution Caused by Nitrates from Agricultural Sources Based on Member State Reports for the Period 2004–2007. In Report from the Commission to the Council and the European Parliament; SEC (2011) 909; Corrigendum to COM; European Commission: Brussels, Belgium, 2011.

[104] Ibid 120
[105] Ibid 121
[106]Ashton, P.J. (2007). Disputes and conflicts over water in Africa

single authority is authorized to govern a single legal code; but instead, the right part to handle a dispute is determined by the judges. *Xeer* formed an alternative resolution to dispute settlement that takes one form among the following; mediation, arbitration, or negotiation. Out of these, arbitration is common, hence mostly used. In arbitration, the protagonists bring their cases to a neutral 3rd party, who has power to guide some means after listening to the postulations from each side. Those proposed solutions were closely connected with the concept of diya, or pay back through blood, which lays down the rules for misconduct punishment.[107]. The *Xeer* system advantageous from the perspective of being familiar, relatively simple, accessible and transparent to those who would wish to use it. Despite the fact that, the system is many centuries old, some commentators argued that it may provide the fountain for contemporary functioning state[108].

4.4 The international community and its role

Disputes over resource, sometimes resist resolving issues domestically. There are a number of reasons, why this is so. Specifically, the items may be hard to control; political will could not be favorable to deal with disputes internally; or the participating structures may not be seen as legally binding. In such instances, the international community may intervene and help. There are a myriad of ways under which the global community can aid resolution of local dispute. The avenues may be direct, that is, make the protagonists meet for discussions, or indirect, that is assisting to put conditions in the case of straight forward disputes resolution[109]. They may include the following examples:

[107]Thorne, K. (2005), Rule of Law through imperfect bodies? The informal justice systems of Burundi and Somalia, Geneva: HD Centre.
[108]Abdile, M. (2012), 'Customary Dispute Resolution in Somalia', in African Conflict and Peacebuilding Review, Vol. 2, Issue 1 (Spring 2012), pp. 87–110.
[109] Ibid 129

4.4.1 Knowledge and capacity-building

Provision of impartial and objective examination; establishing and capacitating networks of mediators who are truly local; developing capacity to negotiating asymmetries or reduce technical; and implementing early warning and -response systems.

4.4.2 Stakeholders Conventions

Organization of national dialogues, facilitating and convening gatherings in a neutral space and safe place. In addition, encouraging involvement of valid owners in groups, e.g. peace organization , and legal support in campaign for peace in all stages.

4.4.3 Aiding dispute resolution processes

Supporting dispute resolution process may comprise building trust first, then helping the parties in joint problem solving and mediation. It may also involve providing open support for sovereign efforts so as to achieve political end state. In addition, evaluating and monitoring the implementation of the agreements may be a support area in the dispute resolution process. Other supports may include ensuring that is coherence amongst interrelated initiatives, and provision of financial and political support.

In the year 2008, in the midst of rising tensions in the political scene, Bolivia was almost descending into constitutional crisis over reform bill which was disputed and was the main component of the new constitutional dispensation, which took not less than 2 years to compile. It was to include the recognition of thirty-six distinct ‘nations’ with Indian, more independence for 9 regions in Bolivia; the state imposing to take over main natural resources like gas reserves and private land ownership control to a maximum of 5000 ha. The United Nations helped protagonist to arrive at local consensus over the change of constitution. This was achieved by authorizing surveys within the public fraternity, giving trusted news on

technical issues facing the protagonists, and providing assistance at the individual stage through its team in the country[110].

4.5 Community based water management

For the last 2 decades, some sort of evolution emerged in the practice with philosophy of the management of environment in national, regional, and international cycles. This change involved a move from top down strategies, where formulation of policy, planning and instructions was conducted locally by government agencies, which were centralized, from a down to up approach, involving all the relevant parties, in particular domestic communities, in the way of managing the surroundings l and decisions making[111]. By Blaikie described the new philosophy [112] defined by community's responsibilities and strictly spatial borders of jurisdiction. By considering the common interests and differentiated social structure, communities can administer their own natural resources in an amicable and efficient manner. This point was based upon discussions from scholars like Ostrom [113] and Agrawal [114] who accepted that dependable management of resource could be sustained collectively by human institutions. Also those resource governance frames, together with all that local users are often the stakeholders in sustainability of the institutions and resources. It based upon the imagination all the stakeholders can jointly manage resources in sustainable manner.

110Piette, C. (2009), 'Bolivia faces long reform struggle', BBC News, http://news.bbc.co.uk/1/hi/world/americas/7850587.stm (accessed 14 September 2014).

[111]Merkhofer, M. W.,Conway R., & R. G. Anderson. (1997). Multiattribute utility analysis as a framework for public participation in siting a hazardous waste management facility. Environmental Management 21:831–839.

[112]Blaikie, P. (2006) Is Small Really Beautiful? Community-based Natural Resource Management in Malawi and Botswana. World Development, Vol. 34, No. 11, pp. 1942–1957.
[113]Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. New York: Cambridge University Press.

[114]Agrawal, A. (2002). Environmentality: Technologies of Government and the Making of Subjects. Durham, NC: Duke University Press.

Collaboration, Cooperation, social negotiation and conflict resolution are emerging as internal issues in the society's involvement paradigms[115] dshaw and others, who are proponents of community-based resource management believed that, location making of decision as close as possible to the area of resource utilization. This move exposes the decision makers to the consequences of their own decisions creating the potentiality for a more prudent flexible management of resource. Further, in the capacity building communities to formulate their own strategies for progress in which is locally achieved for greater community stability. Critic on the practice and theory resource management (CBRM) based at the community has been advocated for. Bradshaw, for instance, argued that not any of these strengths would be achieved if the capacity and credibility of communities are not considered. The expected end won't be realized when societies who are newly empowered have inadequate capacity to do so or proof incredible in the management of local resources. . In other words communities are expected to show a true desire to manage local resources in the interest of all the stakeholders such as non-locals and future generations. The late group may have enough room to steward the resource in order that stable return and adequate is achieved. Blaikie raised an important argument on society based management of resource; and argued that the ability of CBRM to be attractive rides on universal set of sentiments and theories which have been receiving criticism in professional evaluations and in the academy. . He further argued that monitoring and evaluation of the fruits of CBRM actions have been rare, non-existent. In addition, evaluations of CBRM by the local societies have not been seen, so that there has been no articulation of voices. Bradshaw , went further to claim that their success was reproduced in a network of multi-lateral and bi-lateral agencies, in-country NGOs, international NGO sand a few number of government officials (who are senior) in recipient states. Scholars like Draper and Crance , Selin and Chavez , Maser and argued that,

[115] Rhoads, B.L. (2009), Empirical analysis of planform curvature–migration relation of meandering rivers, Water Resources Research, 45, W09424, doi:10.1029/2008.

not only should the community participate as technical and scientific experts but also as an individual and community as a whole. According to the aforementioned authors there is need to have effective communication in the decision making process between scientific and/or technical experts and local people so that positive results can be generated[116].

Conclusion

This chapter has attempted to discuss the strategies that have been deployed to quell or mitigate conflicts arising from water resources. Many strategies have been postulated and include the UN's strategic partnership in which the capacity of national stakeholders is built through the development and implementation of a strategic multi-agency project, policy formulation. Cases of conflicts have been mitigated in cases of Brazil-Peru-Bolivia, where water governance initiatives were mounted. Negotiations at the table have also proved to be another strategy towards mitigating water conflicts. This has succeeded in Lesotho Highlands and Senegal River basin, where the benefit-sharing principle has been applied. Expert led conflict resolution has also been another approach in which protagonist are capacitated to the negotiating table. The policy strategy including International Water Treaties on Transboundary Conflicts have been successfully been used by governments including the Kenyan one with formation of Water Resource User Association (WRUAs), which are legally recognized as organization that manage usage of community water.

[116]Aarts, J. (2012).The performance of Water Resource User Associations in the Upper EwasoNg'iro river basin, Kenya.RadboudUniversitetit Nijmegen

CHAPTER FIVE

DATA PRESENTATION AND ANALYSIS

5.0 Overview

In the chapters' one through four, it observed that water resource is a scarce commodity in the catchment area Embobut, as perceived or actual nature. The water availability is dwindling due to degradation of the forested area, and the demand for farmland continues to grow. This situation has and will, eventually result into a serious inadequacy of water resources. What this means in terms of overall economy and the livelihood within the basin, is that conflicts will arise due to the environment change. Choudri and North suggest[117] that environmental scarcity may lead to violent conflicts. In the same breath scholars such as Homer Dixon, Peluso, Watts and Baechler suggest the urgent need to partner. Partnering serves as a chance through which peace can be made as claimed by other scholars like Wolf and Yoffee and Giordiano. This chapter highlights some of findings from the study area including water interventions measures meant to alleviate shortage.

5.1 Demographics

This chapter outlines the findings from the data analysis. It also attempts to make meaning out of the results. Chapter five has been arranged into five main sections. The first part presents the socio demographic information of households as provided by the designated household head, the second section presents information on the sources of water and its usage, while the third section reports the state of water scarcity and the measures or interventions taken by the respondents to alleviate the problem of water scarcity. Sub-section three presents ecological and socio-economic changes and the activities carried out by the respondents over a period of time. The last sub-section presents the types of conflicts

[117] Ibid 138

experienced by the respondents over water resources and the strategies undertaken by them to mitigate the conflicts experienced.

5.2 Water source and use

The study findings indicated that there were more (55.6%) females of the households, who participated in the study in comparison to the fellow male counterparts (44.4%) with a mean age of 37.6%. Concerning the levels of income generating activities or main occupation, majority of the household members had formal employment at 44.4% whereas keeping animals and trade/buying & selling were each at 22.2%. The smallest proportions of the households were engaged in crop production at 11.1%. Other forms of occupation practiced by the respondents included farming which was practiced my majority of them 55.6%. On the other hand, (33.3%) practiced pastoralist with the least (11.1. %) not indicating their occupation (Table 1)

Table 1Demographic information of household members

Demographic information	**Categories**	**N**	**N%**
Gender	Male	124	44.4
	Female	155	55.6
	Total	**279**	**100**
Age	Maximum	45	
	Minimum	27	
	Mean	**73**	**37.5556**
Occupation/income generating activity	Formal Employment	124	44.4
	Crop production	31	11.1
	Keeping animals	62	22.2
	Trade/ Buying & Selling	62	22.2
	Total	**279**	**100.0**
Other occupation	None	31	11.1
	Farming	155	55.6
	Pastoralist	93	33.3
	Total	**279**	**100.0**

5.3 Water scarcity and Interventions

The members of the households were interviewed pertaining to their sources of water and the usage. Most of the household members used stream/river (55.6%) as the main source of their water, whereas the 33.3% of the households used borehole as their mainstay source of water. A small percentage (11.1%) of the household members used tap water as their main source of water (Figure 1).

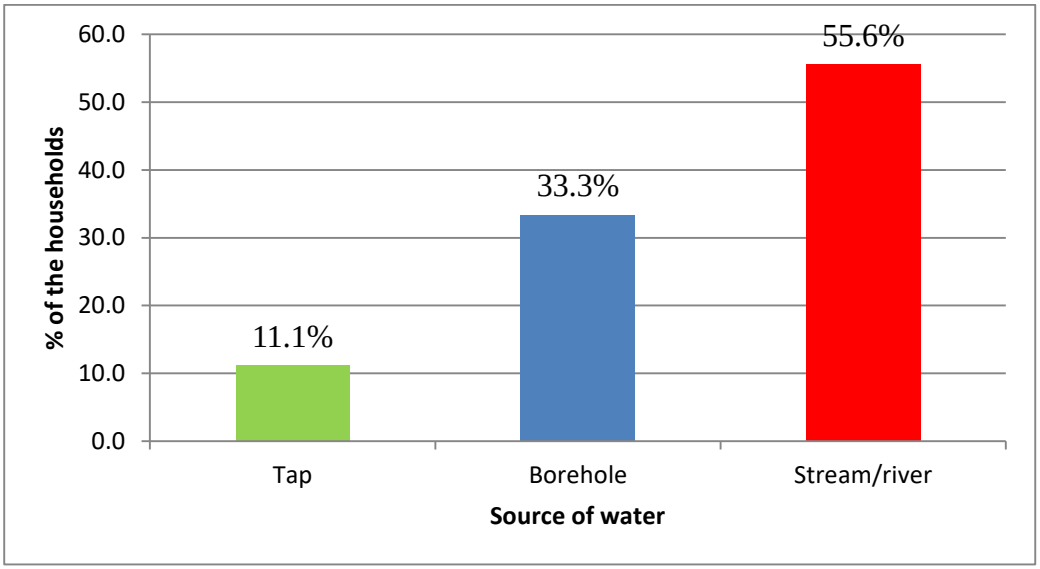

Figure 1 Source of Water for households

Concerning the usage, most of the household members used water for irrigation purposes (66.7%), and watering animals (11.1%). Others uses of water by the households included domestic (89.9%), The study findings further revealed that, on average mean, each household used 19.7 gallons of water on a daily basis. This translates to approximately 76 litres of water each day.

Uses of water	**Frequency**	**Percent (%)**
Watering animals	31	11.1
Irrigation	186	66.7
Others	62	22.2
Total	**279**	**100.0**

5.4 Water Scarcity and intervening measures

5.4.1 Scarcity

The study attempted to explore on the state of scarcity of the water as well as the action taken to overcome the challenges of the scarcity The findings indicated that majority (77.8%) of them agreed that water was inadequate while a paltry (22.2%) indicated that water was adequate for their own use.

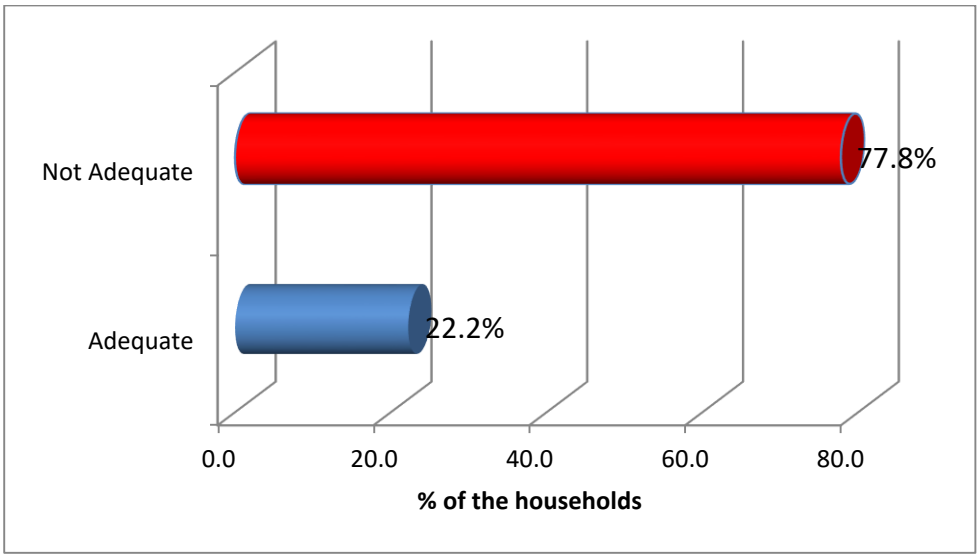

Figure 2 Water Scarcity

5.4.2 Interventions to deal with shortage

Twenty (22.2%) of the respondents indicated that, to deal with water shortage, they usually walk deep into the Embobut forest in search for water. A similar proportion of the households had the number of farmed acreage reduced due to falling flows of irrigation water. Some (22.2%) had sold off some of their animals to manageable numbers. Some of them dealt with the scarcity issue by minimizing their water usage (11.1%) or fetching water from Rain water (11.1%) and sinking boreholes (11.1%). See Table

Table 2 Ways of dealing with water shortage

Intervention measures		**Frequency**	**Percent**
Individual households	Deep into the forest	62	22.2
	Minimizing use	31	11.1
	Rain water	31	11.1
	Reduced acreage	62	22.2
	Sinking boreholes	31	11.1
	Sold the animals	62	22.2
Government/ Community	Digging boreholes	31	11.1
	None	31	11.1
	Planting of more trees	186	66.7
	Proposed building of a dam reservoir	31	11.1
	Total	**279**	**100.0**

Concerning intervening measures whenever there is water scarcity in the studied area, a higher percentage (66.7%) of the respondents indicated that the government/community had opted to plant more trees. Other remedies done by the government and community included digging boreholes (11.1%), proposal for building dam reservoirs (11.1%).

Most of the households (77.8%) indicated that they experienced water scarcity for a period of between (11-20) years (66.7%) whereas some households indicated that, they experienced water shortage for the period spanning (0-10) years (22.2%). The least period of water scarcity by some of the households was (21-30) years (11.1%). See Figure 3.

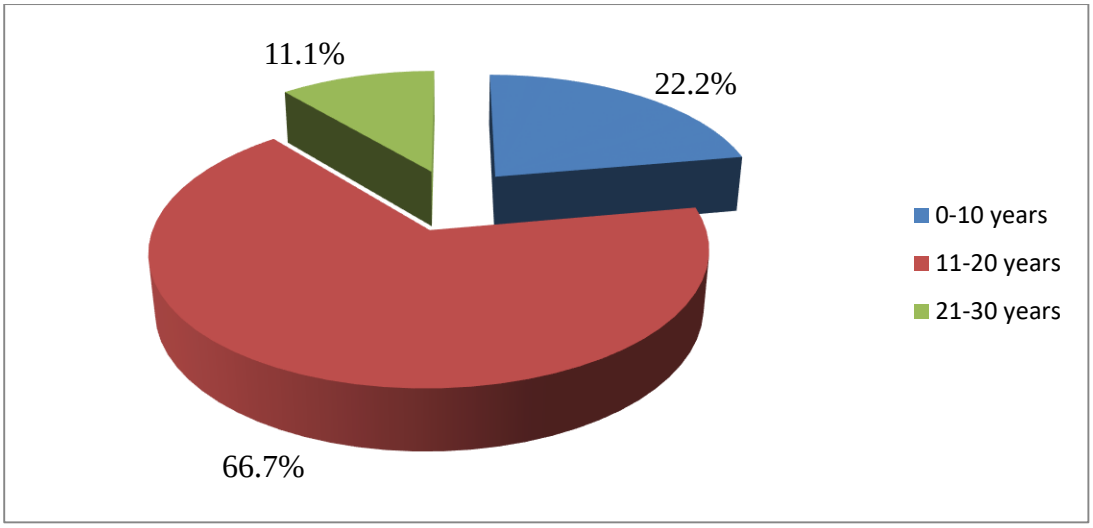

Figure 3 Period of water scarcity

5.4.3 Causes of Water shortage

On causes attributed to inadequacy of water in the Embobut, felling of trees contributed most (66.7%) followed by Irrigation upstream areas (22.2%) whereas Degradation of the forest in the high lands contributed the least (11.1%). See Table 3

Table 3 Causes of water shortage

Causes of water shortage	Frequency	Percent
Cutting of trees	186	66.7
Degradation of the forest in the high lands	31	11.1
Irrigation upstream	62	22.2
Total	**279**	**100.0**

5.5 Ecological and Socio-economic Change

Members of the households were asked whether there has been any change in the economic activities in their locality in the last three decades. The study findings indicated that majority (55.6%) of them accepted that there has been change overtime in their economic activities with the rest (44.4%) were of the contrary opinion.

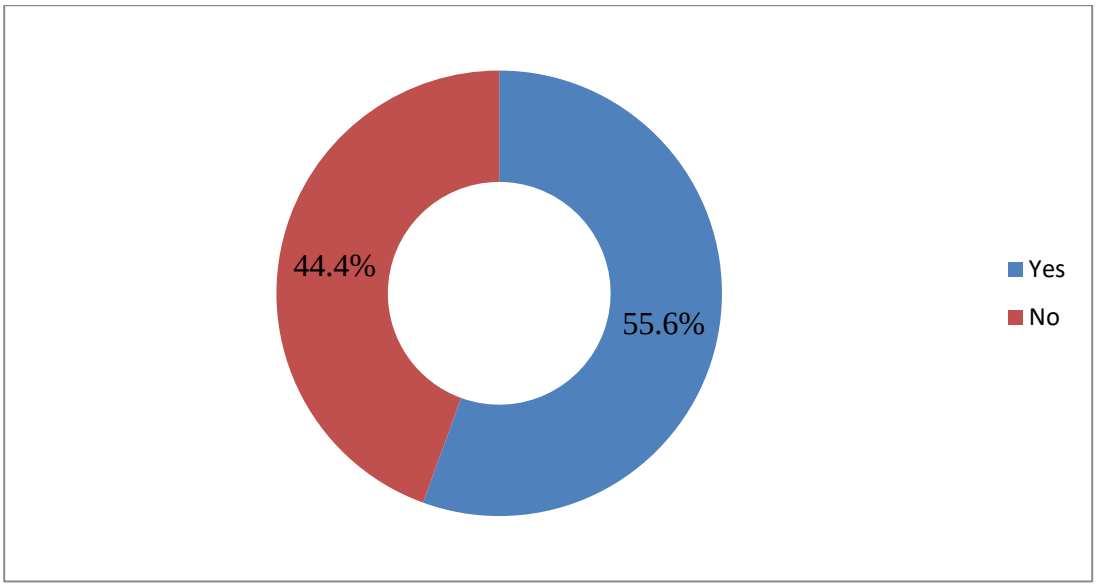

Table 3 Change in Economic Activities

Peasantry activities (66.7%) have dominated the study area for the last 10 years. Peasant farming is a type of farming where small-scale agriculture is practiced, that is, farmers often rear some livestock and grow crops on a smaller scale. Most of the proceeds from the farm is used in feeding the family, with the surplus being sold to earn small cash. On average, a peasant farm in the study area owned not more than five acres of land.

The household members would provide almost all the labour force required. The households grow a variety of crops including Maize, kales – cabbages and sukuma wiki, pepper and tomatoes. They also rear some livestock including chickens, cattle and goats. Majority have dug several irrigation canals or channels that are used in supplying the crops with the water. Animal farming comprised 22.2% of the households while those who do crop farming only comprise 11.1%.

By comparison on the dominant economic activities, there is evidence of change over time. There has been reduction (from 66.7% to 22.2%) in the number of household who practice the traditional peasant farming. On the contrary there has been a relative increase in specialization in crop production only, with some opting to specialize in husbandry. Actually most of the households have resorted to growing short time crops for the growing urban centres in such as Kapsowar, Iten, Eldoret and Kitale (Figure 4)

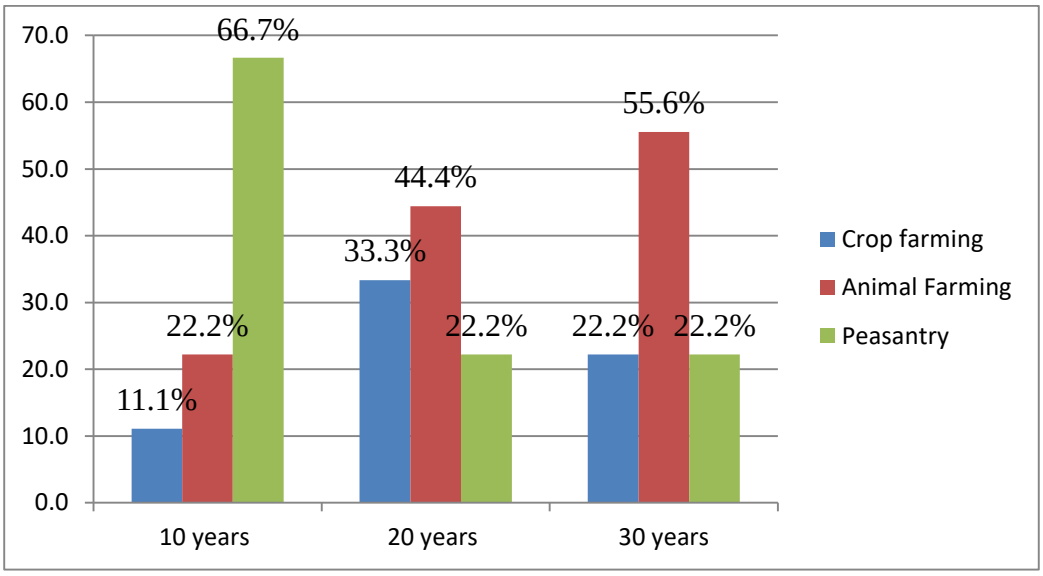

Figure 4 Economic Activities in the last three decades

5.5.1 Reasons for change in Economic Activities

Respondents were also asked to give reasons as to why they changed their economic activities. Findings indicate that, majority of the respondents accepted climate change (66.7%) as one of the major reason followed by forest destruction (22.2%). The least reason given by some members interrogated was lack of enough water (11.1%). The summary of the above findings are represented in Table 5 overleaf.

Table 4 Reason(s) why people have changed the economic activities

Reasons	Frequency	Percent
Climate change	186	66.7
Forest destruction	62	22.2
Inadequate water	31	11.1
Total	**279**	**100.0**

The results indicate that, in the last three decades, the economic activities of the study area has drastically changed and these changes have had significant change of the ecological zone of the Embobut forest due to encroachment by the natives of the area. The tributaries that emanate from the forest, no longer form the rivers that had guaranteed seasonal river fluctuations caused by low evapotranspiration, high rainfall, and relatively high water retention capacity, making such rivers reduce in its flows[118]. The changes in the land use systems, both in the high and low lands have been accompanied by very high growth rates in population, mostly due to migration of agro pastoralist closer to the forest. The increase in population has led to demands on water resources[119]. Selling of land neighboring the forest has made the area have small land holdings that have been sub-divided into small plots for agro pastoralists. These transformations in land utilization systems have made it densely populated small-scale farming areas that are highly settled. This large population has also encroached partly into the forested area[120].

5.6 Conflicts on water resources

Water resources conflicts are not new in area of the study. The study outcome shows that competition for scarce water resources (21.4%) comprise one among many of most perennial problems related to water conflicts. There are many causal effects arising due to competition

[118]Wiesmann et al (2000). Mitigating Conflicts over Scarce Water Resources in High and Lowland System of Mt Kenya
[119]Ibid 2
[120] Ibid 2

for such waters. Due to competition, lack of access to water (14.3%), exploitation of water by agro pastoralists (14.3%) and privatization of water points (14.3%) were other water conflicts that existed in the study area.

Water Conflicts	Responses	
	N	Percent
Lack of access to water	186	14.3%
Unequal access to water	124	9.5%
Exploitation of water by agro pastoralists	186	14.3%
Competition for scarce Water resources	279	21.4%
Compliance with national laws - water users and the government, human and wildlife	93	7.1%
Conflicts over water allocation	124	9.5%
Privatization of water points	186	14.3%
Quality of water and absolute pollution	124	9.5%
Total	**1302**	**100.0%**

Subsequently other nature of conflicts pointed included unequal access to water (9.5%), conflicts over water allocation (9.5%) and poor quality of water and absolute pollution (9.5%). More over other conflicts emanated due to non-compliance with national laws - water users and the government, human and wildlife (7.1%), which comprised the smallest proportion of reported cases (33.3%) related to water conflicts. The study findings are consistent with those of Eduardo, who indicated that conflicts arose as a result of exploitation of water resource. He cited an example of Capiap'o valley in Chile, where competition for use of water resource was observed between agriculture and the mining sector. The case of privatizing water points was also another cause of conflict as indicated by Riberio intimates that privatization of water points arise due to people constructing infrastructure such as irrigation canals to capture or direct water for use. Such construction will deny the population downstream the much needed clean water for livelihoods Haftendorn.

5.7 Strategies to mitigate conflicts

On strategies to mitigation water conflicts, the respondents agreed with all the strategies in equal measure (10.2%). However, a smaller proportion (8.0%) of the respondent agreed to the strategy of ejecting the population from the forest water tower. Majority of the respondents equally concurred on the following conflict mitigation strategies; Stakeholder partnerships, Development of policy and regulation, Programme Coordination, Prior negotiations on conflicts, Sharing formulae for water resources, Information exchange/promotion of confidence, Constructing linkage strategies, arbitration/mediation/intervention, control by using permits, all at (10.2%). The summary of these findings are shown in table 6 below

Table 5 Strategies to mitigate conflicts

Strategies to mitigate conflicts	**N**	**Percent**
Stakeholder partnerships	279	10.2%
Development of policy and regulation	279	10.2%
Programme Coordination	279	10.2%
Prior negotiations on conflicts	279	10.2%
Sharing formulae for water resources	279	10.2%
Information exchange/promotion of confidence	279	10.2%
Constructing linkage strategies	279	10.2%
Arbitration/mediation/intervention	279	10.2%
Control by using permits	279	10.2%
Ejecting the population from the water tower	217	8.0%
Total	**2728**	**100.0%**

The strategies suggested by the house hold members are consistent with those of researchers such as Yahya (2008), Riberio (2008), Daoudy (2010) Haftendorn, (2000) and Keating, 2015. Yahya had suggested that, partnership with local and national stakeholders ought to prevent conflicts with Riberio pointing to putting regulations in place. R adds that in a bid to ensure a

democratic process, issues which involve security of water need to be regulated politically. [121].On the other hand, Daoudy pointed out the benefit of sharing as means to ensure all get access and to avoid water conflicts, thereby creating opportunities for greater cooperation in basins. Haftendorn, indicated a number many strategies that have proved as particularly effective in resolving water conflicts. They included integrating the conflict in a non-negative interactive complex, the improvement of exchange of information and confidence promotion. Construction of linkage strategies by creating package solutions, and use of mediation, arbitration, and intervention. Ashton , suggests that, the water resource management strategy of each country requires to be harmonized with that of its neighbors so that prosperity and peace is maintained and conflicts are avoided in any region of Africa . Brown and Keating suggests way of overcoming resource disputes which are national or sub-national; engaging an internal and external actors with regard to sovereignty of the actors on the national level.

Conclusion

This chapter has attempted to discuss the characteristics of the population in the study area. First the source of water source and their uses is explored, in which it emerged water is mostly used for domestic, irrigation and animals. A significant amount of water comes from the stream or river. Water scarcities exist in the study area and this has led to competition for dwindling quantity of water. There is glaring evidence of changes in ecology as well as the socio-economy with strategies employed by the households to deal with the shortage included reducing the flock by selling the animals, reducing tilled acreage, while government strategy included planting of more trees. The four top most water conflicts included competition, exploitation and inaccessibility to water and privatization of water points. Strategies suggested by the household members to mitigate conflicts arising from water included stakeholder partnerships, development of policy and regulation, programme Coordination and prior negotiations on conflicts.

[121]Riberio, W. C. &Sant'Anna, F.M.(2011). Water security and interstate conflict and cooperation São Paulo University.

CHAPTER SIX

SUMMARY OF KEY FINDINGS CONCLUSION AND RECCOMENDATION

6.1 Discussion

The changes in ecological setup and the land use system have and will continue to vary because of dynamic human activities. The changes in a micro ecological system brings about a significant change climate and this may be disastrous to live hoods. The changes accompanied by changes in climate are change of economic activities for human survival. In an ideal situation water towers need not be disturbed at all costs. Forest destruction and basins formed out of such water towers need not be disturbed as well. The change in economic activities and land use system has significant change of the ecological zone of water towers such as the Embobut forest.

The tributaries that emanate from such water towers attract exploitation from the populace around it and conflicts are bound to arise. There is a likelihood of upstream communities to divert waters from the basins and deny those in the lowland areas and conflicts are meted. The rapid increase in population has worsened the water problems due to demand for water resources[122]. Conflicts of over water resources are likely to dominate the coming years. Competition for scarce water resources is perennial and has created inaccessible access to water to a substantial section among the human populace.

Consequently other conflicts escalate such as unequal access to water conflicts over water allocation and poor quality of water and pollution. There is also the aspect of non-compliance with national and international laws that attempt to protect human and wildlife. Laws to govern water must oversee all human actions that may unfairly jeopardize access to water with issues of privatization death with.

[122]Ibid 2

Strategies to mitigation water conflicts are an important undertaking in water governance. There are several conflict mitigation strategies that include stakeholder partnerships, development of policy and regulation, programme Coordination, prior negotiations on conflicts, sharing formulae for water resources, information exchange/promotion of confidence, Constructing linkage strategies, arbitration/mediation/intervention and control by using permits.

6.2 Conclusion

Conflicts over scarce water resource are not only a local problem but also national and international. It may significantly provide conflicts states or adjacent states of a region. There are water governance laws that have been formulated for specified parts of the world and have affected some states or regions. Such laws have been developed on ad hoc basis depending on where and when the conflict is presenting itself. The conflicts are as dynamic as the uses of water and the manner in which they are used by the users. These kinds of conflicts undoubtedly require different solutions strategies as with other natural resources.

6.3 Recommendations

From the research findings, the following recommendation are made

(i) Human population will always increase at an exponential rate and as such water scarcity will be a never ending problem. Population increase will put undue pressure on the existing resources (water) due to the changing farming systems and economic activities that heavily depend on water

(ii) Due to ecological and economic changes in land use system and exploitation of water resource, pressure on existing water resources will about scarcity. There is need to continually plant more trees that can harness water reduce evapotranspiration

(iii) There is need to identify, classify and protect all water towers in all parts of the globe, as it is capable of being a genesis of water conflicts. There is need for laws, policies and regulations that govern issues of water risk of scarcity. Such laws should include those that are geared towards water capture and storage for future use

(iv) There is also need to develop legal framework to mitigate conflicts which may have arisen because of water scarcity and use. Some organizations such, for example OECD and Unites states Institute of peace are well versed on laws on governance of water but also how to mitigate laws, and have developed them for particular regions and should assist other emerging economies develop theirs as well

6.4 Area for Further Research

1. A study should be undertaken on the mitigation and resolution of conflicts among communities living in Riparian counties such as Nakuru and Nyahururu.
2. A study on policy analysis of water governance need be done for the East African Community, and in particular, Kenya and Uganda

APPENDICES

APPENDIX I: QUESTIONAIRE

SECTION A: DEMOGRAPHICS

1. Gender

   Male ☐ Female ☐

2. Age: _____ (years)

3. Main Occupation/ income generating Activities of the household

	Tick if engaged (√)
Formal Employment	……..
Crop Production	……..
Keeping Animals	……..
Trade/ Buying and Selling	……..

   Others (Specify): …….....

   …….

4. What are the source(s) of water for domestic use in your household?

   Tap ☐ Borehole ☐ River ☐ Lake ☐ Rain ☐

   Others (Specify):

   ……..

5. (a) What are the uses of water other than domestic?

   Watering Animals ☐ Irrigation ☐ Others (specify):

   ……

   (b) What Quantity (number of gallons)? …….

   (c) Average quantity of water used daily (number of gallons): ……

WATER SCARCITY

(d) Is the water used adequate?

Yes ☐ No ☐

(e) If No, how do you deal with the shortage?

.....

How long ago has the water been scarce?

0-10 ☐ 10-20 ☐ 20-30 ☐ Over 30 ☐

(f) What are the probable causes of shortage?

……

……

(g) What has been done by you/community/authorities to address the shortage?

……

……

(h) How much quantity of water other than domestic, do you think will be enough for you activities? …… gallons

SECTION B: SOCIOECONOMIC DYNAMICS, CONFLICTS OVER WATER AND PREVENTION

6. What have been the main economic activities in this area?
7. (a) By comparison over the years, has the economic activities changed?

YES ☐ NO ☐

(b) If yes, what has been The dominant activity in the following time periods:

10 years ago; …….

20 years ago…….

30 years ago. …….

8. What are the reason(s) why people have changed the economic activities?

…….

…….

APPENDIX II: INTERVIEW GUIDE

9. What have been the main economic activities in this area?
10. By comparison over the years, has the economic activities changed?
11. If yes, what have been the dominant activities in the following time periods: 10 years ago; 20 years ago, 30 years ago.
12. What are the reason(s) why people have changed the economic activities?
13. The have been conflicts previously on water scarcity. What exactly brought about the water conflicts?
14. Are the conflicts still there?
15. If yes, what is the cause of these conflicts?
16. Who are the protagonists in the conflicts?
17. What role does each protagonist have in the conflict? How can these conflicts be prevented/controlled?

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