

GRASSROOTS DEVELOPMENT INITIATIVES FOUNDATION-KENYA (GRADIF-K)
THE STATE OF NATURAL RESOURCES IN NYERI, MERU AND THARAKA NITHI
COUNTIES



For the project

**“INCREASED CITIZENS’ PARTICIPATION IN GOVERNANCE AND SUSTAINABLE
UTILIZATION AND MANAGEMENT OF NATURAL RESOURCES IN THE
COUNTIES OF MERU, THARAKA NITHI AND NYERI”**

By:

GRASSROOTS DEVELOPMENT INITIATIVES FOUNDATION-KENYA (GRADIF-K)

IN PARTNERSHIP WITH:

DEVELOPMENT TRAINING AND RESEARCH AFRICA (DETRA-AFRICA)

**WITH FINANCIAL SUPPORT FROM THE GOVERNMENT OF
SWEDEN-SIDA PROGRAMME THROUGH ACT! (FORMERLY, PACT KENYA).**

DETRA-Africa

Development Training and Research Africa

ACT!

SIDA



CERTIFICATION

We the undersigned hereby certify that the research was solely conducted and this report produced professionally without due influence from anyone and the information presented is correct and reflects an objective approach.

The process involved a number of professionals from Africa Energy and Environment Consulting and Centre for Research in Environment Kenya who professionally and personally was involved in the activities that led to completion of this report. This report was produced for Development Training and Research Africa, under the grant supported to Grassroots Development Initiatives - Kenya and Development Training and Research Africa through the Changieni Raslimali Facility of ACT! Funded by the Government of Sweden and the UK's Department for International Development.

Peter Waiharo (Ph.D.) and Marion Ebiachu

EXECUTIVE SUMMARY

The mapped Counties (Tharaka Nithi, Meru and Nyeri) are rich in a number of Natural Resources, among them being Mountains, Rivers and other water Bodies, Forests, fertile Soils, Wildlife. A number of these resources were mapped.

ACRONYMS

ACT:	Act Change Transform
CFA:	Community Forests Associations
CSOs:	Civil Society Organizations
DFID:	Department for International Development
DEAPs:	District environment Action Plans
DETRA:	Development Training Africa
GRADIF:	Grassroots Development Initiative Foundation
KEFRI:	Kenya Forest Research Institute
MOA:	Ministry of Agriculture
NEMA:	National Environment Management Authority
NRM:	Natural Resources Management
SIDA:	Swedish International Development Agency
WARMA:	Water Resources Management Authority

ACKNOWLEDGEMENT

We hereby wish to acknowledge **ACT! (Formerly PACT KENYA)** for financial support to implement the project “Increased citizens’ participation in governance and sustainable utilization and management of Natural Resources in the Counties of Meru, Tharaka Nithi and Nyeri”, for which this survey was conducted.

Much gratitude goes to **Development training and Research Africa (Detra-Africa)** and **Grassroot Development Initiatives Kenya (Gradif-K)** for giving us the opportunity to undertake this assignment. Throughout the period that we conducted this activity, they gave us guidance and support whenever we required.

We also wish to thank all the stakeholders, community groups’ members and cooperative Societies members who were our respondents while conducting this assignment. Without their information and feedback, the information documented in this report could not be gotten. We therefore appreciate their cooperation during the interview process.

Table of Contents

CERTIFICATION	1
EXECUTIVE SUMMARY	2
ACRONYMS	3
ACKNOWLEDGEMENT	4
LIST OF TABLES	7
LIST OF FIGURES	8
CHAPTER ONE	9
1.0 INTRODUCTION.....	9
1.1 Implementing Bodies	11
1.2 Increased citizens’ participation in governance and sustainable management of natural resources in the Meru, Tharaka Nithi and Nyeri project.....	12
1.2.1 Project goal and objectives	13
1.2.2 Expected Impact of the Project.....	15
CHAPTER TWO	16
2.0 Mapping of Natural Resources in Nyeri, Tharaka Nithi and Meru Counties	16
2.1 Objectives of the mapping exercise	16
2.2 Limitations and key challenges	16
CHAPTER THREE	17
3.0 METHODOLOGY	17
3.1 Area of Interest.....	17
3.1.1 Nyeri County	17
3.1.2 Meru County.....	17
3.1.3 Tharaka Nithi County	17
3.2 Research Design.....	19
3.3 Sampling procedure.....	19
3.3.1 Sampling frame and design	19
3.4 Data collection.....	19
3.4.1 Primary data collection.....	20
3.4.2 Secondary data collection.....	21
3.4.3 GIS and Remote Sensing.....	21

3.4 Data analysis	Error! Bookmark not defined.
CHAPTER FOUR.....	23
4.0 RESULTS AND DISCUSSION	23
4.1 THARAKA NITHI COUNTY	23
4.1.1 Key Natural Resources in Tharaka Nithi County	24
4.2 MERU COUNTY	27
4.2.1 Key Natural Resources in Meru County.....	27
4.3 NYERI COUNTY	32
4.3.1 Key Natural Resources in Meru County.....	33
CHAPTER FIVE	36
5.0 Conclusion.....	36
6.0 Recommendations	37
References	38

LIST OF TABLES

Table 1: Forests in Tharaka Nithi County.....	24
Table 2: Mountains and hills in Tharaka Nithi County	25
Table 3: National Parks in Tharaka Nithi County.....	26
Table 4: Forests and their coverage in Meru County.....	28

LIST OF FIGURES

Figure 1: Map of Tharaka Nithi County	23
Figure 2: Map of Meru County	27
Figure 3: Map of Nyeri County	32

CHAPTER ONE

1.0 INTRODUCTION

In large parts of the Kenya, especially in rural areas, a large fraction of the population depends directly upon natural resources for their livelihoods. However, their efforts to improve living conditions are often thwarted by degradation of these resources. This more often than not takes place at an alarming rate as a result of a complex interplay of natural factors, climate variability and human-induced factors for instance increased population density, unsustainable land use driven by geographic pressure and insecure land tenure system. This is accelerated by the fact that agricultural sector which mainly depends on the natural resources is the backbone of the economy and the principal livelihood activity in Kenya, providing about 65% of export earnings and supporting over 70% of the population who live on crop production, livestock raising, fishing, forestry and the associated value addition activities.

In Kenya, the underlying causes of the human-induced depletion of a range of natural resources are numerous and lie at different levels, but essentially revolve around their increased demand for profit and subsistence from a growing population. Over three decades ago, Kenya had 15 % of its surface area covered by forests but today its primary forest cover has been reduced to a mere 1.7 %. The forests are threatened by encroachment and logging for charcoal and fuel wood which has subjected many of the country's 38.6 million people to great hardships.

Many rivers have dried up completely while others have become seasonal. Additionally, drought seasons have become acute and more frequent and so has the loss of livelihoods. But these are not the only costs of the forest loss; the pronounced dry seasons continue to greatly affect the agricultural production and the supply of electric power in a country that derives 70 % of its electric needs from hydro-electricity power. Water scarcity is compounded by extensive degradation of water resources, including water catchment areas. The few existing water resources are intensively exploited, resulting in often irreversible environmental damage. The degradation of critical resource areas, negatively affects Kenya's parks and wildlife reserves, which are the foundation for the country's tourism industry. The degradation of critical natural resources poses a threat to Kenya's social and economic life.

In the targeted counties of Meru, Tharaka Nithi and Nyeri poverty has often resulted to degradation and overexploitation of natural resources due to small farm holdings resulting to low

land productivity, human/wildlife conflict and population pressure. Natural resources conservation and management by state administration has largely failed because local people's necessary reliance on these resources for their livelihoods has often not effectively been taken into account. With devolution, each County has been vested with specific powers over management of natural resources under their jurisdiction. However, devolving decision-making powers to various unaccountable local bodies threatens local equity and the local environment and threatens the very reason for resource use devolution.

Another major environmental issue affecting communities is climate change which is already having a profound impact in developing countries especially in Sub-Saharan Africa (SSA) and South Asia with increasing frequency and intensity of climate related disasters, notably recurrent droughts, floods and erratic rainfalls and threaten natural resource base, agricultural production and food security. Africa's vulnerability to climate change is also exacerbated by the multiple stresses it faces such as natural resource degradation, high dependence on rainfall agriculture, inadequate infrastructure, and low level of technology, widespread poverty, weak governance and thus low level of adaptive capacity to climate impacts.

However all is not doom as a new governance framework is evolving based on the new constitution promulgated in August, 2010. This brings with it both opportunities - improved governance and accountability, devolution to the grassroots - and challenges. The constitution envisages significant devolution of governance responsibilities to the county level. This will have a major impact on the way rural development programmes and natural resources are management. The new constitution is thus expected to provide an enhanced framework for natural resources management (NRM), including the provision that the "state shall work to achieve and maintain a tree cover of at least 10% of the land area of Kenya", and every person has a right to a clean and healthy environment.

Another policy document that can be used to streamline and enhance sustainable environmental and natural resources management is the Vision 2030 which is Kenya's long term development blueprint that aims at creating a "globally competitive and prosperous country with a high quality of life by 2030". It aims to transform Kenya into "a newly-industrializing, middle-income country providing a high quality of life to all its citizens in a clean and secure environment".

Vision 2030 will ensure that Kenya's economic development strategy emphasizes the long term development of agriculture, tourism, manufacturing and the energy sector, all of which rely heavily on sustainable exploitation of natural resources, and especially, the five major water towers namely, Mt. Kenya, Aberdare, Mau Complex, Cherangany Hills and Mt. Elgon.

As part of the intervention measures to enhance sustainable natural resource management and improved livelihood, DRADIF-Kenya in collaboration with DETRA-Africa is implementing a project that seeks to increased citizens' participation in governance and sustainable utilization and management of natural resources in the counties of Meru, Tharaka Nithi and Nyeri. In order to achieve this, it will therefore be necessary to map the natural resources that are found in these counties. This will greatly help in know the available resources in these counties as well as their utilization trends and local communities' participation in their management and sharing of their benefits. In the long this is expected to ensure that natural resources are sustainably managed through development of proper policies and involvement of public/local communities in their management at county level.

1.1 Implementing Bodies

The project under which mapping of natural resources in Nyeri, Tharaka Nithi and Meru is being done, is being implemented by two organizations which are working in partnership. These organizations are: Development Training and Research Africa (**DETRA-Africa**) and Grassroots Development Initiatives Kenya (**Gradif-K**).

GRADIF-K is a public Community Development Foundation registered as a public company limited by guarantee and with no share capital. The goal of the organizations is to support the improvement of living standards of disadvantaged children and other vulnerable community groups in poverty stricken areas in Kenya especially in rural areas and urban slums. For promote effectiveness, wide reach, cost cutting, impact and sustainability of the supported programmes, GRADIF-K works with organized community groups who are the key drivers of development agenda in various parts of the country. The organization has a fundraising office in Nairobi and programme coordination offices in Embu town, Mweiga, Nyeri and Kanyakine Market.

GRADIF-Kenya envisions a country where human rights are respected; communities are empowered in all ways, have access to resources, equal opportunities and actively participating

with dignity in the development processes. The organization has a mission to improve the well being of children and vulnerable communities in Kenya through transformative capacity building of grass root Community Based Organizations (CBOs), Self Help Village groups, Youth Groups, Children's Clubs, Women Groups and other Civil Society Organizations for effective resource mobilization and quality service to promote their meaningful participation in sustainable development initiatives.

DETRA-Africa is a registered NGO undertaking programmes/projects in key areas of Environment and Climate Change; Education; Health; infrastructure and enterprise through promotion of voluntary action, development and livelihood improvement. The main aim of Detra- Africa is to empower and strengthen local institutions and communities' capacity to eradicate poverty, hunger and disease with a mission of fighting poverty and disease in Africa. It seeks to network people, organizations and resources in Eastern Africa for sustainable development and work in partnership with community based groups and organizations in Eastern Africa assisting them acquire technical, human and financial resources from all parts of the world. In Kenya, Detra Africa has offices in Nairobi, Chuka and Meru.

1.2 Increased citizens' participation in governance and sustainable management of natural resources in the Meru, Tharaka Nithi and Nyeri project

This project was founded on the basis that NRM and use is critical to promoters of devolution and local democracy because they are a source of revenue and power and therefore potential legitimacy for the new county government. The project seeks to engage and empower the rural population, grassroots organizations and marginalized groups to claim their rights to environmental management and strengthen the responsiveness of the County government and the national government to respond to their needs in environmental management. This can effectively be done by strengthening farmers groups who are at the centre of environmental conservation efforts in selected counties. But with often meager resources and limited organizational and technical capacities, many farmers groups require external support to start-up and/or expand their operations. Furthermore, with the decline of farmers' cooperatives, many smallholder farmers lack a collective voice. They often cannot gain access to affordable and vital resources and infrastructure, such as land, water, credit, seeds, fertilizer, post-harvest storage facilities or transport and are locked out of lucrative markets. As a result, many small-scale

farmers in the selected counties of Meru, Tharaka Nithi and Nyeri remain caught in poverty traps and are unable to influence policies that affect their livelihoods or benefit from emerging market opportunities.

The project will facilitate reforms of NRM legislative, policy frameworks in each of the selected Counties with an aim of devolving sufficient benefits to motivate local actors to carry out new environmental management responsibilities and ensure genuine participation and representativeness of end users of local resources, both men and women, in development planning and practices and foster the local ownership and sustainable use of natural resources.

1.2.1 Project goal and objectives

The overall goal of the project is: To increase citizens' participation in governance and sustainable utilization and management of natural resources in the Counties of Meru, Tharaka Nithi and Nyeri.

The project has got two objectives:

Objective one: To promote accountability by county governments in natural resources management and enhance equitable and efficient environmental management regimes in the Counties of Meru, Tharaka Nithi and Nyeri.

In order to achieve this objective, the project seeks to bring on board citizenry into decision making on natural resource management through better representation by engaging county leadership of the selected counties through strengthening of adhoc CSOs networks, farmers cooperatives and county leadership. Representative and accountable local actors securely holding meaningful powers in return will constitute democratic decentralization. This application seeks to capture the natural resources base for the selected counties and show case stakeholders the accruing interests that can be realized if these resources are well managed. The project will also ensure through advocacy that local people in the selected Counties are actively involved in the planning, responsibility and decision-making for the management through sensitizing them of the available County resources and further, their long term access and use rights must be guaranteed and benefits shared equitably amongst them and with other stakeholders.

Through this the project will seek to contribute to creating accountable representative authorities by facilitating reforms of NRM legislative, policy frameworks in each of the selected counties with an aim of devolving sufficient benefits to motivate local actors to carry out new

environmental management responsibilities and ensure genuine participation and representativeness of end users. It will also seek to improve knowledge on local governance for natural resource management through mapping and inventorying the natural resource base in the targeted counties, documentation and dissemination of the County's resource profile and dissemination of successful approaches and holding quarterly networking meetings to share best practices for policy dialogue and advocacy.

Objective two: To strengthen the capacity of farmers groups to influence agricultural policy frameworks development in the Counties of Meru, Tharaka Nithi, and Nyeri.

Given that agriculture is the backbone of the economy of these selected counties with most of the farming activities being carried out by smallholder farmers with small parcels of land and characterized by lack of cooperation amongst themselves these farmers are therefore heavily exploited by middlemen; have no access to markets and suffer enormous losses through damages and delayed delivery of fresh produce to the market. Consequently, degradation of natural resources in targeted counties has in many occasions been associated with land tenure and small farm holdings.

Where farmer groups have been formed, they are characterized with poor production, processing, weak leadership, and marketing systems. The products are marketed in raw form and most often are perishable in nature. Small holder farmers incur losses in the farm and at post harvest through poor handling in the farm, transit and in the store. The farmers lack capacity and facilities to prevent losses.

Natural resource management can only be realized if there are deliberate efforts to sustain significant increases in farm productivity through the efficient use of land and other resources. Farmers who are the requisite engine in the management of natural resources understand the value of these resources for their survival and livelihoods. They must contend with unreliable rainfall and short, unpredictable rainy seasons. To sustain their livelihoods, farmers need to be empowered to adopt strategies for managing these resources including engaging in policy and advocacy processes. To effectively manage natural resources, maximal land use and sustained livestock productivity is requisite. This can only be realized by building the capacities of farmers

through farmers groups in natural resource management. For decades the viability of livelihood systems in the targeted counties has been weakened for a number of reasons, including the erosion of farmers' groups' cooperatives institutional arrangements around natural resources management.

1.2.2 Expected Impact of the Project

- The project is expected to achieve improved knowledge of citizens and county leadership on existing natural resources; increased stronger citizen's voices in NRM; enhanced sharing of good practices in NRM advocacy; increased vigilance in NRM as well as increased farmer's voices on favourable agricultural policies/legislations.
- Additionally, the project will also seek to improve knowledge on capacity gaps facing farmers cooperatives; enhanced farmers voices on supportive agricultural policies; improved knowledge on agricultural policies; increased participation of farmers in agricultural policies advocacy; increased adoption and replication of best practices on NRM and better farm management; increased lobbying and advocacy for supportive agricultural policies; increased participation of farmers in agricultural policies advocacy.

CHAPTER TWO

2.0 Mapping of Natural Resources in Nyeri, Tharaka Nithi and Meru Counties

Meru, Tharaka Nithi and Nyeri Counties are endowed with various natural resources that are of local, regional, national and international importance and which provides environmental, social, cultural, aesthetic and economical benefits to the county residents and the Kenyan population at large. However, in order to increase citizen's participation in the decision making and management of these resources, this project sought first to map them and show case stakeholders the accruing interests that can be realized if these resources are well managed.

2.1 Objectives of the mapping exercise

This exercise was undertaken for the purpose of achieving the following objectives:

- i. To find out the key natural resource base in Tharaka Nithi, Meru and Nyeri Counties
- ii. To map out and document the key natural resources in the three counties.
- iii. To produce maps and County's Natural Resource profiles in the three Counties.

It is expected that the outputs of mapping exercise will contribute immensely towards enhancing the achievement of increased citizens' participation in governance and sustainable utilization and management of natural resources in the counties of Meru, Tharaka Nithi and Nyeri".

2.2 Limitations and key challenges

Though accomplishment of this project was realized, there were many challenges and limitations that were experienced during the exercise, however efforts were done to address or minimize their impacts on the results. The following are some of the challenges experienced:

- i. Time constraints. The mapping exercise was time consuming especially certain activities such as organizing for community and stakeholders meetings. Therefore their participation was very minimal.
- 3 Financial constraints. Due to limited funding, only key natural resources in the three Counties were mapped.
- 4 Inaccessibility of certain areas due to poor infrastructural network. Most of the areas especially in the remote parts of Meru and Tharaka Nithi counties were in accessible; it was also very hard to get people because the population is very sparse with the geographical area characterized by bushes, hills and also very hot sun.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Area of Interest

This exercise involved mapping of natural resources in Nyeri, Meru and Tharaka Nithi Counties of Kenya. The three counties are located in the Mt. Kenya region and the key economic activity is agriculture. These counties contain vast natural resources which include: rivers, hills, mountains, forest, game parks, game reserves, traditional shrines among others.

3.1.1 Nyeri County

Nyeri County is situated between longitudes 36° and 38° East and between the equator and latitude $0^{\circ} 38'$ South. The county covers an area of $3,266 \text{ km}^2$ with an arable land of $2,349 \text{ km}^2$ and 917 km^2 being semiarid (District Commissioners' Office Nyeri, 2000). Nyeri County borders the following Counties; Laikipia to the North, Kirinyaga to the East, Muranga to the South, Nyandarua to the West and Meru to the North East.

The main physical features of the county are Mt. Kenya (5,199m) to the east and the Aberdare range (3,999m) to the west. The county also has forests, National parks, forested hills, rivers, war memorial burial sites among other resources and attraction sites.

3.1.2 Meru County

Meru County is located at $0^{\circ} 30' 0''$ North, $37^{\circ} 39' 0''$ East, on the northeast slopes of Mount Kenya. Meru County borders the following Counties: Isiolo to the North and North East, Tharaka Nithi to the South West, Nyeri to the South and Laikipia to the West. The county has an area of $6,936 \text{ Km}^2$

The main physical features in the county include: Meru National Park, Njuri Ncheke shrine, Mt. Kenya, Meru Museum, Nyambene Complex among others. The mainstay economic activity in the county is agriculture.

3.1.3 Tharaka Nithi County

Tharaka Nithi County is located at between Longitudes $37^{\circ} 18'37''$ and $37^{\circ} 28'33''$ East. The County borders the following Counties: Meru to the North and North East, Kitui County to the East and South East, Embu County to the South and South West. The County has an area of $2,638.8 \text{ Km}^2$

The main physical features in Tharaka Nithi County include: Mutejwa National Park, hills, mountains, rivers, valleys among others. There is also great reliance on farming and pastoralism with the rearing of cattle, goats, sheep and poultry also contributing to the needs of the people in the County.

3.2 Research Design

Cross sectional survey research design was used for this exercise. The design allowed collection of data at one point in time and this data was used for purposes of description. By one point in time it means that data was collected in as short a time as is feasible. The design was used because it offers the best way to determine prevalence of an activity, identifying resources and has no follow-up loss.

3.3 Sampling procedure

3.3.1 Sampling frame and design

The sampling frame for the mapping of natural resources was Nyeri, Meru and Tharaka Nithi counties. Probability and non probability sampling procedures/designs were employed in this exercise. Purposive sampling was used to select the key natural resources in the area based on the information provided by the key informants and the local communities in the counties.

In order to ensure inclusivity, random sampling was employed when selecting the local communities to be interviewed. Proportional allocation of the local communities to be interviewed was ensured due to the diversity of population density as well as distribution of resources in the three counties. As for the key informants in the three counties, purposive sampling was used to select those to be interviewed. Key informants interviewed included selected officials of; Non Governmental Organizations (NGOs), Community Based Organizations (CBOs), Ministry of agriculture officers, forest department officers, national park officers, village elders among others. These key informants offered deeper insights relating to the dynamics surrounding the natural resources in the three counties.

3.4 Data collection

The mapping exercise relied on both primary and secondary data. Primary data sources included semi-structured interview schedules, field observations as well as picking of GPS points using handheld Geographical Positioning System (GPS). Secondary data was obtained by reviewing of literature on similar studies conducted within the study area or elsewhere, journal articles, Ministry of Agriculture annual reports, forestry reports, national archives reports, theses, and other relevant materials concerning coffee and forest sectors. This information was mainly found in libraries, publications and websites of various institutions dealing with coffee and forests.

3.4.1 Primary data collection

3.4.1.1 Stakeholders' consultation

During the mapping exercise in the three counties, there was an active involvement through interviews of all relevant stakeholders in natural resources management which included:

1. Government line ministries and authorities responsible for management of various resources. These include the ministries of Water and irrigation, Environment and Mineral Resources, Agriculture, Forestry and Wildlife, Lands, local government and Fisheries among others.
2. Local authorities
3. Local community groups such as Women Groups, Youth Groups, Men Groups
4. Community based Conservation organizations
5. NGOs operating in the three counties
6. Local resource use groups such as Water Resource Users Associations, Community Forest Associations, Community Wildlife Conservation groups
7. Local leaders (both government and traditional leaders such as the council of elders)

3.4.1.2 Focused group discussions (FGD's)

These focused on relevant groups based on the resources being mapped and the information being targeted. Examples of groups include local resource users (such as WRUAs and CFAs) and women groups among others. A questionnaire which contained open ended questions was administered to the following groups of people:

1. Relevant groups such as women groups, opinion leaders, elders, CBOs etc.
2. Heads of departments at the county, districts and constituency level. They include MOA, WRUA's NEMA, DDO'S, Ministry of Gender and social services, Ministry of cooperatives among others.

3.4.1.3 Social methods

Social methods were used during the resource mapping. Emphasis was paid on use of Participatory Rural Appraisal (PRA) techniques including transect diagrams, seasonal calendars, matrix scoring and ranking and community sketching. Some of the key information gathered from PRA methods include temporal (or seasonal dimension of resources), relative importance

of various resources, resources of cultural importance and common pool resources (such as village ponds and grazing lands). Other social methods applied included questionnaires, checklists and discussions as appropriate.

3.4.2 Secondary data collection

3.4.2.1 Review of past records

This entailed a detailed review of available relevant literature for each of the targeted counties. The purpose of literature review was to analyze background information regarding the three counties, particularly on natural resources endowment. Secondary data was sourced in various government departments including the Ministry of Water, water resources management authority (WARMA), National Environment Management Authority (NEMA), County Councils, the Kenya Wildlife Service (KWS), the Kenya Forest Service (KFS) and the Department of Resource Surveys and Remote Sensing (DRSRS), Department of Minerals and Geology, internet among other sources. Examples of literature reviewed included:

1. District development plans
2. District Environmental Action Plans (DEAPs)
3. Strategic plans;
4. Previous studies on natural resources in the areas
5. State of the Environment Reports
6. Resources survey reports
7. Natural resources management plans in the area including catchment management plans, wildlife resources management plans, forest management plans
8. Relevant legislations governing management of natural resources in the areas targeted.
9. Area resource maps

3.4.3 GIS and Remote Sensing

This entailed the use of GIS applications and remote sensing techniques for mapping of natural resources. Appropriate GIS hardware (GPS handset, scanners, computers etc) and software (such as arc GIS and NRDB Pro) were used. Moreover, suitable methods for remote sensing (High Spectral Remote Sensing and High Spatial Resolution Imagery) were used.

3.4.3.1 Thematic methods for resource mapping

This entailed use of specific methods for mapping of resources, based on the type of resource being mapped. For instance, for vegetation mapping methods used included plot methods, transects and forest mensuration techniques.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 THARAKA NITHI COUNTY

Tharaka Nithi County found in the Eastern region of Kenya and is composed of four districts which are: Meru South, Maara, Tharaka North and Tharaka South. The County is endowed with a variety of natural resources which ranges from national parks, rivers, hills, wetlands, iron ore deposits, forests, bushlands, grasslands, mountains, among others.

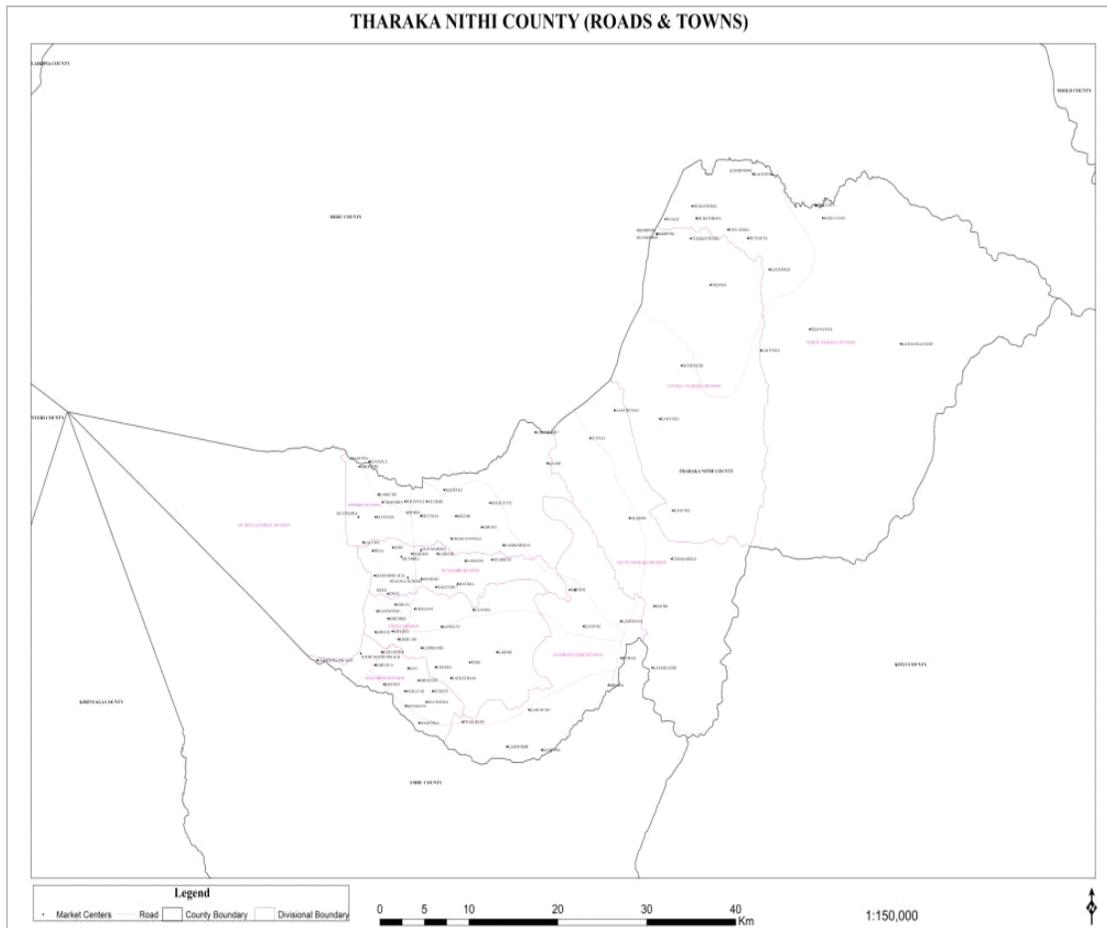


Figure 1: Map of Tharaka Nithi County

The County has bi-modal rainfall pattern with the rains falling during the months of March to May and October to December. The rainfall is favorable for cultivating *tea*, *Coffee*, *maize*, *Cow peas*, *pigeon peas*, *Tobacco* in the highland areas of the county and *Cow peas*, *pigeon Peas*, *Tobacco*, *Cotton*, *Green grams* plus many other food crops which are drought resistant.

4.1.1 Key Natural Resources in Tharaka Nithi County

4.1.1.1 Forests and vegetation cover

Tharaka Nithi County has several forests and a variety of vegetation covers. The total area covered by forest in Tharaka Nithi County is 2110.50 km² some of which are key water catchments in Kenya. These forests are summarized in table 1 below:

Table 1: Forests in Tharaka Nithi County

Forest	Area km ²	District where it is located
Mount Kenya	1986.56	Meru South and Maara
Kikingo	11.98	Tharaka
Maatha	6.29	Tharaka
Mutejwa	13.12	Tharaka
Kiagu	13.55	Tharaka
Njuguni	19.78	Meru South and Maara
Munguni	1.88	Tharaka
Mutharanga	2.92	Tharaka
Kierera	7.74	Tharaka
Kijege	32.89	Tharaka
Ntugi	13.79	Tharaka

Mount Kenya forest is one among the key forests in the County and it covers a total area of 1986.56 km². The area bordering Mt Kenya forest is the highest part of the County and receives fairly reliable rainfall which decreases as you go to the lower parts of Tharaka districts which are semi arid areas. The County also contains numerous bushlands, woodlands, barren land and cultivated land under agriculture. The county has a total 167.07 km² under Bushland while 1996.96 km² is on agriculture. A total of 31.41 Km² is barren land while 119.32 km² contains woodland. (See Tharaka Nithi Map No 4).

It is worth to note that, these forests are key livelihood sources of the local communities residing in Tharaka Nithi County since they provide resources such as water, timber, firewood, grass resins, honey among others. These forests are heavily exploited for timber and firewood for domestic use. Eco-tourism is also being done in these forests but on a small scale.

4.1.1.2 Landforms in Tharaka Nithi County

The main Landforms in Tharaka Nithi County are mountains, hills and mountain foot ridges. Mt Kenya is the main mountain in Tharaka Nithi County which covers an area of 6117.04 km². The topography of the county is greatly influenced by the Mount Kenya volcanic activity creating a V shaped valleys within which main tributaries of river Tana flow originating from Mt Kenya Forest. Landforms within the County are represented in table 2 below.

Table 2: Mountains and hills in Tharaka Nithi County

Mountain/hill name	Area in Km ²	District located
Mount Kenya	5959.68	Meru South and Maara
Kikingo	23.95	Meru South and Maara
Kiagu	13.54	Meru South and Maara
Maatha	6.29	Meru South and Maara
Ntugi	13.79	Tharaka
Mutejwa	39.37	Tharaka
Njuguni	19.78	Meru South and Maara
Kijege	32.89	Meru South and Maara
Kierera	7.74	Meru South and Maara

(For more information, check on Tharaka Nithi map No. 2)

4.1.1.3 Water resources in Tharaka Nithi County

Tharaka Nithi County contains many streams most of which are perennial. The County also contains rivers that are big having drained all the streams upstream. Most of water resources have their catchment in Mount Kenya which drains eastwards to river Tana. The Main Rivers originating from Mt. Kenya forest in the County are: Tana, Thuchi, Ruguti, Maara, Nithi and Mutonga all of which flow eastwards. The drainage pattern in the County is characterized by rivers and streams draining into the Indian Ocean through Tana River. Other rivers in Tharaka Nithi County which originate from Nyambene hills in Meru County include: Kithenu, Kiriria, Kathengecha, Kathita, Thanantu, Thangatha, Mubuura, Ngoru, Ura, kambogo, Mutonga. Other rivers in the County, among them include; Tungu, Nithi, South Maara, North Maara, Gituambugi, Mwirithi, Namakithie, Tungu, Kurugucha, Muthi, Irigu, Kamuu, Naka, Tharia,

Thangatha, Mataka, Kambogo, Nziitu, Gituambugi among others. For more details, refer to Tharaka Nithi Map No (5).

However, the rivers have low flows during the dry season. Due to environment degradation, levels of are on downward trend. The river water is also turbid due to cultivation of the river banks and water source catchments which are under intensive farming using unsustainable methods. Most permanent rivers above have capacity for development of micro hydro power generation sites. These points’ rivers include:

1. Machui falls in Naka River
2. Two sites along river Ruguti.
3. Kanda Kame and Enamwamba falls in south Maara River
4. Tungu river near the forest
5. Nithi river in the forest
6. South Maara in Mount Kenya Forest

The county also contains numerous wetlands, however due to the heavy rains that were being experienced in the region; it was difficult to map them due to demarcation problems and establishment of temporary and permanent wetlands.

4.1.1.4 National Parks and other tourist sites in Tharaka Nithi County

In Tharaka Nithi County contain two national parks as shown in table 3 below.

Table 3: National Parks in Tharaka Nithi County

National park	Size
Meru North National park	0.34
Mt. Kenya forest national park	352.96

(For more information, check on Tharaka Nithi County maps No. 2&6)

Other tourist attraction sites in the County include: Njuguni Hill, Mount Kenya in Meru South and Maara Districts and Ntugi, Mutejwa, Kijege, Kierera, Kiagu and Kikingo Hills in Tharaka Districts. The water falls indicated in the earlier chapters also form part of tourist attraction in the District.

4.2 MERU COUNTY

Meru County is among the counties that are found in the Eastern region of Kenya. The county is composed of the following districts: Igembe North, Igembe South, Tigania East, Tigania West, Buuri, Imenti North, Imenti Central and Imenti South. Just like Tharaka Nithi, Meru County is endowed with a variety of natural resources which ranges from national parks, rivers, hills, dams, wetlands, forests, bushlands, grasslands, mountains, among others.

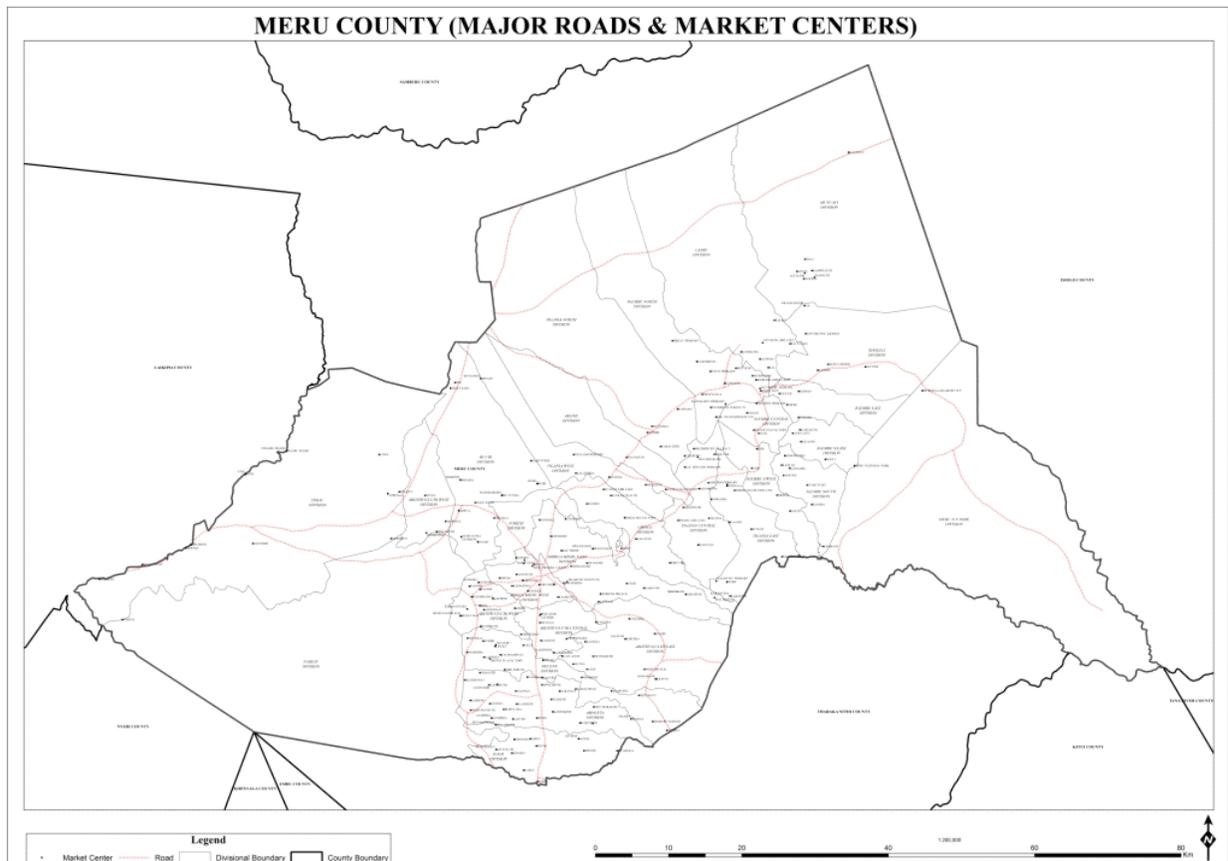


Figure 2: Map of Meru County

4.2.1 Key Natural Resources in Meru County

4.2.1.1 Forests and vegetation cover in Meru County

Meru County is endowed with vast forest resources covering a total area of approximately 2303.48 km². There are numerous small and major forests in the County some of which make up major forest reserves and water catchment areas in Kenya. These forests are shown in table 4 below:

Table 4: Forests and their coverage in Meru County

Name of forest	Area in Km²
Ndare	56.02
Mount Kenya	1986.56
Ngaia	42.95
Kiagu	13.55
Thunguru Hill	5.52
Lower Imenti	24.66
Kieiga	5.71
Thuuri	7.28
Upper Imenti	103.56
Nyambeni	7.08
Kibithewa	2.38
Nyambeni	47.22

(For more information, check on Meru County maps No. 1&2)

Apart from the above mentioned forests, Meru County also contains the following vegetation cover as well as barren land: grasslands/bushlands which covers approximately 2397.53 km², woodlands covering 78.27 km², cultivated land covering 2940.26 km², forest plantation covering 410.52 km² and barren land covering 519.82 km².

4.2.1.2 Water resources (rivers and streams)

Meru County is drained by many streams most of which are permanent or perennial depending on the seasonality. Rivers in the lower zone of the district are big having drained all the streams up stream. The rivers however have low flows during the dry seasons. Due to environmental degradation and over-abstraction upstream the levels are on a down ward trend. The river water is also turbid, the reason being the cultivation of the river banks and the water sources areas.

The County has plenty of surface water in most areas especially in the south. Most of the water comes from the slopes of Mt. Kenya and the surrounding forests, which act as the catchment area. Also, much of the water is retained by the volcanic rocks in the region, so most of the rivers rising from here are permanent and have enough discharge to keep the dry eastern

lowlands well watered. With a large number of swift flowing rivers and waterfalls, Meru County has high potential for hydro-electric power generation. Surface water in the district is both adequate and suitable for all aspects of farming, and can be economically treated by conventional methods to make the water safe for drinking.

Meru County has a large number of rivers. In this exercise more than 2323 rivers were mapped. The following is the distribution of the mapped rivers according to the District;

Imenti North and Buuri Districts Rivers

Most of these rivers have their Catchment in Mt Kenya Forest. Among the mapped ones include; Liki, IthANJI Mbaya, Oltulili, Sirimon, Teleswani, Timau, Ngusishi, Western marania, Njoro, Murogo, Liji, Luedi, Liji, Lueye, Tangenge, Tangege, Kathita, Kombokie, Kunungu, Gachioma, Kinyaritha, Gakuuru, Luguso, Liki north, Kihonde, Darerqote, Mariara, Liliaba, Lueye Luedi, Kithui, Thingithu, Mutonga, Loria, Bule shilme, Eastern Marania (Ruguthu), Kabutukei, Murera, Ithambanchego, Ruiri, Wasumata, Thiiti, Teleswani, Gachoge, Kuuru, Laga batana, Thananta, Kamarai, Bisanadi, Ngusishi, Nithi North, Nithi, Sirimon, Kanyuango, Kaja, Kakungu, Kunungu, Lembolio, Small Laga Loko, Nchoronyuki, Liki North, Lurria, Muugi, Nankere, Garba Tula, Kanin, Kinyaritha, Gachioma, Ontulili, Njoro, Anduathama, Kamaroo, Kithenu, Mukongoro, Gakuuru, Luguso, Liki north, Kihonde, Darerqote, Mariara, Liliaba, Lueye Luedi, Kithui, Thingithu, Mutonga, Loria, Bule shilme, Eastern Marania (Ruguthu), Kabutukei, Murera, Ithambanchego, Ruiri, Wasumata, Thiiti, Teleswani, Gachoge, Kuuru, Laga batana, Thananta, Kamarai, Bisanadi, Ngusishi, Nithi North, Nithi, Sirimon, Kanyuango, Kaja, Kakungu, Kunungu, Lembolio, Small Laga Loko, Nchoronyuki, Liki North, Lurria, Muugi, Nankere, Garba Tula, Kanin, Kinyaritha, Gachioma, Ontulili, Njoro, Anduathama, Kamaroo, KithenuMukongoro, Mariara, Gachioma, Lurria, Morire, Kabutukei, Kamarai, Morire, Kihonde and Kanyuango rivers. (See Meru County maps No 1&6 for more information).

Imenti South and Imenti Central District's Rivers

Most of these rivers have their Catchment in Mt Kenya Forest. Among the mapped ones include; Kathita, Mutonga, Kathirumu, Ruiri, Liji, Lueye, Kathita, Nankere, Thingithu, Kithenu, Muug, Mutonga rivers. (See Meru County maps No 1&6 for more information).

Igembe North and South District's Rivers

Most of the mapped rivers have their catchments in Nyambene Forest. Among the Mapped rivers in this area include Laga Batana, Laga Loko, Laga batana, Garba Tula, Bule shiime, Lembolio, Darerqote, Loria, Anduathama, Nchoronyuki, Liliaba, Ura, Kakungu, Kiolou, Ithambanchego, Mutundu, Bwatherongi, Merutano, Kakungu, Rojewero, Kiolou, Tana. (See Meru County maps No 1&6 for more information).

Tigania East and Tigania west

Most of the mapped rivers have their catchments in Nyambene and mount Kenya Forest. Among the Mapped rivers in this area include Maji ya chumvi, Ngara Niting, Kiaru, Loria, Anduathama, Kamaroo, Ngare mara, Kamberia, Maji ya chumvi, Kihonde, Thananta, Thiiti, Thangatha, Kithui and Ura Rivers. (See Meru County maps No 1&6 for more information).

4.2.1.3 Lakes found in Meru County

In Meru County, two lakes were mapped which are: Nkunga Sacred Ecotourism lake and Mbututia Sacred Ecotourism lake. The two lakes are used for social cultural activities by the local people. The lakes are also tourist attraction sites in Meru County.

4.2.1.4 Wetlands found in Meru County

During the exercise, a total of 13 wetlands were mapped, covering approximately 42.24 km². (See Meru County maps No 1&6 for more information). These wetlands are essential since they act as sponge and therefore they provide water during dry seasons. The wetlands also help to control flooding, are habitat for certain flora and fauna and therefore they enhance biodiversity conservation, support agriculture and perform other ecological, economical and social cultural functions.

4.2.1.5 National Parks and Game reserves

The largely undisturbed ecological system in the County supports a wide variety of animal species. In the County, the areas inhabited by wildlife and which have potential for tourism are the Mount Kenya Forest, National Park and the Imenti Forest. The animals found these parks are elephants, buffaloes, zebras, water bucks, cheetah, leopards, the primates and a variety of the avian community. Because of its biodiversity, forests also have great botanical, aesthetic and ecological values. With their wide bio-diversity and picturesque sceneries, Mt. Kenya Forest and

Meru National park are the singularly most noticeable tourist attractions with wildlife resource in the County.

The *parks* in Meru County mapped in this report include Mt Kenya National Park which covers approximately 3702 km² and Meru National park which covers approximately 878.2 km². Other national Parks and Game reserves Mapped in this report include; North Kitui National Reserve, Meru North National Park, Rapsu game reserve, Korbesa game Reserve, Imenti Forest national Park, upper Imenti forest reserve, lower Imenti forest reserve and Thunguru Hill forest reserve. (See Meru County maps No 1&7 for more information).

4.2.1.4 Landforms in Meru County

Meru County contains a variety of beautiful land forms which are natural attractions. These landforms include mountains, hills and mountain foot ridges, volcanic shield and volcanic craters and Plateaus. The largest and the main attractions in the County is Mount Kenya.

Landforms per District

Imenti North and Buuri districts

Ndare Hills/Mountains, Upper Imenti Hills/Mountains, Nkunga Sacred Ecotourism Lake, Mount Kenya hills/mountains, Lower Imenti Hills/Mountains, Njuri Ncheke Shrine

Imenti South and Central

Kiagu hills/mountains, Thunguru hill, Mount Kenya Hills/Mountains.

Tigania East and West

Kieiga Hills/Mountains, Kieiga Hills/Mountains, Thuuri Hills/Mountains, Nyambeni Hills/Mountains, Mbututia Sacred Ecotourism Lake, Njuri Ncheke Shrine.

4.2.1.5 Shrines

Three sacred shrines were mapped in Meru County. The sacred shrines are very important social cultural sites for the local people. These shrines are: Mbututia Sacred Ecotourism Lake, Njuri Ncheke Shrine and Nkunga Sacred Ecotourism Lake.

4.3 NYERI COUNTY

Nyeri County is located in Central part of Kenya and it borders the following counties; Laikipia to the North, Meru to the North East, Kirinyaga to the East, Muranga to the South, and Nyandarua to the West. The County covers an area of 3,266 km². The main physical features of the district are *Mount Kenya* (5,199m) to the east and the *Aberdare Range* (3,999m) to the west. The western part of the district is flat, whereas further southwards, the topography is often characterized by steep ridges and valleys occasionally interrupted by hills such as *Karima, Nyeri and Tumutumu*. To some extent these hills affect the pattern of rainfall, thus influencing the mode of agricultural production in some localized areas.

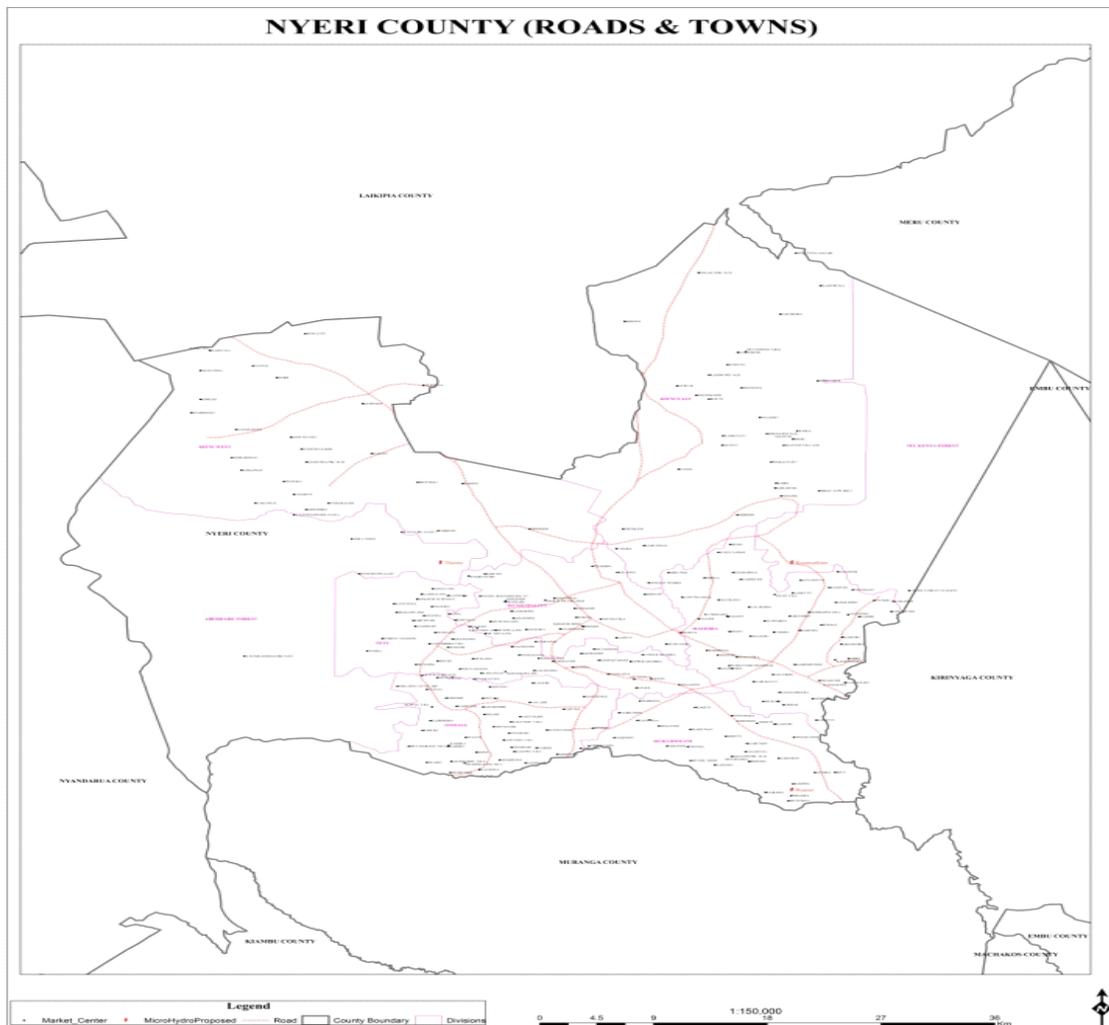


Figure 3: Map of Nyeri County

4.3.1 Key Natural Resources in Nyeri County

4.3.1.1 Forests and land cover

In Nyeri County is endowed with vast forest resources. During this exercise 10 Forests were mapped which covered a total area of 119.12 km². Mount Kenya forest is the largest forest in the County while the second largest is Aberdares Forest. Other Forests in the county include: South Laikipia, Nyeri Hill, Kiganjo, Karima, Tumutummu, Nyana forest among others. These forests are critical sources of water catchment as well as biodiversity hotspots.

4.3.1.2 Water Resources (rivers and streams)

In most areas of Nyeri County there is plenty of surface water. Most of the water comes from the slopes of Mt. Kenya, Abardares and the surrounding forests, which act as the catchment area. Also, much of the water is retained by the volcanic rocks in the region, so most of the rivers rising from here are permanent and have enough discharge to keep the dry eastern lowlands well watered. With a large number of swift flowing rivers and waterfalls, Nyeri County has high potential for hydro-electric power generation. Surface water in the district is both adequate and suitable for all aspects of farming, and can be economically treated by conventional methods to make the water safe for drinking. During the mapping exercise a total of 3116 rivers were mapped in Nyeri County. Most rivers in the western parts of the County originate from Aberdares forest while those on the eastern part of the County originate from Mount Kenya.

Distribution of mapped Rivers per district

Kieni West

Rivers in Kieni West district originate from Aberdares forest. Among them include; Mugachi, Kariguini, Karuthingitu, Kamiriki, Kamariki, Karemeno, Karemeno, Ewaso Ng'iro East, Similik, Thuka Thuka, Ewaso Ng'iro South, Kamigogo, Amboni[Honi], Kanyiriri Muiga and Rongai Rivers. (For more details on the Forest in Nyeri, check Nyeri maps No 1&5).

Kieni East

Rivers in this district have their catchment area in Mount Kenya. These are: Rongai, Burguret, Naru Moru, Wuguziru, Gathiuru, Northern Ondare, Liki, Nanyuki, Burguret, Wuguziru, Kirugutu, Rongai, Nairobi, Nyangi, Losoi (Kachueri, Kaduni, Mere, Nassia, Warazo, Kituvia, Kamahuri and Sagana rivers.

Nyeri South.

Some rivers in this district have their catchment in Aberdares forest while others from Mount Kenya Forest as well as several forested hills in the district. They include: Honi, Kihoni, Honi, Mwathe, Waitimu, Chania, Mwathe Gaturuma, Amboni, Ruhutii, Murin gato, Thaina, Gataraini, Magura, Karimu, Magura, Karuru, Gochiguini, Thuti, Ndurumo, Gikira and Gikururu Rivers.

Tetu

The rivers in this district have their catchments in Aberdares forest. Among the mapped rivers include Thaina, haina[Zaina], Chanya, Thiriko, Kaigonde, Kanyore and Gura Rivers.

Mukurweini

Some rivers in this district have their catchment in Aberdares forest and others from Mount Kenya Forest. They include Mugono, Ruara, Sagana and Thiha rivers.

Mathira

Rivers in this district have their catchment in Aberdares forest and others from Mount Kenya Forest. They include ; Kamwoya, Hombe, Sagana, Kariumbaini, Kanikwe, Rui-Ruiru, Gathita, Rathithi, Muthira, Kamwoya, Kanja, Gaichamuki, Tegu, Itoga, Kagochi, Karuru, Ragati, Gathangaini, Sagana, Kinyeeru, Kandogo and Ithanji Kirigu Rivers.

Othaya

Rivers in this division Originate from Aberdares forest. Among the mapped include; Githugu, Mumwe, Tunuku, Maragoya, Chinga and Ruarai rivers.

4.3.1.3 Landforms in Nyeri County

Nyeri County has so many hills, mountains and foot ridges. This is evident as one traverses the county and in this case the main mountains, hills and foot ridges that were mapped include: Mount Kenya, Aberdares ranges, Nyeri hill, Tumutumu hill and Karima hill. Mukurwe-ini valleys also presents some very beautiful scenery with very many bird species inhabiting the area and has hence been declared as Important Bird Area by the National Museums of Kenya. However, it is important to note that there are several other hills that are in the County that were not mapped due to the challenges that are mentioned at the section that describes the challenges experienced during the mapping exercise.

4.3.1.4 National parks and game reserves.

The largely undisturbed ecological system in the County supports a wide variety of animal species. In Nyeri County, the areas inhabited by wildlife and which have potential for tourism are the *National Parks and Game Reserves* (Mount Kenya and aberdares national parks) which are the main parks in the Region. In these parks, the main types of wildlife include; elephants, buffaloes, zebras, water bucks, cheetah, leopards and the primates. In Mukurwe-ini there also exists the Wajee Nature Park that has a bird sanctuary.

CHAPTER FIVE

5.0 Conclusion

This mapping exercise noted that the three counties covered by this report (Meru, Nyeri and Tharaka Nithi Counties) are very rich in natural resources, which if well utilized could be very crucial for the benefit of not only the people living in the region but the whole country at large. Natural resources such as mountains, rivers, dams, national parks, game reserves, bird sanctuaries, shrines, forests, grasslands, bushlands, woodlands, mineral deposits, escarpments, plateau among other resources if sustainably managed can be important income generation in the counties.

However, during the mapping exercise it was observed that most of these resources are facing management challenges due to unsustainable utilization. The key environmental issues affecting these resources although it is not exhaustive include:

1. Encroachment- Cultivation along the main river banks mainly for horticulture –kales and tomatoes, pulses etc.
2. Land use changes- Migration from the upper zones has led to more area under crop cultivation and depletion of natural vegetation to give way more land for agricultural
3. Resource use conflict- -In areas where land adjudication is incomplete conflicts in resource use arise in form of grazing and charcoal burning. Water users associations are used to address water resource use conflicts.
4. Illegally cutting down of trees to meet timber demand and also grazing lands. Cutting and growing of trees in the farms mainly along farm boundaries sometimes attracts conflicts between neighbors.
5. Tree felling in the farmlands which has lead to soil erosions and changes in weather patterns.
6. Bhang cultivation in the forests.
7. Encroachment for cultivation in the Forests
8. Over Tapping of water from the rivers hence draining all water from the major Streams.
9. Unsustainable land use and farming methods leading to Soil Erosion.
10. Failure to involve local communities in decision making on issues affecting these resources.

6.0 Recommendations

While the mapping exercise has provided a detailed analysis of the available natural resources and their locations in the three counties, it is important to have an integrated approach that will enhance sustainable management of these resources. This can be achieved through public participation and formulation of policies that will provide management guidelines of these resources. All stakeholders should therefore be consulted at all levels of decision making to ensure inclusivity and ownership in the natural resource management in the three counties.

References

Imenti South District Development Plan 2008-2012: Government printers, Nairobi

Imenti North District Development Plan 2008-2012: Government printers, Nairobi

Imenti Central District Development Plan 2008-2012: Government printers, Nairobi

Kenya National bureau of Statistics 2009, *Kenya Housing and Population Census 2009*, Kenya census 2009 "Nipo natambulika. Available at

<http://www.knbs.or.ke/Census%20Results/KNBS%20Brochure.pdf>

Ministry of Agriculture, <http://www.kilimo.go.ke/>

Maara District Development Plan 2008-2012: Government printers, Nairobi

Meru South District Development Plan 2008-2012: Government printers, Nairobi

Meru District Environment Action Plan 2006; National Environment management Authority, Nairobi.

Meru South District Environment Action Plan 2006; National Environment management Authority, Nairobi.

MKEPP/IFAD, 2010-2011, <http://www.ifadkenya.org/kenlibrary/docpublic/AWP&B%202010-11.pdf>

Nyeri District Development Plan 2008-2012: Government printers, Nairobi

Oxfam GB 2009, *Urban Poverty and Vulnerability in Kenya, Background analysis for the preparation of an Oxfam GB Urban Programme focused on Nairobi*. Available at

http://www.irinnews.org/pdf/Urban_Poverty_and_Vulnerability_in_Kenya.pdf

Office of the Prime Minister, Ministry of State for Development of Northern Kenya and other arid Land strategic plan;

<http://www.northernkenya.go.ke/dmdocuments/Strategic%20Plan%20Final%20Draft%20Jan%2006%202009.pdf>

Tharaka District Development Plan 2008-2012: Government printers, Nairobi

Tharaka Districts Environment Action Plan 2006

Tigania District Development Plan 2008-2012: Government printers, Nairobi

Igembe District Development Plan 2008-2012: Government printers, Nairobi

World bank 2000/2001, *Attacking Poverty: Opportunity, Empowerment, and Security*. World development report. Available at

<http://siteresources.worldbank.org/INTPOVERTY/Resources/WDR/overview.pdf>