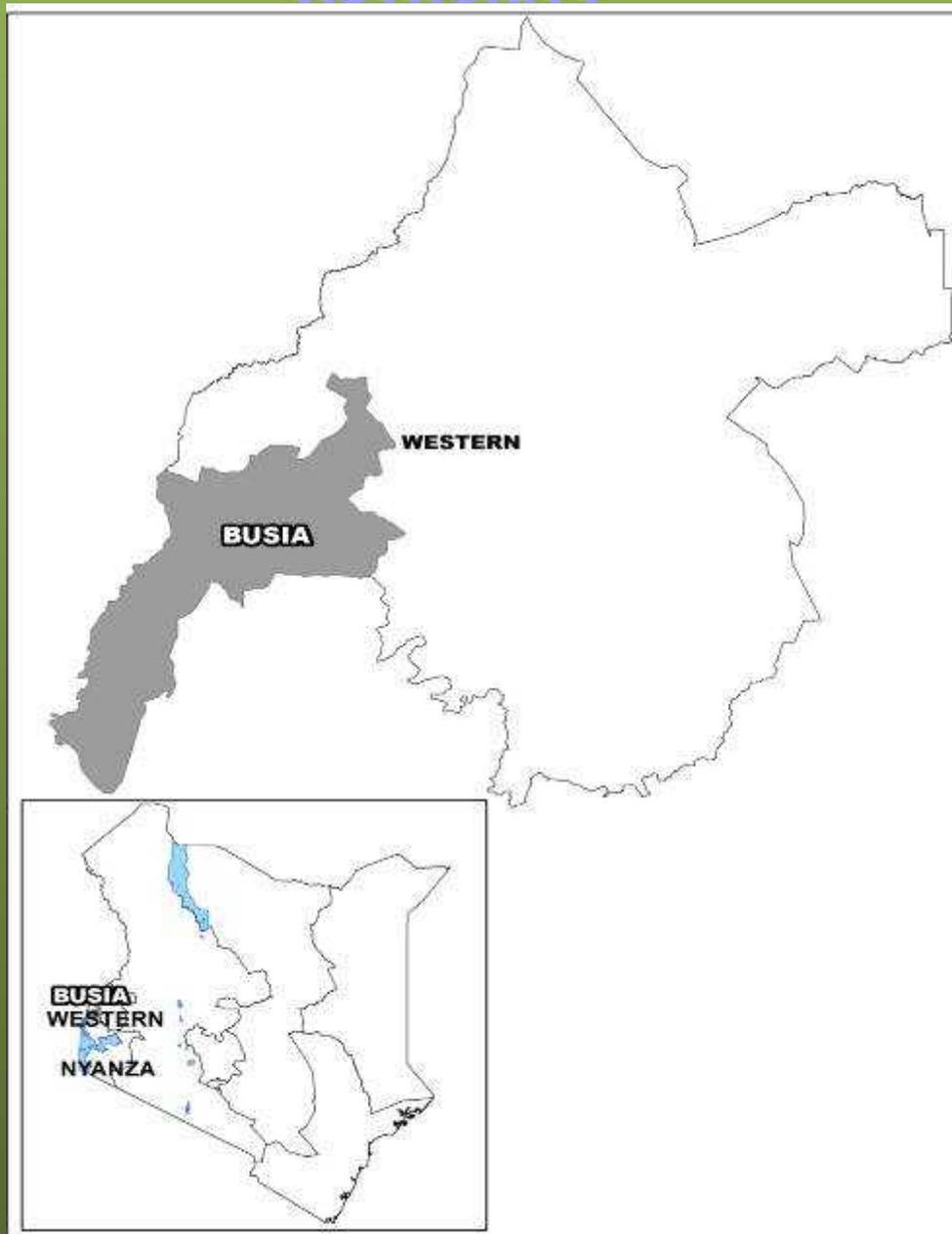




REPUBLIC OF KENYA
MINISTRY OF ENVIRONMENT AND MINERAL RESOURCES
NATIONAL ENVIRONMENT MANAGEMENT
AUTHORITY



BUSIA DISTRICT
ENVIRONMENT ACTION PLAN
2009-2013

EXECUTIVE SUMMARY

Plan (DEAP) for Busia 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 Action 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; droughts, 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 Plan 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 (EAP) is a tool that aims at integrating environmental concerns into development planning. This EAP process was participatory, involving various stakeholders from institutions and sectors, including the public, private, NGOs and local communities at District, Provincial and National levels. These consultative meetings provided the basis for formulation of the Provincial Environment Action Plan (PEAP) and finally the National Environment Action Plan (NEAP) Framework.

The DEAP report addresses environmental issues from various sectors in an integrated manner and 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 report 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 through the Annual State of the Environment Reporting.

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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NATIONAL ENVIRONMENT MANAGEMENT

ACKNOWLEDGEMENT

On behalf of the National Environment Management Authority (NEMA), I would like to thank the Busia District Commissioner, who is also the chairman 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.

I acknowledge the insights and dedication to this process by the Provincial Director of Environment (Western) and the District Environment Officer.

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

Dr. Kennedy I. Ondimu

**DIRECTOR, DEPARTMENT OF ENVIRONMENTAL
PLANNING & RESEARCH CO-ORDINATION**

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ACRONYMS

AEZ:	Agro-ecological zones
BMC:	Busia Municipal Council
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 was thereafter well anchored in the Environment Management and Coordination Act (EMCA, 1999). (EMCA, 1999) provides for the integration of environmental concerns in 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 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 with holding of regional workshops and appointment of the DEAP Secretariat by the Director General in 2004. The secretariat comprising of a District Water Officer, District Development Officer (DDO) and District Environment Officer (DEO) latter attended an induction course on the DEAP methodology.

District Environment Committee (DEC) members were gazetted in 2003 and requested to form a District Environment Action Planning Committee (Technical Committee comprising lead agencies and representatives from other stakeholders), chaired by the DDO and the DEO being the secretary to spearhead preparation of the DEAP. The role of the DEC was to approve the DEAP once prepared and submit it to the Provincial Environment Committee for inclusion in the Provincial Environment Action Plan.

The District Environment Action Planning Committee spearheaded the preparation of the Busia DEAP. The committee requested for sectoral environment reports from the lead agencies and compiled the DEAP.

Objectives of District Environment Action Plan

The objectives of District Environment Action Planning were:

- To determine the major environmental issues and challenges facing the district
- 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 Challenges for environmental management in the district

The economy of the district depend on natural resources where majority of the population live in the rural areas and subsequently deriving their livelihoods from natural resources. Economic activities undertaken in the district from natural resources include agriculture, industry, tourism, water, energy, trade and quarrying. These resources are currently faced with threat due to over reliance on them. The situation is made worse by the increasing poverty levels.

Poverty is a major issue in the district. It leads to over use and destruction of the environment as poor people struggle to get daily livelihood as opposed to long term environmental sustainability. This phenomenon is counteractive in the sense that as the resources so destroyed gets diminished; the population will still require resources. There exists a close link between poverty and environment such that fighting poverty leads to improved environmental conditions.

Rapid urbanization has led to the development of slums in most urban areas. This has been worsened by rural urban migration resulting in; health deterioration, loss of biodiversity, water pollution and encroachment of fragile areas. Sanitation has also deteriorated coupled with widespread accumulation of wastes and poor disposal of effluents resulting in increased respiratory and waterborne diseases.

The challenges of managing environmental resources sustainably call for development of integrated plans and their implementation. This calls for all stakeholders' involvement and participation. Proper programming and resource mobilization is key to success. Section 38 of EMCA provides for preparation of District Environment Action Plans every five years.

1.5 Scope

The preparation of the Busia DEAP was aligned with Vision 2030 and the Midterm Plan 2008-2012. It covers the period 2009-2013 and will be revised after five years as directed by EMCA (1999). 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 Reports. The National Steering Committee and the National Environment Action Planning Committee have approved the indicators. The DEAP has been subjected to stakeholder meetings at District level.

1.6 District profile

This section provides summary information on Busia district in terms of the geographical position, physiological features, settlement patterns, socio economic profile and the district fact sheet. The data mentioned are based on data and information 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.

1.6.1 Geographical Location, Size and Administrative Units

Busia is one of the eight districts (Old larger Busia) that make up Western Province. It is bounded to the north by Teso district, to the east by Kakamega district to the south by Siaya district and the Republic of Uganda to the west. The divisions forming the districts are Budalang'i, Funyula, Butula, Nambale, Matayos and Township.

It is located at the extreme western part of Kenya between longitude 33° 55' and 34° 25' East and latitudes 0° 30' and 0° 45' North. It has approximately 1125km² of occupied area and 137km² of permanent water surface. The table 1 below shows the area and administrative units by divisions.

Table 1: Area and Administrative Units by Divisions

Division	Locations	Sub-locations	Area Km ²
Budalangi	6	18	306.5
Butula	6	21	245.2
Funyula	7	29	281.2
Matayos	5	15	173.7
Nambale	5	14	232.5
Township	1	2	22.2
Total	30	39	1,261.3

Source: Busia District Development Plan 2002 – 2008.

The smallest administrative division is Township, which covers an area of 22.2 Km² while the largest division is Budalangi within area of 306.5 Km². Budalangi and Funyula have a water surface of 120 Km² and 17 Km² respectively. The division with the largest land surface area is Funyula with an area of 264.2 Km².

The District has five local Authorities namely Busia County Council, Busia Municipal Council, Nambale Town Council, Port Victoria Town Council and Funyula Town Council. The jurisdiction of Busia Municipal Council covers the entire Township Division and Parts of Teso District, while Nambale Town Council, Port Victoria Town Council and Funyula Town Council covers parts of Nambale, Budalangi and Funyula Division.

The District has four constituencies namely: Budalangi, Butula, Funyula and Nambale. Nambale constituency covers Nambale, Matayos and Township divisions.

1.6.2 Population Size and Distribution

According to Busia District Poverty Reduction Strategy Paper 2001-2004 the population was 370,608 as per 1999 population census. The growth rate was about 2.95%. the table 2 below shows the demographic profile of the district.

Table 2: *Demographic Profile*

Division	Population (Number)		Number		
	Male	Female	Total	Location	Sub-Location
Budalangi	25,338	28,018	53,356	6	18
Butula	43,929	51,560	95,489	6	21
Funyula	34,610	39,265	73,875	7	29
Matayos	25,954	29,232	55,186	5	15
Municipality	12,268	12,890	25,158	1	2
Nambale	32,269	35,275	67,544	5	14
TOTAL	174,368	196,240	370,608	30	99

Source: Busia district poverty reduction strategy paper 2001-2004



Figure 1: Map of Busia District Administrative Boundaries

1.6.3 Physiographic and Natural Conditions

Busia District falls within the Lake Victoria Basin. The altitude varies from 1,130m above sea level on the shores of Lake Victoria to 1,375m above sea level in the central part. Butula and Nambale Divisions occupy a plain characterized by low flat divides. These are often capped by laterites and shallow incised swampy systems. The peneplain has fertile soil suitable for growing maize, robusta coffee and sugar cane.

The southern part, which covers parts of Matayo Division, Funyula Division and the northern part of Budalangi Division, is covered by a range of hills comprising the Samia Hills, which run from northeast to southwest culminating at Port Victoria. In the extreme south of the district is found the Yala

Swamp. The area forms a colony of papyrus growth broken by irregular water channels and occasional small lakes with grassy islands.

The district is in the Low Midland (LM) zone. It is divided into four agro-ecological zones LM1, LM2 and LM4. LM1 is the sugarcane zone and covers the larger part of Butula, Matayos and Township Divisions. L2 is the marginal sugarcane zone and is found in parts of Butula, Nambale and Funyula Divisions. LM3 is the cotton zone and covers the larger part of Funyula Division and parts of Nambale and Budalangi Divisions. LM4, the marginal cotton zone, covers parts of Funyula and Budalangi Divisions that adjoin Lake Victoria from Sio Port to Osieko.

1.6.4 Climate

There are two rainy seasons in the district, the long rains and the short rains. The long rain season starts in March and continues into May, while the short rain season starts in late August and continues into October. The dry spells are from December through February and June/July. The mean annual rainfall for the district is 1,500mm with most parts of the district receiving between 1,270mm and 1,790mm. The driest part of the district receives between 760mm and 1,015mm of rainfall annually and is found along the lakeshore. The mean annual rainfall in Budalangi and Funyula Divisions is between 1,020mm and 1,270mm.

The climate supports two cropping seasons during the year. However, crops are grown all the year round. During the long rains, crops such as maize, sorghum, sweet potatoes, soya beans, cowpeas, green grams and beans are grown in most parts of the district. The same crops are grown during the short rains but with an addition of quick maturing crops such as kales, simsim and sunflower. The climate also supports crops that grow all the year round or have long gestation periods such as sugarcane, robusta coffee, cassava, avocados, oranges, bananas and various types of vegetables.

The annual mean maximum temperatures range from 26°C and 30°C while the annual mean minimum temperatures vary between 14°C and 18°C. Due to the proximity of the district to Lake Victoria, the district records high rates of evaporation of between 1,800mm and 2,000mm per year. Thus, humidity is relatively high.

1.7 Social cultural and economic characteristics

The Welfare Monitoring Surveys (see attached Annex for Busia and Butula profiles) indicate an increasing incidence and severity of poverty in Kenya. According to the second report on poverty in Kenya, the relative position of Busia District in the incidence of poverty viz-a-viz the provincial and national indices are as follows:

Table 3: Poverty levels

Measure of Poverty	Busia	Western	National (Rural)
Absolute Poverty	65.99	58.75	52.93
Food Poverty	61.4	58.58	50.93
Hardcore Poverty	50.64	41.67	34.82

Source: Poverty in Kenya, June 2000 – *Ministry of Finance and Planning*

CHAPTER TWO

2.0 Environment and natural resources

2.1 Land and land use

Most of land in Busia district is used for different purposes. The largest proportion is under agriculture. Urban areas and rural settlements take the second largest portion of the land. Land is regularly used for food production. Cash crop production like sugarcane, small scale maize and other subsistence crop farming, while the greatest challenge remains how to minimize soil erosion due to poor farming methods, heavy rains and lack of adequate vegetation cover as a result of opening up new land for cultivation.

Due to increasing demand of change of land use as a result of population increment there is need for proper urban and regional physical plans for proper land use and environmental management. There are significant land use changes taking place in the district due to increased demand of expansion land for farming. Wetlands in particular are being reclaimed for settlement and farming activities, hilltops have not been spared either. This has severely caused land degradation through soil erosion.

2.1.1 Soil Types, Characteristics' and Distribution

The soils in the district are moderately deep, generally rocky and stony consisting of well-drained red clays which have a low natural fertility. In parts of Nambale and Butula Divisions there are soils that are well drained, deep, brownish and sandy with moderate water holding capacity. In the parts of Budalangi and Funyula divisions that adjoin Lake Victoria, soils are poorly drained and mainly of clay type due to frequent flooding. In the swamps, there are heavy clay types, which are very difficult to cultivate, both when it is dry and wet. The district has approximately 925,200 hectares (924 Km²) of agricultural land. The relatively good soils of Nambale and Butula Divisions, together with the higher rainfall, promote production of a variety of crops, which are not prevalent in Budalangi and Funyula Divisions.

Key Environmental Issues

- Soil erosion/degradation

- Inappropriate farming practices
- Sedimentation and siltation of rivers
- Poor waste management practices and excessive use of agro-chemicals have led to soil pollution due to leaching of chemicals

Proposed Interventions

- Undertake receding and other soil conservation measures
- Promote proper farming practices through agricultural extension services
- Enhance education on safe use of chemicals and fertilizers
- Encourage integrated pest management practices

2.2 Land and land use changes

Land Tenure System

There are three basic types of land tenure /ownership in the district.

- Government land: Administered under the government land Act Cap 280.this land owned by government for its own purposes
- Trust land: Administered under the trust land Act Cap 288 and it is held under trusteeship by the local authorities i.e Municipal Council
- Private land : Administered under registration Act Cap 300.This land is owned privately in freehold or leasehold tenure after registration and issuance of title deed following trust land or government allocation

Land Use Types

The major land use types in the district include agriculture, forestry and fishing in Lake Victoria. The major land use in the district is cash crop farming and subsistence crop production. Other land uses include brick making, livestock rearing, settlements, sand harvesting and quarrying. The sandy soil near the lake shores, beaches and sand from the rivers are harvested for construction purposes.

Land Use Changes

With the increasing population in the district, the land currently being used for forestry and agriculture is being converted for settlement. It is expected that as the demand for food and shelter increases the

land under forestry and livestock will be under more pressure. This has led to deforestation and destruction of water catchment resulting in the drying up of streams leading to water shortages.

2.3. Agriculture, livestock and fisheries

The broad agricultural production systems in the districts include; crop cultivation, livestock rearing and fisheries.

2.3.1 Agriculture

This is the most important sector in the District as it provides for over 65% of the total earnings in the District. Most people in the District are employed either directly or indirectly in this sector.

Most of the available farmland is taken up by sugar cane farming as a cash crop leaving little room for food crops. This situation compels the farmers to encroach on the fragile areas like riverine catchments and wetlands for food production.

There is one medium size irrigation scheme in the district, situated in Budalangi Division. The project covers 540 Ha. Water is drawn from River Nzoia and the drainage water discharged in a swamp.

The availability of sugar cane has encouraged the proliferation of small jaggeries involved in the production of brown sugar.. Most of these have very poor waste disposal mechanism in place and hence dispose raw effluents into nearby rivers.

There is wide spread use of fertilizers in sugar cane production across the District. However, the effect of this on the soil PH and possible water pollution has not been studied hence not given the attention it may require. The table 3 below shows crop production in the district

Table 4: *Crops (grown)*

No.	Crop	Long rains	AREA (HA)		Mean yield To/ha.
			SRS	Total	
1	Maize	12,000	8500	20500	1.0
2	Sorghum	5600	250	5850	0.3
3	Finger millet	1050	500	1550	0.43
4	Rice	550		550	1.0
5.	Beans	5700	5700	11400	0.35
6.	Cowpeas	600	600	1200	0.4
7.	Soya beans	140	140	280	0.4
8.	Green Grams	95	95	190	0.3
9.	Ground nuts	50	150	300	0.25
10.	Bambara nuts	4.5	4.5	9	0.3

11.	Sim Sim	10	10	20	0.15
12.	Sunflower	15	15	30	0.6
13.	Oil Palm				
14.	Cassava	12,800	12,800	1500	5.2
15.	Sweet Potatoes	1300	1300	2200	8.2
16.	Arrow Roots	70	70	140	6.2
17.	Kales	115	115	117	8
18.	Tomatoes	120	120	240	10.5
19.	Onions	30	30	60	
20.	Pepper	3	3	6	1
21.	Carrots				
22.	Cabbage	35	23	58	
23.	Local Vegetables				
24.	Tobacco	430	-	430	0.8
25.	Coffee				
26.	Cotton	-	500	500	0.62
27.	Sugar Cane	4500	4500	4500	54
28.	Pine Apple	40	40	80	13
29.	Paw Paw			65	7.5
30.	Bananas			600	8
31.	Citrus			65	7.5
32.	Mangoes			50	.6

The commonest land tillage method in use is hand tools, followed by Ox-plough and tractors which is least used. Very few elite farmers practice conservation tillage and it has largely remained at demonstration level by institutions like Ministry of Agriculture. The cropping patterns practiced in the District are; inter-cropping of food crops especially cereals and the pulses and cash crops like coffee/maize or beans. There is also mono-cropping which include irrigated rice/rain fed rice, coffee, bananas, and groundnuts. Relay cropping is also practiced e.g. planting maize during the long rains then interplant with cotton once attains the silking stage or approaching physiological maturity.

Generally, the food crops are planted at the on-set of long rains (mid-Feb to March) and short-rains early August, while the root crops, sweet potatoes and Cassava are planted in the mid to the end of either long or short rains. Currently farmers exclusively plant cotton during the short-rains season.

Key Environmental Issues

- Wetlands encroachment
- Land degradation and Soil erosion
- Flooding
- Inappropriate farming practices such as cultivating steep gradients without terraces and cultivating up to river/stream banks,
- Deforestation
- Poor management of Liquid and solid waste disposal
- Unsustainable fishing methods
- Invasion of striga weed resulting to low yields

Proposed Interventions

- Construction of dams, open water channels to L.Victoria and maintain/ repair of dykes that have outlived their life span.
- Afforestation and reforestation
- Extensive agricultural education and extension
- Promote appropriate soil conservation measures.
- Introducing drought tolerant crop varieties.
- Developing technologies that reduce the effects striga weed in cereals production.
- Use of integrated pest control strategies.
- User of high yielding crop varieties.
- Promote Value adding and other post harvest activities.
- Improvement of marketing of farm produce.
- Enhance striga weed menace control

2.3.2 Livestock production

Livestock Census in Busia District

The census was done in 2004 through support of FITCA and results were as follows:

2.4. Water resources

Types of water sources

The main water sources in the district are surface water, ground water and run-off water. There are two main rivers in the district namely Nzoia and Sio. Other sources include protected springs, dug wells or rural piped schemes.

Lake Victoria is an important resource for the people living in Busia district. Their livelihoods revolve around goods and services from the Lake. The resources of Lake Victoria ecosystem to the district residents can be categorized as follows:

- Economic
- Traditional socio-cultural benefits
- Ecological biodiversity
- Communication

Status and trends of water sources

The occurrence of groundwater in the district is mainly from 1,200mm annual local precipitation and the subsequent infiltration into the sub-surface. shallow ground water levels lie between 1.0m and 7.0m. The ground water potential of the district is from poor (less than 1m³/h) to very good (More than 5m³/h). The central parts of the district and some pockets in the southern parts have potentials ranging from 2m³/h to more than 5m³/h. Most parts of the district have potentials above fair (1m³/h to 2m³/h). The surface water of Busia is generally good. The quality however decreases during the rainy season with an increase in color, turbidity and conductivity mainly due to the sediments and suspended matter transported by the river. The district has good spring water potential in its central parts, mainly central Bukhayo Location. The Marachi area has moderate potential while west Bukhayo has moderate to low potential. The southern parts of the district do not have spring potential at all. The table 4 below shows surface water quality

Table 5: Surface Water Quality Parameters

Parameters	Unit	L. Victoria	River Sio	River Walatsi	River Namwitsula	River Nzoia
PH	PH scale	6.1	7.3	7.7	8.0	7.6
Turbidity	NTU	120	64	146	168	91
Colour	Mg/L	150	300	70	5	20
Conductivity	Ms/cm	128	140	140	170	146
Iron	Mg/L	-	-	-	-	-
Manganese	Mg/L	-	-	-	-	-
Calcium	Mg/L	11	15	10	26	18
Magnesium	Mg/L	5.3	1.9	4.4	7.8	5.3

Sodium	Mg/L	18	9.5	8.4	11	13
Total Hardness	Mg/L CaCO ₃	50	46	44	96	66
Total Alkalinity	Mg/L Ca CO ₃	34	50	56	54	90
Chloride	Mg/L	6	1	4	1	4
Fluoride	Mg/L	0.02	0.02	0.02	0.02	0.04
Orthophosphate	Mg/L	0.01	0.01	0.01	0.01	0.02
Sulphates	Mg/L	1.8	0.30	0.30	0.30	0.4
TDS	Mg/L	77	84	84	102	88

2.5 Wetlands

In the upstream areas, riverine wetlands tend to occur in wide U-shaped valley bottoms separating the gently sloping topography on each side. At the headwaters of most streams, springs occur which feed into the main stream channel at slow velocities and in combination with the gradient cause the water to stagnate making the areas to be waterlogged. The water from the springs also brings ions leached from the rocks. Over and above the spring water, these wetlands also receive surface runoff and its sediment load from the adjacent sloping areas. These support the wetland vegetation. The vegetation cover of papyrus and phragmites tend to be the most dominant along the river channel increasing in density downstream. Other vegetation types include vossia, sesbania spp., typha, duom palm, sedges and other grasses. Most of these wetlands are permanent in nature.

In the downstream areas the wetlands mainly occur in the floodplain of major rivers mainly Nzoia and Sio. The downstream areas suffer from the aridity caused by proximity to the lake hence low and erratic rainfall. These areas only receive their waters during the high flows when the rivers break their banks flooding their floodplains. Wetlands are mainly seasonal in nature depending on rainfall amounts in the upstream areas. Vegetation is sparse consisting mainly of *sesbania* spp., *cyperus* spp. Sedge grass and *typha*. The drainage is impeded and during the high flows floods are common causing extensive damage to crops and property.

Deltaic wetlands occur downstream in areas where the rivers enter the lake or along the lakeshore. They receive the floodwaters sediments and nutrients from the rivers. They are also affected by the rise

in lake levels and waves, which causes backflows. These wetlands are very productive as reflected by the luxurious and dense vegetation cover of papyrus, phragmites, vossia, duom palms and sedge grass. These are areas with recent deposited alluvial sediments.

Key Environmental Issues

- Encroachment of wetlands
- Brick making. \Sand harvesting mainly on R. Sio and Walatsi.
- Waste water from municipal sewerage treatment system.
- Soil erosion due to poor land use practices
- Contamination of water sources

Proposed Interventions

- Community sensitization on the importance of wetlands
- Promote rainwater harvesting technologies
- Land use planning/Policy
- Water catchment conservation and protection
- Monitoring and evaluation of water resource status
- Enforcement of relevant legislations
- Storage of flood flows by building dams at strategic points
- Enhancement and straightening of the river channel
Embarking
- Develop and improve the existing water resources monitoring systems.
- Improve sanitation in municipality, Busia, Sio Port, Port Victoria and other small centres to be in line with development of water supply.
- Strengthen and promote the role of community groups, women, youths to fully participate in health, sanitation, water resources, and environmental management and conservation.

2.6. Forestry

Types of Forests and the Area under Forestry

The Gazetted Forest Area in the district is 578.5 Ha

Status and Trends of Forest Resources

The growth in population has affected vegetation and particularly the tree cover. This has been mainly due to land clearing for cultivation fuel wood demand and other agricultural activities. About 90% of the rural Population use woodfuel. This has led to depletion of trees which have been used not only

for firewood but also for boundary marking, soil conservation, medicinal, fodder, ornamental and shade to both livestock and people.

Key Environmental Issues

- Deforestation
- Logging for timber and charcoal
- Forest Fires
- Destruction of trees by livestock
- Inadequate reforestation programmes

Proposed interventions

- Community sensitization about forestation
- Enforcement of relevant laws and regulations
- Participatory forest management by community members bordering forests
- Establishment of buffer zones between communities and forests
- Encourage communities to plant fodder and practice carrying capacities
- Reforestation and afforestation of hilltops

2.7 Wildlife resources

There are no government established national parks, game reserves or animal orphanage in the district. There has been a continued threat to wildlife and ecosystem due to habitat destruction in the district. This is caused mainly to changes in land use patterns and inadequate regulatory and management instruments. The threatened wildlife is mainly, hares, dik dik , hyenas and quelleda.

2.8 Biodiversity conservation

Status and trends of Flora, Fauna and Microbes

There are over 200 trees species in Busia district above 90 species are trees and over 100 are shrubs and herbs. All the shrubs and herbs are endemic in the hills and are endangered by persistence of fires which occur occasionally during the dry season.

The most important species found in the district and particularly in riverine ecosystem include: *Albizia coriara*, *Cordia africana*, *Vitex domiana*, *Acacia polyacantha*, *Syzygium guineense*, *Chlorophora excelsia*, *Terminalia brownii*, *Maesopsis eminii*, *Aloizia coriara*, *Eucalyptus saligna* and *Vitex damiana*.

Most of the shrubs and majority of trees are significant for their cultural and medicinal values though some are now being over-exploited and are threatened with extinction.

The threatened plant species in Busia district can be categorized into trees and herbs. The trees include *Mvuli*, *Abbisia Gummisera*, *Albisia Amara* around Samia and Bunyala hills, *Dombea* and *Olea Africana*.

Threatened herbs include *commallina bengatensis*, spider weed, indigenous *amaranthas* and the local herb known as Sinyolonyolo. According to the agricultural office in Busia, the disappearance of these herbs is a result of application of herbicides, chemical fertilizers and weeding of the weeds.

There are two known important bird area in the district these are busia grass lands and Sio Port swamps. However there is no documentation on the exact number of bird species in the district but according to the local communities there are over 160 known bird species.

There are areas which are occasionally invaded by monkeys in Funyula and Budalangi. and are driven out by KWS Rangers. There is presence of reptiles e.g snakes

Key Environmental Issues

- Deforestation
- Soil erosion
- Loss of biodiversity
- Wetland encroachment for cultivation, settlement and brick making.
- Human-wildlife conflict
- Indigenous plant/tree species are vulnerable due to over harvesting

Proposed Interventions

- Initiate Reforestation and afforestation programmes
- Enhance Soil conservation measures and appropriate farming methods
- Enforcement of all regulation on conservation of biodiversity
- Enhance community participation in conservation efforts
- Sensitize local people on the negative impacts of forest fires

2.9 Energy

Kenya relies on two forms of energy: namely renewable and non-renewable. The raw materials for energy include biomass, fossil fuel, and radioactive minerals. Other sources include hydro, geothermal,

solar and wind. Alternative renewable sources of energy hold tremendous potential for mitigating environmental problems arising from over dependence on woody biomass. Exploitation of these energy sources also create opportunities for income and employment generation, both of which have a positive impact on improving the quality of life while reducing poverty.

2.9.1 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. Charcoal is widely used in urban centers than in rural areas where majority live. Fuel wood is dominant because it is cheap and easily obtained

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 River Nzoia.

The other energy sources in the district are as follows;

Efforts have been made to come up with the following energy technologies to enhance efficient use and adequate supplies;

- Biomass energy-charcoal, biogas
- Improved cooking stoves
- Solar systems
- Saw dust

2.9.2 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. hence most households lack on-farm sources of fuel wood. There have been attempts to encourage farmers to establish farm forest and enhance agro forestry practices. The ministry of environment and mineral resources through the district forest and NEMA departments are targeting hill tops, urban centres, schools and other public institutions for tree planting.

2.9.3 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 no-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 and therefore there is need to make electricity accessible to more households and market centers. Such a move will have positive environmental impacts.

2.9.4 Unexploited and Potential Sources of Energy

Unexploited energy source in Busia is wind while the underutilized energy sources include biomass, solar and liquefied petroleum (LPG). The main constraints in energy utilization and exploitation efforts include high initial costs/capital cost and the accessibility to such energy sources. Besides they must also encourage rural electrification as we have only two stations supplying electricity in Busia (i.e. Bumala and Mundika Stations). The district has a number of potential sources of energy, which remains largely unexploited.

2.9.5 Gender Constraints in Accessing Fuel wood

Women and youth are the major fetchers of firewood and water. With the depletion of forest ,they are forced to make long journeys looking for firewood .this problem is compounded by the fact that women are not supposed to own trees because it is a preserve for men.

Key Environmental Issues

- Pollution through emissions from carbon monoxide ,sulphur dioxide, nitrous oxide, lead)
- Deforestation
- Indoor pollution from the use of fuel wood
- High cost of energy technologies
- Corrosive gases that have eroded iron sheets in the neighbourhoods

Proposed interventions

- Enforcement of regulations on air quality standards
- Encourage Afforestation and reforestation programmes

- Design houses with adequate ventilation
- Mainstreaming gender issues in energy related interventions
- Introduction of efficient and affordable energy technologies

CHAPTER THREE

3.0 Human settlement and infrastructure

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 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.

Decline in per-capita arable land, water supply, degradation of soils and forest make rural life increasingly challenging and migration to urban centres accelerated (Republic of Kenya, 2002). Informal settlements with no direct connection to water supply or sewerage services as a result of high population pressure and inadequate physical planning emerges as potential challenge in most urban centres in the district.

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 had greater emphasis on incorporating local communities in the management of natural resources and their goods and services.

3.1 Human settlements and planning

Adverse environmental conditions coupled with lack of access to safe water and sanitation, inadequate solid and liquid waste management, poor drainage, air pollution, exposure to excessive noise levels and ineffective and inadequate health services have brought about health problems such as malaria, diarrhea, typhoid, skin and eye infections (GoK, 2004)

The population of Busia district lives predominantly in rural areas. The annual growth rate stands at 2.89% per annum. The table below shows the area population and density per division.

Table 6: Area population and density

<i>Division</i>	<i>Area(Km²)</i>	<i>Population</i>	<i>Density</i>
Budalang'i	306.50	58,363.00	190
Butula	245.20	104,450.00	426
Funyula	281.20	80,808.00	287
Matayos	173.70	60,365.00	348
Nambale	22.20	73,883.00	318
Township	232.50	27,519.00	1,240
TOTAL	1,261.30	405,388.00	321

Butula division has the highest population followed by Funyula division while Busia Township has the lowest. The high population in Butula, (25.8%), Funyula (19.9%), Nambale (18.2%) can be attributed to their large expanse in size as well as their rich agricultural base. The average density is 321 people per km². Busia Township has the highest population density (1240 people/km²) while Budalangi (190 people/km²) the least densely populated division in the district. The high density in Busia Township can be attributed to workers and businessmen and provision of services as well as immigrants from the rural areas in search of better opportunities. The lowest density in Budalangi is due to harsh climatic conditions. The area is generally hot and dry and is prone to heavy flooding. Thus population distribution in Busia district tends to be directly influenced by agro-climatic zones. The high population growth therefore means that in rural areas natural resources such as forests, wetlands, water, fisheries and other biotic resources will be put under a lot of pressure including encroachment and hence degradation. In Town centres the increase is expected to put pressure on basic facilities such as housing, water and sanitation and health facilities.

Key environmental issues

- Inadequate physical planning
- Pollution of water resources by human waste
- Inadequate waste management
- Inadequate enforcement of by local government
- Lack of access to clean water

Proposed interventions

- Carry out comprehensive urban /physical planning
- Improvement of sanitary accommodation and hygiene promotion
- Enhance the enforcement of relevant legislations
- Control of pollution through proper waste management
- Promote cleaner production technologies

3.2 Human and environmental health

The most prevalent diseases in the district are; malaria, acute respiratory infections, anaemia and intestinal worms. Malaria contributes 50% of the total morbidity in the district. Malaria and acute respiratory infections contribute the largest share of the morbidity among the out-patients who visit the health facilities. Poor environmental sanitation coupled with the humid tropical atmosphere contributes significantly to the prevalence of respiratory infections cases. The district is currently covered with 26 health facilities health facilities. On average, Patients travel 4-5 km to reach a facility. The table below shows the five major diseases by divisions

Table 7: Five Major Diseases by Divisions

Diseases	Township	Nambale	Matayos	Funyula	Butula	Budalangi
Malaria	8781	16,053	10,674	19,579	22,791	19,486
Respiratory	4,261	12,412	6,960	9,975	6,542	8,384
Diarrhoeal	1,649	1,897	1,740	3,374	2,292	3,730
Skin	1,835	2,146	1,126	3,481	1,933	2,789
Intestinal worms	397	1,025	992	2,578	987	956

Source: MOH, Busia(K), 2003

3.3 Pollution and waste generated from human settlements

The rapid population growth has increased demand for urban, agricultural and industrial activities hence the generation of vast amount of waste into the environment. In the district major pollution sources include market centres, hotels, bars, sand harvesting and quarries.

The types of wastes generated include both solid and liquid. These include polythene bags, and organic wastes, Effluent from defective sewage facilities, agricultural fields chemicals, excreta polluted soils, waste disposal grounds and surface run offs.

3.4 Communication networks

The infrastructure in the district is relatively well developed. The district has a good network of roads including B1 which is a national trunk road linking Kisumu and Busia and also Kenya with Uganda. Others are classified as primary, secondary, minor and special purpose roads. These presented in the table below

Table 8: Road Network

Total Km of Road	Tarmac	Gravel	Earth	Other	Total
Budalangi	0	0.7	27.1	0	117.8
Butula	6.0	76;0	20.5	0	102.5
Funyula	0	94.8	50.7	2	147.5
Matayos	14.0	17	8.0	0	32.4
Township	7.0	10.0	14.6	0.8	32.4
Nambale	31.6	89.0	23.9	0	144.5
TOTAL	58.6	377.5	144.8	2.8	583.7

Most roads in the district are earth roads which re impassable during rainy seasons. The situation is worse in Butula and Nambale divisions, which received rainfall all the year round. Regular flooding of Sio, Yala, and Nzoia Rivers in southern parts of Budalang'i and Funyula divisions also leaves many roads in a very deplorable state.

The most common means of transport in Busia is Bicycle Transport locally known as *boda-boda*. Since its introduction in early 1990s, the number of bicycles has increased in Busia town streets and on the rural roads.

3.5 Sanitation

Potable water supply coverage levels are higher in urban centers and townships in Busia district than in rural areas. Chlorination is uncommon in rural areas and water quality control is also extremely limited, notwithstanding the efforts of water and health sectors.

Urban sewage system has a lower coverage level of about 25%. This implies that the unconnected population uses either septic tanks or pit latrines which have serious implications on ground water quality.

The access to safe water is still a big challenge in the district. This is especially so in urban centers where population is rapidly increasing without a corresponding upgrading of the water infrastructure. In the rural areas, safe water is a rare commodity and where available, people have to travel long distance to access it. These are in form of protected springs, dug wells or rural piped schemes. The water supply situation is presented below.

Table 9: *Water Supply Situation*

Household with access to Piped water	18785
Household with access to Portable water	48312
Permanent Rivers	7
Number of Boreholes	292
Number of protected springs	162
Number of shallow wells	358
Number of dams	12
Average distance to nearest portable water point	1Km
Coverage of VIP pit latrines	71%

3.6 Education facilities

The district is endowed with a number of education institutions. There is a total of 117 primary schools with 104 government, 10 private and 3 community schools. For secondary schools, the district has over 25 schools, 11 are government, 11 private and 3 community.

3.7 Health facilities

There are a total of 35 health facilities in the district categorized in the form of clinics, dispensaries, health centres and district hospital. The facilities are evenly distributed with high concentration in Butula and Funyula and the least being in Busia township. The table below shows the distribution of the health facilities per division .

Table 10: Health facilities in the District

Division	Facilities
Township	2
Matayos	4
Nambale	6
Butula	8
Funyula	8
Budalangi	7
Total	35

Source: Ministry of Health, Busia (K), 200

Key environmental issues

- Low access to safe drinking water
- Poor environmental sanitation
- Low public awareness on sanitation and hygiene
- Poor waste management

Proposed interventions

- Create public awareness and improve sanitation
- Waste management and handling
- Enforcement of relevant regulations and legislations
- Develop and implement the guidelines for surveillance and control measures of vector borne diseases and their vectors

CHAPTER FOUR

4.0 INDUSTRY, TRADE AND SERVICES

4.1 Industry

Industry is a very important sector in the district. However there is minimum industrial activity. There is one jaggery in Nambale Division. Others are Jua Kali activities such as Carpentry workshops, metal works, brick-making, tailoring, poshomills, ice making, shoe making, printing and confectionaries. There is a proposed sugar factory which is yet to come up. The district's industrial potential especially for agro-processing has not been tapped. hence cannot be considered as a major source of income and employment. commercial businesses such as retail trade, tailoring, motor vehicle repairs, hardwares, butcheries, catering services and posho mills dominate. and are well distributed throughout the district.

They are concentrated in various centers throughout the district, these include: Busia, Nambale, Mungatsi, Bumala, Tangakona, Nyapera, Budalangi, Matayos, Funyula, Butula, Bukiri, Sio port, Burumba, Buyofu, Port Victoria, Lupida, Mulukhoni and Buhuyi

Industrial Potential

The district has a lot of potential which is either under- exploited or not exploited at all.

These include: fish processing, milk processing, cotton ginning, fruit processing, fruit processing, confectionaries, sugar industry, sweets making and oil processing.

4.2 Trade

The following are the major types of trade in the district:

- Wholesale (Supermarkets - mini to large scale)
- Retail trade (isolated kiosks and hawking)
- Hardware - micro to large scale
- Open-air markets- Deals in textile, agricultural products such as fruits and vegetables and livestock and poultry products

4.3 Services

The following are some of the services undertaken by various entrepreneurs in the district:

- Dry cleaning

- Hospitality and tourism
- Shoe repairs/shining
- Garages
- Carpentry
- Tailoring,
- Posho milling,
- Hairdressing and cuts
- Boda- boda (Bicycle transport)
- Jaggery

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

4.4 Tourism

The district has no major tourist attraction activities taking place, though there are potential of tourist attraction sites, for instance , some of the tourists on their way to Uganda go through the district and use the tourist hotels in the district. There exists boating at Sio Port. There are important bird areas in Nambale and Yala swamp. Generally Lake Victoria is the main tourist attraction in the district.

4.5 Mining and quarrying

4.5.1 Mining

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

4.5.2 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
- Low local demand due to limited construction activities
- Sand harvesting

Key Environmental Issues

- Land degradation especially soil surroundings the mining area
- Occupation health hazards
- Pollution
- Destruction of scenic beauty
- Inadequate community on tourism potential
- Inadequate compliance to regulations for natural resources management
- Diseases i.e malaria as a result of stagnated water from the disused mines and quarries

Proposed interventions

- Awareness creation on environmental issues related to mining and quarrying
- Rehabilitation of disused mines and quarries
- Community participation in environment conservation
- Enforcement of relevant legislations and regulations.
- Rehabilitation of the damaged sites by planting appropriate tree species and establishing the appropriate soil conservation measures
- Intensification of malaria vector control i.e by use of mosquito nets and awareness creation on households behaviour change

CHAPTER FIVE

5.0 ENVIRONMENTAL HAZARDS AND DISASTERS

Natural and human induced hazards pose a threat to human life, property and environment. Natural hazards include dry spells, soil erosion, drying-up of water sources, lightening and hailstorms, among others. Disasters occur when natural hazards interact with vulnerable people, property, and livelihoods causing varying damage depending on the level of vulnerability of the individual, group, property or livelihoods.

Anthropogenic factors causing land degradation; deforestation of catchment areas, poor agricultural practices, inappropriate land use systems and changing living conditions, among others contribute to increased impacts from the various natural hazards. In the recent past these hazards have increased in number, frequency and complexity. The level of destruction has also become more severe with more deaths of people and animals, loss of livelihoods, destruction of infrastructure, and environmental degradation among other effects resulting in losses of varying magnitudes. Environmental disasters in the district are climate or weather related. Most of them are natural rather than man-made and a few cases have been reported to have led to loss of life, livelihoods and environment.

In the past years, lightening has been a major threat in the district due to frequent rainfall, nature of rocks and thunderstorms. There have been cases where lives are lost especially in leaning institutions. It is however, important to note that since rain is a natural phenomenon a number of institutions and individuals have installed lightening arrestors. This however, needs to be intensified in learning institutions, health facilities and churches.

In addition, anthropogenic factors causing land degradation such as deforestation of catchment areas, poor agricultural practices, and inappropriate land use systems and changing living conditions are potential natural hazards. Floods often occur, causing gullies and soil erosion, which has an effect on soil fertility.

5.1 Extend and trends of environmental hazards and disasters

According to the Busia District Development Plan- 2002-2008, there are four frequent recurrent forms of disasters in the district namely floods, fires, lightening and drought. Floods mainly occur in Budalangi Division while drought mainly affects Budalangi and Funyula divisions. Fires are common in

sugarcane growing areas of Butula, Nambale and Matayo's divisions. Lightening in the district is sporadic.

5.2 Floods

Floods are mostly experienced during the high rainfall season. The main causes of floods are deforestation ,land degradation, poor environmental planning, inappropriate soil and water conservation measures, poor agricultural practices and climate changes related issues. Impacts of floods in the district are loss of lives and property, outbreak of water borne diseases infrastructure destruction, displacement of people ,soil erosion that will result in silting of rivers and blockage of drainage systems. The flooding creates the stagnant water which in turn provides a breeding site for mosquitoes that cause malaria.

5.3 Invasive species

The main invasive species in the district is striga weed which can suppress yield by 20% and even up to 80% depending on the level of infestation.

5.4 Accidents

Most of the accidents in Busia district are as a result of numerous cyclists sharing the same roads with motorists. Bicycles (Boda boda) are the main mode of transport in Busia district. Due to congestion on the roads, accidents do occur frequently. There is also a potential fire hazard due to petroleum tankers that line up the narrow road with occasional oil spills.

5.5 Pests and diseases

The most common pest in the district is the termite. Termites are found in the North of Busia and the South. All A.E.Z areas are afflicted by the termite. The termites mostly attack woody materials,dry plants and poles and hinder the survival of seedlings.

The aphid also forms a formidable problem especially exotic species such as cypress and even cedar - an indigenous. A few of the indigenous trees e.g *Markhamia lutea*, *Albizia coriara*, *Ficus natalensis*, *Milicia excelsa*, *Vitex doniana* have survived the exploitation and can still be found in the up-land and dissected pen plain.

Key Environmental Issues

- Flooding
- Loss of biodiversity
- Soil erosion
- Lack of equipments and early warning systems
- Low awareness on disaster preparedness
- Outbreak of diseases
- Land degradation
- Disruption of household routine and social functions

Proposed interventions

- Construction of dams and dykes to contain excess water and rrepair of the existing dykes
 - Enforcement of biodiversity regulations
 - Develop and implement effective early warning systems
 - Creation of awareness and educating community who are prone to such disasters on ways of coping with the disasters
 - Integrated indigenous knowledge in pest and disease management
 - Encourage community participation in flood control
 - Land use planning
 - Resettlement of people living in flood prone areas
-
- Trends, status and projections in identification and response mechanisms (Pollution, land degradation (desertification, soil erosion/degradation).
 - Trends, status and projections in occurrence and response mechanisms of invasive Species, droughts, floods, accidents and technological disasters.
 - Factors influencing trends on the above resources
 - Management challenges
 - Proposed mitigation/management measures.

CHAPTER SIX

6.0. ENVIRONMENTAL INFORMATION, NETWORKING AND TECHNOLOGY

Information is a fundamental resource in decision - making process. Information is required in defining objectives, setting targets and it guides in the implementation of programmes. In order to make an informed decision about policies and priorities, there is need to establish a strong, authoritative data gathering mechanism. Reliable and comparable information allows organizations to develop indicators and link them to other critical issues such as health and poverty. Implementation of environmental education and dissemination of environmental information is fundamental to enhancing public involvement and participation in environmental management that leads to behaviour change resulting in responsible living and interaction with the environment.

Environmental information and networking technology has not received much attention and priority for many decades as compared to other sectors. Lack of capacity, poor coordination and linkages, documentation, utilization and preservation of indigenous knowledge are key issues affecting environmental information and networking at community, civil society, private sector, learning institution, government institutions and international levels. Information Communication Technology sector is vital for development Other sources of environmental information include the district environment and wetland offices as well as the District Information and Documentation Center (DIDC).. There is need for Telkom Kenya, Kenya News Agency and other service providers to enhance information communication through telecommunication services and e-mail facilities.

6.1. Environmental education

Information technology has become a powerful tool for environmental information dissemination. Environmental education among the Busia population is critical for active involvement in conservation. Formal and informal education is helpful in changing people's attitudes and behaviour. It imparts skills and knowledge that enable people to strive for sustainable development through effective public participation in decision-making processes.

6.1.1 Public awareness and participation

Public awareness initiatives in the district are mainly through print and electronic media, barazas, commemoration of environmental days such as World Environment Day, workshops and seminars.

6.2. Technology

Cleaner production technologies have not been embraced in the district. Waste recycling firms have not been established either in spite of huge amounts of recyclable garbage. Scrap metals and high density plastics are collected by 'waste pickers' and transported to recycling plants outside the district.

6.3. Environmental information system

Environmental information refers to all forms of knowledge, which relates to the environment in one way or the other needed to understand or manage the environment. Main sources of information in the district include international organizations (Action Aid) research institutions and centres, educational institutions and civil society organizations.

6.3.1 Status of environmental information management system

Information on environmental related issues is easily available in the district. This is because institutions and organizations do share the information in workshops and seminars. Busia Municipal Council, District Public Health office both have environment unit. The daily newspapers, which occasionally contain environment related information, are kept at the District Library and the District NEMA office. Despite the existence of valuable indigenous knowledge (IK) on environmental issues it still remains undocumented. IK is normally discussed in seminars and workshops. There is an urgent need to document this information so that policy makers can make good use of it. Students participate in environmental education through environmental clubs, and 4k clubs. Secondary schools have more organized and better focused environmental activities than primary schools. There are no tertiary institutions in the district.

6.4 Environmental Information Systems

Types and Sources of Environmental Information

The broad challenge in harnessing environmental information and communication technology include inadequate resources and capacity for information collection, analysis storage and dissemination, inadequate awareness among environmental managers and the public.

Most environmental information in the district is found in reports, newsletters books and reports general. Most of these are with the District environmental officer. Other publication can be formed at the DIDC .Most of the information is accessible

Status of Environmental Information Management Systems

The most shared information is the NEMA newsletter which is inadequate. The major constraints are on funds and printing and photocopy machine. Most reports e.g. SOE are not well circulated due to such constraints. Proposed intervention include have most report is soft copy for any stakeholder to produce.

Information Networking

As Kenya aspires to achieve sustainable development and the Millennium Development Goals (MDGs), there is need to intensify environmental education and public awareness programmes. Increased awareness is a precondition for creating an environmentally responsible citizenry. Equally important is the inculcation of environmental values in students when they are still young.

Application of appropriate technologies is important in solving socio-economic problems and taking care of the environment.

Key Environmental Issues

- Inadequate environmental information materials for distribution and reference
- Inadequate office space
- Inadequate facilities and equipment
- Understaffing of the environment office
- Inadequate documentation of IK

Proposed Interventions

- Develop and improve circulation of the materials
- Translation of scientific information into simple format for the general public
- Capacity building for the NEMA District Office
- Undertake documentation of IK
- Nursery establishment
- Promote organic farming
- Initiate awareness creation activities

CHAPTER SEVEN

7.0 ENVIRONMENTAL GOVERNANCE AND INSTITUTIONAL FRAMEWORKS

7.1 Introduction

Status of Environmental Governance and Institutional Arrangement
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 an overarching framework law, environmental laws were scattered in various sectors and some were conflicting to each other. 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/or 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 for 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 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 Tribunal
- District and Provincial Environment Committees

7.3 Other Players in Environmental Governance

There are environmental programmes in the District, NGOs and CBOs that operate in District to address environmental issues. These are: Western Kenya Integrated Ecosystem Management Project (WKIEMP) jointly implemented by Kenya Agricultural Research Institute (KARI) and World Agroforestry Centre (ICRAF) and Nile Basin Initiative – Small Micro Grants Project in collaboration with NEMA and other GoK line Ministries are jointly implementing environmental projects in the District. There are several NGOs and CBOs in the District. The NGOs include VI Agro Forestry dealing with agro forestry, VIRED – Research in Environmental Science and flood control activities, CREPP – Food Security and Environment Management and SANA- water.

- The media plays a major part in publicity and advocacy and example is Radio Lake Victoria, KBC, KTN, Citizen radio and NTV

- Ministry of Youth Affairs through registered youth groups work closely with NEMA staff in the province for awareness creation and clean up activities, including investing the waste recycling activities
- The Private sector has been supporting NEMA in their effort to enforce EMCA in collaboration with Kenya Association of Manufacturers
- Schools and tertiary colleges have infused Environmental Education in their curriculum
- Since EMCA gives *mwananchi*, a *locus standi*, the public has been blowing the whistle on anybody defiling the environment and NEMA has always acted on such cases appropriately
- Some environmental related cases have ended in the Law Courts and prosecuted successfully
- Some cases of environmental degradation have been reported to Public Complaints Committee and investigated thoroughly and action taken.
- Other Committee dealing with environmental issues at the district level include Physical Liaison Committee, Forest, Health and Environment Committee, District Agricultural Committee, DDC, District Executive Committee, District Health Board.

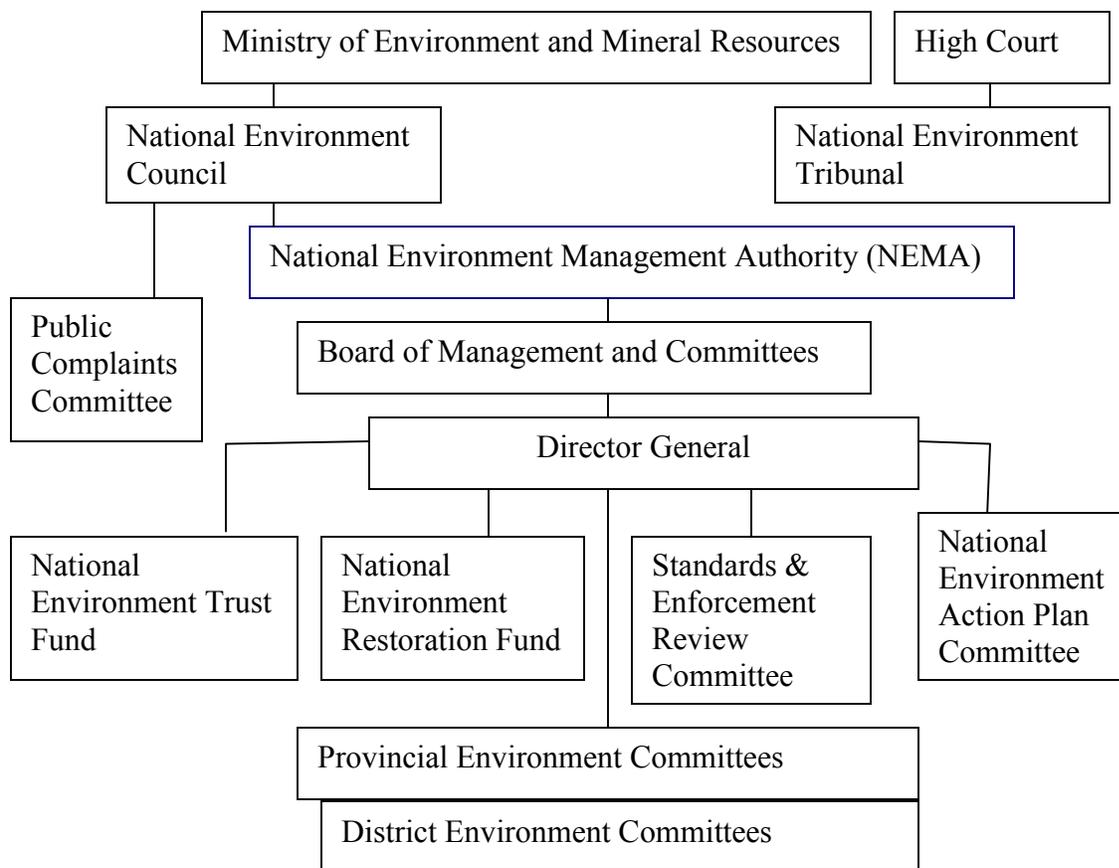


Figure 2: Institutional Framework for EMCA, 1999

(Source: NEMA Strategic Plan, 2005-2010)

7.4. Regulatory Instruments

Some environmental tools being employed in the district include.

- Environmental Management and Coordination Act of 1999
- Environmental Impact Assessment of 2003
- Environmental Audit of 2003
- Water Quality Regulations of 2006
- Waste Management Regulations of 2006
- Access and benefit sharing for conservation of biodiversity 2007

Other Sectoral Legislations for Environmental Management

Public Health Act Cap 242, Forest Act No 7 of 2005, Wildlife Act Cap 376, Water Act No 8 of 2008, Mining Act Cap 306, Physical planning Act No 6 of 1996 and Factories Act Cap 514.

7.5. Multilateral Environmental Agreements (MEAs)

Some of these MEAs have been domesticated in Kenya a number donor agencies have released funds towards environmental management through these instruments.

Key areas where community are involved in domestication of MEAs include;

- Poverty eradication programme.
- Natural resource conservation.
- Environmental health.

However there is need to scale up the programme to include more partners in order to enhance the community involvement in the enter district.

International Agreements

- Convention on Biological Diversity (CBD)
- Cartagena Protocol on Biosafety
- United Nations Framework Convention on Climate Change (UNFCCC)
- The Vienna Convention on the Ozone Layer Protection
- The Montreal Protocol of the Vienna Convention on Ozone Layer Protection
- Kyoto Protocol to the UNFCCC
- United Nations Convention to Combat Desertification (UNCCD)
- Convention on International Trade in Endangered Species (CITES)
- Convention for the Protection of the World Cultural and Natural Heritage
- Convention on the 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)

Regional Agreements

- Bamako Convention on the hazardous Wastes in Africa
- African Convention on the Conservation of Nature and natural Resources
- Tripartite Environmental Management Program for Lake Victoria
- The Nile Basin Treaty of 1929

Key Environmental Issues

- Inadequate capacity to interpret and enforce environmental legislations
- Conflict of environmental legislations 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 services and goods
- over reliance on elaborate and lengthy court systems
- formal institution in deliberating environmental cases
- inadequate capacity to domesticate MEAs

Proposed Interventions

- Build capacity on interpretation and enforcement of environmental legislations
- Incorporation of community pre-existing rights in natural resource utilization
- Raise awareness on environmental legislations
- Devolve court systems up to the village council level and local environmental courts to help in fast tracking environmental decisions/cases.
- Devolve funds for environment management
- Build capacity to domesticate MEAs
- Institutionalize democratic, transparent, accountable and enforceable environmental management rules and regulations
- Synergies in institutional partnership
- Institutionalize participatory, consultative and community inclusive environment management
- Use of incentives to promote compliance
- Incorporate trans boundary environmental management into existing environmental laws
- Enhance enforcement of EMCA, 1999 and other legislations for natural resource utilization
- Valuation of ecosystem services and goods in monetary terms
- Devolvement of funds with specific percentage for environment management

CHAPTER EIGHT

8.0 IMPLEMENTATION STRATEGY

8.1 Overview

Environmental concerns are cross cutting in nature and their impacts are felt at local, district, regional, national and global levels. The overriding goal of this Environmental Action Plan is to enhance integration of environmental concerns into local development planning and implementation. The purpose of the implementation strategy is to catalyse the development enabling environment and establish synergies to achieve this goal.

Implicit in this strategy is the recognition that significant activities are already ongoing and will ultimately lead to the realization of the EAP goal. This implementation strategy seeks to support the initiatives and develop new activities. Accordingly, the strategy outlines a wide range of strategic catalytic actions to achieve each objective, without presenting them as an exhaustive list since environmental issues are expected to remain dynamic, responsive and catalytic to specific needs that may arise in the course of time before the review of this DEAP.

The implementation strategy is composed of division, location, issue category, problem statement, actions and time frame and lead agencies involved.

8.2 Stakeholder involvement

The implementation Strategy of Environment Action Plans will involve lead agencies, policy makers, communities, civil society, private sector, learning institutions, and development partners (Table 11). Engagement of stakeholders in the implementation process will be guided by their statutory mandate, their capacities and priorities. The target will be to develop District Programmes and Projects from the EAP framework. The recently formulated Public Private Partnership strategy sets the framework for private sector involvement. Stakeholders will be involved at all stages of project preparation and implementation including monitoring and evaluation. Measures will also be explored to enable donors finance various projects.

8.3 Resource requirements

Implementation of the District Environment Action Plan requires a deliberate and targeted allocation of resources (financial, human, and technological) that calls for resource capacity assessment. The impacts from various interventions in integration of environmental concerns often take time to be realised hence the need for prioritisation as resources for allocation are usually scarce. Potential sources of funding should include locally available resources as well as Local Authorities Transfer Fund; Constituency Development Fund; Government Budgetary allocations; support from NGOs; CBOs; religious originations, private sector and development partners.

It is recognized that Busia District has considerable technical capacities in various disciplines. These capacities are found within specialized departments of government, state corporations, private sector research and learning institutions. There may be access to capacities from international research institutions and regional development organizations. It is expected that the preparation and implementation of the District Environment Action Plan may seek technical support from these sources.

8.4 Monitoring and evaluation

The purpose of monitoring and evaluation of the District Environment Action Plan is to ensure their effective and efficient implementation as well as ensuring that environmental concerns are addressed and integrated in the development process. In order to evaluate the implementation of this DEAP, a monitoring and evaluation plan has been formulated. The set parameters will be monitored on an annual basis to evaluate impacts so that a pro-active action can be taken (Table 12).

Monitoring and evaluation will be undertaken by lead agencies. However, other actors/stakeholders in the respective sectors will be considered key in the implementation of the EAP. It will involve documentation of 'Best Practices' for the purpose of replication. Monitoring will be undertaken on continuous basis and an annual report prepared. There will be a review of the DEAP after five years

Table 11: Implementation Matrix

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
District Wide	District Wide	Air	Air pollution	1	Establish air treatment systems in factories & Industries	Min. of trade	
				2	Enforce air standards requirements	Min. of trade	
	District Wide	Climate & related environmental hazards	Destruction of property by thunderstorms and strong winds	3	Install lightening arresters	Min. of energy, Min. of public works	
				4	Afforestation and re-afforestation	KFS, Min. of Agric	
				5	Undertake public awareness on disaster preparedness	Dist. Disaster preparedness committee	
				6	Strengthen District Disaster Preparedness Committee	Dist. Disaster preparedness committee	
			High potential for flooding	7	Construct flood control dykes/check dams	Min. of special programmes, LBDA	
				8	Construct water drainage systems	Min. of special programmes, LBDA,	
				9	Afforestation and re-afforestation	KFS, LBDA	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013	
				10	Enrich riparian areas with suitable vegetation cover	Min. of Agriculture, KFS, WRMA		
District Wide	District Wide	Crop production & Soils	Soil erosion	11	Construct terraces	Min of Agriculture,		
				12	Plant Napier grass	Ministry of agriculture		
				13	Afforestation & Re-afforestation	KFS, LBDA		
				14	Practice contour farming	Min. of Agriculture, KFS,		
				15	Build gabions	Min of Agriculture		
District Wide	District Wide	Crop production & Soils	Soil erosion	16	Rehabilitate and restore gullies	Min of Agriculture, Min of special programmes		
				17	Protect and conserve water catchments	KFS, LBDA, WRMA		
				18	Increase awareness on agriculture act	Min. of Agriculture		
				19	Construct storm drains	Min. of special programmes, local authorities		
				20	Sensitisation of community on global MEAs			
				21	Poor crop yields	Promote Agroforestry in sloppy areas	Min. of Agriculture, KFS	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
				22	Undertake appropriate soil conservation measures	Min. of Agriculture, LBDA	
				23	Promote use of organic manures	Min. of Agriculture	
				24	Practice crop rotation	Min. of Agriculture	
				25	Promote Integrated Pest Management	Min. of Agriculture	
			Water Pollution	26	Promote proper use of fertilizers and farmyard manures	Min. of Agriculture	
				27	Training on safe handling of agrochemicals	Min. of Agriculture, Pesticide control board	
		Energy	Deforestation	28	Afforestation and re-afforestation	KFS, LBDA	
				29	Hold seminars on good forestry practices	KFS, LBDA	
				30	Promote use of renewable sources of energy such as Biogas, solar and wind	Min. of energy	
District Wide	District Wide	Energy	Deforestation	31	Promote use of energy efficient devices	Min. of energy	
				32	Re afforest hilltops	KFS, Local authorities	
		Environmental Education & Awareness	Low awareness on sustainable environment management	33	Establish Adult Literacy Centres with a focus on environmental issues	Min. of culture and social services	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
				34	Collect data through baseline surveys on level of awareness	Min. of planning and national development	
				35	Enhance documentation of Indigenous Knowledge	National museums of Kenya	
				36	Increase community awareness on EMCA 1999 and other environmental related laws	Office of the President	
				37	Undertake training on safe use of agrochemicals and disposal containers	Min of Agriculture	
District Wide	District Wide	Fish & Fisheries	Shortage of fish	38	Construct water control structures	LBDA, WRMA, Min. of Public Works	
				39	Reclaim encroached water systems to encourage natural fish production	Min of Fisheries, Min of Lands, WRMA	
				40	Adopt modern/artificial control measures to discourage predators	Min. of Fisheries	
				41	Reclaim wetland ecosystems to ensure increased water volumes	Min of Fisheries, Min of Lands, WRMA	
				42	Apply and enforce the Fisheries Act	Min. of Fisheries	
		Forests & Trees	Deforestation	43	Plant agroforestry trees	KFS, Min. of Agriculture	
				44	Promote education awareness on good forestry practices	KFS	
District Wide	District Wide	Forests & Trees	Deforestation	45	Promote sustainable use of forests	KFS	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
				46	Afforestation and re-afforestation programmes	KFS, LBDA	
				47	Identify and rehabilitate hill tops prone to erosion	KFS, Local Authorities, Min of Agriculture	
				48	Initiate alternative income generating activities	Min of trade, Min of Youth	
				49	Protect and Re-afforest hill tops and slopes	KFS, Local Authorities	
		Health	High incidences of air and water borne related diseases	50	Promote public health education	Min of Public Health and Sanitation	
				51	Apply and enforce public health and sanitation Act	Min of Public Health and Sanitation	
				52	Promote use of treated mosquito nets	Min of Public Health and Sanitation	
				53	Apply and enforce the Physical planning Act	Min of Lands	
				54	Apply and enforce Water quality and Waste management regulations	WRMA, Local Authorities	
				55	Establish proper drainage infrastructure	Local Authorities	
				56	Improve conditions at work places particularly lighting and ventilation	Min of Industry, Min of Public Health and Sanitation	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
				57	Provide personal protective equipments	Private sector	
District Wide	District Wide	Industries and other Business Activities	Water pollution	58	Protect water springs	WRMA, Local Authorities	
				59	Promote cleaner production technologies	Min of Industry,	
			60	Apply and enforce Water quality and Waste management regulations	Min. of Public Heath and Sanitation, Local Authorities		
			61	Promote environmental education awareness among business community	Min. of Public Heath and Sanitation, Local Authorities		
		Air pollution	62	Incinerate industrial waste	Local Authorities		
			63	Apply and enforce Waste management regulations	Min. of Public Heath and Sanitation, Local Authorities		
			64	Afforestation and Re-afforestation	KFS		

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
				65	Enforce air quality regulations	Min. of Public Health and Sanitation, Local Authorities	
			Land degradation resulting from brick making activities	66	Improve brick making production technology	Min of industry, Civil Society	
Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
				67	Restore/rehabilitate degraded sites	Local Authorities	
				68	Standardize the brick sizes	Min. of Industry, KEBS	
				69	Encourage formation of brick making groups	Min of Culture and Social services	
District Wide	District Wide	Livestock & Grazing	Soil erosion	70	Control livestock numbers	Min. of Livestock a	
		Mining & Quarrying	Land Degradation	71	Rehabilitate and restores mined sites	Mines and Geology Dept	
				72	Apply and enforce EMCA 1999	Mines and Geology Dept, local Authorities	
			Accidents & Deaths	73	Apply and enforce mining Act	Mines and Geology Dept	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
	Urban areas	Settlements & Infrastructure	Poor sanitation	75	Construct pit latrines	Min. of Public Health and Sanitation, Local Authorities	
				76	Construct sewerage systems/septic tanks in urban areas	Min. of Public Health and Sanitation, Local Authorities	
				77	Enforce physical planning Act	Min. of Public Health and Sanitation, Local Authorities	
				78	Promote proper hygiene & sanitation	Min. of Public Health and Sanitation, Local Authorities	
				79	Apply and enforce the public health and sanitation Act	Min. of Public Health and Sanitation, Local Authorities	
District Wide	District Wide	Waste Management & Sanitation	Poor waste disposal	80	Construct sanitary landfills/ garbage pits	Min. of Public Health and Sanitation, Local Authorities	
				81	Promote waste recycling	Min of Industry, Local Authorities	
				82	Apply and enforce the public health and sanitation Act	Min. of Public Health and Sanitation, Local Authorities	
				83	Apply and enforce Waste management regulations	Min. of Public Health and Sanitation, Local Authorities	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
				84	Regular garbage/refuse collection in temporary holding bins	Local Authorities, Min. of Public Heath and Sanitation	
				85	Apply and enforce municipal council by laws	Min. of Public Heath and Sanitation,	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
				86	Apply and enforce the Physical Planning Act	Min of lands	
				87	Promote public awareness on proper disposal of waste	Min. of Public Health and Sanitation, local Authorities	
				88	Promote the use of biodegradable packaging materials	Min. of Trade, Min of Industry	
				89	Privatise waste collection and recycling	Min. of Public Health and Sanitation	
		Water Resources	Shortage of water for domestic and Agriculture use	90	Promote water harvesting – tanks/dams	WRMA, Local Authorities, Min of Agriculture	
				91	Plant suitable tree species along water sources	KFS, Min of Agriculture, WRMA	
				92	Establish indigenous tree nurseries	KFS	
				93	Drill wells/boreholes	WRMA	
				94	Apply and enforce the Water Act 2002	WRMA	
				95	Promote education awareness on environmental laws	Provincial Adm. KFS, Min of Agriculture, WRMA	
				96	Protect springs	WRMA	
				97	Protect and restore water catchments areas through re-afforestation	WRMA, KFS	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
			Water pollution	98	Apply and enforce waste management and Water quality regulations	Local Authorities, WRMA	
				99	Construct effluent treatment plants	Local Authorities	
				100	Construct proper waste water drainage systems	Local Authorities	
				101	Protect and conserve water sources	WRMA	
				102	Increase public awareness on water pollution control	WRMA	
				103	Remove blue gum from waterways and sources	WRMA, Min of Agric., KFS	
District Wide	District Wide	Wetlands	Degradation of wetlands	104	Protect, Conserve and rehabilitate wetlands	WRMA, Local Authorities	
				105	Create public awareness on values of wetlands	WRMA	
				106	Establish District Wetland Conservation and Management committees	WRMA	
				107	Promote sustainable use of wetland resources	WRMA,	
				108	Develop and strengthen community wetland conservation programmes	Min. of Culture and Social Services, WRMA	
				109	Apply and enforce EMCA 1999	Community	
				110	Apply and enforce Water Act 2002	WRMA	

Division	Location	Issue Category	Problem Statement	Action No.	Actions Needed	Stakeholders	Time Frame 2009 - 2013
		Wildlife, Biodiversity & Tourism	Loss of biodiversity due to habitat destruction	111	Protect Hill tops	KFS, Local Authorities	
				112	Apply and enforce existing regulatory and management instruments on biodiversity	KFS, National Museums of Kenya	
				113	Practice proper land use planning	Local Authorities, Min. of Lands	
				114	Afforestation and re-afforestation	KFS	
				115	Control charcoal burning	KFS, Provincial Administration	
				116	Reclaim wetlands	Min. of Lands, Local Authorities, WRMA	
				117	Apply and enforce biodiversity regulations on access and benefit sharing	KFS, National Museums of Kenya	

APPENDICES

APPENDIX 1: EXTRACT FROM EMCA, 1999

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) prioritise 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.

**APPENDIX 2:
REFERENCES**

- GoK:** Vision 2030, Government Printer, Nairobi, 2008.
- GoK:** Medium Term Plan, Government Printer, Nairobi, Kenya. 2008,
- GoK:** The National Development Plan, Government Printer, and Nairobi, Kenya. 2002.
- GoK:** Annual Report Livestock Department, Busia 2007.