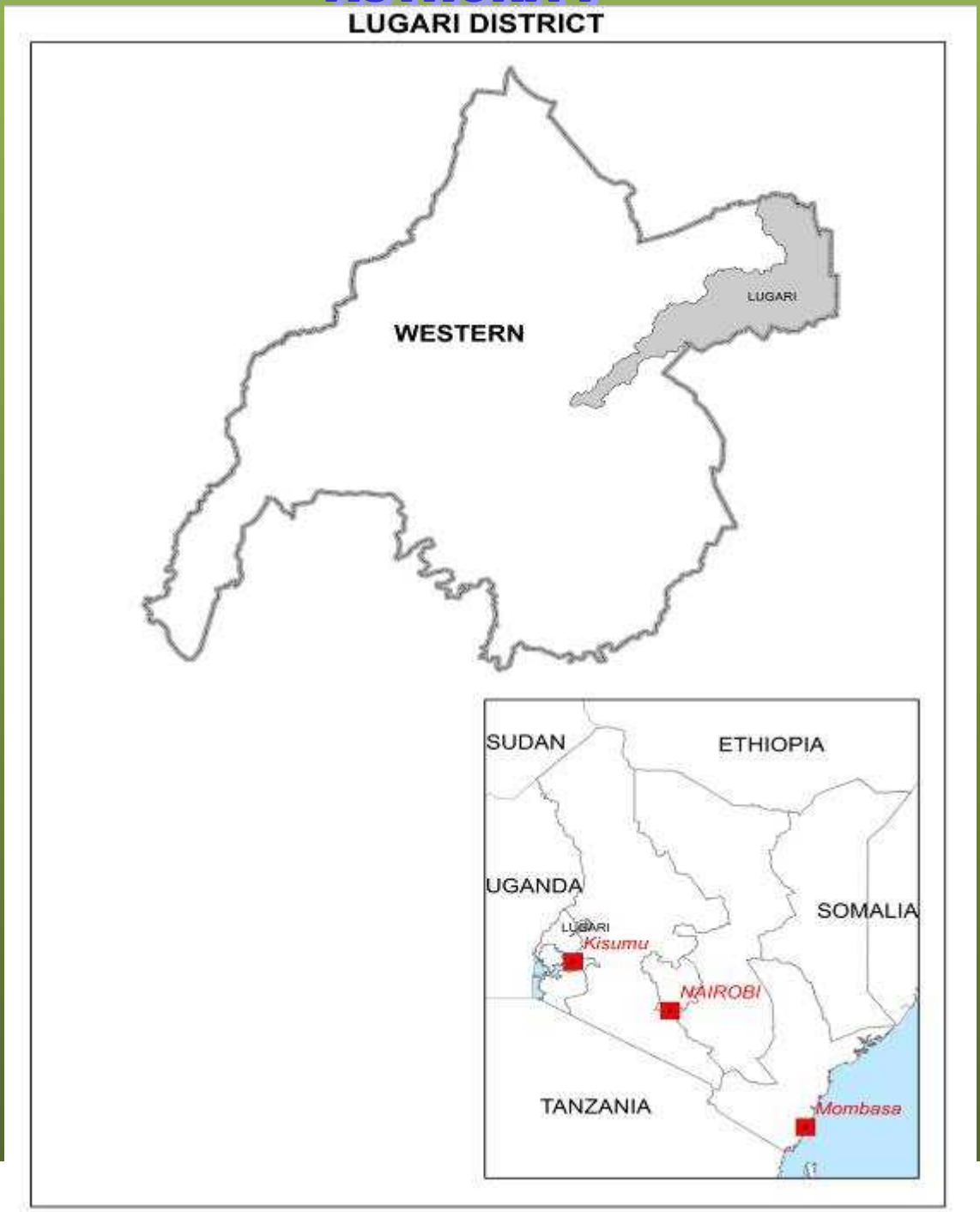
REPUBLIC OF KENYA
MINISTRY OF ENVIRONMENT AND MINERAL RESOURCES
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY



LUGARI 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 Lugari 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; socio-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 Location, Divisional and District 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.

I wish to underscore that the 2009-2013 DEAP report is a broad-based strategy that will enable the District attain sustainable development as envisaged in the Vision 2030.

Dr. Ayub Macharia (PhD),
DIRECTOR GENERAL (Ag),
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ACKNOWLEDGEMENT

On behalf of the National Environment Management Authority (NEMA), I would like to thank the Lugari 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 for their invaluable inputs and approval of this environmental action plan.

NEMA also acknowledges the contribution of the members of the local communities, who actively participated in the identification and prioritization of the environmental issues in their location which formed part of this document. Our sincere thanks goes to the District Officers (DOs), Chiefs and Assistant Chiefs who were instrumental in mobilizing the local communities and civil society organizations. Special thanks go to the civil society organizations that were drawn from entire the district who were instrumental in the identification of the environmental issues across the district.

We particularly appreciate the technical support provided by officers from the Environmental Planning and Research Coordination Department, NEMA Headquarters for their insights and dedication to this process.

Last but not least, I extend my gratitude to all those who contributed towards the finalization of this District Environmental Action Plan.

Dr. Kennedy I. Ondimu
DIRECTOR, DEPARTMENT OF ENVIRONMENTAL
PLANNING & RESEARCH CO-ORDINATION

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ACRONYMS

ACU	Aids control Unit
AIDS	Acquired Immune-Deficiency Syndrome
ASALs	Arid and Semi-arid Lands
CACC	Constituency AIDS control Committee
CAP	Community Action Plans
CBOs	Community Based Organizations
CHWs	Community health workers
CPDA	Christian partnership Development Agency
DACC	District AIDS control Committee
DALEO	District Agricultural, Livestock and Extension Officer
DC	District Commissioner
DDOs	District Development Officers
DDPs	District Development Plans
DEAPs	District Environment Action Plans
DEO	District Education Officer
DEOs	District Environment Officers
DFID	Department for International Development
DFO	District Forest Officer
DHMT	District Health Management Teams
DIDC	District Information and Documentation centre
DIMS	District Information Management System
DMOH	District Medical Officer of Health
DPHO	District Public health officer
DPT	District Planning Team
DPU	District Planning Unit
DVO	District veterinary officer
EA	Cumulative Environment Assessment
EMCA	Environment Management and Coordination Act
EMS	Environment Management System
ERSW&EC	Economic Recovery Strategy for Wealth and Employment Creation

GDP	Gross Domestic Product
GIS	Geographical information System
GMOs	Genetically Modified Organisms
GOK	Government of Kenya
GTZ	Germany Technical Assistance
HHC	Primary Health care
HIS	Health Information System
HIV	Human Immune Deficiency Virus
ICE	Information Communication and Education
ICIPE	International Centre of Insect Physiology and Ecology
ICRAF	International Centre for Research in Agro forestry
ICT	Information Communication Technology
IDA	International Development Agency
IEC	Information Education and communication
IIRR	International Institute of Rural Reconstruction
IT	Information Technology
JICA	Japan International Cooperation Agency
KARI	Kenya Agricultural Research Institute
KARI	Kenya Agricultural Research Institute
KEMFRI	Kenya Marine and Fisheries Research Institute
KIFCON	Kenya Indigenous Forests Conservation Program
KP&LC	Kenya Power and Lighting Company
KWS	Kenya Wildlife Service
LBDA	lake Basin Development Authority
LDP	Livestock Development Program
LIS	Status of Land Information System
LPG	Liquidified Petroleum Gas
LTC	Luanda Town Council
MCH/FP	Maternal Child Health/Family planning
MDGs	Millennium Development Goals
MEAs	Multilateral Environmental Agreements
Mkts	Markets

MOEST	Ministry of Education, Science and Technology
MOFP	Ministry of Finance and planning
MSE	Medium small Enterprises
MTEF	Medium term expenditure Framework
NACC	National AIDS control Council
NALEP	National Agricultural and Livestock Extension Program
NCD	New Castle Disease
NCPD	National Council for Population and Development
NDP	National Development Plan
NDPs	National Development Plans
NEAP	National Environment Action Plan
NEAPC	National Environment Action plan Committee
NEMA	National Environment Management Authority
NEPAD	New Partnership for Africa Development
NGOs	Non-Governmental Organizations
NGOs	Non-Governmental Organization
NII	National Information Infrastructure
NPEP	National Poverty Eradication Program
OI	Opportunistic Infections
OPD	Outpatient Department
PDEs	Provincial Directors of Environment
PDPs	Part development plan
PEAPs	Provincial Environment action Plans
PHT	Public Health Technician
PLWA	Persons Living with AIDS
PMEC	Provincial Monitoring and Evaluation Committee
PRA	Participatory Rural Appraisal
PRSP	Poverty Reduction Strategy Papers
RD	Rural Development
Rd.	Road
REFIP	Research Farmers Interaction program
RHTC	Rural Health Training Centre

SACCOs	Saving and Credit Co-operative Societies
SEA	Strategic Environment Assessment
SEAs	Strategic Environment Assessments
SIDA	Swedish International Development Agency
SoE	State of the Environment
STIs	Sexually Transmitted Diseases
TAC	Technical Advisory Committee
UNCED	United Nation Conference on Environmental and Development
UNDP	United Nations Development program
UNESCO	United Nations Educational, Scientific and cultural Organization
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VCT	Voluntary counseling and testing
VIP	Ventilated Improved Pit latrine
WSSD	World Summit on Sustainable Development
YFCK	Young Farmers Club of Kenya

CHAPTER ONE

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 people in the district fundamentally depend on the natural systems and resources for existence and development. Particular attention needs to be paid to the dynamics of the global system, the importance of watershed in microclimates and the natural ecosystems, the natural vegetation including forests in maintaining its equilibrium, the importance of soil quality and agriculture in ensuring basic human security among others should also be considered. There is need to use non-renewable resources efficiently and ensure that renewable resources are used sustainably.

The District Environmental Action plan (DEAP) aims at integrating environmental concerns in the District Development processes noting that the linkage between socio–economic development and environmental sustainability is closely intertwined. DEAP will

also strive to propose and promote low cost but efficient environmental interventions that reduce vulnerability to poverty, recognizes indigenous knowledge, observe socio-cultural concerns and improve livelihood production options.

1.2 EMCA, 1999 provision on environmental planning

The EMCA provides that every District Environment Committee shall every five years prepare a District Environment action plan in respect of the district for which it's appointed and shall submit such plan to the chairman of the provincial environment action plan committee for incorporation into provincial environment action plan as proposed under section 39.

1.3 The Environmental Action Planning Process

DEAP Methodology

The process started by holding regional workshops, during which the DEAP Secretariat was appointed by the Director General in 2004. The team comprised of District Water Officer, District Development Officer (DDO) and District Environment Officer (DEO) to attend an induction course on the DEAP methodology. The District Environment Committee (DEC) members gazetted in 2003 were further requested to form a District Environment Action Planning Committee (Technical Committee comprising lead agencies and representatives from other stakeholders), chaired by the DDO while the DEO is the secretary. Once the draft DEAP is prepared, the DEC approves and submits to the Provincial Environment Committee for inclusion in the Provincial Environment Action Plan.

1.3.1 Objectives of District Environment Action Plan

The objectives of District Environment Action Plan include the following:

- To determine the major environmental issues and challenges facing the districts
- To identify environmental management opportunities
- To create synergy and harmony in environmental planning
- To integrate environmental concerns into social, economic planning and development of the district
- To formulate appropriate environmental management strategies specific to the district

1.4 Scope

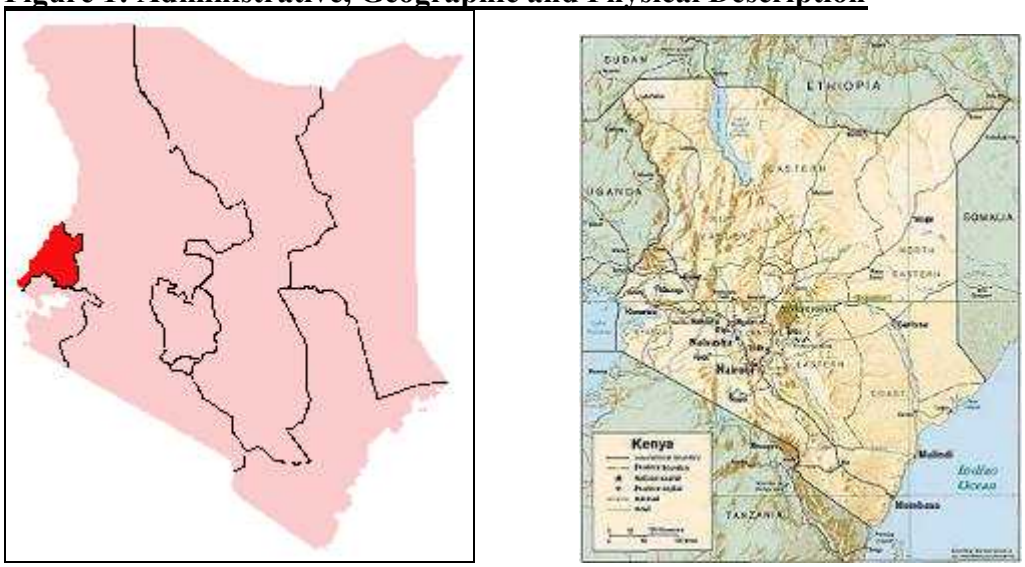
The preparation of the Lugari DEAP has been realigned with Vision 2030, Midterm Plan 2008-2012 as directed by the government. The current DEAP covers the period of 2009-2013 and as per EMCA, 1999 shall be revised after every five years. The DEAP will be monitored by the annual preparation of the State of Environment Reports. The environmental indicators that have been developed in the implementation matrix will be monitored by the respective lead agencies on an annual basis and incorporated in the annual State of Environment Report. The National Steering Committee and the National Environment Action Planning Committee have approved the indicators. The DEAP has been subjected to stakeholder meetings at Sub Location and District levels.

The District Environment Action Planning Committee spearheaded the preparation of the Lugari DEAP. The committee requested for Sectoral environment reports from the various lead agencies to assist in the compilation of the DEAP. The Lugari District Environment Action Plan was further enriched through participatory planning approach in the subsequent consultative workshops at the district and location levels. Local communities consultations were held and focused on the location that rank the poorest in the poverty index (PI scale, CBS) in the district. This helped in linking poverty to environmental degradation at the lowest levels. The Community Development Environmental Management Programme (CDEMP) supported these workshops both at District and location levels.

1.5 District Profile

This section provides summary information on Lugari district in terms of the geographical position, physiological features, settlement patterns, socio-economic profile and the district fact sheet. The data mentioned are gathered from different government departments and agencies and reports of periodic surveys conducted by the Kenya National Bureau of statistics the latest being The Kenya integrated household budget survey of 2005/06

Figure 1: Administrative, Geographic and Physical Description



Lugari district was curved out of Kakamega district in 1998 and occupies an area of 670.2 km² and is divided into three administrative divisions namely: Likuyani, Lugari and Matete.

1.5.2 Physiographic Features and Natural Conditions

The district lies between altitude 1300 –1800m above sea level it is hilly and rocky towards the east but gradually becomes plain as it progresses to the south. The main rivers traversing the district are Nzoia & Kipkarren.

1.5.3 Climatic Conditions

Climate and rainfall pattern are largely equatorial type with temperatures between 6 –24 degrees centigrade. The rainfall pattern is bimodal and averages are 1000-1600mm annually.

1.5.4 Population size and distribution

Division	Population (1999)	Density
Likuyani	99,074	328
Lugari	87,041	327
Matete	48,421	475
Total	234,536	350.

CHAPTER TWO

2.0 ENVIRONMENT AND NATURAL RESOURCES

2.1 Soils and land use

2.1.1 Soils

Soil types, Characteristics and Distribution

The major soil types in the district include Rhodic feral soils with feralo chronic agri-soils. The soils are well-drained deep red to dark red, sandy loams to sandy clays, which are not very fertile but deep and well drained.

A long river Nzoia there is a complex of imperfectly drained to poorly drained very deep dark grey to dark grayish brown sandy to clay in higher areas while some patches of regosils lithosoils are found around Mwamba characterized by being shallow and rocky.

Current Potential Uses of Soils

The major soil use in the District is crop production and pasture for livestock rearing. There is maize cultivation for both commercial and subsistence, pockets of coffee growing, bean, sunflower & Sugarcane for commercial purposes.

The soils here have great potential for enhanced maize production, horticultural crops and fruits and development of irrigation facilities. This potential can only be realized if water is available for irrigation.

Key Environmental Issues

- Farm inputs and methods of farming e.g. use of synthesis fertilizers that affect the soil PH and soil composition.
- Soil and water erosion.
- Farming system (i.e. lack of farming diversification resulting in low fertility input e.g. use of un-calibrated machines that cause hardpan leading to low yield per capital.
- Change of Land use

Proposed intervention

- Construct soil conservation structures
- Destocking
- Gazettement of the forest areas
- Training on soil fertility enhancement
- Water harvesting for improved moisture retention.
- Promotion of agro forestry activities.
- Rehabilitation of degraded areas.

2.2 Agriculture, livestock and fisheries

2.2.1 Agriculture

Table 1: Crop production trends/yield per hectare

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Maize	49		44	42	43	23	43	35	45	-
Beans	5.5	6.6	5.5	4.1	-	5.5	8.75	5.3	5.6	-
Sweet Potatoes	12	9	10	12	10	12	6.2	-	-	-
Local Vegetables.	2.9	3	3.3	3	2.7	3	3	2.7	2.1	-
Bananas	12	12	10	10	10	10	10	14	14	-

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
sugarcane	65	60	70	70	65	60	102	55	55	-
coffee	3.5	3.0	3.5	3.0	4.2	3.0	4.5	1.5	1.1	-
sunflower	1	1.1	1	1	0.8	9.8	0.84	-	-	-

Food Security -2006 Production Perspective

Major Food Crops

Maize	29,966ha	1,361,680bags
Beans	22,425ha	13,800 bags
Sweet potatoes	2,786ha	19,000 tonnes
Vegetables	384ha	2,833 tonnes
Fruits	862 ha	16,227 tonnes

Major Cash Crops

Coffee	789 ha	968 tonnes
Milled cane	1,052 ha	23,144 tonnes
Sunflower	632 ha	632 tonnes

New Crops

Mushrooms, vanilla, artemesia, jatropha

The crop production trends in yields per hectare show an averagely constant trend. There is need to intensify, diversify and introduce more high value crops to meet the demand for the rising population.

Crop Projects in the District

- NALEP SIDA-Which covers one focal area (location) per division per financial year
- NALEP GOK-this is a specific crop project in certain designated area per fiscal year
- NJAA MARUFUKU KENYA-, which is district wide common interest group, based support project.

Table 2: Livestock Production Trend

	1998	1999	2000	2001	2002	2003	2004
Grade cows	41,850	40,620	45,785				46,790
zebu	45,060	51,650	54,954				55,806
sheep	23,560	27,160			26,441		27,300
goats	-10,200	10990			10,973		12330
donkeys	-	260			686		614
pigs	-	3,850			4315		6680
rabbits	6680	8080			8435		8550
turkey	3500	4220			26441		7120
ducks	1450	1580			1950		1960
geese	425	800			960		1190
poultry	357,750	330,424			356,400		384,430
beehives	1250	1510			2647		3310

Key Environmental Issues

- Soil erosion
- Soil fertility degradation
- Overgrazing
- Habitat loss
- Pollution of rivers and other water sources
- Destruction of wetlands and riverside vegetation
- Landscape degradation

Agricultural Act Cap 318 and Environmental Conservation

Under this Act, section 48 deals with soil and water conservation on various landscapes. The section gives the basic land usage rules to reinforce environmental conservation. The rules define the various actions to b undertaken for effective conservation of landscape including water causes, farmlands, sloping lands and soil conservation structures.

- Soil conservation and promotion of Conservation agriculture
- Soil fertility improvements
- River bank protection
- Safe use of chemicals and promotion of organic farming
- Agro forestry
- Rain water harvesting
- Control livestock numbers
- Enhance communities education programs and veterinary services
- Construct watering points
- Protect springs and wells
- Baseline survey to determine carrying capacity
- Advice communities on safe use and handling of drugs and chemicals

2.3 Water sources

Main Water Catchments

All the major rivers in Lugari originate from Cherang'ani hills, Kaptagat forest and local seepage points.

Status and Trend of Water Sources

Surface Water is mainly from the rivers in the district. Surface water compromise of rivers, dams, ponds and wetlands

The other sources of water in the district are the springs. About 35% have been protected. Other sources are boreholes and hand dug wells. The government has developed 90% of the boreholes and 45% of the hand-dug wells. Most of the hand-dug wells are individually owned.

Roof catchment is yet another source of water in the district. This has not been well developed but due to the abundant rainfall 25% of the population use storage tanks for roof catchment.

Main water uses

The various types of water use in the district include;

Table 3: Main water uses

Source	Usage	Management System	Challenges	Proposed Intervention
Dams	Domestic and Agriculture (irrigation)	Community Owned	• Siltation • Pollution • Encroachment by Settlement and Urban development	▪ Monitoring ▪ Pollution control ▪ Afforestation ▪ Desiltation ▪ Land redesignation ▪ Integrated landUse ▪ Recreation
Boreholes	Domestic	Individual	Reduced aquifer	Rain catchments Afforestation
Springs	Domestic	Local Group	Reduced Quantity	Spring protection Integrated land use

Issue	Current Implementation	Proposed	Responsible	Remark
Springs Protection	Protection Group management	Increased No Expand catchment	NEMA WRMA MOH LCC KAMADEP MOA	Water is the center for most activities

Key Environmental Issues

- Pollution of the surface water
- Destruction of catchment areas
- Water borne diseases
- Siltation of dams and wells

Proposed interventions

- Rehabilitation and completion of all stalled water projects.
- Institutional support and capacity building.
- Improve water and sanitation conditions in the district
- Inventorize of all water resources
- Map and gazette water catchments for conservation.
- Promote community based catchment management
- Education and awareness programmes on water management
- Law enforcement on river frontage cultivation
- Carry out survey on water pollution sources and enforce pollution laws.

2.4 Forestry and wildlife resources

Types of Forests and Area under Forestry

Forest in the Lugari District can be categorized as Riverine forest /High forests and Transitional Zone forest (bush lands).

Table 4: Forest Cover

Forest Type		Area (HA)	Distribution	Location	Uses:	% degradation
Gazzetted	High forest	7,242.5	86.3 %	Lugari	pulpwood	35.9%
	Bush lands	532.7	6.3%	Nzoia	timber	
	Grassland	619.1	7.4 %	Turbo	fuel wood	
Private	farm forest	152	28.0%	District wide	poles & posts	72%

Key Environmental Issues in forests

- Logging for timber and charcoal burning
- Persistent drought
- Unreliable and unpredicted weather patterns
- Traditional burning of swampy areas and forest fires
- Free ranch grazing of livestock which roam and damage vegetation especially along the rivers;
- Inadequate forest products
- High levels of poverty, which lead to environmental degradation
- Disappearance of valuable timber tree species.
- Inadequate awareness on Environmental /forest management plans for continuous implementation to realise positive results for livelihood sustenance.
- Conflicting legislations which lead to confusion among natural resource users and enforcers
- Inadequate incentives and motivation for natural resource keepers in terms of investment to boost natural resource base
- Low understanding levels of natural resource users on sustainable management of natural resource to enhance sustainable development.

Proposed Intervention

- Enhance public awareness on the need to conserve and protect the forest resources
- Support community/other stakeholders action plans in forestry or related operations/activities- participatory forest management programmes
- Enforcement of environmental legislations e.g. Regulate movement of forest produce through the issuance of movement permits/licenses
- extensive afforestation and re-afforestation programmes
- forest zoning
- Involve the public in proper land use plans, and incorporation of woodlot establishment.
- Encourage local authorities and other stakeholders in setting aside a piece of land for tree planting.

- Introduction of non-timber projects such as apiaries, sericulture, mushroom farming
- Introduction of highly valuable timber species
- Establishment of water pans which can assist in sustainability of enterprising projects such as tree nurseries and irrigation horticulture.
- Training farmers to adopt modern technologies in farming e.g. establishment of demonstrations plots.
- Intensify patrols for fires and other illegal operations in the forest

Strategies to conserve indigenous vegetation

- Protection of fragile lands for natural vegetation regeneration through organized patrols
- Rehabilitation of degrade areas (re-afforestation).
- Patrols for fires
- Gazettement of new forest effective management
- Promote seedling production of other tree species as an alternative
- Commercialize tree seedling production where the seedlings raised are sold to boost the domestic budgets at household or community level.

2.5 Wildlife

Area under Wildlife and wildlife Types

There is no gazetted park in the district. The major issue in the area of wildlife management is the farmers/monkeys conflict. Vegetation clearance and wetlands destruction has greatly affected wildlife occurrence and distribution in the district.

Wildlife

Various fauna exists in Lugari district these include squirrels, antelopes, rabbits and snakes. Most of them are however disappearing as most land cover is being cleared for cultivation

Key environmental issues

- Destruction of wildlife habitats.
- Wild forest fires
- Poaching.

- Human- wildlife conflict

Proposed interventions

- Establishment of wildlife protected areas.
- Afforestation and re-afforestation
- Promotion of wetlands conservation
- Promoting underground crops
- Sensitizations Programme for the locals to appreciate the wildlife
- Collaboration with CBOs and the public
- Increased security and Surveillance,
- Disease control

2.6 Biodiversity consideration

Biodiversity and Environmentally Significant areas

The district has a wide array of ecosystems such as hilltops and hillsides, forests and bush lands, wetlands, rivers and riverside vegetation. These ecosystems support a wide variety of wildlife species.

Hill	**Remarks**
Maturu	Deforested due to encroachment and grazing
Mawe tatu hills	Deforested due to settlement and cultivation

Rare, Threatened, Invader and vulnerable species

Invasive species-None exists in the District intervention measures are to keep monitoring.

Key Environmental Issues affecting Biodiversity

- Droughts
- Water and pasture shortages
- Fires
- Poaching
- The deforestation has led to the loss of habitat
- The human- wildlife conflict

Proposed Interventions

- Reforestation Programme on the hills
- Riverine protection
- Develop water infrastructure.
- Create awareness on the dangers of lighting fires around the park and forests
- Community participation in the biodiversity conservation and application of indigenous knowledge in biodiversity conservation

2.7 Energy

Types and Sources

There are various sources of energy in the district. These include fossil fuel, wood fuel, solar energy and the hydroelectric power.

Fossil fuels include:

- Petrol for vehicles, motor cycles, motor boats
- Paraffin: used for lighting and cooking
- Diesel used by vehicles, generators, coffee industries and posho mills

8.5%of households use kerosene, and gas. LPG gas is used on a small scale for cooking.

Solar energy

Solar energy is used traditionally for drying firewood and foodstuffs like maize, beans; cassava etc. A few homes in rural areas use solar energy. This is a potential source of energy, which is under exploited in the district.

Wood fuel

The district energy source is mainly firewood. 83.9% of the district's population relies on the firewood for their domestic use. They use it directly as firewood while some use it in the form of charcoal. The demand for wood fuel due to increased population has put a lot of pressure on the forests and bush land in the district leading to deforestation and loss of vegetation cover.

Electricity

The number of households with electricity is about 4,000. These are mainly in the urban/market centers. 70 trading centers in the district are connected to the electricity grid.

Wind

Wind energy is untapped.

Biogas

Animal waste and crop residue/bargasse largely un-exploited

Key environmental issues

- Population growth
- Pollution through emissions
- Lead bio-accumulation in plants along the main track highway.
- Deforestation and loss of vegetation cover
- Indoor pollution from use of fuel wood.
- High cost of energy technologies

Proposed interventions

- Enforcement of regulation on air quality standards
- Enhance planting of trees on hill tops and other suitable areas
- Promote agro-forestry and/or farm forestry practices
- Design houses with adequate ventilation
- Mainstream gender issues in energy related interventions
- Introduction of efficient affordable energy technologies e.g. use of improved *jikos* and energy saving fixture/bulbs
- Promote use of wind, solar and Biogas energy

CHAPTER THREE

3.0 HUMAN SETTLEMENT AND INFRASTRUCTURE

3.1.1 Physical development plans

There is no approved physical plan for the district nor is there any planning framework to guide development in the various urban centers in the district. There is haphazard expansion of towns and market centers due to high demand for human settlement and commercial premises. There are no sewerage systems, licensed waste disposal facilities are non-existence, no provisions for car wash facilities and other environmental protection amenities.

3.1.2 Rural and urban housing types

Most building is made of iron sheet roofed with mud walls. 2% of the populations have permanent houses

3.1.3 Factors influencing types of shelter

Factors Influencing types of Shelter ranges from economic to socio-cultural issues Adults with strong economic base will build stone walled houses with iron-sheeted roofs while the very poor will settle for mud walled and grass thatched roof houses. The cultural practice that sons have to build a cottage(*Simba*) in their parents homestead before they migrates to their own home has made youths who are economically endowed go for this cheap building materials just to conform to this cultural requirement

3.1.4 Demographic trends

Population density has been increasing at a rate of 4.13% as reflected at 322 person's per square km in 1999 to 364 person's per square km in 2004.

Table 5: Population distribution by gender

Division	Males	Females	Total	Households	Area	Density
Likuyani	44, 499	46,711	91,210	17,846	302	302
Lugari	39,217	40,915	80,132	15,197	266.3	301
Matete	21,557	23,021	44,578	8,766	101.9	437

Rural and Urban Population

Rural population 228, 174

Urban population

Migration rate Females 14.8%, males 10.8%

Poverty level

57.37% (mainly squatters, landless and female/children headed households)

Water and Sanitation

Water borne diseases in Lugari district 1993-2004

Table 6: Waterborne Disease incidences

Disease	1993	1999	2002	2004
Diarrhea	285	5359	6160	7400
Malaria	3413	59515	66190	93341
typhoid	213	540	550	1323
Bilharzias	0	11	41	12
Cholera	0	0	0	0

- No. of households with access to piped water 3,377.
- No. of household with access to portable water 17, 728.
- No. of permanent rivers 2
- No. of wells 13.
- No. of protected springs 68.
- No. of boreholes 6.
- No. of dams 43.
- No. of households with roof catchment 140
- Average distance to nearest portable water point 500m
- Number of VIP latrines 22, 472
- Labor force 17, 071.

Population and waste generated from human settlement:

- Slaughter houses and slabs
- Jaggery bargasse.
- Agro based
- Sanitation related waste.

Education/Schools

- No. of pupils in primary schools. 61,190.
- No of students in secondary schools 26,403.

Average land parcels ……2.5 ha

Key Environmental Issues

- Lack of physical development plan and/or land use planning framework
- Poor drainage systems and soil erosion
- Poor disposal of waste (solid wastes and sewer)
- High population growth within the urban centers
- Poor sanitation
- Lack of trees in most schools to act as wind-brakes
- Poor landscaping in schools
- Pollution

Proposed Interventions

Development of Physical Development Plan

Establishment of sewerage works and waste disposal facilities

Establishment of domestic water treatment facility and promote rain water harvesting and storage.

Encourage school to establish tree-nurseries and woodlots

Improve road infrastructure in the district

Establish emergency Fund for disaster management.

Promote landscaping in schools

CHAPTER FOUR

4.0 INDUSTRY, TRADE AND SERVICES

4.1 Types of industries

Industries, trade and services can benefit a lot by adopting environmental management systems that not only address production processes but also promote waste minimization. Lugari district does not enjoy presence of industrial establishments and is largely a service dependant district except for sugarcane jaggeries.

4.2 Trends in industrial development

4.3 Industries in the district

The main factories are in sugarcane sector, they are mainly the jagery factories and they include:

i. Chimoi jagery factory (harry lamp jagery)
ii. Shajanand industries
iii. Chetambe jageries
iv. Chabadiya jagery
v. Chabadiya quarry plant

4.4 Tourism

The tourism industry is heavily dependent on the vast and abundant natural resources in the country. This includes wildlife, beaches, landscapes and diversity of cultural, historical and archeological reserves. Lugari has no known tourist attraction and is not on the main tourist circuit. However, there are potentials in ecotourism and recreation.

4.5 Service industry

Trade in agricultural inputs/produce is an activity for generating incomes and employment reducing poverty and promoting food security through extensive land use and input use.

The district is agriculture dependent and therefore a suitable hub for such services as banking and trading in agricultural produce, which will contribute to wealth being retained in the region. With a labor force of approximately 17, 071 people, related potentials include demand for housing, which then generates an opportunity for investment in housing and related development.

The district has a number of other attractive entrepreneurial opportunities in the service industry supported by services such as banking, health facilities, government services and other social amenities.

4.6 Markets

There are a number of market places in the district. These include.

Table 7: Market Centres in the District.

1	MWAMBA
2	LWANDETI
2	MATETE
3	LUGARI
4	LUMAKANDA
5	KOROMAITI
6	MUGUNGA
7	MAUTUMA
8	MLIMANI
9	LUKUYANI
10	KILIMANI
11	BINYENYA
12	KONA-MBAYA
13	NZOI-MARKET
14	HEAD-QUATER
15	MACHINE
16	NUMBER-ONE
17	SHANGO
18	NANGILI
19	MATUNDA
20	FAFARO
21	LUMANI
22	MAKHUKHUNI
23	LUMANI

Key Environmental Issues

- Poor solid waste and waste water management
- Odour
- Noise pollution due to hawking
- The district lacks a sewerage plant
- Mushrooming of informal settlement
- Health hazard to livestock due to ingestion of polythene bags
- Destruction of scenic beauty
- Air and water pollution

Proposed interventions

- Proper management, recycling and management of polythene bags
- Phasing out scheme of the polythene bags
- Incineration of waste
- Establish and enforce physical Development planning
- Enforce relevant legislations
- Construction of sewerage treatment plant
- Construction of planned waste disposal sites

4.7 Mining and quarrying

4.7.1 Mining

Mining has some potential adverse on the environment. There are no reported mineral deposits in the District and therefore no mining activity.

4.7.2 Quarrying

There are pockets of building stone quarrying in the District. However, there is a lot of Murram excavation all over the district mainly for road maintenance. This is usually carried out by the Ministry of Roads.

The quarries usually leave open pits with high cliffs which a danger to the public and livestock. Rehabilitation/restoration attempts and after use planning is wanting.

4.7.3 Sand harvesting

There is isolated small-scale sand harvesting sites.

4.7.4 Brick making/surface soil mining

There is significant brick making in the district resulting into destruction of wetlands and landscape degradation.

Key Environmental Issues

- Unsafe quarrying operations-the presence of high vertical cliffs, undercutting, tunneling and risky material conveyance practices.
- Lack of Personal Protective Equipment-the workers does not have the necessary protective gear and other basic welfare facilities such as water and sanitary conveniences.
- Quarry sites in close proximity to homesteads, schools, roads, rivers, and shopping centers exposing them to danger and inconveniences.
- Nuisance and danger posed by high-unfenced cliffs, uncontrolled and illegal blasting, dust emissions and water ponding in the quarry pits.
- Encroachment into ecologically sensitive environments and deposition of quarry waste in some waterways.
- Negative landscape effects due to the presence of abandoned quarries pits and heaps of quarry wastes
- Lack of quarry pit rehabilitation/restoration plan and/or after-use plans.
- Exploitation of workers by middlemen leading to low wages
- Notable negative effects such as illicit brews, drug abuse, and HIV /AIDS prevalence.

Proposed Intervention

- Enforce relevant legislation
- Implement the recommendations of Taskforce on Management of quarrying activities in Kenya
- Apply safe quarrying practices such as benching/terracing, open cast operations for removal of the soil overburden,
- Warnings signs of appropriate font size and in the appropriate language should be erected in all quarry entries and in areas with high cliffs
- Establish safety distances/buffer zones between quarry sites and other incompatible land uses.
- formation of community based groups that shall enable them easy access to devolved funds, training, and market outlets and be able to negotiate for better prices for their products.
- Establish sub-committees to ensure regular inspection of quarries and sand mines in the District.
- Quarrying activities within the forested land should be in accordance with section 42 of the Forest Act 2005.
- Establish quarry pit rehabilitation and/or after use plan. The after use plan should identify suitable alternative land uses for the disused pits e.g. land restoration for agriculture; Land restoration for recreation; Land restoration for forestry and apiary (bee keeping); exploitation for aquaculture; Exploitation of the pits as water reservoir; and if suitable exploitation for sanitary land filling.
- Promote progressive quarrying operations and therefore progressive restoration and/or reclamation.

CHAPTER FIVE

5.0 ENVIRONMENT HAZARDS AND DISASTERS

Most environmental disasters in the district are mainly climatic and weather related with cases of tectonic movements reported. The common hazards and disasters reported in the district include droughts, floods, landslides, lightening, fire, hailstorms, and environmental related diseases.

Hailstorms

Hailstorms are an important form of precipitation in Lugari. Depending on the size of the ice pellet, intensity and the growth stage of crops, hailstorms cause a lot of damage to crops.

Lightening

Lightening is a common phenomenon in this part of Kenya, which causes damage to property, animals and human beings.

Floods

Because of the topography of the district, minor river floods are experienced in the lowlands along the major rivers like Nzoia, and adjacent areas.

Environmental Related Diseases

Diseases such as Malaria are common during floods.

Key environmental issues

Loss of human lives
Loss of biodiversity
Manifestation of invasive species
Fluctuating water levels
Water pollution
Oil spills into the water bodies
Destruction of farmlands
Disease outbreaks

Emergency of conflict over natural resources

Accidents on the roads

Proposed intervention measures

- Conduct disaster risk assessment
- Undertake disaster mapping
- prohibit settlement in landslide prone areas
- Develop disaster contingency measures and risk reduction
- Develop early warning systems
- Enforce relevant regulations
- Enhance awareness and coping mechanisms
- Strategic environment assessment
- Incorporate traditional coping mechanisms
- Promotion of water harvesting techniques

CHAPTER SIX

6.0 ENVIRONMENTAL INFORMATION, NETWORKING AND TECHNOLOGY

6.1 Status

The Ministry of Education Science and Technology has developed a Curriculum in Primary, Secondary and tertiary institutions on Environmental Conservation. Pupils from class one is taught about their surroundings and the curriculum develops to upper primary as a science subject. The topics covered are water, agriculture, and air and soil conservation and are examinable in national examinations. After theory in class, the students are taken through demonstration activities like soil conservation, good land use, waste disposal, recycling of materials, water conservation and tree planting.

Other non-examinable areas are:

- Environmental education programs including 4K-Clubs in primary schools, afforestation programs, debate on environmental issues.
- Secondary environmental programs including Wildlife Clubs, Presidential Award Scheme and Science Congress
- Eco-schools and environmental programs
- Quality Assurance officers to sensitize teachers and pupils on environmental conservation.

Table 8: Schools participation in Environmental Education

No of schools		**Type of Environmental Programme**	**Remarks**
Primary 14	Secondary 4	4k clubs, wildlife clubs, Agenda 21, club Miti Mingi Society.	They are mainly active in secondary boarding schools.

Table 9: Environmental Programmes

Environmental Programme	Key Players	Challenges	Proposed Intervention
Nursery Establishment, Organic Farming and Awareness creation	CBOs NGOs Environmental office Forest	▪ Funds ▪ Enforcement ▪ Sustainability	▪ Follow-ups ▪ Source for funds e.g. CDF

6.2 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
- CARE Kenya
- Plan Kenya
- Office of the President (Provincial Administration)
- Ministry of agriculture
- Forest department
- Ministry of Information
- Ministry of health
- Fisheries department

Table 10: Priority issues and interventions

Issue	Current intervention	Proposed	Institution	Remarks
Awareness creation	Schools lecture Public barazas	Pamphlets enforcement awards	NEMA GOK departments NGO's CBO's	This should be done as team work. The companies to sponsor awards

6.3 Status of environmental information management

Table 11: Types and sources of environmental information

Data types available in the district	Sources of environmental data/information	Custodian of the data/information
• Climate • Natural resources • Pollution • Infrastructure • Demography • Diseases	• Annual reports • Research studies and journals • Projects progress reports • Population censuses • Registers and files • District state of environment report	• Government departments and local authorities • Non government Organizations • Special government projects and programs • District information documentation center • District environment information center

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.

Indigenous knowledge

Lugari has varied ethnic groups. The cultural diversity offers potential information that can be exploited to contribute positively to national development and environmental sustainability. Information on IK has not been well documented and properly packaged to allow, effective dissemination, hence contributing to the massive loss of IK from one generation to the next.

There are various types of indigenous knowledge, innovations, and practices in Lugari district. The level of their applications in environmental management is low. Food production using organic farming is one such knowledge so is the preservation and storage of harvested crops. However, the consumption of indigenous food is being overlooked, the myth that was originally used to protect fragile ecosystems are not encouraged and Shrines hitherto protected have been cleared to pave way for settlement and agriculture. Population explosion and cultural erosion are major challenges hindering the application of IK in the district.

6.4 Technologies

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

- Grafting in tree planting
- Use of oil receptacles at petrol stations
- Energy saving technology
- Food preservation

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 over-arching 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. EMCA has provision for the establishment of the District Environment committee, which is the lead organ for the management of environment in the District. Furthermore, EMCA empowers organized 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 lead agencies, which are sectors of the government who have aspects of environmental management in their programmes as recognized by EMCA, 1999. 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
- Standards and Enforcement Review Committee

Environmental NGOs/CBOs

The NGOs and CBOs addressing environmental issues in Lugari district are KAMADEP, ANASS etc.

7.3 Regulatory and Management Tools

There are various mechanisms in the district that ensure that the environment is conserved.

National Legislation

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

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

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 Transboundary Movement of Hazardous Wastes and their Disposal (Basel Convention)

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:

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

ii) The Location Action Plan derives its information from the Community Consultative Workshops (CCW) where the Project is focused on poverty reduction strategies.

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.

Table 12: Implementation Matrix

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
District Wide	District Wide	Air	Air pollution	1.	Control burning garbage	Min. of Public Health and Sanitation, Local Authorities	
				2.	Promote recycling of waste	Local Authorities	
				3.	Apply and enforce Public Health and Sanitation Act on disposal of dead animals	Min. of Public Health and Sanitation, Local Authorities	
				4.	Sensitize communities on waste management	Min. of Public Health and Sanitation, Local Authorities	
				5.	Afforestation and Reafforestation	KFS	
			High prevalence of T.B	6.	Improve housing ventilation and control indoor pollution arising from cooking stoves/*jikos*	Min. of Public Health and Sanitation, Local Authorities	
				7.	Conduct ambient and air quality monitoring	Min. of Public Health and Sanitation, Local Authorities	
		Climate & related environmental hazards	Frequent Drought /Famine	8.	Irrigate crops where possible	WRMA Min. of Agriculture	
				9.	Plant drought tolerant crops	Min. of Agriculture	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
Division	**Location**	**Issue Category**	**Problem Statement**	**Action No.**	**Actions Needed**	**Stakeholders**	**Timeframe 2009-2013**
				10.	Plant early maturing crops	Min. of Agriculture	
			Frequent Drought /Famine	11.	Afforestation and Reafforestation	KFS	
				12.	Promote storm water harvesting e.g. construct water pans	WRMA	
				14.	Promote fish farming	Min. of Fisheries	
District Wide	District Wide	Climate & related environmental hazards	Flooding	15.	Promote storm water harvesting e.g. construct dams and/or water pans	WRMA	
				16.	Afforestation and Reafforestation and farm forestry	KFS	
				17.	Initiate appropriate soil conservation measures	Min. of Agriculture	
				18.	Improve farming methods	Min. of Agriculture	
				19.	Peg and protect river banks	Min. of Agriculture	
				20.	Construct drainage channels	Min. of Agriculture	
				21.	Introduce new crops such as rice	Min. of Agriculture	
		Crop Production & Soils	High rate of soil erosion	22.	Initiate appropriate soil conservation measures	Min. of Agriculture	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
				23.	Afforestation and Reafforestation	KFS	
				24.	Construct waterways	WRMA	
				25.	Construct proper drainage on roads	Min. of Roads	
				26.	Build gabions	Min. of Agriculture	
				27.	Plant cover crops	Min. of Agriculture	
				28.	Promote roof water catchment	Min. of Agriculture	
				29.	Promote use of mulching	Min. of Agriculture	
			Poor crop yields	30.	Promote use of certified seeds	Min. of Agriculture	
				31.	promote timely land preparation and planting	Min. of Agriculture	
				32.	Initiate appropriate soil conservation measures	Min. of Agriculture	
				33.	Plant early maturing crops	Min. of Agriculture	
District Wide	District Wide	Crop Production & Soils	Poor crop yields	34.	Promote use of idle fertile land for farming	Min. of Agriculture	
				35.	Practice crop rotation	Min. of Agriculture	
				36.	Plant drought tolerant crops	Min. of Agriculture	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
				37.	Promote use of farm yard manures	Min. of Agriculture	
				38.	Promote irrigation	Min. of Agriculture, WRMA	
				39.	Promote Agroforestry	Min. of Agriculture	
				40.	Promote indigenous crops	Min. of Agriculture	
				41.	Sensitize communities to abandon cultural beliefs that contribute low crop production	Min. of Culture and social Services	
				42.	Conduct frequent soil sampling	Min. of Agriculture	
				43.	Use push pull technology to reduce striga weeds	Min. of Agriculture	
				44.	Diversify crops	Min. of Agriculture	
		Energy	Shortage of wood fuel	45.	Promote planting of quick maturing trees, woodlots and farm forestry	KFS	
				46.	Promote use of energy saving devices	Min. of Energy	
				47.	Promote use of alternative sources of energy eg biogas, solar	Min. of Energy	
		Environmental Education & Awareness	Low level of awareness on environmental education	48.	Educate the public through electronic and print media, drama and songs	Min. of Information	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
District Wide	District Wide	Environmental Education & Awareness	Low level of awareness on environmental education	49.	Promote public participation in environmental plans, programmes and activities	Provincial Administration, Min. of Public Health and Sanitation, Local Authorities, Min. of Social Services	
				50.	Sensitize communities/opinion leads to abandon cultural beliefs that inhibit environmental conservation	Min. of Culture and social Services	
				51.	Disseminate environmental information	Min. of Public Health and Sanitation, Local Authorities	
				52.	Integrate environmental issues in Schools & Adult/Public Institutions and literacy Centers	Min. Education	
				53.	Increased awareness on environmental laws through *Barazas*, seminars, workshops	Provincial Administration, Min. of Public Health and Sanitation, Local Authorities	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
District wide	District wide	Fish and Fisheries	Shortage of fish	54.	Promote fish farming	Min. Fisheries	
				55.	Afforestation and Reafforestation	KFS	
				56.	Monitor and ban use of chemicals for fishing	Min. of Fisheries	
				57.	Rehabilitate and restore water catchment areas	WRMA, Min. Agriculture	
				60.	Apply and enforce Public Health and Sanitation Act to control pollution	Min. of Public Health and Sanitation, Local Authorities	
				61.	Provide incentives for fish farming including fish markets and better prices	Min. of Fisheries	
				62.	Construct ice plants and/or preservation facilities	Min. Fisheries, min of Cooperatives	
District Wide	District Wide	Forests & Trees	Deforestation	63.	Afforestation and Reafforestation Promote agro forestry and farm forestry	KFS	
				64.	Conserve herbal medicinal plants	KFS	
				65.	Promote use of energy saving devices	Min. of Energy, Min. of Agriculture	
				66.	Promote community education and awareness on good forestry practices	KFS	
				67.	Sensitize communities against traditional beliefs that hinder environmental conservation	KFS, Min. of Social Services	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
Division	**Location**	**Issue Category**	**Problem Statement**	**Action No.**	**Actions Needed**	**Stakeholders**	**Timeframe 2009-2013**
				68.	Gazette existing forests	KFS	
				69.	Enforce the Forest Act	KFS	
				70.	Promote public awareness on the need to conserve and protect forests and catchments	KFS	
				71.	Establish tree nurseries	KFS	
				72.	Identify hilltops prone to soil erosion and rehabilitate and/or undertake reafforestation Programme.	KFS, Min. of Agriculture	
District Wide	District Wide	Health	Prevalence of waterborne diseases	73.	Apply and enforce Public Health and Sanitation Act	Min. of Public Health and Sanitation, Local Authorities	
				74.	Promote treatment of drinking water	WRMA	
				75.	Protect water sources	WRMA, Min. Agriculture	
				76.	Apply and enforce waste management Regulations, 2006	Min. of Public Health and Sanitation, Local Authorities	
				77.	Construct a proper drainage and sanitation facilities	Min. of Public Health and Sanitation, Local Authorities	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
Division	**Location**	**Issue Category**	**Problem Statement**	**Action No.**	**Actions Needed**	**Stakeholders**	**Timeframe 2009-2013**
District Wide	District Wide	Health	Prevalence of waterborne diseases	78.	Construct latrines	Min. of Public Health and Sanitation, Local Authorities	
				79.	Create awareness on proper hygiene	Min. of Public Health and Sanitation, Local Authorities	
				80.	Promote use of treated mosquito nets	Min. of Public Health and Sanitation, Local Authorities	
		Industry & Other Business Activities		81.	Apply and enforce Water quality, Waste management and EIA/EA regulations	NEMA, Min. of Public Health and Sanitation, Local Authorities	
				82.	Enforce air control regulations	NEMA, Min. of Public Health and Sanitation, Local Authorities	
				83.	Promote use of environmentally friendly sources of energy	Min. of Energy, NEMA	
				84.	Promote use of cleaner production technologies	Min of Industry, NEMA	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
Division	**Location**	**Issue Category**	**Problem Statement**	**Action No.**	**Actions Needed**	**Stakeholders**	**Timeframe 2009-2013**
				85.	Promote 3R oriented society- waste **Reduction, Reuse and Recycling** Properly manage and Recycle polythene materials	Local Authorities, Min of Industry	
				86.	Promote use of EFB	Min of Industry	
District Wide	District Wide	Livestock & Grazing	Low livestock productivity	87.	Control animal diseases	Min of Livestock	
				88.	Upgrading of indigenous cattle breeds/crossbreeding	Min. of Livestock	
				89.	Train farmers on good animal husbandry	Min. of Livestock	
				90.	Plant fodder crops/trees	Min. of Livestock	
				91.	Construct water points	Min. of Livestock	
				92.	Make hay for use during the dry season	Min. of Livestock	
				93.	Reduce the stocking rate	Min. of Livestock	
				94.	Promote zero grazing	Min. of Livestock	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
Division	**Location**	**Issue Category**	**Problem Statement**	**Action No.**	**Actions Needed**	**Stakeholders**	**Timeframe 2009-2013**
District Wide	District Wide	Mining & Quarrying	Unsafe quarrying operation	95.	Promote safe quarrying practices such as benching/terracing and open cast operations.	Mines and Geology Dept. Local Authorities, DOHSS	
				96.	Establish buffer zones and fence mining areas/pits and erect appropriate warnings signs/notices	Mines and Geology Dept. Local Authorities	
			Negative Landscape effects (Open mining pits)	97.	Establish quarry pit rehabilitation and/or after use plan to ensure restoration of mined areas	Mines and Geology Dept. Local Authorities	
				98.	Enforce relevant legislation and implement the recommendations of Taskforce on Management of quarrying activities in Kenya	Mines and Geology Dept. Local Authorities,	
District Wide	District Wide	Settlements & Infrastructure	Poor sanitation & Diseases	99.	Construct latrines and/or sewerage system	Local Authorities	
				100.	Apply and enforce Waste Management and Water Quality regulations	NEMA, Min. of Public Health and Sanitation, Local Authorities	
				101.	Promote community education on good hygiene and sanitation	Min. of Public Health and Sanitation, Local Authorities	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
				102.	Apply and enforce Public Health and Sanitation Act	Min. of Public Health and Sanitation, Local Authorities	
			Unplanned settlements	103.	Improve existing roads	Local Authorities, Min. of Roads	
Division	**Location**	**Issue Category**	**Problem Statement**	**Action No.**	**Actions Needed**	**Stakeholders**	**Timeframe 2009-2013**
				104.	Promote land use planning	Min of lands, local Authorities	
				105.	Prepare urban development plans	Min of Lands, local Authorities, NEMA	
				106.	Apply and enforce Physical Planning Act and Council Bylaws	Min. of Public Health and Sanitation, Local Authorities	
				107.	Construction of sewerage system	Min. of Public Health and Sanitation, Local Authorities	
				108.	Designate waste disposal sites	NEMA, Min. of Public Health and Sanitation, Local Authorities	
District Wide	District Wide	Water Resources	Inadequate clean drinking water	109.	Treat drinking water and prevent pollution of water sources	Water Service Providers, Min. of Public Health WRMA	
				110.	Drill boreholes/shallow wells	WRMA	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
				111.	Protect and conserve water sources, Afforestation & Reafforestation of water catchments including hill tops	WRMA, KFS	
				112.	Promote roof water catchments	WRMA	
				113.	Regulate river water abstractions	WRMA	
Division	**Location**	**Issue Category**	**Problem Statement**	**Action No.**	**Actions Needed**	**Stakeholders**	**Timeframe 2009-2013**
				114.	Promote proper waste management	Local Authorities, Min of Public Health and Sanitation	
				115.	Promote safe application of agrochemicals	Min. of Agriculture	
District Wide	District Wide	Water Resources	Water pollution	116.	Undertake appropriate soil conservation measures	Min. of Agriculture	
				117.	Divert run offs far from the boreholes	Min. of Public Works, WRMA	
				118.	Construct sewage systems	Local Authorities,	
				119.	Designate waste disposal sites	Local Authorities, Min of Public Health and Sanitation	
				120.	Protect water sources e.g. Plant trees on the water catchment areas	WRMA, KFS	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
				121.	Provide piped water	WRMA, Service Providers	
				122.	Apply and enforce Waste Management and Water Quality regulations	NEMA, Local Authorities,	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
District Wide	District Wide	Wetlands	Degradation of wetlands	123.	Regulate the usage of wetlands resources	NEMA, WRMA, Min. Agriculture	
				124.	Educate communities on the importance of conserving wetlands	NEMA, WRMA, Min. Agriculture	
					Map and protect wetlands and other fish spawning areas	NEMA,WRMA, Min. Agriculture, Min of Lands, Min of Fisheries	
				125.	Draw management plans for wetlands	NEMA,WRMA, Min. Agriculture, Min of Lands	
				126.	Apply and enforce wetlands, River Banks, Lake Shores and Sea Shores Management Regulations, 2009	NEMA,WRMA, Min. Agriculture, Min of Lands	
		Wildlife, Biodiversity & Tourism	Human – wildlife conflict	127.	Establish wildlife buffer zones and protected areas	KWS	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Timeframe 2009-2013
				128.	Strengthen District Compensation Committee	KWS	
				129.	Sensitize communities to appreciate the importance of conserving wildlife	KWS	
				130.	Involve the communities in wildlife management	KWS	
Division	**Location**	**Issue Category**	**Problem Statement**	**Action No.**	**Actions Needed**	**Stakeholders**	**Timeframe 2009-2013**
			Loss of biodiversity	131.	Plant and preserve indigenous trees	KFS	
				132.	Control invasive plant species	KFS, Min of Agriculture	
				133.	Protect natural ecosystems	KFS, KWS, WRMA	
			Untapped eco-tourism potential	134.	Carry out an inventory of existing/potential tourism sites	Min. of Tourism	
				135.	Promote and market existing tourism activities	Min. of Tourism	
				136.	Use media to promote local tourism	Min. of Tourism, Min of Information	

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 organizations nominated by the National Council of Non-Governmental Organizations;

f) representatives of specialized 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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Lugari District Development Plan 2008-2012 Government Printer, Nairobi