REPUBLIC OF KENYA
MINISTRY OF ENVIRONMENT AND MINERAL RESOURCES
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

MT ELGON DISTRICT ENVIRONMENT ACTION PLAN 2009-2013

EXECUTIVE SUMMARY

The Environmental Management and Coordination Act (EMCA) 1999 provides for the preparation of District Environment Action Plans every five years. This is the first District Environment Action Plan (DEAP) for Mt Elgon district. Preparation of this DEAP was done through a participatory process involving the civil society, private and public sectors. The document has incorporated salient issues from the divisions and it highlights priority themes and activities for the district towards attaining sustainable development. It is divided into eight chapters.

Chapter one covers the preamble that highlights provisions for environmental planning as provided for under EMCA, Environmental Acton Planning process that discusses the methodology used in preparation of the DEAP. It also stipulates objectives, scope of this DEAP and challenges for environmental management in the district. It further describes district profile, climate and physical features, population size and distribution and social economic characteristics.

Chapter two discusses the district's environment and natural resources such as soils; land and land use changes; agriculture, livestock and fisheries; water sources; forest and wildlife resources and Biodiversity conservation.

Chapter three addresses the human settlements and infrastructure. It covers human settlements and planning; human and environmental health; pollution and wastes generated from human settlements; communication networks; social economic services and infrastructure and energy supply.

Chapter four discusses industry trade and services in the district. It highlights major industrial sector that covers agro-based industries, engineering, chemical and mineral industries; trade; service sector; tourism sector; mining and quarrying.

Chapter five discusses environmental hazards and disasters. It gives a definition of hazard and disaster, the extent and trend of environment hazards and disasters. The major hazards and disasters covered include; drought floods and fire.

Chapter six covers environmental information, networking and technology. Issues discussed include status of formal and non-formal environmental education; public awareness and participation; technologies; environmental information systems and indigenous knowledge. The chapter thus highlights the need for sustainable environmental management through environmental education and information, awareness raising and enhancing public participation at all levels.

Chapter seven covers environmental governance and institutional framework. It discusses status of environmental governance and institutional arrangements, regulatory and management tools and multilateral environmental agreements. The key issue addressed is the need for strengthened collaboration among lead agencies and stakeholders in environmental management.

Chapter eight provides an implementation strategy in a matrix form for addressing key environmental issues and proposed actions highlighted in chapters two to seven. The implementation matrix is divided into issue category, problem statement, action needed, stakeholders involved and the time frame.

The respective lead agencies and stakeholders are expected to be involved at all stages in the implementation of the district environmental action plan. Secondly, they are required to monitor and evaluate environmental management indicators identified in the matrix for the annual reporting for the district state of environment report.

FOREWORD

The 1992 Earth Summit held in Rio de Janeiro came up with various recommendations, among them Agenda 21, a Global Environmental Action Plan. The theme of the Summit focused on how nations could attain sustainable development. The Government of Kenya embraced this idea by developing the first National Environment Action Plan (NEAP) in 1994.

Since independence, Kenya has continued to demonstrate her commitment to environmental management through various initiatives, among them the National Development Plans of 1974 and the National Environment Action Plan of 1994. Further, there have been a number of sectoral policies on environment in fields such as Agriculture, Livestock, Water, Energy, Food, Land, Wildlife, Forest, Industry, Trade, Arid Lands, Disaster Management and the Draft Sessional Paper No. 6 of 1999 on Environment and Development.

The Environmental Management and Coordination Act (EMCA, 1999) provides for the integration of environmental concerns in national policies, plans, programmes and projects. In this regard, EMCA 1999 provides for the formulation of National, Provincial and District Environment Action Plans every five years.

Environmental Action Planning is a tool that aims at integrating environmental concerns into development planning. The process followed in preparing this DEAP was participatory, involving various stakeholders from institutions and sectors, including the public, private, NGOs and local communities at District and Provincial levels. These consultative meetings provided the basis also for formulation of the PEAP and finally the National Environment Action Plan.

The DEAP addresses environmental issues from various sectors in an integrated manner and discusses their significance in development planning. It proposes a strategy for achieving sustainable development in line with Kenya's quest to meet the Millennium Development Goals (MDGs) Vision 2030 and Medium Term Plan (MTP). The Plan has brought out a number of proposed interventions, legal and institutional framework to be incorporated into sectoral development plans and programmes. Its implementation will be monitored by the DEC and will be reflected in the State of the Environment Reports.

The preparation of the DEAPs for Nyanza Province owes much to the technical and financial assistance provided by the European Commission under the Community Development for

Environment Management Programme. This support, which included innovative community and civil society consultations, facilitation of DEC meetings, as well as final publication costs, is gratefully acknowledged. I also commend the assistance provided by UNDP under the Poverty Environment for supporting the development of the EAP Manual which was used for the preparation of this DEAP.

I wish to underscore the importance of this document as a broad-based strategy it will enable the District attain sustainable development as envisaged in the Vision 2030.

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ACKNOWLEDGEMENT

On behalf of the National Environment Management Authority (NEMA), I would like to thank the District Commissioner, who is also the Chairman of the District Environment Committee (DEC) for spearheading the preparation process for this District Environment Action Plan (2009-2013). I also wish to thank most sincerely the District Environment Committee and the District Environmental Action Plan Technical Committee members for their invaluable inputs and approval of this environmental action plan.

NEMA also sincerely thanks the Provincial Administration through the District Officers (DOs), Chiefs and Assistant Chiefs who were instrumental in mobilizing the local communities and civil society organizations during data collection sessions. Special thanks go to the civil society organizations that were drawn from the entire district who were instrumental in the identification of the environmental issues across the district.

Last but not least, I extend my gratitude to all those who contributed towards the finalization of this District Environmental Action Plan for Mt Elgon district. Implementation of the activities identified in this document will see the district attain sustainable development.

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ACRONYMS

AEZ:	Agro-ecological zones
CBOs	Community Based Organizations
CEA:	Cumulative Environmental Audit
DAO	District Agricultural Officer
DC	District Commissioner
DEAPs	District Environment Action Plans
DEC	District Environment Committee
DEOs	District Environment Officers
DIDC:	District Information Documentation Centre
DFO	District Forest Officer
DWO -	District Water Officer
EA	Environmental Audit
EIA	Environment Impact Assessment
EMCA	Environmental Management Coordination Act
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
IBA	Important Bird Area
ICIPE	International Centre of Insect Physiology and Ecology
IBA	Important Bird Area
ICIPE	International Centre of Insect Physiology and Ecology
KAMADEP:	Kazi Mashambani Development Programme
KWS:	Kenya Wildlife Services
NEAP:	National Environmental Action Plan
NEMA:	National Environment Management Authority
NGOs:	Non- Governmental Organizations
NP:	Non Point Source of Pollution
PEAPs:	Provincial Environment Action Plans
PRSP	Poverty Reduction Strategy Paper
PS:	Point source of Pollution
SOE:	State of Environment
TFR	Total Fertility Rate
UNCED	United Nations Conference on Environmental and Development

CHAPTER ONE

1.0 INTRODUCTION

1.1 Preamble

The United Nations Conference on Environment and Development (UNCED) commonly known as the Earth Summit held in Rio de Janeiro in 1992 aimed at improving the global environment, while ensuring that economic and social concerns are integrated into development planning. The Conference underscored the need to plan for sustainable socio-economic development by integrating environmental concerns into development through adopting and preparing appropriate policies, plans, programmes and projects. The Conference agreed on the guiding principles and a global plan of action *(Global Environmental Action Plan)* for sustainable development commonly called Agenda 21.

Sustainable development is commonly defined as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs". Development is also said to be sustainable if it meets ecological, economic and equity needs. The process of attaining sustainable development calls for the integration of environmental considerations at all levels of decision making in development planning and implementation of programmes and projects. The theme of the Summit was on how nations could attain the sustainable development objective. The Government of Kenya embraced this noble idea when it developed the first National Environment Action Plan (NEAP) in 1994.

The country also prepared the National Development Plan (1994-97) that ensured that there was not only a chapter on Environment and Natural Resources but also that environmental concerns were integrated in all the chapters of the Development Plan. Environmental planning is thereafter well anchored in EMCA, 1999, which provides for the integration of environmental concerns into national policies, plans, programmes and projects. In this regard, EMCA provides for the formulation of National, Provincial and District Environment Action Plans every five years.

1.2 EMCA, 1999 provision on environmental planning

The Act requires that every District Environment Committee (DEC) shall every five years prepare a District Environment Action Plan in respect of the district for which it is appointed and shall submit such plan to the chairman of the Provincial Environment Action Plan

Committee for incorporation into the Provincial Environment Action Plan as provided for under Section 39 of EMCA, 1999.

1.3 Environmental action planning process

i) DEAP Methodology

District environmental action planning began with the capacity building of the DEAP Secretariat comprising of District Water Officer, District Development Officer (DDO) and District Environment Officer (DEO) on DEAP methodology/ manual. Subsequently, the District Environment Committee gazetted in 2003 constituted the District Environment Action Planning Committee comprising lead agencies and representatives from other stakeholders, chaired by the DDO and the DEO as the Secretary. Once the DEAP draft was ready it was tabled before the DEC who approved it for submission to the Provincial Environment Committee for inclusion in the Provincial Environment Action Plan (PEAP).

ii) Objectives of District Environment Action Plans

Objectives of District Environment Action Planning are to:

- Determine major environmental issues and challenges facing the district
- Identify environmental management opportunities
- Create synergy and harmony in environmental planning
- Integrate environmental concerns into social, economic planning and development of the district
- Formulate appropriate environmental management strategies specific to the district

1.4. Scope

Mt. Elgon District Environment Action Plan (2009-2013) is aligned to Vision 2030 and Medium Term Plan (2008-2012). It is due for revision after every five years as provided for by EMCA, 1999. The DEAP has been subjected to stakeholder meetings at district level and will be used in monitoring the district's annual State of Environment reports for a period of five years i.e. 2009-2013. Environmental indicators in the implementation matrix will be monitored by the respective lead agencies on an annual basis and incorporated into the annual State of Environment reporting.

1.5 District profile

1.5.1 Geographical Location and Size

Mt. Elgon is one of the eight districts in Western province. It borders the Republic of Uganda to the North and West, Trans Nzoia district to the East, and Bungoma District to the South. It lies between latitude 0º48' and 1^0 30'N, and longitudes 34^0 22' and 35^0 10' East.

The district has a total land area of 934.74 square kilometers, of which 508.66 square kilometers is gazetted forest. Only 334.7 square kilometers is arable and available for agriculture and settlements. Altitude ranges from 1800-4320metres above sea level, influenced by Mt. Elgon, the defining topographical feature.

1.5.2 Administrative Boundaries

The district is divided into four divisions, namely Kapsokwony, Cheptais, Kopsiro and Kaptama. It has 16 locations and 40 sub-locations. Politically, the district has one constituency- Mt. Elgon constituency. Similarly, Mt. Elgon County council is the only local authority with a total of 18 wards.

Table 1.1 below shows the area and administrative boundaries of the District together with area under forest.

Table 1: Area and Administrative Boundaries

Division	Area (km2)	Forested area (km2)
Kapsokwony	255.66	198.99
Kaptama	209.95	142.81
Kopsiro	248.78	143.34
Cheptais	222.36	160.04
Total	**936.75**	**649.04**

Source: Mt. Elgon District Development Plan 1997-2001. Pg 4

1.5.3 Climate and Physical Features

Topography

The main land formation which defines the district's topography is Mt. Elgon which slopes gently through areas around the southern and central parts and rising abruptly in an undulating characteristics to form cliffs which rise up to 70 meters in height and are dissected by deep river gorges with frequent water falls. The terrain rises from 1800m above sea level in the south to about 4310m in the North.

Mt. Elgon is the oldest of the East African Volcanoes that originated 20 million years ago. Almost assuming a dome shape, its altitude on the Kenyan side, ranges between 1000m and 4,187m above sea level. The series of volcanic eruptions and subsequent weathering processes that followed over a long period of time created a general landscape appearance of both gentle and steep slopes. Steep valleys and gorges through which rivers flow, characterizes the mountain.

At the top of the summit is an 8km wide caldera, which is a flat-bottomed depression formed as a result of past volcanic activities. Other unique landforms include spurs, caves and valleys that give Mt. Elgon its scenic value.

Climate

The district receives a bi-modal type of rainfall, with long rains between March and June, and short rains from September to November. The mean annual precipitation ranges from 1400mm to 1800mm.

Temperatures are generally influenced by altitude whereby the very high peak areas display very cold conditions, while the lower altitude zones at the base of the mountain are relatively warmer. The temperatures vary between 14 ^{0}C and 24 ^{0}C.

Hydrology

The high rainfall received in the area give rise to permanent rivers and streams. The rivers exhibit a radial drainage system, with most rivers originating from the mountain peaks. They provide for the livelihoods of people within and without the district. Their distribution is generally even and traverses the mountain slope, which makes them fast moving.

The district is a major catchment for L. Victoria and Turkana with its many tributaries draining into the major rivers that lead to these main water bodies. Rivers include: Kamukuywa, Sosio, Kimilili, Kibisi, Kuywa, Malakisi, Sit and Lwakhakha. The Lwakhakha River, which flow southwards, marks the international boundary between Kenya and Uganda.

Soils

The soil types mainly found in Mt. Elgon are mainly of two types: Nithosols and Andosols. Nithosols are well-developed soils due to sufficient weathering and are reddish-brown to dark brown in colour. Andosols are ashy soils with high organic matter with a mixture of black top soils, clay and loam, which were mainly derived from volcanic matter from the mountain.

Soils of the caldera are generally moist shallow and dark loams. On the steep slopes of the moorland, shallow soils are found but with deep humus, reddish-brown and clay loams formed on the more gentle slopes. Soils on the Afro-montane forest zone are shallow loams on the mountain crests but deep red loams on the gentle sloping areas. On the lower slopes to the southern section of the mountain are shallow to moderately deep, brown clay loams covering the volcanic rocks.

Population Size and Distribution

During the 1999, population and housing census, Mt Elgon District had a population of 135, 033 people with a density of 158 persons per square kilometer. At a growth rate of 2.3% per annum, the population was projected to increase to 144,679 in 2002 and to 166,088 in the year 2008. The population profile of the district is predominantly rural where over 90% of the population lives.

The population is now estimated to be 159,596 persons with a density of 169 persons per square kilometer. The table 1.2 below gives population figures and density per division.

Table 2: Population Size and Density

DIVISION	**YEARS**					
	1989		**1999**		**2005(ESTIMATED)**	
	NO.	**DENSITY**	**NO.**	**DENSITY**	**NO.**	**DENSITY**
KAPTAMA	20,067	96	27,635	132	28,276	134
KAPSOKWONY	19,092	75	26,292	101	29,028	113
KOPSIRO	36,421	146	50,156	202	54,940	220
CHEPTAIS	32,125	144	44,240	199	47,348	212
TOTAL	**107,705**	**115**	**148,323**	**158**	**159,596**	**169**

Source: KNBS 2008, based on 1999 census

The impacts of population dynamics and trends in the District on the environment and natural resources are manifested in:

- Increasing demand for more land for subsistence to feed the growing number of people. This pressure for more land leads to encroachment on the forest reserve.
- Demand for land as population increases has led to cultivation in ecologically fragile areas like steep slopes, swamps, and riverbanks.
- Increasing cases of conflict over land and other natural resources
- Sub-division of land into small uneconomical units
- Deforestation to clear land for agriculture outside protected areas.

Social, Cultural and Economic Characteristics

The district is inhabited by three main ethnic groups i.e. Sabaots, Luyhas (mainly Bukusu), and Tesos. Of these, the Sabaots are the majority. Poverty is one of the greatest challenges facing the District. It is the major underlying driver of environmental degradation. In turn environmental degradation, further fuels incidences of poverty and limits the capacity of the people to escape from the ravages of poverty. Poverty in the District is defined in terms of access to productive resources, educational opportunities, health facilities, water and sanitation services, and opportunities for economic growth. On average, it is estimated that approximately 56% of the district's population live below the poverty line[1].

The District's PRSP consultative process in 2001 identified the following as among the main causes of poverty: landlessness, poor rural infrastructure, environmental degradation, poor farming methods, gender bias in resource allocation, and unequal distribution of resources.

[1] Poverty line is as per the World Bank definition of a Dollar a day

CHAPTER TWO

2.0 ENVIRONMENT AND NATURAL RESOURCES

2.1 Soils and land use

Land is the basic natural resource in the district, which supports livelihoods. Since the district is predominantly agricultural both for subsistence and commercial purposes, land issues are of paramount importance.

The centrality of land in the livelihoods systems in the district has several implications:

- As population increases, land has come under intense pressure, and the state of soils is an indicator of environmental degradation. Over-exploitation of land resources is increasing in severity.
- Efforts to address poverty in the district must place sustainable land management as a key issue.
- Land is a source of local conflicts from competing land users and interests

Land use intensification is proceeding rapidly due to population pressure and economic and technological changes. This development often leads to degradation of soils and vegetation, and over utilization of resources.

Soils

The soil types mainly found in Mt. Elgon are Nithosols and Andosols. Nithosols are well-developed soils due to sufficient weathering and are of reddish-brown to dark brown in colour. Andosols are ashy soils with high organic matter with a mixture of black top soils, clay and loam, which were mainly derived from volcanic matter from the mountain.

Soils of the caldera are generally moist shallow and dark loams. On the steep slopes of the moorland, shallow soils are found but with deep humus, reddish-brown and clay loams formed on the more gentle slopes. Soils on the Afro-montane forest zone are shallow loams on the mountain crests but deep red loams on the gentle sloping areas. On the lower slopes to the southern section of the mountain are shallow to moderately deep, brown clay loams covering the volcanic rocks.

Land and Land Use Changes

The major land uses in the district are conservation, settlements, and agriculture. The district is predominantly rural with little industrial activities.

Land is a scarce resource in the district, and there must be a proper balance in its use for agricultural and non-agricultural purposes. To meet the food and income needs of a rising population sustainably, land and related resources must be used judiciously. The soil must also be properly conserved with a view to preventing degradation and maintain productivity.

Table 3: Major Categories of Land Use

Statistic	Area
Total area	936.75km2
Arable land	290.69km2
Non-arable land	646.06km2
Gazetted forest	50866ha
National Reserve	17,200ha
Urban area	24km2

Source: *District Development Plan 2002-2008*

Ecological Zones

There are four main agro-ecological zones: the Upper Highlands (UH), the Upper Midland (UM), the Lower Midland (LM) and the Tropical Alpine (TA) zones. These are further subdivided into minor agro-ecological sub-zones as shown in Table 4.2.

Table 4: Ecological Zones

Ecological zone	Sub-ecolocal zones and land use	Location
Upper Highland (UH)	UH1: Suitable for sheep and dairy production UH0: Forest zone	These zones are found on the central and south-eastern parts of the district
Upper midland (UM)	UMI: The coffee and tea zone UMII: Marginal coffee zone	These zones are found in Cheptais and Kapsokwony divisions respectively. This zone is characterized by long cropping season. Other activities include maize, livestock and horticulture in the UMI zone
Lower Midland (LM)	LMI: The tea and Dairy zone LMII: The wheat, maize and pyrethrum zone.	These zones are found in parts of Kopsiro, Cheptais, and Kaptama divisions.
Tropical Alpine (TA)	TAI: The sheep and cattle zone TAII: The sheep zone	These zones are found on the peak of Mt. Elgon and falls within the 4 divisions.

Soil / Land Degradation

The main processes through which soil is degraded in the district are: Soil erosion, Overgrazing, Excessive use of agro-chemicals, forest fires, and over cultivation without adequate fallow periods to allow for regeneration.

Table 5: Extent and distribution of soil degradation

Category of destructive activity	Magnitude	Location	Remarks
Gully erosion	80 Km	District wide	Mainly formed on foot paths by cattle going to graze in the forest
Sheet/rill erosion	9500 ha	District wide	On non conserved farms
Land slide	Trace	Kopsiro Division	Occurs on small scale during very wet season around Maseak market along Terem river
Forest fires	Sporadic	In Forest reserve	Occurs occasionally during very dry periods
Overgrazing	Trace	District wide	Particularly in the lower parts of Cheptais

Source: *Ministry of Agriculture, Kapsokwony*

Land Use Challenges

Increasing ecological destruction and changes in land use around Mt. Elgon are exerting tremendous pressure on the mountain ecosystem, placing millions of livelihoods within the district and beyond at risk. Major threats include:

- Deforestation to create room for settlements, agriculture, and meet wood fuel and timber needs;
- Encroachment on protected areas and ecologically fragile areas e.g. steep slopes, river banks, and wetlands as per capita land sizes shrink due to population growth;
- Land use changes which are fueling resource use conflicts e.g. human-wildlife conflicts; and degradation;
- Land degradation from intensive use without safeguards, soil erosion, and over-grazing;
- Poverty which limits people's option in investing in sustainable land management practices

To meet the needs of a growing population of the district while significantly reducing ecological impact of human activities on the mountain ecosystem implies a number of formidable challenges, among them:

- Increase food production without further conversion of critical habitats and excessive use of chemical fertilizers;

- Provide energy and other timber products without continued degradation of the forest cover
- Address resource based conflicts and reconcile competing land uses
- Protection of prime and potential agricultural land against degradation
- Continuous review of land use practices
- Adoption of conservation practices such as contour operations and minimum tillage to minimize loss of top soil;
- Careful and continuous monitoring of the use and application of fertilizers and pesticides in agriculture;
- Promotion of organic farming and agro -forestry;

Priority Issues and Intervention

Table 6: Priority Issues and Interventions

Prioritized Issues/Challenges	**Current Interventions**	**Proposed Interventions (2008-2013)**	**Responsible Institution**
Maintaining the productivity of soils for agricultural production	1. Control and manage soil erosion 2. Control and manage Overgrazing	1.Intensify public education on soil conservation 2. Judicious use of fertilizers 3.Control overgrazing	1. Ministry of agriculture 2. Ministry of livestock and Fisheries department.

2.2 Water resources

2.2.1 Water Sources

The mountain is a source of clean water for the District and beyond. Numerous streams and rivers emanate from the mountain and form the biggest source of water in the District.

Sources of water include: Ponds, Dams-only one dam which is currently heavily silted, Streams/rivers, springs, Wells, Borehole, Piped schemes, Rain water, and Rock catchments which could be tapped with appropriate technology.

Table 7: water access by source

Source	Households	Percentage
Pond	170	0.67
Dam	9	0.19
Lake	49	35.26
Stream/ river	9,001	30.21
Spring	7,713	2.83
Well	722	1.74
Borehole	443	28.83
Piped	7,359	0.25
Jabias/tanks	63	
Total	**25,529**	**100.00**

Source: *1999 population and housing Census, VOLI*

Rivers

Mt. Elgon is a major catchment for rivers in western Kenya, which feed into L.Victoria. The major rivers are Kamukuywa, Sosio, Kimilili, Kibisi, Kuywa (Terem) Malakisi, Sit, Lwakhakha, Kamoson, Kisawai, Suam, Turkwel, and tributaries feeding into river Nzoia.There are twelve (12) permanent rivers with annual discharge varying from 0.014 to 0.974 cumecs.

Other Water Sources

Other sources of water include underground water. The District has a lot of potential for underground water. Underground water has not been fully exploited due to higher costs involved and abundance of surface water sources in the District. Rock catchment is another unexploited water resource.

Drainage

The district is well drained due to the mountainous topography. The drainage pattern is radial to parallel on the upper and mid-slopes respectively. Flooding is not common and limited to the lower parts of the District at the boundaries with Bungoma and Teso districts.

However, drainage infrastructure is poor. Storm water flows freely carrying with it massive soils downstream. Water erosion is the major form of erosion in the district. The district lies in the Lake Victoria North drainage basin.

Main Uses of Water
Water is used for various purposes:

- Industrial use: Coffee factories are located along the rivers and use water for pulping and washing of coffee berries. Coffee factories are also the biggest polluters of rivers on the district.
- Limited Irrigation takes place along rivers to irrigate small gardens for horticultural crops such as tomatoes, onions, Sukuma Wiki (Kale).
- Tourism and recreation. There is potential for trout fishing
- Domestic use
- Spiritual and cultural use

Impacts of Human Activities on Water Resources
Environmental degradation from human activities is affecting water sources especially rivers. The volume and water quality has been decreasing over the years.

Degradation of Rivers
Causes include:

1. Deforestation of watersheds or water catchments through illegal logging and riverbank cultivation.
2. Population pressure has led to encroachment on forest, especially in the once expensive indigenous forests in Chepyuk, Chepkitale and Cheptoror.
3. Demand for fuel wood and timber has exacerbated charcoal burning and illegal logging-destroying water catchment areas.
4. Unsustainable Agricultural practices.

Water Pollution
Coffee factories are the main source of industrial pollution of rivers. They discharge raw waste into rivers and most of them have no waste management systems. Due to low toilet coverage, human waste pollution of water sources is the main cause of diarrheal diseases.

Water pollution can also be traced at watering points from livestock's discharge of urine and faecal waste into the river. Other sources of pollution include bathing and washing in rivers. Car wash activities though limited due to low vehicle ownership in the district, do take place.

Application of excessive chemical fertilizer and other agro-chemicals, has also contributed to water pollution. These chemicals are washed into the river during and after heavy downpours. This is dangerous to human and animal health, as rivers are major source of domestic water supply.

Sustainable Water Management Challenges

- River bank conservation measures and enforcement of laws and regulations
- Addressing pollution-dumping toxic substances in rivers-especially from
- Coffee factories
- Catchment protection and afforestation programmes.
- Sustainable agricultural practices
- Sustainable water use-minimizing water use, improving the efficiency of water use.
- Promote rainwater harvesting.

Quality of river water

Due to high rainfall and intensive cultivation of the undulating landscape, and deforestation, erosion and siltation occurs during the rainy seasons. The water is therefore quite turbid during the rain season but becomes cleaner during the dry season. The following parameters relate to water quality in the district:

- PH: Varying form 6.8 to 8.3 for all of the rivers.
- TDS: Vary with seasons but are usually higher than the recommended WHO of less than 1,000 Mg/l during rain season.
- TURBIDITY: All the rivers have turbid water of more than 60NTU.
- COLOUR: All these rivers have water that is highly coloured to tunes of more than 200 mg Pt/L.
- FAECAL COLIFORMS: They all have a high number of faecal coliforms of more than 100/100m/s.
- TOTAL COLIFORMS: All Rivers have waters of high counts of more than 200/100m/s.
- HARDNESS: All Rivers have water that is not hard.

Droughts/Floods

Droughts have been experienced but not severe. Floods have not been experienced. No human life was lost attributed to floods and drought.

Catchment Degradation

The forest resources have been depleted due to rapid increase in population and demand for human settlements, agricultural activities, grazing and sourcing of agricultural materials, fuel wood and herbal medicines. Soil erosion or other forms of land degradation have serious implications for food security and availability of clean water.

The removal of vegetation cover and intensified land use on the slopes of Mt. Elgon have led to increased surface run off during heavy storms, causing erosion and pollution of surface water.

Water abstractions upstream are not yet significant to affect volumes and flow downstream.

Priority Issues

Table 8: Priority Issues and Interventions

No.	Prioritized Issues/ Challenges	Current Interventions	Proposed Interventions (2006-2010)	Responsible Institution
1	Increase availability of sufficient wholesome water for domestic and other economic activities	Formation of water resources users' associations to manage water resources	1. Delineating water catchment areas 2. Gazettement of water catchment areas	Water Resources Management Authority
2	Effective operation and maintenance of water supplies/facilities to make them more reliable in providing clean portable water for domestic usage and other purposes	Formation of Water Services Regulatory Boards and water Services Boards	Encouraging privatization of water services and handing over GoK schemes to other water supply operators	Lake Victoria North Water Service Board
3	Catchment protection	Afforestation programmes	1. Afforestation and public education programmes 2. Formation of watershed committees to oversee proper management of riverine areas	1. KFS 2. Water Resources Management Authority

Table 6.2: contd.

No.	Prioritized Issues/ Challenges	Current Interventions	Proposed Interventions (2006-2010)	Responsible Institution
4	Riverine conservation	1. Public awareness campaigns 2. Enforcing the Agriculture and Water Act.	1. Involving CBOs in management of riverine ecosystems.	1. Ministry of Agriculture 2. Water Resources Management Authority 3. NEMA
5	Limit industrial pollution from coffee factories	1. Environmental audits	1. Environmental audits 2. Promotion of cleaner production 3. Enforcement of waste and water quality regulations 2006	1. NEMA
6.	Monitoring of water quality		Continuous assessment and monitoring of water quality and levels of rivers/streams within the ecosystem.	WRMA
7.	Catchment management strategies for river basins	1. Rehabilitation of destroyed catchment areas 2. Identification of gaps and development terms of reference for primary data on catchment conditions 3. Collection and assessment of secondary data. 4. Protection of catchment areas through inter-sectoral approach	1. Identification and mapping of water resource conservation areas. 2. gazettement of water catchment areas(Ground water and Surface water)	WRMA NEMA
8.	Water resources and catchment monitoring	1. Monitoring water quality and pollution control on water resource bodies. 2. Water quality analysis/assessment 3. Rehabilitation of high priority stations (RGS) rainfall stations.	1. Determining water balances in the sub catchment area. 2. Determining pollutant transport into water resource bodies. 3. Flood forecasting/mitigation models. 5. Modernize high priority stations. 6. Establishment of GIS (Geographical Information System) for monitoring stations.	WRMA
9.	Protection of water catchment areas	1. Formation of sub-catchment area management units (catchment areas advisory committees) 2. formation of community based river basins management units on use of WRUA(water resource users associations).	1. Implement preventive measures on water resources (G/W and S/W through: 2. Sub catchment WRM strategies 3. EA and EMP for preventive WRM measures in the sub catchment area.	WRMA

2.3 Biodiversity

2.3.1 Forestry and Wildlife

Forestry
Approximately 69% of the District is under forest cover, with only 31% under human settlements. The human settlements are concentrated in the lower parts of the district.

Diverse vegetation types are found within the District. They comprise of indigenous trees, bamboo, moorland, exotic plantations, shrubs, grasslands, herbs, heathers, lianas, moss, lichens and other forms of vegetation.

The total forest area is approximately 50,866.3ha. This includes Chepkitale National Reserve 17,200ha and an area approximately 3000ha under plantation, while the rest is natural forest, bamboo and moorland.

Table 9: Forest Types

Type	Coverage (ha)
High forest	26,638.7
Bush land	8,701.6
Bamboo	11,479.8
Grassland	4,046.90
Total	**50,866.3**

Source: *FD, Annual Report, 2004.*

Vegetation Types
Mt. Elgon is the single most important feature that influences vegetation types in the District. The vegetation descends from the caldera, moorland and heath land area, to the afro-alpine forest, down to the afro-montane forest compost of indigenous forests, bamboo, scattered bush land and grassland. Plantation forests, mixed open woodland, grasslands and glades, dominate the lower fringes of the mountain.

Mt. Elgon displays the characteristic sequence of altitudinal belts generally found on tropical high mountains.[2] These are:

- The Agricultural zone, extending up to 2800m in some places
- The forest zone: approximately between 2000-3500m, containing areas of indigenous forest and areas of forest plantations, merging into the Bamboo and Hagenia-Hyperricum zones with increasing altitude

These are composed of productive and protective forests. The productive forest is dominantly of exotic plantations i.e. Pine spp, Cypress spp, and the Eucalyptus spp.

The protective forest is predominantly characterized by indigenous species of considerable economic value.

- Bamboo forest (3500-4000m): A zone characterized by pure stands of mountain Bamboo *Arundinaria alpina:* also covers areas along the river valleys mixed with other indigenous species. Other species in this area are *Juniperus procera* and *Podocarpus* species
- Hagenia-hypericum zone: Also known as the Rosewood zone, which is a high altitude rain forest between approximately 2850-3000m.
- Heath Zone: also known as Ericaceous zone, displays a unique environment with giant heather and grass moorlands (3000-3300m)
- The Afro-Alpine zone (3300-4350m): is the home of many unique high altitude plants such as protea, helichyrsums, ostrih plum lobelia, the giant lobelia, Senecious, and fields of tussock grass which is the main cover of afro-alpine zone.
- The Nival Zone (above 4350m) on top of the mountain. It is the zone of rock, snow, and ice. Few plants survive, mainly in sheltered situations.

Natural Forest Cover

The natural forest constitutes the largest proportion of the area of vegetation cover in the ecosystem. The dominant indigenous species include: *Prunus africana, Aningeria adolfi-friedericii, Olea capensis, Cordial abyssinica, Podocarpus falcatus, Trichillia species, Croton macrostachyus, Podocarpus gracilior, Juniperus procera, Hagenia abyssinica, Ekibergia rurepelliaro, Olea africana, Vitex keniensis, Polycius kikuyensis, African volkensis, Vernoma jagalis, Trichillia volkensi, Cussonia spicata, Croton megalocarpus etc.*

Plantation Forest

[2] Vertical changes in temperatures and both vertical and horizontal changes in precipitation result in the formation of many vegetation zones and belts.

Exotic plantations constitute 20% of the total forest cover in the District. The main plantation stands are composed of exotic softwood trees that are fast growing namely *Pinus patula, Pinus radiata and Eucalyptus saligna*. There are a few stands of hardwood plantation of mixed species such as *Olea capensis, Vitex keniensis, Podo facaltus,* and *Juniperus procera*. The few plantations of hardwood do not constitute a significant proportion of the plantation area.

The exotic plantations face a number of challenges:

- Insufficient financial resources and manpower have led to the decline of silvicultural practices and maintenance which contribute to sustained healthy stands- pruning, cleaning, thinning etc.
- Prolonged attacks of diseases and pests, particularly the cypress aphids
- Increased incidences of fire outbreaks both in frequency and intensity, as more undergrowth dominates the under surface
- Inconsistency in exploitation has adversely affected age class distribution and the growing stock. This has been due to lack of long-term felling plans. And inconsistent planting regimes.

Forest resources utilization

- Wood products (timber and poles) especially from Elgon Teak, *Cordia abbysinica, Albizzia coriara, Podocarpus spp, Hagenia abbyssinica, Juniperus procera,* cypress, pines, eucalyptus.
- Medicinal plants e.g P*runus africana, Spathodea campanulata, Warbugia ugandensis, Albizzia coriara and Teclea nobilis*.
- Several species of grass are used for thatching e.g. *hyparrhenia spp.*
- Grazing for both livestock and wild animals
- Food in form of wild fruits, vegetables, edible roots and tubers
- Fuel wood, honey, fibers (bamboo)
- Ecological use: water catchment for L. Victoria and Turkana, water to neighboring communities, habitat for unique flora and fauna etc
- Eco-tourism (not developed)
- Research and education
- Socio-cultural uses

Priority Issues

Table 10: Priority Issues and Interventions

No.	Prioritized Issues/Challenges	Current Interventions	Proposed Interventions (2008-2013)	Responsible Institution
1.	Watershed management	1. Rehabilitation of degraded catchment areas by planting indigenous trees	1. Promotion of community participation in watershed management	KFS WRMA NTZ
2.	Rehabilitation of degraded sites	1. raising of indigenous tree seedlings 2. Discouraging cultivation and other activities that inhibit regeneration in the areas earmarked for rehabilitation. 3. Involving communities in rehabilitation activities.	1. Conduct research on the regeneration capacity of the various indigenous species. 2. Identify and protect sites of endemic and threatened species. 3. Rehabilitate degraded areas through enrichment planting, natural regeneration and re-introduction.	KFS KEFRI
3.	Sustainable utilization of forest resources	1. Confining utilization to the lower areas adjoining farmlands. 2. Regulation and control of forest products for subsistence use through licensing. 3. Encouraging local communities to plant indigenous trees and woodlots for firewood, fodder, and other wood requirements.	1. forest resource assessment 2. Increase patrols to curb illegal removal of forest products. 3. Encourage forest adjacent communities to develop forest based income-generating activities. 4. Promote efficient utilization of forest products. 5. promote research and education 6. preparation of management plans	KFS KWS KEFRI MOA Community
4.	Protecting endangered and endemic plant species.		1. Document all endemic, rare and threatened plant species and identify specific habitats for protection. 2. Encourage planting of threatened indigenous tree species in the forest and farmlands. 3. Institute monitoring programmes on species population and other dynamics.	KEFRI KFS KWS NMK Community
5.	Fire management	1. Maintaining firebreaks within plantation and natural forest areas. 2. Personnel training on fire suppression and conducting drills 3. Increased surveillance through setting up of fire stations 4. Encouraging the adjacent neighborhood to keep their common boundaries with the forest.	1. Prepare fire and patrol management plans for the forest reserve. 2. Undertake cleaning and clearing of the entire external boundaries.	KFS KWS
6.	Boundary marking and alignment	1. Solving the settlement/boundary dispute in Chebwek and Chebyuk.	1. Intensify patrols along the forest boundary. 2. boundary surveys and marking	KFS

Table .2: Continued.

No.	Prioritized Issues/Challenges	Current Interventions	Proposed Interventions (2008-2013)	Responsible Institution
7.	Supply of adequate exotic and indigenous tree seedlings	Target to raise: 22,000 various indigenous tree seedlings 30,000 eucalyptus tree seedlings 10,000 cypress tree seedlings 10,000 Grevillia tree seedlings	Annual targets: 24,000 exotic tree species 8,000 indigenous tree species	Nyayo Tea Zones Development Corporation (NTZDC) Note: consolidate with KFS activities
8.	Increase exotic and indigenous tree stocks	Target to plant: a total of 14ha along river banks and at water catchment points with indigeneous tree species. 25ha of fuelwood on hill tops and rocky terrain 6ha boundary marking along tea estate farms to minimize effect of wind on tea.	Annual targets: 5ha under indigenous tree cover 15ha under exotic tree cover	NTZDC Note: consolidate with KFS activities
9.	Protect young transplanted tree seedlings from destruction by local herders.	Intensified patrols in collaboration with forest guards Detain livestock and effect fines on livestock owners	Engage forest adjacent communities in joint tree planting and conservation activities.	NTZDC NOTE: consolidate with patrols
10.	Enhance tea buffer belt around indigenous and plantation forests	Raise 322,000 tea seedlings Infill and consolidate 12ha of tea belt.	Annual targets: Raise 133,000 tea seedlings Increase tea buffer belt by 14ha.	NTZDC
11.	Boundary encroachment	Frequent patrols by the forest guards	Boundary marking and realignment Placement of beacons Boundary planting Community sensitization	KFS Note: boundary marking bullet
14.	Poor infrastructure	Improve infrastructure e.g roads, buildings, communication, transport facilities etc.	Improve infrastructure e.g road, buildings, communication etc. Provide enough VHF radios for patrol purposes	KFS Note: this has been reconstructed
15.	Lack of adequate transport facilities	Transport hire	Headquarters to provide tractor, lorry and vehicle plus motorbikes for extension services	KFS Note: delete
16.	Lack of enough water supply	Old hydrodrum used in Kaberwa Flow by gravity used in kaboiywo Rain water used in Cheptais	Rehabilitate water supply system in Cheptais and kaboywo stations Maintain hydrum in Kaberwa	KFS Note: Delete
17.	Management plan 2002-07	The 2002-2007 Management currently in use	Promote income generating activities Revise the 2002-2007 plan Develop and pilot a participatory management plan Train community	KFS Note: delete-it's a resource utilization tool
18.	Promote forest extension	Encourage agro/commercial forestry through forest extension services	Promote tree nursery production Promote fast growing agro-forestry tree species, riverbank protection, and commercial woodlots.	KFS

Wildlife

Different animal species are found in a variety of places such as on trees, rocks, rivers, swamps, caves, and other microhabitats situated in Mt. Elgon Forest reserve and Chepkitale National Game reserve. Most of the wildlife is found in the protected areas. Outside the protected areas where human activities have destroyed wildlife habitat, wildlife is minimal and mostly birds. They are comprised of mammals, birds, reptiles, insects, amphibians and mollusks. Of major importance, however, is the mammalian and bird life.

No comprehensive description of the forest fauna has been undertaken of yet. The district serves as a dispersal area for wildlife from Mt. Elgon National Park in Trans Nzoia District. Poaching on the Ugandan side of the mountain makes most wildlife to migrate the Kenyan side sometimes beyond carrying capacity. This is aggravated by the fact that the dispersal area has been reducing over the years due to human settlements and farming activities.

Mammalian Species

These include elephant (Loxodonta africana), buffalo, Defaser waterbuck, Bushbuck, Giant forest hog, Red duicker, impala and various rodent species. Table shows mammals found in the Mt. Elgon ecosystem, with their English, Sabaot and Bukusu names.

Elephant, Impala, Buffalo, Olive baboon, Blue monkey, Black and white colobus monkey, Debrazza monkey, Red duiker, Leopard, Spotted hyena, Rock hydrax, Deffasser waterbuck, Bushbuck, Oribi, Giant forest hog, Porcupine, Squirrel, Hare, Civet cat, Rat and Bush pig.

Original inventories and oral accounts show that the Mt. Elgon ecosystem was inhabited by about 30 mammalian species, but as of now, only 20 can be check listed. The remaining 20 species have disappeared from this habitat. Commonly seen are elephants, buffaloes, red duiker, Oribi, Giant forest hog, waterbuck, Bushbuck, and various rodent species. Among the carnivores are the leopard, spotted hyena, wildcat, and civet.

Different mammalian species inhabit different vegetation zones, or habitats. There are three main categories of the Mt. Elgon forest as they relate to wildlife habitation which include montane forest, bamboo zone, and open moorland.

The montane forest (2000-3500m) is comprised of tall trees of various species, bushes, and climbers. It is the area where most rivers originate. Caves that provide natural salt licks are found in this zone. Among the mammals found in this region are buffaloes, cave elephants, black and white colobus monkeys, and the antelopes. The area offers abundant resources required by these mammals such as water, forage, and natural salt licks.

The bamboo zone (3500-4000m) is frequented by red duiker and a few varieties of birds like francolins. Seed trees thrive here, hence plenty of food for the birds. Leopards can also be found in this area.

The moorland area (4000-4500m) has little vegetation and cooler due to the higher altitude. Commonly inhabiting the moorland are rock hydrax, leopard, and a notable variety of rodents. Some stray lowland, mammals are also found in this area, including the buffalo and bushbuck.

Birds, Reptiles, and Amphibians

Records show that approximately 240 species of birds are found in the Mt. Elgon ecosystem. Among the most common are the Guinea Fowls, Black and White Casqued Hornbill and the Grey Crowned Crane. The cranes breed in wetlands and forage both inside and outside the wetlands.

The bird species have four habitat types, which are the bushy grassland, open grassland, cultivated lands and swamps. Other birds include: Grey Heron, long-tailed Cormorant, African Darter, Great White Egret, and little Egret, Night Heron, Hammerkop, Yellow-billed Stork, Hadada Ibis, Glossy Ibis, Yellow-billed Duck, Sparrow, varieties of doves and others.

Mt. Elgon is considered one of the Important Bird Areas (IBA) in Kenya. Certain species such as the Splendid Starling are only found in the Mt. Elgon Region.

Apart from the birds, the Mt. Elgon ecosystem is a habitat for many varieties of snakes, chameleons, frogs, tortoises, and snails. The tortoise is found in salty springs, which the Sabaot call Kong'ta meaning "the eye".

Wildlife Utilization

- Ecological significance
- Tourism
- Socio-cultural significance
- Food (illegal hunting)

Priority Issues

Table 11: Priority Issues and Interventions

No.	Prioritized Issues/Challenges	Current Interventions	Proposed Interventions (2008-2013)	Responsible Institution
1.	Human-wildlife conflicts	1. Monitoring spatial and temporal distribution of wildlife in the Forest Reserve. 2. Prompt response to human-wildlife conflict issues. 3. Shoot rogue animals in case of buffaloes that have strayed into human settlements 4. Equipping community members with basic tools for handling problem animals.	1. construction and maintenance of wildlife barriers e.g. game moats, electric fences, 2. Intensify patrols along human-wildlife conflict areas. 3. Scare away problem animals with thunder flashes or blanks. 4. Open outposts at strategic locations for effective animal control. 5. Monitor predator-prey relationships, migratory patterns, and high conflict seasons 6. translocation of problem animals where applicable	KWS Community
2	Elephant management	1. Scare elephants by use of thunder flashes and blanks in conflict hotspots. 2. Elephant-monitoring programme in the whole ecosystem.	1. Prevent fire outbreaks that tend to scare and drive elephants out of their habitats into farmlands 2. Intensify patrols in conflict prone areas.	KWS KFS Community Note: delete-part of human wildlife conflicts
3.	Management of endangered animal species		1. Carry out a complete inventory of endangered animal species distribution and abundance. 2. Develop specific conservation strategies 3. Develop a monitoring system on habitat and animal trends	KWS KFS

BIODIVERSITY CONSERVATION

Mt. Elgon Ecosystem

The Mt. Elgon Ecosystem spans Kenya and Uganda. Mt. Elgon, the defining feature of the ecosystem is reputed to be one of the oldest East African volcanoes formed approximately 15-20million years ago. At the height of 4320m, it is one of the few single-standing mountains of Africa over 2000m above the surrounding ground. It has a unique caldera, moorlands of great importance, montane lakes and bogs, upland and midland wetlands, and rivers.

A combination of climate, altitude, and gradient of the mountain contributes to a dynamic ecosystem rich in fauna and flora. This abundance of species inhabits a highly diverse ecosystem and natural protected area (forest reserve and chepkitale game reserve) that ends abruptly against a hard-edged boundary of human settlements. The natural vegetation types include alpine moorland, bamboo forest, montane forests, lowland forests and wooded grassland. Each of these habitats supports unique and diverse flora and fauna. The mountain is also unique in the sense that it is more "tropical" than its neighbours in East Africa.

The ecosystem includes Mt. Elgon National Park, Chepkitale National Reserve and Mt. Elgon Forest Reserve. It also includes other areas without conservation status- a landscape of agriculture, human settlements, cultural and historical sites, and geomorphological sites. Mt. Elgon is part of the Eastern African High-Altitude Biodiversity Hotspots. It contains a number of endemic, endangered and threatened fauna and flora.

The conservation and sustainable management of the Mt. Elgon ecosystem is of major trans-boundary concern. It confers diverse biological, ecological, cultural and economic values to the neighbouring communities as well as regional and global communities. Mt. Elgon is a regional water tower. It is a catchment for the Lake Victoria Basin, The Turkwell and Turkana systems, Lake Kyoga, and the Nile River Basin – including Malaba/Malakisi River Basin. It provides marketable goods such as food, timber, water and medicine; and non-marketable services such as air and water purification, rain formation, soil generation and maintenance of soil fertility, pollination of crops and natural vegetation, and preservation of biodiversity. It also provides aesthetic beauty and preserves the cultural and spiritual well being of local communities.

Environmentally Significant Areas

- Mt. Elgon
- Mt. Elgon forest reserve
- Mt. Elgon national park
- Chepkitale Game reserve

- Rivers and water falls

Threatened and Endemic Plant Species

The ecosystem has endemic species found in the Afro Alpine region. These are mainly shrubs and herb species found in THE high altitude areas. *Ericaceae* family, which is composed of heathers such as *Erica aborea*, and *Etrimera* are species endemic to the region. One fifth of the *Oliniaceae* family tree genera, i.e. *Afrocrania, Agenia, Kiggelaria, Leucosidea*, and *Xymalos* are practically endemic and display the highest number of afro-alpine endemic species. The species of the two families are found in scattered dense shrubs in the alpine zone.

The endangered indigenous species occur in the lower forest zones. These are *Olea capensis* (Elgon teak), *Podocarpus* species, *Juniperus procera* (Cedar tree), *Hagenia abyssinica* (Rose wood), and *Aningeria aldolf-fierici*. The exploitation of these species due to their economic value has put them in great demand. *Prunus africana* is threatened due to its medicinal value. These species are mainly found in the afro-montane forest zone mainly composed of indigenous trees. Other trees and shrubs known for their medicinal values are also threatened as result of the unsustainable harvesting practices.

Threats to wildlife in the District are linked to loss and habitat degradation from encroachment and unsustainable harvesting/utilization practices. The elephant, giant forest hog, leopard and Oribi are highly threatened due to poaching and habitat loss. Wild fires and general deforestation have further contributed to the constriction of wildlife habitats.

Significance of the Resources of Mt. Elgon to the Communities

Mt. Elgon has traditionally been an important resource for the people living in the district. Their livelihoods revolve around goods and services from the Mt. Elgon ecosystem. The predominant communities living adjacent to the forest are the Bukusu and Sabaot, the former with a long history in the area and were originally forest dwellers.

The resources of Mt. Elgon ecosystem to the district residents fall into the following categories:

- Traditional socio-cultural benefits;
- Ecological benefits; and
- Economic and livelihood benefits.

Traditional and socio-cultural benefits
The mountain was used as a sacred worship place and was considered the place of gods. Among the Bukusu, the mountain is known as 'masaba' or 'zayuni'. The name zayuni comes from Mt. Zion, the Israelites sacred mountain. The mountain contains a number of caves with ecological and historical importance [caves are known as 'pango' in the local language]. The caves have a lot of myths and legends. They are used for religious and customary rituals. The caves were also the homes of the traditional Ndorobo and sheltered them from the cold of the mountain.

The forest also acted as a hideout from enemies. The natural forest had great thickets below the tree canopy. Because of the terrain one could also spot an enemy and not be caught off-guard. The forest has trees that are used for ceremonial purposes. For example, the Korosiondet, Tekantet, Sinendet(Markhamia lutea) and Kagorwet(Erythrina abbysinica). Ceremonial dress is obtained from the skin of the colobus monkey, blue monkey, buffalo and elephant skin, hooves and horns and seeds of the wild animals and plants.

Ecological benefits
Mt. Elgon has several ecological benefits as a result of the altitude and forest. They include:

- Abundance of rainfall
- Water catchment and a source of clean water. It is a catchment for rivers in western Kenya which feed into lake Victoria- kamukuywa, Sosio, Kimilili, Kibisi, Kuywa, Malakisi, Sit, Lwakhakha, Kimothon, Kissawa, Suam, Turkwell and tributaries feeding into river Nzioa.
- Rich and fertile soils with immense agricultural potential
- Air purification

Livelihood and economic benefits
The mountain supports livelihoods and economy of the district. These benefits include:

- Fuel wood which is the main source of energy for domestic use;
- Timber for building
- Pasture and herbal medicine
- Edible forest products e.g. honey, vegetables, fruits and game meat

Threats to Biodiversity in the District
Deforestation

Activities undertaken to meet demands for forestry products, wood fuel, charcoal, timber etc. affects the local environment through deforestation. For example, they accelerate erosion and topsoil loss by removing physically stabilizing root systems and energy absorbing forest canopies and by reducing the capacity of the soils to absorb rain water and hence control the intensity with which it runs off, into and over the soil. Increased runoff carries large amounts of soil into nearby waterways (rivers) decreasing the fertility of the originally forested landscape and making forest regeneration more difficult.

Forest Fires

Forest fires pose one of the greatest and potential threats to biodiversity loss in the protected areas. It is greatly hampered by lack of fire fighting equipment and tools. Inaccessibility of certain areas makes the exercise difficult. Monitoring is also hampered by lack of adequate fire towers. There is also need to train the local communities bordering the forest on fire prevention and fighting.

Illegal Activities

Illegal activities include poaching of both wild animals and trees, illegal harvesting of medicinal plants leading to over-exploitation, charcoal burning, and illegal logging inside the protected areas. Although statistics are not yet available, bio-prospecting for biological resources is an emerging threat.

Others

Other threats include: encroachment and forest excisions, insecurity, human wildlife conflicts, and resource use conflicts.

Priority Issues

Table 12: Priority Issues and Interventions

No.	Prioritized Issues/Challenges	Current Interventions	Proposed Interventions (2006-2010)	Responsible Institution
1.	Protection of endangered and endemic species of fauna and flora	None	1. Carry out an inventory of all endemic and rare plant and animal species.	KWS KFS
2.	Curbing illegal activities e.g. logging, hunting of bush meat	1. Patrols and surveillance	1. Enhanced patrols and surveillance.	KFS KWS Provincial administration

AGRICULTURE, LIVESTOCK AND FISHERIES

Introduction

Agriculture, livestock, and fisheries production are the main sources of livelihoods for the majority poor in the district. Of the three production systems, fisheries is of least significance but with unexploited potential especially trout fishing.

Small-scale mixed farming encompassing crop and livestock production dominates the district. The average farm size is approximately four acres.

Each of these agricultural production systems has the potential to significantly affect the state of the environment and natural resources especially land and water. This chapter identifies specific activities under each system, status and trends, institutional arrangements, key environmental issues and interventions.

Agriculture

Agriculture is the predominant land use in the district. It is characterized by small-scale mixed farming, which includes subsistence and cash crops. Average land holdings are approximately four acres.

The main crops grown in the district are: maize, beans, tomatoes, Irish potatoes, tea, sunflower, wheat, coffee, potatoes, Finger millet, sorghum and horticultural crops such as onions and vegetables.

Table 13: Main Crops per Division

DIVISION	MAIN FOOD CROPS	MAIN CASH CROPS
Cheptais	Maize, beans, tomatoes, onions	Coffee, tomatoes, onions, tobacco, maize
Kaptama	Maize, beans, potatoes	Wheat, potatoes, sunflower, coffee
Kopsiro	Maize, beans, Irish potatoes	Wheat, coffee, pyrethrum, potatoes
Kapsokwony	Maize, beans, potatoes	Wheat, potatoes, sunflower, coffee

Table 14: Crop production statistics (between 2003 and 2004)

Crop	Target ha		Achieved Ha		Production (Metric Tonnes)		Value (ksh)	
	2003	2004	2003	2004	2003	2004	2003	2004
Maize	1760	17600	15400	16500	55440	49752	616	553m

Crop	Target ha		Achieved Ha		Production (Metric Tonnes)		Value (ksh)	
	0						m	
Finger millet	100	80	76	63	0.1	0.1	1.7 m	2.8m
Sorghum	60	60	56	48	0,05	0.05	0.9 m	0.8m
Wheat	405	400	357	400	1.4	1.3	28m	22m
Beans	17500	17500	15100		15100	14353	30m	29m
Field peas	55	60	42.2	53	54	53	1m	1m
Cowpeas	103	53	62	80	42	40	1M	1M
Irish potatoes	2030	1630	1393	1600	23681	28800	237 M	288M
Sweet potatoes	160	160	67	140	670	1400	0.1 M	0.2M
Cassava	79	55	40.5	60	238	300	0.05 M	0.05M
Tea	109.4	115	107.4	109	522	400	-	-

Table 5.2: contd.

Crop	Target ha		Achieved Ha		Production (Metric Tonnes)		Value (ksh)	
Arrow roots	15	15	34	13	190	190	0.1M	0.1M
Pyrethrum	85	85	73	62	62	62	-	-
Sunflower	100	100	62	95	62	95	0.6M	1M
Ground nuts	38	38	22	22	20	20	0.5M	0.5M
Tomatoes	270	270	240	275	8000	4125	150M	80M
Onions	400	400	415	280	6230	4200	100M	67M
Garlic	45	45	45	45	864	864	15M	15M
Kales	175	175	180	175	1440	1125	22M	22M
Cabbages	250	270	228	260	3092	5200	20M	20M
Carrots	37	37	31	35	340	340	4M	4M
Spinach	4	4	4	4	24	24	0.5M	0.5M

Source: *Ministry of Agriculture, Kapsokwony*

Priority Issues and Intervention

Table 15: Priority Issues and Interventions

No.	Prioritized Issues/Challenges	Current Interventions	Proposed Interventions (2006-2010)	Responsible Institution
1.	Increasing food production for subsistence and commercial purposes with minimal environmental damage	1. NALEP programme 2. Njaa marufuku programme 3. Agricultural extension services	1. NALEP programme 2. Njaa marufuku programme 3. Agricultural extension services	Ministry of Agriculture Ministry of Livestock
2.	Promoting best agricultural practices in the district	1. Promoting agro forestry 2. Promoting soil conservation programmes	1. Encouraging on-farm recycling of nutrients 2. Minimizing the use of agro-chemicals by encouraging organic farming	Ministry of agriculture
3.	Soil erosion	Soil conservation Laying of terracing Contour citing Tree nursery establishment Agro-forestry	Laying of soil conservation structures in 3000 farms	Ministry of Agriculture
4.	River bank encroachment	River bank protection by pegging	Protect the riverbanks in all the rivers in the district covering 200km	Ministry of Agriculture
5.	Deteriorating soil fertility	Soil fertility management through use of organic fertilizers etc Agroforestry	Promote use of organic fertilizer	Ministry of Agriculture

Table 5.3: contd.

No.	Prioritized Issues/Challenges	Current Interventions	Proposed Interventions (2006-2010)	Responsible Institution
6.	Use of agrochemicals in farms	Training in safe use of chemicals Use of biodegradable chemicals Inspecting stockers to ensure sell of non-hazardous chemicals to farmers Promotion of integrated pest management	Register all stockists in the district and liaise with KEPHIS to be trained on chemical handling Promote use of organic fertilizers	Ministry of agriculture
7.	Crop pest and diseases i.e bacterial wilt in potatoes	Training farmers in control of pests and diseases	Establish bulking plot for producing clean material in liaison with KARI	Ministry of Agriculture

		Liase with KEPHIS to provide clean planting material		
8.	Use of uncertified seed by farmers	Training farmers on the need to use certified seed Registering stockists with KEPHIS	Register all seed stocking in the district for licensing.	Ministry of agriculture

Livestock Production

Mt. Elgon district has a high potential for livestock production. The highland areas are ideal for high yielding breeds of dairy cattle and wool sheep. The midlands are good for medium breeds of dairy cattle. The indigenous cattle, sheep, goats and poultry are well adapted to all parts of the district. There is also high potential for bee keeping.

The main livestock kept are: cattle, sheep, poultry, and goats. Emerging livestock such as crocodiles, ostriches, guinea fowls, quails, butterflies and tortoises are non-existent (Table 5.4). All divisions are engaged in the same livestock activities. Major livestock products are milk, eggs, honey, meat, hides and skins.

The Ndorobo's who inhabit the upper parts of the mountain in Chepkitale practices limited amount of pastoralism. The land under pastoralism is generally not as degraded as land under other land uses.

The community bordering the forest heavily depends on the forest reserve for grazing. The effects are manifested in competition for pasture between wildlife and livestock, gully erosion along paths used by livestock and diseases outbreaks. There is need to assess the carrying capacity of the forest reserve, and develop a grazing plan to minimize environmental degradation due to over-grazing.

Table 16: Livestock Population & Distribution –By end of September 2005

Type	Division				Total
	Kapsokwony	Kaptama	Kopsiro	Cheptais	
Grade cattle	2665	6105	3410	2575	14755
Zebu cattle	6305	5365	8720	8560	28950
Local goats	2680	1580	2050	1880	8190
Dairy goats/crosses	2	8	Nil	2	12

Type	Division				Total
	Kapsokwony	Kaptama	Kopsiro	Cheptais	
Local sheep	3320	3380	3110	1720	11530
Local chicken	37000	26800	31000	26900	121700
Commercial chicken	100	-	-	35	135
Ducks	210	490	450	310	1460
Turkeys	80	180	70	260	590
Geese	90	40	-	20	150
Local hives	340	169	357	249	1115
Langstroth hives	10	40	1	269	320
KTBH	160	238	94	257	749
Pigs	2	120	45	231	398
Rabbits	1360	540	4015	600	6515
Donkeys	300	875	3100	790	5065

Source: District Livestock Office, 2006

5.1.1 Priorities issues and Interventions

Table 17: Priority Issues and Interventions

No.	prioritized issues/challenges	Current interventions	proposed Interventions (2008-2013)	Responsible institution
1.	Improvement of local poultry production	1. Training through CIGs in NALEP 2. Improved hatching- fabricated incubators using paraffin 3. Demonstrations on management	1. NALEP support continues 2. Agricultural Technology and Information Response Initiative (ATIRI) by KARI	Department of livestock production WKCDD
2.	Improvement of milk production	1. Upgrading of local herd. 2. Promoting zero grazing. 3. Importing breeding stock from outside the district. 4. Napier bulking	1. NALEP 2. MERECP programme 3. Livestock Development Programme 4. Napier bulking 5. Technical support 7. Assist farmers access livestock development loans from AFC 8. Heifer Project international	Department of livestock production
3.	Improvement of honey production	1. Promoting the use of modern beehives	1. Processing and marketing 2. Revive the honey refinery in Kapsokwony 3. MERECP	Department of livestock production

2.4 Fisheries Production

The district's potential for a strong and vibrant fishing industry remains largely untapped. Fish farming is restricted to the lower areas of the district where warm water tilapine fishes are reared. The species of farmed fish include tilapia zili, tilapia niloticus and claria.

Techniques used in fish farming include polyculture, monosex culture, integrated fish farming and polysex culture. Integrated fish farming involves farmers rearing fish in conjunction with other livestock like poultry, sheep and goats, with the aim of establishing a complex food chain for better nutrition and diversify sources of income. There are approximately 67 fish farmers with 120 ponds earning on average 13,000/= annually. Most ponds are below the standard size of 300m^2 as the majority of them are between 100-200m^2. Table 5.6 gives pond statistics in the District.

Table 18: Pond Statistics in the District

DIVISIONS	KAPSOKWONY	KAPTAMA	CHEPTAIS	KOPSIRO	TOTALS
No. of farmers	9	5	20	1	35
No. of ponds in operation	11	12	37	7	67
Area of ponds in operation	3350	2800	9220	1410	16780
No. of non operational ponds	-	-	-	-	-
Area of new ponds (m^2)	420	220	250	-	890
No. of new ponds	2	1	1	-	4

Source: *District Fisheries Office*

Trout fishing is still unexploited and has a lot of potential in the district. Trout needs fast flowing clear water, with no siltation and a temperature of 10 degrees centigrade. These conditions are prevalent in the upper ecological zones of the district. Trout also already exists in the local rivers having been introduced by the colonial settlers. The predominant species is the rainbow trout. There is also potential to develop sport fishing.

The Trout Development Project mooted in 2000 has, however, stalled due to lack of funding. The project had the following objectives:

- To promote trout farming in the district both for local consumption and for sale outside the district
- To promote tourism through sport fishing, establishing fishing camps, hotels, and curio shops.
- Provide a cheaper and readily available supply of trout fingerlings for Mt. Elgon district and other areas in Western Kenya
- Reduce importation of trout eggs into the country by constructing a hatchery; and
- Act as a training facility for farmers, and students on trout fishing.

5.4.1 Priority issues

Table 19: Priority Issues and Interventions

No.	Prioritized Issues/Challenges	Current Interventions	Proposed Interventions (2006-2010)	Responsible Institution
1.	Increase fish production from farms-ponds	1. Extension and technical support	1. Extension and technical support	Department of fisheries
2.	Develop trout fishing potential of the district		Trout Development Project	Fisheries department

2.5 Ecological Impacts of Agriculture

Many of the adverse environmental impacts resulting from agriculture are connected either to the loss of natural habitat that occurs when land is converted to agricultural purposes or to the use (or misuse) of pesticides and fertilizers.

The impact of agricultural activities on the district's ecology can be seen in the following processes:

- Encroachment on forest land/reserve is particularly critical in Cheptais and Kopsiro divisions to bring more land under cultivation due to population pressure.
- Cultivation on steep slopes, which are not, recommended for cultivation, without any soil conservation practices in place. Equally, rocky places are being cultivated in the quest to bring more land under agriculture as arable land shrinks due to population pressure.
- Use of agro-chemicals that pollutes water sources, especially rivers, and reduces the natural resilience of the ecosystem to control pests.

- Loss of agro- biodiversity in the district as farmers concentrates on a few crops- maize, beans and Irish potatoes. This monoculture system, which lack diversity, increases ecological vulnerability and increases risks to farmers in case of crop failure.
- Land degradation through soil erosion and repeated cropping without sufficient fallow periods or replacement of nutrients with cover crops, manure, or fertilizers. This is due to inappropriate farming methods.

CHAPTER THREE

3.0 HUMAN SETTLEMENTS AND INFRASTRUCTURE

3.1. Overview

This Chapter covers human settlements and planning, pollution, waste, infrastructure, water and energy utility issues. Over the years, these issues have continued to cause degradation on the environment. Although a number of policies and legislations have been put in place to address some of the emerging concerns, environmental degradation continues unabated due to weak enforcement mechanisms. The district's inhabitants are predominantly a rural society with majority of them living in dispersed rural settlements.

Urbanization process is a demographic phenomenon that has had tremendous impacts on the social and economic processes of developing countries. It is generally accepted that the causal factors for this phenomenon include rural to urban migration; natural population increase among urban residents especially when economic opportunities expand; and reclassification of previously rural areas as urban, thus becoming built up and changing character. It is expected that with proper planning of human settlements and infrastructure, social, economic and environmental issues will be addressed.

Many environmental contaminants as a result of urbanization, such as persistent organic pollutants, work their way into the food chain and eventually into human beings, thus compromising the health of present and future generations. The proliferation of policies and legislations in the recent past has seen a greater emphasis on incorporating local communities in the management of natural resources and their goods and services.

3.2 Human Settlement and Planning

The district's mountainous topographical profile influences the settlement patterns. Human settlements occupying approximately 31% of the district land mass are concentrated in the lower regions of the District. The upper regions constituting 69% of the land mass are under the Forest Reserve and Chepkitale National Reserve.

Rural Settlements

The district is predominantly rural where agriculture is the main activity for both subsistence and as source of income. Over 90% of the population live in rural areas and depend directly on

natural resources e.g. rivers, forests, soils etc. for livelihood. Dwelling units are traditional huts made of mud and grass thatched.

Urban Settlements

Total urban population as at the year 2002 was 10,030, projected to increase only marginally to 11,515 by 2008. The growth of urban centers is affected by poor infrastructure – electricity, water supply and sanitation, and communication. Kapsokwony and Cheptais are the main towns. Table 3.1 shows their population as at 1999. Lack of planning is the biggest challenge in improving the environmental conditions of these towns and the upcoming ones.

Table 20: Urban Centers and Population 1989-1999

Centre	**1989**	**1999**
Cheptais	5354	3675
Kapsokwony	3182	5687
Total	**8536**	**9362**

Source: CBS

Land Tenure

Most land in the district under human settlement is under freehold tenure as shown in table 3.2. There is inadequate data on the land tenure situation in the district.

Table 21: Land Tenure Systems and Area (ha) in the District

TENURE TYPE	**AREA (Ha)**			
	1990	2000	2005	REMARKS
Leasehold			-	No leasehold tenure
Freehold			33,470	Individual farmers/commercial
National reserve			17,200	Chepkitale Game reserve
Gazetted forest			50,866	Mt. Elgon Forest reserve
Ungazetted forest				Covered under the private forests on freehold land
National park			200	The rest of the Mt. Elgon National park is in trans Nzoia district
County council			2,400	Land occupied by towns and market centres
Other GoK land				
Wetland			No inventory	Caldera at the peak of the mountain, mountain bogs
Lake			None	
TOTAL				

Housing

During the 1999 population and housing census, more than 60% of the houses were grass thatched with approximately 34% iron sheet roofed. Table 3.3 below shows the number of households by main type of roofing materials for the main dwelling unit.

Table 22: Number of households by main type of roofing materials for the main dwelling unit

No.	type	households	%
1.	Iron sheets	8,814	34.53
2.	Tiles	81	0.32
3.	Concrete	39	0.20
4.	Asbestos	270	1.06
5.	Grass	16,006	62.70
6.	Makuti	32	0.13
7.	Tin	13	0.05
8.	Others	274	1.07
	Total	**25,529**	**100.00**

Source: *1999 Population and Housing Census, Vol.II, CBS*

3.3 Human and environmental health

Environmental health is a major concern in the District. Most of the diseases that cause high mortality and morbidity in the District are related to environmental factors especially poor hygiene and sanitation. Common diseases include diarrhea, cholera, typhoid, dysentery and malaria.

Sanitation both in homes and urban centers remains poor. The urban centers have no waste disposal infrastructure like dumping sites and even public toilets. Toilet coverage in rural areas is as low as 40%.

Waste disposal

The district has inadequate waste disposal facilities. Waste disposal facilities include refuse pits, pit latrines, septic tanks, and incinerators. Table 3.4 shows the status of these facilities in the district.

Table 23: Status of Waste Disposal Facilities and Equipment

	No. exist	Pop.	No. of incinerators	No. of latrines	No. of WCS	Disposal sites no.	Refuse tracks no.
Towns	1	3,000	0	318	26	102	1
Markets	70	11,000	0	464	21	401	0
Learning institutions	111	41,052	0	583	14	140	0
Health inst	11	120	1	16	42	12	0
Factories	8	7,000	0	20	0	14	0
Rural	4,200	130,000	0	5,522	10	1,600	0

Source: *Public health, annual report 2002*

3.4 Pollution and Waste Generated from Human Settlement

Pollution and waste generated from human settlements include:

- Faecal matter due to low latrine coverage
- Storm water
- River bathing
- Agricultural waste-agro-chemicals, animal wastes (dung), crop residues etc.
- Plastic and polythene bags especially in urban centers
- Domestic wastes e.g. food wastes

3.5 Communication Networks

The district has very poor communication infrastructure and accessibility in most parts is a problem. It has no tarmac road, neither is it served by a railway line, airstrip or airport. Fixed line telephony is poor and limited to the district headquarters in Kapsokwony. However, mobile phone providers Safaricom and Celtel, and Telecom wireless now cover most areas. Postal services are available in only three urban centers: Kapsokwony, Kaptama, and Cheptais.

The poor state of infrastructure in the District has a negative impact on environmental protection and sustainable natural resource use:

- Poor road network exacerbates poverty by limiting the growth of the district's rich agricultural potential.
- Poor infrastructure limits the growth of alternative livelihood activities which could take considerable pressure from over dependence on natural resources especially land. Land is degrading faster due to over use especially as it is divided into small pieces.

- Monitoring environmental conditions and the state of the natural resource base is hampered due to inaccessibility of most places especially during rain seasons. Inaccessibility has been a major draw back in combating illegal activities in the forest.

Key Environmental Issues

- Inadequate physical planning
- Inadequate infrastructure
- Inadequate land for the expansion of urban centres
- Inadequate waste management
- Inadequate enforcement of relevant legislation
- Encroachment in ecologically fragile areas

Proposed Interventions

- Undertake urban/physical planning
- Develop and improve the existing infrastructure
- Develop land-use plans
- Plan and develop waste management systems
- Enhance the enforcement of laws
- Rehabilitation of degraded areas
- Encourage public private partnership in waste management
- Marking of forest cut lines of Chebwek and chepyuk settlement schemes
- Identifying and gazette ecologically fragile areas
- Create awareness

3.6 Energy sector

3.6.1 Types and Sources of Energy

The dominant source of energy in the district is biomass (e.g. fuel wood, cow dung, crop residue). Among the biomass fuel, wood fuel, particularly firewood and charcoal is the most prominent. A majority of the district's population use firewood for cooking and maintaining essential levels of warmth in their homes. Charcoal is more widely used in urban centers than in rural areas where majority live. Fuel wood is dominant because it is:

- Cheap and easily obtained from farms and the forest reserve compared to other sources; and
- Does not require complex and expensive equipment like gas or electricity.

Electricity supply is limited only to the District headquarters in Kapsokwony. Majority of the people in the rural areas and other urban centers have no access to electricity. The district has no other sources of energy e.g. gas, biomass, geothermal, hydropower, Solar, wind, and geothermal. However, there is potential for micro-hydro generation especially on Terem falls.

Energy Status

Energy supply is inadequate both in quantity and diversity. The lack of diversity in energy provision is an indicator of the lack of diversity of the economy in the District. The district is largely a rural subsistence economy. There has been lack of investment in the provision and diversification of energy in the District to spur economic growth and improve people's lives.

As population has increased and land use has changed to lean disproportionately towards food and cash crops, the supply of fuel wood has been dwindling to meet the demand. High population growth rates translate into higher energy demands. Kopsiro with the highest population is also the most deforested division, and the supply of increasing energy demands explains the situation.

Too much dependency on the forest for energy provision is exerting considerable pressure on it. The neighboring communities depend on the forest for their fuel wood needs.

Electricity grid reaches only the district headquarters in Kapsokwony and more recently in Kaptama. There is no rural electrification project undertaken in the district.

3.6.2 Changing Land Use and Energy Sources

Population pressure and new economic opportunities are changing land use patterns in the district. As deforestation to create more land for agricultural activities (change from forest to agricultural uses) take place, the supply of fuel wood is severely reduced. Most farmlands do not have sufficient tree cover. Most households therefore lack on-farm sources of fuel wood. The result is over dependence on the forest reserve sometimes illegally.

Moreover, subdivision of land into small units as population has increased over time has meant that in the absence of a sound agro forestry campaign, priority has been to maximize the use of available land by reducing the tree cover. Trees are seen as taking up vital space that could better be used for crop production. The challenge is to vigorously promote agro-forestry in the district as a viable way of utilizing small farms sustainably.

The deficit in the supply of fuel wood is putting undue pressure on the forest reserve. The local communities usually access firewood from the forest at a small fee annually or monthly. They are supposed to collect only dead wood and branches. But as more people want to access firewood and in large quantities, some resort to illegal activities like cutting down trees, and illegal logging.

The fuel wood deficit has also created market conditions, which have made firewood and charcoal marketable commodities. People now trade in firewood and charcoal. Ideally, this should be an incentive for people to plant trees on commercial basis. However, the long-term nature of this investment against the need to meet immediate needs makes it a challenge.

The growth of urban centers in the district as an emerging land use is changing the dynamics of energy demand and supply. Urban centers predominantly rely on charcoal for domestic use. As they grow and attract more people, they affect the demand side of the energy equation without necessarily addressing the supply side. Therefore, demand for charcoal will continue to outstrip supply, especially given that charcoal production is an illegal activity at the moment.

Demand for charcoal in these centers is creating market conditions, which encourage further deforestation and illegal logging activities in the forest reserve to satisfy this demand. The charcoal produced in the district is supplied to other urban centers beyond Mt. Elgon district.

3.6.3 Energy Consumption Patterns, Demand, and Supply.

Fuel wood in form of charcoal and firewood is the dominant energy source. It is used for domestic purposes like cooking and heating up homes. Sources of fuel wood include on-farm exotic trees, indigenous trees in non-protected areas, and the forest reserve. The forest department allows only the gathering of deadwood and branches for firewood from the forest reserve by the local community. However, due to the high demand for charcoal, in the district and beyond, illegal logging for logs to burn charcoal is a threat to the forest ecosystem.

Demand for electricity also outstrips supply. The main use of electricity in Kapsokwony is the district headquarters for lighting and running office equipments like computers and typewriters. It is not yet used for industrial purposes, as there is no industry in Kapsokwony.

There is a need to make electricity accessible to more households and market centers. Such a move will have positive environmental impacts:

- Reducing pressure on the forest resources
- Supporting small-scale (Jua kali) industries, which provide alternative livelihood systems away from intensive use of natural resources, like land. The industries also provide a possibility of using natural resources more efficiently. They also support poverty eradication efforts, which are good for environmental protection.
- Clean energy-reduces environmental pollution associated with burning wood fuel.

3.6.4 Unexploited and Potential Sources of Energy

The district has a number of potential sources of energy, which remains largely unexploited. They include:

- Micro-hydropower generation especially on Terem river
- Solar energy
- Wind energy
- Biofuel

3.6.5 Threats to Energy Sources

- Increasing deforestation and reduction in tree cover poses the biggest challenge to the supply of wood fuel in the district. Since it is the energy source for the majority who are poor and cannot afford alternative energy sources, this is a serious threat.
- Degradation of the catchment areas through deforestation and encroachment, will lead to reduction in flow volumes of rivers with potential hydropower generation.

3.6.6 Energy Based Pollution

The most prominent energy based pollution is indoor air pollution associated with using charcoal and firewood in poorly ventilated dwellings. No impact assessment has been done on the impact of fuel wood consumption, demand and supply trends on the forest resources in the district and how such impacts can be mitigated.

9.3 Key environmental Issues

- Inadequate wood fuel
- Inadequate alternative sources of energy

Proposed Interventions

- Development of woodlots and agro-forestry.
- Introduction of efficient affordable energy technologies

CHAPTER FOUR

4.0 INDUSTRY, TRADE AND SERVICES

4.1 Industrial activities

The district is limited industrial activities. The district's industrial potential especially for agro-processing has not been tapped. The only prominent industrial concerns are coffee processing factories run by cooperative societies. The factories are old, financially unstable and in need of modernization. A milk cooling plant in Kaptama is currently not operational. The current level of industrial activities cannot be considered a major source of income and employment. The coffee factories have not been engines of urban growth in the District.

4.1.1 Formal and informal Sectors

It is not easy to draw a line between formal and informal sectors in the district. Small-scale commercial concerns such as retail trade, tailoring, motor vehicle repairs, hardwares, butcheries, catering services and posho mills dominate. Though few, they are well distributed throughout the whole district.

Cheptais division accounts for the largest number of business premises followed by Kapsokwony, Kaptama and Kopsiro divisions in that order. The commercial sector is not as competitive and in places like Kaptama and Kopsiro divisions, almost half of the business premises are not operating because they have been abandoned.

Other activities include barbershops, shoe repair and tailoring. Participation in informal sector is low due to preference for agriculture. In general, the level of commercial activities is still low.

Industry and Environment

Industrial pollution and other environmental problems associated with industrialization process are not a major concern in the district. This is due to the fact that the district is has no industries. The district is basically an agro-based economy, and agro-processing is not yet developed.

On the positive side, the water, soil, and air do not suffer from pollution effects. Future industrial developments will most probably have less environmental impacts because they will be taking place at a time when the framework for environmental impact assessment is already in place.

4.2. Service Industries

The district has a very under-developed service industry. It has no hotels, apart from a few kiosks. There is only one small petrol station. This has encouraged hawking of petroleum products in conditions that compromise safety and environmental protection. There is no major bank in the District. Kenya Commercial Bank, which at one time was operating in the district, closed down due to low business volumes. The only banking services are provided by a local teacher's Savings Cooperative Society (FOSA).

There are no developed market centers, only open-air markets where trade in agricultural produce is the main activity. Equally, the district is served poorly by information and communication, transport, legal, and insurance services.

Key Environmental Issues

- Non conformity to environmental standards and regulations
- Inadequate enabling physical environment for sustainable industrial growth
- Inadequate waste management systems

Proposed Interventions

- Enhanced sensitization among industries on cleaner production and eco-efficiency.
- Enforcement of relevant regulations
- Expansion of electricity supply
- improving transport and communication networks
- Enhance environmental audits for facilities
- Provision of dumpsites and sewerage systems

4.3 Mining and quarrying

4.3.1 Mining

The district has no major minerals or materials, which can be commercially exploited.

4.3.2 Quarrying

Quarrying for building materials although with potential is currently not extensively exploited on large scale. The main handicaps for minimal quarrying activities include:

- Poor infrastructure especially the road network.
- Most of these materials are located in private farms whose owners have low economic power to exploit the stones
- Most of the district- approximately two-thirds is under protected forest, where mining of these rocks is not allowed
- Low local demand due to limited construction activities

4.3 3 Sand Harvesting

Sand harvesting activities are minimal because rivers are fast flowing and deposition of sand particles is minimal. The district's steep topography means its not a deposition zone.

Key environmental Issues

- Open quarries act as breeding grounds for mosquitoes and other environmental hazards.
- Inadequate enforcement of relevant legislations governing the sector

Proposed Interventions

- Rehabilitation of quarries and disused mines
- Creating awareness on sustainable quarrying and mining activities
- Enforcement of relevant legislations

4.4 Services sector

The following are some of the service industries in the district:

- Dry cleaning
- Hospitality and tourism
- Shoe repairs/shining
- Garages
- Carpentry
- Tailoring,
- Posho milling,
- Hairdressing and cuts

These activities have created self-employment for the youth who form a majority of the population.

4.5 Tourism

The district tourism falls in the following categories:

- Wildlife- 3 big five (buffalo, leopard, elephants), mammals, rare and endangered primates (blue *debrazza* monkey), over 200 bird species, butterflies, reptiles etc
- Flora- floral diversity of threatened species a and unique montane vegetation
- Topography/scenery- cliffs for panoramic views, mountain and its easy o climb peaks, hills and valleys, caldera, hot springs, gorges, magnificent caves with natural salt licks, nesting sites for birds
- Water resources- rivers and springs, hot springs, waterfalls, natural dams
- Cultural attractions- historic sites, sacred places, community festivals, art and music.

The main Tourism Opportunities include:

- Animal watching
- Bird watching
- Cave explorations
- Camping and pick nicking
- Photography
- Study tours
- Self guided walking tours
- Sport fishing
- Geological safaris
- Mountain trekking
- Cultural/village tours
- Community festivals
- Scenic drives
- Sports tourism-athletics, motor sport

Key Environmental Issues

- Pollution by waste from industries
- Inadequate Ecotourism development in the forest reserve
- Inadequate Infrastructure development

Proposed Interventions

- Enforce regulations governing waste disposal
- Develop ecotourism ventures
- Infrastructure development

CHAPTER FIVE

5.0 ENVIRONMENTAL HAZARDS AND DISASTERS

5.1 Extent and Trends of Environmental Hazards and Disasters

Hazard: A hazard is a potentially damaging physical event, human activity or phenomenon with a potential to cause loss of life or injury, property damage, social and economic disruption of life, environmental degradation among other effects.

Disaster: A disaster can be defined as a serious disruption of the functioning of the society causing widespread human, material or environmental damage and losses which exceed the ability of the affected community to cope using their own resources.

Most disasters are climate/weather and tectonic movements related. They can both be natural or manmade and in most cases lead to destruction of the environment, life and property. They have the tendency to retard gains made in building meaningful livelihood and economic development. In the district there are several forms of disasters.

The district has not experienced any major environmental disaster, but there is potential for landslides, invasive species, earthquakes, lightning, droughts, and forest fires.

Key Environmental Issues

- disaster risk assessment and mapping not undertaken
- Inadequate preparation for disaster management, prevention and recovery.

Proposed intervention

- Conduct disaster risk assessment
- Undertake disaster mapping
- Develop disaster contingency measures and risk reduction
- Develop early warning systems
- Enforce regulations
- Enhance awareness and coping mechanisms
- Incorporate traditional copping mechanisms

CHAPTER SIX

6.0. ENVIRONMENTAL EDUCATION AND TECHNOLOGIES

6.1. Status of environmental education

The Formal education system has integrated environmental education into the school and tertiary level curriculum. This is done through biological, social and physical sciences. Types of environmental programs in the district include wildlife clubs, environmental clubs, eco-school programmes, tree planting programmes and school gardens.

Information on environmental issues that have been integrated in the subjects taught in schools and tertiary colleges.

- Soil and water conservation
- Pollution problems
- Climate studies
- Natural resources studies
- Health and hygiene
- Pests management

The informal education systems encompasses adult education and outreach programmes, public barazas and village meetings

Key players in non-formal environmental programs

- Department of Adult Education
- Ministry of Agriculture
- National Environment Management Authority
- NGOs
- Civil Society Organizations

Environmental issues integrated into non- formal programs

The environmental issues that have been integrated into the non- formal programs in the district are:

- Energy conservation methods through upesi jikos, solar cooker and saw dust jikos.
- Tree nursery, agro- forestry, poultry keeping, zero grazing

- Soil and water conservation
- Land pollution
- Health education programmes
- Agriculture
- Waste management

Challenges of non-formal environmental education

The non-formal environmental education is faced by the following challenges:

- In adequate qualified staff
- In adequate teaching materials
- Lack of policy guidelines
- In adequate case studies for reference

6.2. Public awareness and participation

The current status of public awareness and participation

Lead Agencies and some CSOs and NGOs do public awareness on environment and community participation. The channels of information dissemination and awareness creation include; public *barazas*, demonstration and field days, CBOs, Environmental clubs in schools, Electronic and the print media.

Key players in environmental awareness and public participation

- National Environment Management Authority
- Agriculture and Environmental Programme
- Office of the President (Provincial Administration)
- Ministry of agriculture
- Forest department
- Ministry of Information
- Ministry of health

Integration of environmental awareness programs

There is inadequate integration of environmental awareness into development planning in the district. NEMA initiated award schemes for best practices in environmental management.

However the programme has encountered challenges due to financial concentrations in the district. Kenya Forest Service occasionally provides free seedlings for planting as an incentive.

6.3. Technologies

The following are some of the technologies being applied to manage natural resources and environment in the district.

- Grafting in tree planting
- Plastic and scrap metal recycling
- Use of oil receptacles at petrol stations

6.4. Environmental information systems

Types and sources of environmental information

Data types available in the district include:

- Climate
- Natural resources
- Pollution
- Infrastructure
- Demography
- Diseases

Sources of environmental information

- Annual reports
- Research studies and journals
- Projects progress reports
- Population censuses
- Registers and files
- District state of environment report

Data/information in the district is available in the following Institutions

- Government departments and local authorities
- Non government Organizations
- Special government projects and programs

Data Formats and Accessibility

The available data formats in the district are purpose specific and vary from one source to another. Most of the available information is in narrative form while a few are depicted in quantitative formats. Maps and electronic formats of presentation of information are very rare. Some institutions charge a fee for information access.

Status of Environmental Information Management Systems

- The available information is scattered in various institutions in form of reports.
- There is inadequate information sharing between various institutions.
- Inadequate institutional capacity in information management
- Some information is obsolete and inaccurate
- There are quite a number of newsletters and magazines in the district.
- Local publications are few.

6.5. Indigenous knowledge

There are various types of indigenous knowledge, innovations, and practices in the district. The level of their applications in environmental management is low. The indigenous knowledge is not well documented.

Key environmental issues

- In adequate environmental reading materials
- In adequate clear guidelines on environmental education
- Low priority on environmental education within the curriculum
- Low funding for environmental education
- In adequate documentation of indigenous knowledge
- Low levels of networking
- Non-formal education programmes are facing difficulties in translating environmental terminologies into local languages
- Inadequate capacity for environmental education
- Inadequate environmental awareness materials
- High costs of technologies
- Lack of policy framework on IK and data sharing

Proposed interventions

- Develop environmental awareness materials
- Dissemination of environmental awareness materials
- Undertake documentation of indigenous knowledge
- Mobilization of resources for environmental education
- Introduction of rewards and sanctions and recognition
- Translation of scientific information into simple format for the general public
- Enhance the ICT infrastructure in environmental education
- Provide policy guidelines
- Integrate environmental awareness into development planning
- Establish environment information centres
- Baseline survey on the existence of environmental technologies and indigenous knowledge

CHAPTER SEVEN

7.0 GOVERNANCE, LEGAL FRAMEWORK, INSTITUTIONAL ARRANGEMENTS AND POLICIES

7.1 Overview

Environmental governance in Kenya is through various legislations, standards and regulations together with institutions that implement them. Before the enactment of EMCA in 1999 as on overarching framework law, environmental management was scattered in various sectoral legislations and some were conflicting. Environmental Management and Coordination Act (EMCA 1999) devolve administration of a number of environmental and natural resources management issues to communities. It recognizes community rights, benefit sharing, pastoral land tenure and equitable and sustainable access to land.

Environmental Management and Coordination Act addresses land use management issues including sustainable land use, land use planning, and ecosystems protection and management. The law identifies structures that oversee the equitable distribution of benefits and devolution of decision making on natural resources. Further EMCA empowers organised communities to formulate environmental actions and conservation and management plans, through NEAPC, PECs and DECs.

7.2 EMCA structures for environmental management

Environmental governance in Kenya involves major players who are coordinated by National Environment Management Authority. There are also sectors of the government who have aspects of environmental management in their programmes and are referred to as lead agencies in the EMCA. Environmental Impact Assessment and Environmental Audit are tools used for planning and monitoring of upcoming and existing projects respectively.

Some of the Lead Agencies in the district

- Ministry of Water and Irrigation
- The Kenya Forest Service
- Water Resources Management Authority and related Companies and Boards
- Ministry of Works

- Ministry of Trade
- Ministry of Industrialization
- Ministry of Planning, National Development and Vision 2030
- Ministry of Home Affairs and National Heritage
- Ministry of Housing
- Ministry of Labour and Human Development
- Mines and Geology Department
- Ministry of Education, Science and Technology Development
- Ministry of Medical Services
- Ministry of Public Health and Sanitation
- Ministry of Energy
- Ministry of Agriculture
- Ministry of Local Government
- Kenya Wildlife Services
- Ministry of Livestock Development
- Ministry of Fisheries development

Committees under EMCA

- Public Complaints Committee
- National Environment Council
- National Environment Tribunal
- District and Provincial Environment Committees

Environmental NGOs/CBOs

The main NGOs addressing environmental issues in Mt Elgon district are World Vision, Action Aid and ICRAF

Community Based Organizations include

The main two CBOs carrying out environmental activities in the district are: Mt Elgon Forest Network (MEFAN) and SOET Youth Group

7.3 Regulatory and Management Tools

There are various mechanisms in place in the district that ensure that the environment is conserved. EMCA1999 provided for the establishment of the District Environment Committees. The Local Authority (Town Council) has an environment Division to ensure that the environment's integrity is maintained.

Some of the environmental tools being used in the district include:

- Environmental Management and Coordination Act of 1999
- Environmental Impact Assessment and Environmental Audit regulations of 2003
- Water Quality Regulations of 2006
- Public Health regulations
- Local Authority Regulations
- Waste Management Regulations of 2006
- Access and Benefit Sharing for Conservation of Biodiversity, 2007

National Legislations

Some of the environmental tools being enforced in the district include:

- Environmental Management and Coordination Act of 1999
- Environmental (Impact Assessment and Audit) Regulations, 2003
- Environmental Management and Coordination (Water Quality) Regulations, 2006
- Environmental Management and Coordination (Waste Management) Regulations, 2006
- Environmental Management and Coordination (Wetlands, River Banks, Lake shores and Sea shores Management) Regulations, 2009
- Environmental Management and Coordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006
- Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
- Public Health regulations
- Local Authority Regulations and by-laws
- Water Act, 2002
- Forest Act, 2005

International Agreements

- Convention on Biological Diversity (CBD)
- Cartagena Protocol on Bio-Safety
- United Nations Framework Convention on Climate Change (UNFCC)
- The Vienna Convention on the Ozone Layer Protection
- The Montreal Protocol of the Vienna Convention on Ozone Layer Protection
- Kyoto Protocol to the UNFCC
- United Nations Convention to Combat Desertification (UNCCD)
- Convention on International Trade in Endangered Species (CITES)
- Convention for the Protection of the World Cultural and National Heritage
- Convention on Wetlands of International Importance especially as Waterfowl Habitats (Ramsar Convention)
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- United NATIONS Convention on the Law of the Sea (UNCLOS)
- Convention on the Control of Trans-boundary Movement of Hazardous Wastes and their Disposal (Basel Convention)

Regional Agreements

- Bamako Convention on the hazardous wastes in Africa
- African Convention on the Conservation of Nature and Natural Resources
- The Nile Basin Treaty of 1929

Key Environmental Issues

- Inadequate capacity to interpret and enforce environmental legislation
- Conflict of environmental legislation and institutional mandates
- Undefined pre-existing ownership rights and utilization of natural resources
- Use of incentives to strengthen compliance for environmental management
- Introduction and acceptance to pay for ecosystem service and goods
- Over reliance on elaborate and lengthy court cases
- Formal institution in deliberating environmental cases
- Inadequate capacity to domesticate MEAs

Proposed Intervention

- Build capacity on interpretation and enforcement of environmental legislation
- Incorporation of community pre-existing rights in natural resource utilization
- Raise awareness on environmental legislation
- Devolve court systems up to the village council level and local environmental courts to help in fast tracking environmental decisions/cases
- Devolve funds for environmental management
- Build capacity to domesticate MEAs
- Institutionalize democratic, transparent, accountable and enforceable environmental management rules and Regulations
- Build synergies in institutional partnership

CHAPTER EIGHT

8.0 IMPLEMENTATION STRATEGY

8.1 Overview

This chapter focuses on the monitoring and evaluation system that will be used to assess the project implementation process during the plan period. It also presents implementation, monitoring and evaluation matrix, that the district will put in place to ensure that the implementation of the plan is carried out to achieve the objectives.

The District Implementation and Monitoring Action Plans were developed from intensive consultation workshops at district level. The range of consultation levels resulted in two action matrices for the Location and District level as follows:

The District Action Plan derives its information from Consultation Workshops,the Technical Planning Committee (TPC), and additional input from the Review Technical Team from NEMA Headquarters,

Implementation of the Action Plan as mentioned in the preceding sections will not be a preserve of NEMA but all Kenyans and non-Kenyans. It is everybody's duty to identify any environmental intervention activity or activities in this report and implement. This will involve resource mobilization from within the district, Province, nationally and even internationally.

The donor community through registered NGOs and CBOs can support some of the intervention strategies identified for addressing the challenges in the district. The Government of Kenya through various programmes in other ministries will play an active role in addressing the many challenges. Sectors like water, energy, forest, Mining, fisheries, roads, housing, local authority, education, research and disaster management, agriculture and livestock may individually or collectively through allocation of funds implement environmental remedial measures.

8.2 Monitoring and evaluation

Monitoring and evaluation will be carried out using participatory approaches where stakeholders are involved at all stages. It will be undertaken on continuous basis through meetings and field visits. Reports will be discussed at all stages while quarterly reports will be prepared and reviewed. Evaluation will be undertaken periodically preferably on annual basis in the line with the performance-contracting period in the public service. The purpose of evaluation is to ensure efficient and effective implementation as well as ensuring that environmental concerns have been

addressed and integrated in development process. It will involve documentation of best practices for the purpose of replication. The implementation strategy will be evaluated using the matrices as shown in table 8.1 below.

17.0 IMPLEMENTATION STRATEGY

Table 24 *Implementation Matrix*

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Forestry	Ecosystem maintenance	Protecting endangered and endemic plant species.	Zonation map of the forest reserve	Zonation of Mt. Elgon forest reserve	5yrs	NMK KWS NEMA MOA Community DRSRS KEFRI ICRAF	KFS	Map will show spatial location and distribution of endangered, rare and endemic species
			Inventory of endemic, rare and threatened plant species	Document all endemic, rare and threatened plant species	5YRS	NMK KWS NEMA MOA Community DRSRS KEFRI ICRAF	KFS	Continuous exercise
				Develop ecosystem monitoring indicators	5yrs	NEMA KWS Community ICRAF WRMA NMK	KFS	
			Threatened, rare and endemic plant species conserved	Encourage planting of threatened indigenous tree species in the forest and farmlands.	5yrs	KWS NEMA MOA Community KEFRI ICRAF	KFS	continuous

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Forestry contd.		Fire management	Fire prevention and management strategy	Maintain firebreaks within plantation and natural forest areas.	5yrs	Community OP NEMA KWS MOA	KFS	continuous
				Encourage the adjacent neighborhood to maintain their common boundaries with the forest.	5yrs	Community OP NEMA KWS MOA	KFS	continuous
				Increased surveillance through setting up and maintenance of fire watch towers	5yrs	KWS NEMA Community OP	KFS	Maintain 2 Built 2
				Built capacity for Personnel and community on forest fire management	5yrs	KWS NEMA Community	KFS	I month training for 8 people
				Prepare fire management plans for the forest reserve.	1st yr	KWS NEMA MOA Community KEFRI	KFS	First year activity
		Promote afforestation for wood and timber products	Increased tree cover	Raise 5M exotic and indigenous tree seedlings	5yrs	NEMA MOA Community KEFRI ICRAF	KFS	Target of 1M annually

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Forestry contd.				Promoting On - farm tree planting	5yrs	NEMA MOA Community KEFRI ICRAF OP DSDO MCC Youth	KFS	Training and inputs
				Support community tree nurseries	5yrs	CBOS Community NEMA MOA KEFRI ICRAF	KFS	Technical support, grants
	Rehabilitation of degraded sites	To rehabilitate ecologically fragile and degraded sites	Degraded sites re-afforested	Support to community participation in rehabilitation program	5YRS	NEMA MOA Community KEFRI ICRAF OP DSDO MCC Youth	KFS	CBOs, and individual farmers
				Seedlings production of indigenous tree seedlings	5YRS	NEMA MOA Community KEFRI ICRAF OP DSDO MCC Youth	KFS	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Forestry contd.				Identification and mapping of degraded areas	5YRS	NEMA MOA Community KEFRI ICRAF OP DSDO MCC Youth	KFS	Simple maps
				Enhance patrols to encourage natural regeneration	5yrs	Community OP MoA NEMA WRMA Youth	KFS	Public awareness
	Sustainable utilization of forest resources	Promote sustainable forest resource use regime	Forest resources sustainably used	Enforce regulations that control use of forest products	5yrs	Community MoA NEMA WRMA Youth DEC	KFS	Licensing, patrolling, easements
				Enhance patrols to curb illegal removal of forest products.	5YRS	Community NEMA Youth DEC	KFS	
			A district biodiversity inventory	Conduct an Inventory of biodiversity in Mt. Elgon district	3RD YR	NEMA MOA Community KEFRI ICRAF OP NMK	KFS	consultancy

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Forestry contd.			Forest based IGAs	Promote community forest based income-generating activities.	5yrs	NEMA MOA Community KEFRI ICRAF OP DLPO Youth DSDO	KFS	Ecotourism, bee keeping, wood based industries
	Plantation management	Increase plantation forest for commercial use	Area under plantation increased	Plant 1500ha of plantation tree species	5YRS	NEMA MOA Community KEFRI ICRAF OP DLPO Youth DSDO	KFS	
			Community and private sector participation in plantation forestry	Facilitate community and private sector participation in plantation management	5yrs	NEMA Community KEFRI ICRAF OP DLPO Youth DSDO KWS	KFS	Through capacity building
	Maintaining the integrity of the protected areas	Forest boundary maintenance	Integrity of the protected forest reserve maintained	Intensify patrols along the forest boundary.	5yrs	NEMA Community KEFRI ICRAF OP Youth KWS DRSRS MERECP	KFS	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Forestry Contd.				Boundary marking and alignment	5YRS	NEMA Community KEFRI OP SoK DRSRS KWS MERECP	KFS	Survey and re-survey- 100km
		Enhance tea buffer belt around indigenous and plantation forests	Tea buffer belt maintained	Target to raise 30,000 assorted indigenous and exotic tree seedlings	5yrs	NEMA KFS Community KEFRI ICRAF OP DLPO Youth DSDO KWS	NTZC	Rehabilitation of degraded
				Target to plant 30ha of both exotic and indigenous species.	5yrs	NEMA KFS Community KEFRI ICRAF OP DLPO Youth DSDO KWS	NTZC	Rehabilitation of degraded
	Urban forestry	Increase urban tree cover i.e. greener towns	Greener and cleaner towns	Raise 200,000 tree seedlings for urban forestry	5yrs	KFS NEMA Private sector Youth	MECC	40,000 seedlings per year

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Wildlife	Management of human-wildlife conflicts	To reduce incidences of human-wildlife conflicts	Reduced human-wildlife conflicts	Monitoring spatial and temporal distribution of wildlife in the Forest Reserve.	5YRS	NEMA Community OP DLPO DSDO KFS	KWS	
				Prompt response to human-wildlife conflict issues.	5YRS	NEMA Community OP DLPO MOA MOH Youth KFS	KWS	
				Intensify patrols along human-wildlife conflict areas.	5YRS	Community KFS OP Youth	KWS	
				Open outposts at strategic locations for effective animal control.	5YRS	Community KFS OP	KWS	2 outposts
			Enhanced community participation in resolving human-wildlife conflicts	Equipping community members with basic tools for handling problem animals.	5YRS	NEMA Community KFS OP DLPO Youth DSDO DVO	KWS	
	Law enforcement	Curbing illegal activities e.g. logging, bush meat	Illegal activities reduced	Regular patrols	5YRS	Community KFS OP	KWS	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Wildlife contd.		Protection of endangered and endemic species of fauna and flora	An inventory of endangered animal species and their distribution	Carry out an inventory of endangered animal species distribution and abundance.	5yrs	NEMA Community KFS NMK OP DLPO DVO Youth DSDO CFA	KWS	
			Conservation strategies for endangered species	Develop specific conservation strategies	3rd yr	NEMA Community KFS OP DLPO Youth DSDO DVO	KWS	Technical consultancy services
			Wildlife monitoring system	Develop a monitoring system on habitat and animal trends	3rd yr	NEMA Community KFS OP DLPO Youth DSDO DVO	KWS	Technical consultancy services
Agriculture	Sustainable land management	Maintaining the productivity of soils for agricultural production	Increased land productivity	Soil fertility improvement	5yrs	NEMA KARI Community KFS ICRAF	MOA	Agro-forestry, organic fertilizer, composting
				Adoption of conservation agriculture	5yrs	NEMA KARI Community KFS ICRAF	MOA	Minimum tillage

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Agriculture contd.				Promoting soil conservation programs	5YRS	NEMA KARI Community KFS ICRAF	MOA	public education
		Increasing food production for subsistence and commercial purposes with minimal environmental damage	Food production enhanced	Support to agricultural extension services	5yrs	NEMA KARI Community KFS ICRAF OP DLPO WRMA KEPHIS	MOA	
	Agro-based pollution	Reduce agro-based pollution	Reduced agro-based pollution	Built capacity for communities on judicious use of fertilizers and agro-chemicals	5YRS	NEMA KARI Community KFS ICRAF OP DLPO WRMA KEPHIS	MOA	Sensitization
				Inspecting stockers to ensure sell of non-hazardous chemicals to farmers	5YRS	NEMA KARI Community KFS ICRAF OP DLPO WRMA KEPHIS POISONS BOARD	MOA	Register stockists

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Agriculture contd.				Promotion of integrated pest management	5yrs	NEMA KARI Community KFS ICRAF OP DLPO WRMA KEPHIS	MOA	
	Cultivation in ecologically fragile areas	To conserve ecologically fragile areas	Ecologically fragile areas mapped	Identify and map fragile agricultural land for purposes of conservation	5YRS	NEMA KARI Community KFS ICRAF OP DLPO WRMA KEFRI Farm owners	MOA	To inform relevant authorities for interventions
		River bank protection	River banks protected from encroachment	River bank protection by pegging		NEMA KARI Community KFS ICRAF OP DLPO WRMA KEFRI Farm owners	MOA	Support community initiatives in riverbank protection.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Agriculture contd.				Support community initiatives in river bank protection	5yrs	NEMA KARI Community KFS ICRAF OP DLPO WRMA KEFRI Farm owners	MOA	Support alternative land use practices
	Land use	Achieve harmony between different land uses	Environmental impact reviews of land use practices	Continuous review of land use practices and their impact on the environment.	5YRS	NEMA KARI Community KFS ICRAF OP DLPO WRMA KEPHIS	MOA	Review meetings and reports
Livestock	poultry production	Improvement of local poultry production	Improved livelihoods	Capacity building	5yrs	NEMA KARI Community KFS ICRAF OP WRMA	DLPO	
				Promote improved hatching-fabricated incubators using paraffin	5YRS	KARI Community ICRAF OP Private sector schools	DLPO	Demonstrations on management

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Livestock contd.	Dairy production	Improvement of milk production	Increased milk output and improved livelihoods	Promote modern dairy techniques	5yrs	KARI Community ICRAF OP Private sector Schools MOA	DLPO	Upgrading of local herd, Promoting zero grazing, improvement of breeding stock, Napier bulking
				To encourage farmers to apply for livestock development loans from AFC	5YRS	DDO DCO DSDO Private sector AFC	DLPO	Operational costs
	Bee keeping	Improvement of honey production	Honey production enhanced	Promoting the use of modern beehives	5yrs	NGOs CBOs MOA DSDO Private sector MERECP KFS DDO	DLPO	Install modern beehives demos
			Value added to honey products	Promote value addition to honey	5yrs	DCO MOA Private sector DSDO DDO KFS NGOs CBOs	DLPO	Revive honey refinery in Kapsokwony, marketing

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Livestock contd.	Livestock pastures/grazing	To balance between forest grazing, development of on-farm pastures and conservation	Pressure on forest reserve for grazing reduced	Development of on-farm pasture	5yrs	MOA ICRAF KARI KEFRI Community OP KFS	DLPO	On-farm pastures will improve productivity
Water	Provision of portable water	Increase availability of sufficient wholesome water for domestic and other economic activities	Improved access to clean water	Support community water projects	5YRS	NEMA KFS Community CDF OP WRMA DIO NGOs/CBOs MECC	LVNWSB	Rehabilitation and construction of new schemes Support to existing ones
				Provision of clean water through proper management of water supply schemes	5yrs	NEMA KFS Community CDF OP WRMA DIO NGOs/CBOs DPHO DAO	LVNWSB	Water treatment, protection from encroachment, operation and maintenance
		Effective operation and maintenance of water supplies/facilities	Water services privatized	Encouraging privatization of water services and handing over GoK schemes to other water supply operators	5yrs	NEMA KFS Community CDF OP WRMA DIO NGOs/CBOs DPHO DAO	LVNWSB	Clustering of small schemes, rehabilitation, capacity building

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Water contd.	Catchments protection	To maintain catchment functions	River banks protected for water quality and quantity	River bank protection	5yrs	KFS NEMA MOA OP Community DSDO	WRMA	Public awareness and participation.
				Enforce the provisions of Water Act 2002. Enforce water rules	5YRS	KFS NEMA MOA OP Community DSDO	WRMA	
			Gazetted catchment areas	Delineating and gazettment of water catchment areas	5yrs	KFS NEMA OP Community DSDO	WRMA	Better protection for catchment areas
				Afforestation and rehabilitation of degraded catchment areas	5yrs	KFS NEMA OP Community DSDO	WRMA	
			Data base on catchment conditions	Identify gaps and collect primary data on catchment conditions	2nd yr	KFS NEMA Community DPHO DWO	WRMA	Consultancy services
	Water pollution	Limit industrial pollution from coffee factories	Improved river water quality	Monitoring of water quality	5YRS	NEMA DPHO Coffee factories Community	WRMA	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Water contd.			Compliance to Water Quality Regulations, 2006 enhanced	Enforcement of water quality regulations 2006	5yrs	DPHO WRMA Coffee factories Community Private sector OP DEC	NEMA	Awareness, inspections, investigations and prosecutions
				Environmental audits	5yrs	Coffee factories Community Private sector DEC	NEMA	Awareness, inspections, follow ups
				Promotion of cleaner production	5yrs	DPHO WRMA Coffee factories Community Private sector DEC	NEMA	Trainings, technology transfers, follow up on EMPs
				Rehabilitation of high priority stations (RGS) and rainfall stations.	2nd yr	KFS NEMA Meteorology	WRMA	A one off activity followed by maintenance
				Determining pollutant transport into water bodies.	2ND YR	DPHO NEMA Coffee factories MOA OP	WRMA	Consultancy services required
	Sustainable water resource management	Minimizing water use, improving the efficiency of water use.	Alternative water resources developed	Promote rainwater harvesting.	5yrs	DWO MOA Community DSDO	WRMA	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Water contd.			Water users involved in resource management	Formation of water resources users' associations to manage water resources	5yrs	DSDO OP NEMA KFS MOA Community	WRMA	8 major basins
			Estimates of available river water	Determining water balances in the sub catchment	5YRS	NEMA KFS MOA Community	WRMA	For apportionment decisions
				Water apportionment	5yrs	NEMA KFS MOW DWO Community	WRMA	Permitting-generates revenue
Fisheries	Promotion of aquaculture	Increase fish production from farms-ponds	Increased No. of farmers and fish output	To enhance extension and technical support	5yrs	NEMA KFS WRMA DLPO DWO MOA OP Community	Fisheries	1st year includes capacity building-transport for dept for extension
	Trout fishing	Develop trout fishing potential of the district	Trout fish farming established	To implement to Trout Development Project	5yrs	NEMA KFS WRMA DLPO DWO MOA OP Community	Fisheries	Establishment of nursery for fingerlings, promote spot fishing

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Tourism	Ecotourism development	Enhance community benefits from conservation and natural resources	Community benefits enhanced from ecotourism	Infrastructure improvement and development	5yrs	KWS MERECP TTF	MCC	Electricity, communication, accommodation and security are essential
				Develop ecotourism ventures in the forest reserves and outside-Establish guided cultural villages and rural cave tour, curio shops for handicrafts	5yrs	KWS MERECP TTF	MCC/KWS	Strengthen ecotourism and cultural groups
	Sustainable tourism development	Making tourism support conservation	Appropriate environmental standards and controls for protecting environmental assets that support tourism	Enforcement of EIA and EA requirements	5yrs	KWS MERECP TTF	NEMA	
				Develop a sustainable district tourism plan		KWS NEMA MERECP TTF Community DEC	MCC/KWS	To provide roadmap for sustainable tourism
Energy	sustainable wood fuel	Providing sustainable wood fuel without environmental degradation	Sustainable wood fuel	Promotion of on-farm woodlots for fuel wood	5YRS	NEMA MERECP Community DEC MOA	KFS	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Energy contd.	Renewable sources of energy	To promote the use of renewable sources of energy	Biogas and solar energy developed and adopted by the community	Develop capacity to tap biogas, wind, and solar energy	5yrs	NEMA DLPO KFS Community NGOs/CBOs	MOA	Sensitization, demos, tours, material support
	Access to electricity	Providing access to electricity to a majority of households and urban centers.	Improved access to electricity	Expanding electricity supply.	5yrs	OP DDC	KPLC	No cost estimates available
				To develop micro hydro-electric power plants	5yrs	Community KFS WRMA NEMA MPND	MoE	
	Environmental impact assessment	Environmental impact assessment of energy demands on the environment	EIA Report	Undertake EIA of energy consumption	2nd yr	MOA KFS Community DLPO	NEMA	Present and forecasted energy demand against availability
Irrigation	Sustainable irrigation practices	To increase land utilization through irrigation and drainage	Land under irrigation increased	Construction of irrigation and drainage infrastructure-150ha	5yrs	Community Contractors OP	Irrigation	
			A new project identified every year	undertaking of investigations to identify new projects	5YRS	Community OP MOA WRMA NEMA DSDO		Logistics-water quality gauging, 1 project under investigation

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Irrigation			Soil, hydrological and topo surveys	Soil, hydrological and topo surveys for design of projects	5yrs	Community OP MOA WRMA NEMA DSDO		
			Irrigation water users associations	Enhancing farmer organization and participation		DSDO MOA NEMA WRMA OP FARMERS		Formation, registration and training of irrigation water users associations
			Farmers capacity enhanced	Capacity building of farmers through training and exchange visits	5yrs	Private sector MoA WRMA DSDO NGOS/CBOS		Field days, on-site trainings, institutionalized training etc
	Horticultural production	Improve horticultural production	Improved output of horticultural produce	Farmer mobilization	5yrs	OP Irrigation NGO/CBO DSDO DCO Farmers	MoA	
				Capacity building for horticultural farmers	5YRS	OP Irrigation NGO/CBO DSDO DCO Farmer	MOA	Trainings, tours, demos, follow up activities

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Infrastructure	Poor road network	To improve road network	Improved roads	gravelling, grading, and tarmacking roads	5yrs	NEMA OP KFS DPP MECC Private sector KWS	MoR	
Mining	Abandoned and disused quarry sites	To ensure that all abandoned and disused quarries are rehabilitated and useful	Sustainable landscapes and land use	to rehabilitee abandoned and disused quarry sites through re-afforestation and landscaping	5 yrs	Private sector community	KFS/MG/ NEMA MECC	
	Controlling quarrying activities	To ensure new and on-going quarrying activities are sustainable	Controlled quarrying activities	Enforce EIA/EA requirements	5yrs	Private sector community	NEMA	Inspections, sensitization meetings, prosecutions
Settlements	Sustainable urban settlements.	To ensure sustainable urban settlements	Planned urban centres	Physical planning of urban centers	5yrs	NEMA OP KFS MOA DPHO DPP DLASO	MECC	Plan and implement at least 4 plans
			Dumpsite and transport facilities	To provide for a dumpsite and waste transport facilities	1yr	NEMA OP KFS MOA DPHO DPP DLASO	MECC	Comply with waste management regulations

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Settlements	Water and sanitation	Improving the level of sanitation in both rural and urban areas.	Reduction in sanitation related mortality and morbidity	Public education and sensitization	5yrs	NEMA OP KFS MOA DPHO DPP DLASO	DPHO/MCC	
				Enforcement of the Public Health Act	5YRS	NEMA OP MECC	DPHO	
	Lands and settlements	Initiate settlement process in the Chebyuk settlement scheme	Land adjudicated, registered and title deeds issued	land adjudication, registration, and issuance of title deeds	5yrs	NEMA OP DPP KFS Community	DLSO	
		Environmental restoration of the settlement areas	Increased tree cover in the settlement and evicted areas	Encouraging reforestation in the settlement	5yrs	NEMA OP MOA DPHO DPP DLASO	KFS	
Education	Environmental education for schools	To support environmental education in schools	Greener and cleaner schools	Capacity support to schools, environmental and 4K clubs in schools.	5yrs	DEO KFS MOA KWS	NEMA	At least 20 schools annually
			Aware students	Environmental talks and lectures.	5yrs	DEO KFS MOA KWS	NEMA	At least 20 schools annually
			Best practices	Environmental award scheme for schools	5yrs	DEO KFS MOA KWS	NEMA	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Education contd.	Public awareness and participation	Increase the level of public awareness on environmental issues	Increased public awareness and public participation in environmental conservation	Conducting regular public barazas	5yrs	DEO KFS MOA KWS OP	NEMA	
				Capacity building and collaboration with CSOs and private sector	5YRS	DEO KFS MOA KWS OP Pan paper CBOs	NEMA	Trainings and logistical support
				Participation in the World environment day, national tree planting day, and clean ups	5yrs	All	NEMA	Annual events
				Implement Environmental award scheme		NBI	NEMA	
	Transfer of environmentally sound technologies	To promote innovation and use of environmentally friendly technologies.	Increased use of environmentally friendly technologies	Promote ESTs	5yrs	OP MOA DPHO KFS Private sector	NEMA	Awareness creation, demos, documentation of IK

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Youth	Participation of the youth in environmental and natural resource conservation and protection	To increase the participation of the youth in the protection, conservation and improvement of the environment	▪ Increased youth awareness on environmental conservation ▪ Increased innovation in environmental management ▪ Improved quality of environment and reduced degradation	Collaborate with stakeholders in integrating environmental education for Sustainable development in training and education programs	5yrs	MOE NEMA CBOs NGOs FBOs UNEP UN HABITAT DEC schools	MYA	
				Conduct training and workshops on the use of alternative energy sources	5yrs	MOE NEMA CBOs NGOs FBOs UNEP UN HABITAT DEC schools	MYA	
				Tree planting as demonstrations	5yrs	MOE NEMA CBOs NGOs FBOs UNEP UN HABITAT DEC schools	MYA	
				Mass cleaning of towns and community awareness on hygiene	5yrs	MOE NEMA CBOs NGOs FBOs UNEP UN HABITAT DEC schools	MYA	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Youth contd.				Participation in the WED	5yrs	MOE NEMA CBOs NGOs FBOs UNEP UN HABITAT DEC schools	MYA	
				Formation of 4k and Young farmers clubs and out of school environmental organizations	5yrs	MOE NEMA CBOs NGOs FBOs UNEP UN HABITAT DEC schools	MYA	
			Improved youth participation in environmental management	Collaborate with NEMA and other stakeholders to promote youth participation in Forestry, waste reduction and recycling	5yrs	MOE NEMA NGOs CBOs UNEP KEFRI Private sector UN Habitat	MYA	
				Collaborate with MOA to engage the youth in environmentall y friendly farming practices	5yrs	MOA MOE NEMA CBOs NGOs FBOs UNEP UN HABITAT DEC Schools	MOYA	

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Youth contd.	Youth awareness	Increase awareness among the youth on environmental issues	Better informed youth on environmental issues and legislation	Carry out awareness campaigns on environmental issues	5yrs	NEMA MECC Youth Organizations FBOs NGOs/CBOs	MYA	
				Disseminate EMCA 1999 and regulations	5yrs	NEMA MECC Youth Organizations FBOs NGOs/CBOs	MYA	
				Mobilize, sensitize, register youth organizations and network them for effective participation	5yrs	NEMA MECC Youth Organizations FBOs NGOs/CBOs	MOYA and Social services	
				Enhancing the role of the youth in environmental advocacy and research	5yrs	NEMA MECC Youth Organizations FBOs NGOs/CBOs	MYA	
Industry, trade and Services	Compliance to relevant laws and best practices	To Ensure that potential and existing industries conform to environmental standards and regulations.	Sustainable industrial development	Sensitization on clean production	5yrs	Private sector MT&I KNCPC	NEMA	Workshops, tours, demos, award scheme

Table 8.1: Implementation Matrix contd.

Sector	Priority Issues	Objective	Outputs	Activities	Time Frame	Stakeholders	Responsible Institution	Remarks
Industry, trade and Services				Enforcing EIA/EA , waste management and water quality requirements	5yrs	Private sector MT&I MCD WRMA OP	NEMA	Inspection, monitoring and prosecutions
	Inventorying	To carry out an inventory of all industrial production processes and services in the district	An inventory	Carry out a district inventory	1st yr	Private sector MT&I MCD WRMA OP MECC	NEMA	Inventory to form the basis for enforcement and support
Disaster management	Disaster preparedness, prevention and management	To increase capacity for natural disaster prevention, preparedness and management	A Disaster management and prevention plan	Prepare and activate a disaster management and prevention plan	2 & 3rd yrs	OP NEMA MOA MOH KFS KP KRCS NGOs Community	DDMC	
			Disaster map	Identification and mapping of potential disaster areas	1st yr	OP NEMA MOA MOH KFS KP KRCS NGOs Community	DDMC	Will form the basis for the disaster management plan
Environmental information systems	An integrated environmental information system	To develop an EIS to support timely, efficient and effective decision-making.	An EIS	Identification and harmonization of data sets and formats	1st yr	All	NEMA	
				Development of EIS to support decision-making	5yrs	All	NEMA	Setting up a GIS based EIS and maintenance

8.2 Monitoring And Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Forestry	Zonation of Mt. Elgon forest reserve	▪ Zonation map ▪ Controlled forest utilization	Reports Maps	Annual	KFS	KFS DEC MERECP	Zonation will improve conservation and sustainable use of the forest reserve
	Document all endemic, rare and threatened plant species	Species lists	Reports photographs	Annual	KFS	KFS DEC MERECP	Documentation is key for species conservation strategies
	Encourage planting of threatened indigenous tree species in the forest and farmlands.	▪ Number seedlings planted in forest and farmlands ▪ Acreage planted ▪ No. of farmers planting threatened species	Reports Photographs	quarterly	KFS	KFS DEC	
	Develop ecosystem monitoring indicators	Ecosystem indicator species identified	Report	Semi-annual	KFS	KFS DEC NMK MERCP	Enables monitoring of changes in the ecosystem
	Maintain firebreaks within plantation and natural forest areas.	▪ Length of firebreaks maintained ▪ Fire incidents	Reports	Quarterly	KFS	KFS DEC NMK MERCP	
	Encourage the adjacent neighborhood to maintain their common boundaries with the forest.	▪ Length of boundary maintained ▪ Boundary marks ▪ Ha encroached	Reports	Quarterly	KFS	KFS DEC MERCP	Community /forest boundaries are critical in fire prevention and management
	Increased surveillance through setting up and maintenance of fire watch towers	▪ No. of fire watch towers set up and maintained ▪ No. of fire incidents	Reports Photographs	Quarterly	KFS	KFS DEC MERCP	Existing towers are inadequate and poorly maintained
	Built capacity for Personnel and community on forest fire management	▪ No. of personnel and communities trained ▪ New fire equipment acquired	▪ Training reports ▪ Inventory of fire equipment	Quarterly	KFS	KFS DEC MERCP	More emphasis will be put on capacity building for the communities

Table 25 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Forestry contd.	Prepare fire management plan for the forest reserve.	Fire management plan	▪ Planning and consultative meeting reports	Semi-annually	KFS	KFS DEC MERCP	Process will be all inclusive and consultative
	Raise 5M exotic and indigenous tree seedlings	▪ No. of tree seedlings ▪ No of nurseries established	▪ Reports ▪ Photographs	Quarterly	KFS	KFS DEC MERCP	To be used for rehabilitation of degraded sites
	Promoting On - farm tree planting	▪ No. of farmers ▪ No. of seedlings raised and planted ▪ No. of tree nurseries ▪ Acreage	▪ Reports ▪ Photographs	Quarterly	KFS	KFS DEC	Reduces pressure on the forest reserve
	Support community tree nurseries	▪ No. of community nurseries supported ▪ Type and number of tools, materials and equipment ▪ No. of seedlings raised	▪ Reports ▪ Photographs	Quarterly	KFS	KFS DEC	Communities are supported through organized groups
	support community in rehabilitation of degraded sites	▪ No of Community Action Plans ▪ Acreage rehabilitated ▪ Seedlings planted	▪ Photographs ▪ Reports	Quarterly	KFS	KFS DEC	Community involvement through provision of labor, seedlings and care
	Nursery production of indigenous tree seedlings in the forest stations	▪ No. of indigenous tree seedlings ▪ No. of tree species ▪ No. of nurseries	▪ Reports ▪ Photographs	Quarterly	KFS	KFS DEC	Continuous activity
	Identification of degraded areas	No. of degraded sites identified	▪ Reports ▪ photographs	Semi-annually	KFS	KFS DEC	Earmarked for rehabilitation
	Encourage natural regeneration	▪ Area under natural regeneration	▪ Reports ▪ photographs	Semi-annually	KFS	KFS DEC	Natural regeneration is ecologically the best for rehabilitation
	Regulation and control of use of forest products	▪ No. licenses and permits ▪ No. of cases prosecuted	Reports	Monthly	KFS	KFS DEC	Regulation in respect of wood products, grazing, firewood, honey and medicine collection etc.

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Forestry contd.	Conduct an Inventory of biodiversity in Mt. Elgon district	▪ Biodiversity inventory ▪ species distribution maps	▪ Reports	Annually	KFS	KFS DEC MERECP	Should be linked to wildlife inventory
	Promote community forest based income-generating activities.	▪ No. of IGAs supported ▪ No. of beneficiaries	▪ Reports ▪ Photographs	Semi-annually	KFS	KFS DEC MERECP	Promotes sustainable use of forest resources
	Increase patrols to curb illegal removal of forest products.	▪ No. and frequency of patrols ▪ No. of illegal activities reported ▪ No. of man days	▪ Reports ▪ Vehicle work tickets	Quarterly	KFS	KFS DEC	Illegal removal of forest produce is a major danger to sustainable utilization of forest resources
	Plant 1500ha of plantation tree species	▪ Acreage planted ▪ No. of seedlings planted	▪ Reports ▪ Photographs	Quarterly	KFS	KFS DEC	Buffers the indigenous forest cover
	Facilitate community and private sector participation in plantation management	▪ No. of meetings/workshops ▪ No. of stakeholders	Reports of meetings/ workshops	Semi-annually	KFS	KFS DEC	Anchored in the Forest Act 2005
	Intensify patrols along the forest boundary.	▪ No. and frequency of patrols ▪ No. of illegal activities reported	▪ Patrol and illegal activities Reports ▪ Vehicle work tickets ▪ Patrol schedules	Quarterly	KFS	KFS DEC	
	Boundary marking and alignment	Length of boundary marked	▪ Reports	Quarterly	KFS	KFS DEC	Supported by MERECP
	Target to raise 30,000 assorted indigenous and exotic tree seedlings	▪ No. of seedlings ▪ No. of tree species	▪ Reports ▪ photos	Quarterly	NTZC	NTZC DEC	Protection of the forest buffer
	Target to plant 30ha of both exotic and indigenous species.	▪ No. of planted seedlings ▪ Area planted	▪ Reports ▪ Photos	Quarterly	NTZC	NTZC DEC	Protection of the forest buffer

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Forestry contd.	Raise tree seedlings for urban forestry	▪ No. of seedlings raised and planted ▪ Area planted	▪ Reports ▪ Photos	Quarterly	MECC	MECC DEC KFS	Contribution towards greener and cleaner urban centers
Wildlife Sector	Monitoring spatial and temporal distribution of wildlife in the Forest Reserve	▪ Species lists ▪ Distribution maps	▪ Monitoring reports ▪ Photos	Semi-annually	KWS	KWS DEC KFS	Part of ecological monitoring
	Prompt response to human-wildlife conflict issues.	▪ Reported cases of human- wildlife conflicts ▪ Cases responded to ▪ Response time	▪ Reports ▪ Occurrence book/ Incidence records	Quarterly	KWS	KWS DEC	Elephants and buffaloes are the main problem animals
	Intensify patrols along human-wildlife conflict areas.	▪ No. and frequency of patrols ▪ No. of conflicts reported	▪ Patrol Reports ▪ Vehicle work tickets ▪ Patrol schedules	Quarterly	KWS	KWS DEC	Increased patrols will reduce incidences of human-wildlife conflicts
	Open outposts at strategic locations for effective animal control.	▪ No. of outposts ▪ No. of human-wildlife conflicts reported	▪ Reports ▪ Photos	Semi-annually	KWS	KWS DEC	Prevention of human-wildlife conflicts
	Equipping community members with basic tools for handling problem animals.	▪ No. of trainings ▪ No. of people trained ▪ No. of cases of community interventions	▪ Training reports ▪ Records of human-wildlife conflicts handled	Semi-annually	KWS	KWS DEC	Prevention of human-wildlife conflicts
	Regular patrols	▪ No. and frequency of patrols	▪ Patrol reports ▪ Vehicle work tickets	Quarterly	KWS	KWS DEC	Part of continuous monitoring
	Carry out a complete inventory of endangered animal species distribution and abundance.	▪ Inventory ▪ Species lists ▪ Distribution maps	▪ Reports ▪ Photographs	Annually	KWS	KWS DEC	Key step in designing species-specific and habitat conservation strategies
	Develop specific conservation strategies	▪ Conservation strategies	Reports	Annually	KWS	KWS DEC	Informed by species and habitat inventory
	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Wildlife contd.	Develop a monitoring system on habitat and animal trends	▪ M&E system for species and habitats	Reports	Annually	KWS	KWS DEC	Part of ecological monitoring
Agriculture	Soil fertility improvement	▪ No. of farmers ▪ Acreage ▪ Tonnage of compost manure	Reports	Quarterly	MoA	MoA DEC	Crop rotation, compost manure, green manure
	Adoption of conservation agriculture	▪ No. of farmers ▪ Acreage	▪ Reports ▪ photos	Quarterly	MoA	MoA DEC	
	Promoting soil conservation programs	▪ soil conservation structures ▪ No. of sensitization meetings ▪ No. of trainings	▪ Reports ▪ photos	Quarterly	MoA	MoA DEC	Targets farmers through sensitizations and trainings
	Agricultural extension services	▪ No. of farmers reached ▪ Types of services ▪ Farmer trainings	Reports	Quarterly	MoA	MoA DEC	Extension services are farmer-driven
	Judicious use of fertilizers and agro-chemicals	▪ Quantities of fertilizers and agro-chemicals used ▪ Soil sampling tests	▪ Reports ▪ Farm records	Semi-annually	MoA KARI	MoA DEC KARI	Sensitization on judicious use
	Inspecting stockers to ensure sell of non-hazardous chemicals to farmers	▪ No. of inspections	Inspection reports	Semi-annually	MoA	MoA DEC	Continuous surveillance and record keeping is key
	Promotion of integrated pest management	▪ No. of sensitization meetings ▪ No. of farmers practicing IPM	Reports	Quarterly	MoA	MoA DEC	IPM is ecologically sustainable and reduces pesticide use
	Identify and map fragile agricultural land for purposes of conservation	No. of sites identified	▪ Reports ▪ Photographs ▪ Maps	Quarterly	MoA	MoA DEC	Include hilly slopes, wetlands, lowlands and rocky places
	River bank protection by pegging-200km	▪ Length of river banks pegged	Reports	Quarterly	MoA	MoA DEC	On various critical rivers

8.2 Monitoring and Evaluation Matrix cond.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Agriculture contd.	Support Community Initiatives In River Bank Protection	▪ No. Of Community Groups Supported ▪ No. Of Seedlings Planted And Survived ▪ Types Of Initiatives	Reports	Quarterly	MoA	MoA DEC	Support Cbos To Raise And Plant Seedlings Along Pegged River Banks And In Iga
	Continuous review of land use practices and their impact on the environment.	▪ Land use surveys ▪ Land use guidelines ▪ No. of consultative meetings	Land use and impact reports	Annually	MoA/NEMA	MoA DEC	To be done through annual surveys and reviews involving relevant stakeholders
Livestock	Training through CIGs in NALEP	▪ No. of trainings ▪ No. of farmers trained	Training reports	Quarterly	DLPO	DLPO DEC NALEP	CIGs are based in NALEP Focal areas
	Improved hatching-fabricated incubators using paraffin	▪ No. of incubators ▪ No. of chicks hatched	Reports	Quarterly	DLPO	DLPO DEC	Promote poultry production as an IGA
	Promote modern dairy techniques	▪ No. of meetings ▪ No. of farmers trained	Reports	Quarterly	DLPO	DLPO DEC	Include promotion of organic fertilizer and biogas
	Encourage farmers apply livestock development loans from AFC	No. of farmers assisted	Reports	Quarterly	DLPO	DLPO DEC	Supports modern and sustainable livestock production
	Promoting the use of modern beehives	▪ No. of meetings ▪ No. of modern beehives ▪ No. of bee keepers	▪ Reports ▪ Photos	Quarterly	DLPO	DLPO DEC	Langstroth hives
	Value addition to honey	▪ No. of honey processing plants ▪ Honey products and by-products	▪ Reports ▪ Photos	Quarterly	DLPO	DLPO DEC	Great potential exists

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Livestock contd.	Development of on-farm pasture	▪ No. of farmers ▪ Acreage ▪ Tones of pasture	Reports	Quarterly	DLPO	DLPO DEC	Improves livestock production and mitigates against impacts of excessive forest grazing
Water	Support community water projects	▪ No. of community water projects	Reports	Quarterly	MoW/LVNWSB	MoW/LVNWSB DEC	Projects are funded by GoK, CDF etc.
	Provision of clean water through proper management of water schemes	▪ Management training for committees ▪ Elections	Reports	Quarterly	MoW/LVNWSB	MoW/LVNWSB DEC	Poor management has been a major set back for community projects
	Encouraging privatization of water services and handing over GoK schemes to other water supply operators	No. of privatizations	▪ Reports ▪ Privatization documents	Semi-annually	MoW/LVNWSB	MoW/LVNWSB DEC	Has basis in the water sector reforms and the Water Act 2002
	River bank protection	▪ Length of river banks protected	Reports	Quarterly	WRMA	WRMA DEC	Collaboration with other stakeholders
	Enforcing the provisions of Water Act 2002.	▪ No. of enforcement cases e.g. warnings, prosecutions	▪ Enforcement reports	Quarterly	WRMA	WRMA DEC	Enforcement has been a major challenge
	Delineating and gazettement of water catchment areas	▪ No. of delineated areas ▪ No. of gazetted catchment areas	▪ Reports ▪ Gazette notices	Semi-annually	WRMA	WRMA DEC	To offer protection and sustainability of water sources
	Afforestation and rehabilitation of degraded	▪ No. of seedlings planted ▪ Acreage	Reports	Quarterly	WRMA	WRMA DEC	Collaborate with KFS and communities

	catchment areas						
	Identification of gaps and development terms of reference for primary data on catchment conditions	▪ Data gaps identified ▪ ToRs for primary data on catchment conditions	Reports	Annually	WRMA	WRMA DEC	To provide baseline information for subsequent monitoring

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Water contd.	Monitoring of water quality	▪ Monitoring schedules and protocols ▪ Water quality parameters	Monitoring reports	Quarterly	WRMA	WRMA DEC	Water quality data is currently inadequate
	Enforcement of water quality regulations 2006	▪ No. of license applications ▪ No. of licenses ▪ No. of prosecutions	▪ Reports ▪ Licenses	Quarterly	NEMA	NEMA WRMA DEC	Effluent licenses
	Environmental audits	No. of audits	Audit reports	Quarterly	Industrial concerns	NEMA WRMA DEC	Major polluters of water are coffee factories
	Promotion of cleaner production	▪ No. of sensitization meetings on CP ▪ No. of facilities adopting CP	Reports	Semi-annually	Facilities NEMA WRMA	NEMA WRMA DEC	CP is a tool for pollution prevention and commercial competitiveness
	Rehabilitation of high priority stations (RGS) and rainfall stations.	No. of stations rehabilitated	Reports	Semi-annually	WRMA	WRMA DEC	Maintenance has not been adequate
	Determining pollutant transport into water resource bodies.	Inventory of pollutants	▪ Reports ▪ Inventory	Annually	WRMA	WRMA DEC	Includes pollutant quantity, types and sources
	Promote rainwater harvesting.	▪ No. of sensitization meetings and demos ▪ No. of rain harvesting structures	▪ Reports	Semi-annually	WRMA	WRMA DEC	To supplement surface water and increase accessibility
	Formation of water resources users' associations to manage water resources	▪ No. of sensitization meetings ▪ No. of WRUAs	Reports	Quarterly	WRMA	WRMA DEC	Provided for in the Water Act 2002
	Determining water balances in the sub catchment	Water balance established	Reports	Annually	WRMA	WRMA DEC	Not available at present. It forms part of water resources monitoring

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Water contd.	Water apportionment	▪ No. of water permits for extraction ▪ Volumes of water extracted	▪ Water permits ▪ Reports	Annually	WRMA	WRMA DEC	To sustainably meet water requirements by competing interests and users
Fisheries	Extension and technical support	▪ No of fish farmers	Reports	Quarterly	Fisheries Department	Fisheries Department DEC	Potential for fish farming has not been exploited
	Trout Development Project	Project in place.	▪ Reports ▪ Photos	Quarterly	Fisheries Department	Fisheries Department DEC	Project has been on hold due to funding
Tourism	Infrastructure improvement and development	▪ Length of roads ▪ Accommodation facilities	▪ Reports ▪ photos	Semi-annually	MECC	MECC DEC DDC Roads and public works	Poor infrastructure has hindered development of tourism potential
	Develop ecotourism ventures in the forest reserves and outside.	No. and variety of tourism ventures developed	▪ Reports ▪ Photos	Semi-annually	MECC	MECC DEC KWS	Cultural villages, Cave exploration, curio shops, nature trails etc
	Enforcement of EIA and EA requirements	No. of EIA and EA reports	EIA and EA reports	Quarterly	NEMA	NEMA MECC KWS DEC	Promote sustainable tourism
	Develop a district tourism plan	District tourism master plan	▪ Reports ▪ Minutes of consultative meetings	Semi-annually	MECC KWS NEMA	MECC KWS NEMA DEC	Provide a road map for sustainable tourism development
Energy	Promotion of on-farm woodlots for fuel wood	▪ No. of farmers ▪ Acreage	Reports	Quarterly	KFS	KFS DEC	Reduce pressure on the forest reserve and generate income for farmers

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Energy	Develop capacity to tab biogas, wind, and solar energy	▪ No. of trainings/ sensitization meetings ▪ Units of biogas, wind and solar energy	▪ Reports ▪ Minutes of the meetings ▪ Training manuals	Semi-annually	DLPO/MoA/ NEMA/private sector	DEC	Alternative energy has not been previously given attention
	Expanding electricity supply.	▪ No. of new connections to the grid ▪ Length of new grid	▪ Reports ▪ photos	Annually	KPLC	KPLC DEC/DDC	Increase access to energy
	Undertake EIA of energy consumption	EIA report	▪ EIA report ▪ Minutes of consultative meetings	Annually	NEMA	NEMA DEC	1 EIA study
Irrigation	Construction of irrigation and drainage infrastructure-150ha	▪ Irrigation infrastructure ▪ Acreage	▪ Reports ▪ photos	Semi-annually	Irrigation dept.	Irrigation dept. DEC	Target 150 ha
	undertaking of investigations to identify new projects	▪ New projects identified	▪ Investigation reports ▪ photos	Annually	Irrigation dept	Irrigation dept DEC	1 new project area to be identified annually
	Soil, hydrological and topo surveys for design of projects	▪ Survey maps ▪ Project designs	▪ Survey maps ▪ Project design reports	Annually	Irrigation dept	Irrigation dept DEC	Baseline information for design
	Enhancing farmer organization and participation	▪ Irrigation water users associations-IWUAs	▪ Reports ▪ Minutes of IWUAs	Semi-annually	Irrigation dept	Irrigation dept DEC	Formation and strengthening of IWUAs
	Training of farmers on irrigation and water management issues	▪ No. of trainings ▪ No. of farmers trained	▪ Training manuals ▪ Training reports	Quarterly	Irrigation dept	Irrigation dept DEC	Capacity building in consultation with relevant stakeholders
	Organize farmer tours	▪ No. of tours ▪ No. of farmers	Reports Photos	Semi-annually	Irrigation dept	Irrigation dept DEC	Exposure and technology transfer
	Mobilization of farmers	No. of sensitization meetings	Reports	Quarterly	Irrigation dept	Irrigation dept DEC	Through farmers meetings and information dissemination

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Irrigation contd.	Capacity building for horticultural farmers	▪ No. of trainings ▪ No. of farmers trained	▪ Training manuals ▪ Training reports	Quarterly	Irrigation dept	Irrigation dept DEC	Horticultural production is the target sector for irrigation development
Infrastructure	Gravelling, tarmmacking and grading roads	▪ Length of roads ▪ No. and names of roads	▪ Reports	Semi-annually	Roads Dept.	Roads Dept. DDC/DMEC	The road network is very poor
	Expansion of the electricity grid to Cheptais and Kaptama	▪ Length of electricity line ▪ No. of households and facilities connected	▪ Reports	Semi-annually	KPLC	DDC/DMEC KPLC	Electricity connectivity is very low
Mining	1. Afforestaion 2. landscaping	▪ Acreage reforested ▪ No. of seedlings ▪ Area landscaped	▪ Reports	Quarterly	KFS/NEMA/Works	KFS NEMA DEC	Quarry rehabilitation after use
	Enforce EIA/EA requirements	▪ No. of EIA applications and approvals ▪ No. of prosecutions	▪ Reports ▪ Cases prosecuted	Quarterly	NEMA	NEMA DEC	Includes inspections, warnings, monitoring, and prosecutions
Settlements	Physical planning of major urban centers, particularly Kapsokwony and Cheptais	▪ No of towns planned	▪ Physical development plans	Semi-annually	MECC	MECC DEC	All towns lack physical development plans
	Purchase land for a dumpsite	▪ Land purchased	▪ Land title deed or ownership documents ▪ Transaction records	Semi-annually	MECC	MECC DEC	The MECC does not have designated waste management sites
	Purchase a solid waste transportation vehicle	▪ Vehicle purchased	▪ Vehicle log book ▪ Purchase documents	Semi-annually	MECC	MECC	To comply with waste management regulations. A one-time activity
	Public education and sensitization	▪ No. of sensitization meetings ▪ No. of people sensitized	▪ Reports	Quarterly	MECC/NEMA	MECC NEMA	Sensitization on waste management

8.2 Monitoring and Evaluation Matrix contd.

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Settlements contd.	Enforcement of the Public Health Act	▪ No. of compliance notices to facilities ▪ No. of prosecutions	▪ Reports ▪ letters ▪ Cases prosecuted	Quarterly	DPHO	DPHO NEMA DEC	Enforcement has been and remains a challenge
	Proposed settlement at Chepyuk	▪ No of plots adjudicated, ▪ No of registered plots ▪ No. of titles issued .	▪ Registered index maps ▪ Title deeds issued	Annual	NEMA	NEMA DEC	Will provide baseline information on impact of the settlement conflict on the environment
	Encouraging reforestation in the settlement	▪ Area reforested ▪ No. of seedlings planted ▪ No. of farmers	▪ Reports ▪ Photos	Quarterly	KFS	KFS DEC	On-farm forestry to address massive loss of tree cover in the settlement
Education	Capacity support to schools, environmental and 4K clubs in schools.	▪ No. of schools supported ▪ No. of environmental active clubs in schools	▪ Reports ▪ Photos	Quarterly	NEMA	NEMA DEC	Promote the concept of eco-schools
	Environmental talks and lectures.	▪ No. of talks and lectures held	▪ Reports ▪ Photos	Quarterly	NEMA	NEMA DEC	Promote environmental awareness in schools
	Environmental award scheme for schools	▪ No. of awards ▪ No. of schools	▪ Reports ▪ Award criteria	Annually	NEMA	NEMA DEC	Encourage best practices
	Conducting regular public barazas	▪ No. of barazas	▪ Reports ▪ Photos	Quarterly	NEMA	NEMA DEC	Promote public awareness on environmental issues
	Capacity building and collaboration with CBOs	▪ Workshops and meetings	▪ Reports ▪ Minutes of meetings	Quarterly	NEMA	NEMA DEC	NEMA/CSOs collaboration is a strategic issue
	Participation in the World Environment Day, national tree planting day, and clean up day	▪ Participation in the events ▪ No. of events participated in	▪ Reports ▪ Photos	Quarterly	NEMA	NEMA DEC	An avenue for awareness creation and promoting participation

8.2 Monitoring and Evaluation Matrix

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Education contd.	Implement Environmental award scheme	▪ No. of awards	▪ Reports and minutes ▪ Award criteria	Annually	NEMA	NEMA DEC	Promote best practices
	Promote ESTs	▪ No. and type of ESTs ▪ No. of adopters	▪ Reports ▪ Photos	Semi-annually	NEMA	NEMA DEC	Promote sustainable practices
Youth	Collaborate with stakeholders in integrating environmental education in training and education programs	▪ No. of schools	▪ Reports ▪ Training manuals ▪ proceedings of workshops	Quarterly	MYA	MYA NEMA DEC	Part of implementation of ESD
	Conduct training and workshops on the use of alternative energy sources	▪ No. of trainings and workshops	▪ Training and workshop reports ▪ Photos	Quarterly	MYA	MYA NEMA DEC	Energy saving jikos, solar energy
	Tree planting demonstrations	▪ No. of demos ▪ No. of seedlings	▪ Reports ▪ Photos	Quarterly	MYA	MYA NEMA DEC	Demo plots for skills transfer
	Mass cleaning of towns and community awareness on hygiene	▪ No. of clean up events	▪ Reports ▪ photos	Quarterly	MYA	MYA NEMA DEC	Public awareness and participation events
	Participation in the WED	Participation	▪ Report ▪ Photos	annual	MYA	MYA NEMA DEC	An annual event spearheaded by NEMA
	Formation of 4k and Young farmers clubs and out of school environmental organizations	▪ No. of clubs	▪ Report	Quarterly	MYA	MYA NEMA DEC	Complement NEMA efforts with schools

8.2 Monitoring and Evaluation Matrix

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Youth contd.	Collaborate with NEMA and other stakeholders to promote youth participation in Forestry, waste reduction and recycling	Youth participation	Reports	Quarterly	MYA	MYA NEMA DEC	Participation in sensitization, demos, and actual implementation
	Collaborate with MOA to engage the youth in environmentally friendly farming practices	▪ Type and No. of practices ▪ No. of youth engaged	▪ Reports ▪ photos	Quarterly	MYA	MYA NEMA DEC	Inappropriate farming practices are the main cause of environmental degradation
	Carry out awareness campaigns on environmental issues	▪ No. of campaigns ▪ No. of participants	▪ Reports ▪ photos	Quarterly	MYA	MYA NEMA DEC	In collaboration with NEMA
	Disseminate EMCA, 1999	▪ No. of dissemination meetings/ workshops	Reports	Quarterly	MYA	MYA NEMA DEC	In collaboration with NEMA
	Mobilize, sensitize, register youth organizations and network them for effective participation	No. of youth organizations involved in environmental issues	Reports	Quarterly	MYA	MYA NEMA DEC	In collaboration with NEMA
	Enhancing the role of the youth in environmental advocacy and research	No. of advocacy events	Reports	Quarterly	MYA	MYA NEMA DEC	In collaboration with NEMA and other stakeholders
Industry, trade, services	Sensitization on clean production	▪ No. of sensitization meetings ▪ No. of participants	Reports	Semi-annually	NEMA	NEMA DEC	Major focus will be placed on coffee factories
	Enforcing EIA/EA , waste management and water quality requirements	▪ No. of license applications and licenses ▪ No. of prosecutions ▪ No. of inspections	▪ Reports ▪ Licenses ▪ License registers ▪ Court rulings and proceedings	Quarterly	NEMA	NEMA DEC	Enforcement will be strengthened

8.2 Monitoring and Evaluation Matrix

Sector	Activity	Objectively Verifiable Indicators	Means of Verification	Reporting Schedule	Implementers	Responsible Institutions for M&E	Remarks
Industry, trade, services contd.	Carry out a district inventory	Inventory of facilities	Inventory	Annual	NEMA	NEMA DEC	Inventory of facilities is the basis for holistic enforcement
Disaster management	Prepare and activate a disaster management and prevention plan	Activated disaster management and prevention plan	▪ Plan ▪ Reports on Mock drills	Annual	DDMC	DDMC DEC	A one-time Consultative exercise with continuous revision
	Identification and mapping of potential disaster areas	Potential disaster areas identified and mapped	Maps	Annual	DDMC	DDMC	A one-time Consultative exercise with continuous revision
EIS	Identification and harmonization of data sets and formats	▪ Relevant data sets identified ▪ Data collection for multi-use format agreed	▪ List of data sets ▪ Reports ▪ Data collection and sharing protocol	Annual	NEMA	NEMA DEC	A one-time Consultative exercise with continuous revision
	Development of EIS to support decision-making	EIS in place	▪ Computer –aided EIS ▪ Manual EIS	Annually	NEMA	NEMA DEC	Will improve efficiency and effectiveness of decisions

APPENDIX
(Extract from EMCA)
PART IV OF THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT (1999) – ENVIRONMENTAL PLANNING

National Environment Action Plan Committee

1. There is established a committee of the Authority to be known as the National Environmental Action Plan Committee and which shall consist of:

a) the Permanent Secretary in the Ministry for the time being responsible for national economic planning and development who shall be the chairman;

b) the Permanent Secretaries in the Ministries responsible for the matters specified in the First Schedule or their duly nominated representatives;

c) four representatives of the business community to be appointed by the Minister;

d) representatives of each of the institutions specified in the Third Schedule;

e) five representatives of non-governmental organisations nominated by the National Council of Non-Governmental Organizations;

f) representatives of specialised research institutions that are engaged in environmental matters as may be determined by the Minister; and

g) a Director of the authority who shall be the secretary.

2. The National Environment Action Plan Committee shall, after every five years, prepare a national environment action plan for consideration and adoption by the National Assembly.

38. Provisions of the National Environment Action Plan

The national environment action plan shall: -

a) contain an analysis of the natural resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time;
b) contain an analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational equity;
c) recommend appropriate legal and fiscal incentives that may be used to encourage the business community to incorporate environmental requirements into their planning and operational processes;
d) recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development;
e) set out operational guidelines for the planning and management of the environment and natural resources;
f) identify actual or likely problems as may affect the natural resources and the broader environment context in which they exist;
g) identify and appraise trends in the development of urban and rural settlements, their impacts on the environment, and strategies for the amelioration of their negative impacts;
h) propose guidelines for the integration of standards of environmental protection into development planning and management;
i) identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general adverse impacts on the environment;
j) prioritize areas of environmental research and outline methods of using such research findings;
k) without prejudice to the foregoing, be reviewed and modified from time to time incorporate emerging knowledge and realities; and
l) Be binding on all persons and all government departments agencies, state corporations or other organs of Government upon adoption by the National assembly.

39. Provincial Environment Action Plans

Every Provincial Environmental Committee shall, every five years, prepare a provincial environment action plan in respect of the province for which it is appointed, incorporating the elements of the relevant district environment action plans prepared under section 40 and shall submit such plan to the chairman of the National Environment Action Plan Committee for incorporation into the national environment action plan.

40. District Environment Action Plans

Every District Environmental Committee shall, every five years, prepare a district environment action plan in respect of the district for which it is appointed and shall submit such plan to the chairman of the Provincial Environment Action Plan committee for incorporation into the provincial environment action plan proposed under section 39

41. Contents of Provincial and District Environmental Action Plans.
Every provincial environment action plan and every district environment action plan prepared under section 30 and 40 respectively shall contain provisions dealing with matters contained in section 38 (a), (b), (c), (d), (e), (f), (g), (h), (i), and (j)in relation to their respective province or district.

REFERENCES

GoK: Vision 2030, Government Printer, Nairobi, 2008.

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