



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



VIHIGA DISTRICT
ENVIRONMENT ACTION PLAN
2009-2013

EXECUTIVE SUMMARY

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

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

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

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

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

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

Chapter six covers environmental information, networking and technology. Issues discussed include status of formal and non-formal environmental education; public awareness and participation; technologies; environmental information systems and indigenous knowledge.

The chapter thus highlights the need for sustainable environmental management through environmental education and information, awareness raising and enhancing public participation at all levels.

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

Chapter eight provides an implementation strategy in a matrix form for addressing key environmental issues and proposed actions highlighted in chapter 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 that will enable the District attain sustainable development as envisaged in the Vision 2030.

Dr. Ayub Macharia (PhD),
Director General (Ag),
National Environment Management Authority

ACKNOWLEDGEMENT

On behalf of the National Environment Management Authority (NEMA), I would like to thank the Vihiga 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 for Vihiga district. Implementation of the activities identified in this document will see the district attain sustainable development.

Dr. Kennedy I. Ondimu

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

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
FOREWORD	iii
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
ACRONYMS	ix
CHAPTER ONE	1
1.0 INTRODUCTION	1
1.1 Preamble	1
1.2 EMCA, 1999 Provision On Environmental Planning	2
1.3 Environmental Action Planning Process	2
1.4 Scope of the Vihiga DEAP	3
1.5 District profile	3
1.5.1 Climate and Physical features	3
1.5.2 Population size and distribution	4
1.6 Social, Cultural, and Economic Characteristics	5
CHAPTER TWO	7
2.0 ENVIRONMENT AND NATURAL RESOURCES	7
2.1 Soils and land use	7
2.2 Land use changes	7
2.3 Agriculture, livestock and fisheries	9
2.3.1 Agriculture	9
2.3.2 Livestock Production	10
2.3.3 Fisheries production	12
2.4 Water resources	13
2.5 Forestry and wildlife resources	15
2.5.1 Forestry	15
Status	16
2.5.2 Wildlife	16
2.6 Biological diversity and conservation	16
2.6.1 Biodiversity data and information	16
CHAPTER THREE	19
3.0 HUMAN SETTLEMENT AND INFRASTRUCTURE	19
3.1 Human settlement and planning	19
3.2 Human and Environmental Health	19
3.3 Communication Networks	20
3.4 Social Economic Services and infrastructure	21
3.5 Health facilities	22
3.6 Energy sector	22
3.6.1 Types and Status of Energy Sources	22
CHAPTER FOUR	25
4.0 INDUSTRY, TRADE AND SERVICES	25
4.1 Industrial Sector	25
4.2 Trade Sector	26
4.3 Service Sector	27
4.4 Tourism sector	27
4.5 Mining and quarrying	27
4.5.1 Mining	27
CHAPTER FIVE	29
5.0 ENVIRONMENTAL HAZARD AND DISASTERS	29

CHAPTER SIX	31
6.0 ENVIRONMENTAL EDUCATION, INFORMATION AND TECHNOLOGIES	31
6.1 Status of Environmental Education	31
6.2 Public Awareness and Participation	31
6.3 Technologies	32
6.4 Environmental information systems	33
6.4.1 Types and sources of Environmental Information	33
6.5 Indigenous knowledge	34
CHAPTER SEVEN	35
7.0 ENVIRONMENT GOVERNANCE AND INSTITUTIONAL FRAMEWORKS	35
7.1 Overview.....	35
7.2 Status of Environmental Governance and Institutional Arrangement	35
7.2.1 EMCA structures for environmental management	35
7.3 Regulatory instruments.....	36
7.4 Multilateral environmental agreements (<i>MEAS</i>)	37
CHAPTER EIGHT	40
8.0 IMPLEMENTATION STRATEGY	40
8.1 Overview.....	40
8.2 Monitoring and evaluation.....	40
8.3 Implementation strategy.....	Error! Bookmark not defined.
APPENDIX	43
REFERENCES	46

LIST OF TABLES

Table 1: Divisions and Locations in Vihiga District	3
Table 2: Population density per Division.....	5
Table 3: Land Use types	7
Table 4: Livestock production data	10
Table 5: Major river Yala tributaries in Vihiga district	13
Table 6: Types and status of Forests	16
Table 7: Communication Networks	20
Table 8: Water and Sanitation.....	21
Table 9: Health Facilities	22
Table 10: Energy Supply	23
Table 11: Banks and Financial Institutions.....	27
Table 12: Tourists attraction facilities.....	27
Table 13: Status of Environmental Education (EE) in the District.....	31
Table 14: Status of Environmental awareness and participation in the district	32
Table 15: Technologies applied in the district.....	32
Table 16: Information and data types in the district.	33
Table 17: Implementation Matrix	Error! Bookmark not defined.

LIST OF FIGURES

Figure 1: Location of Vihiga in Kenya	4
--	---

ACRONYMS

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

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

MTEF	Medium term expenditure Framework
NACC	National AIDS control Council
NALEP	National Agricultural and Livestock Extension Program
NALEP	National Agriculture and Livestock Extension Program
NCD	New Castle Disease
NCPD	National Council for Population and Development
NDP	National Development Plan
NDPs	National Development Plans
NDPs	National Development Plans
NEAP	National Environment Action Plan
NEAPC	National Environment Action plan Committee
NEMA	National Environment Management Authority
NEMA	National Environment Management Authority
NEPAD	New Partnership for Africa Development
NGOs	Non Governmental Organisations
NGOs	Non-Governmental Organisation
NII	National Information Infrastructure
NPEP	National Poverty Eradication Program
OI	Opportunistic Infections
OPD	Outpatient Department
PDEs	Provincial Directors of Environment
PDPs	Part development plan
PEAPs	Provincial Environment action Plans
PHT	Public Health Technician
PLWA	Persons Living with AIDS
PMEC	Provincial Monitoring and Evaluation Committee
PRA	Participatory Rural Appraisal
PRSP	Poverty Reduction Strategy Papers
RD	Rural Development
Rd.	Road
REFIP	Research Farmers Interaction program
RHTC	Rural Health Training Centre
SACCOs	Saving and Credit Co-operative Societies
SEA	Strategic Environment Assessment

SEAs	Strategic Environment Assessments
SIDA	Swedish International Development Agency
SoE	State of the Environment
STIs	Sexually Transmitted Diseases
TAC	Technical Advisory Committee
UNCED	United Nation Conference on Environmental and Development
UNDP	United Nations Development program
UNESCO	United Nations Educational, Scientific and cultural Organisation
UNIDO	United Nations Industrial Development Organisation
USAID	United States Agency for International Development
VCC	Vihiga county council
VCT	Voluntary counselling and testing
VDFG	Vihiga District Farmers group
VIP	Ventilated Improved Pit latrine
VISCOMA	Vihiga District Small Holders Community Marketing Association
VMC	Vihiga Municipal Council
WSSD	World Summit on Sustainable Development
YFCK	Young Farmers Club of Kenya

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 Environmental Action Planning Process

i) DEAP Methodology

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

ii) Objectives of District Environment Action Plans

The objectives of District Environment Action Planning include the following:

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

1.4 Scope of the Vihiga DEAP

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

1.5 District profile

Vihiga district is one of the eight districts (old districts) in Western Province. The district borders Kakamega district to the North, Nandi district to the east, Kisumu district to the South and Siaya district to the Southwest. It lies between longitude 34, 30 east and 35, 0' east and between 0, and 0 15' North. The equator cuts across the southern tip of the district.

The district is divided into six administrative divisions that are further divided into twenty-seven location and one hundred and fifteen sub-locations. Table 1. shows the district's divisions and locations.

Table 1: Divisions and Locations in Vihiga District

Division	Area sq. km	Locations	Sub-locations
Luanda	98.6	4	21
Sabatia	74.6	4	17
Tiriki East	110.4	8	31
Tiriki west	97.0	2	11
Vihiga	92.1	4	17
Total	563.0	5	18

1.5.1 Climate and Physical features

The district experiences modified equatorial type of climate with high reliable rainfall of 1800mm to 2000mm. The rains are well distributed and bimodal, showing two distinct seasons i.e. long and short rains. The long rainy season is experienced in the month of April, May and June while the short rainy season comes in September, October and November. The temperature ranges between 14o C and 32oc with mean temperature of 23oC.

The district lies on the eastern fringes of the Rift valley's Lake basin (Figure 1). The altitude ranges between 1,300m and 1,500m above sea level and slopes gently from east to west. It is characterised with undulating hills and valleys. The main rivers are Esalwa and Yala with drain in Lake Victoria. The southern part is characterised by rugged granite hills of Maragoli, Bunyore and Nyangori.



Figure 1: Location of Vihiga in Kenya

1.5.2 Population size and distribution

The total population of Vihiga District as per the 1999 population and housing census was 498,882 and this has been shown to increase to 581594 in 2004. The population growth rate in 1999 was 3.3%. The population density as of now 2004 is 1033 persons per square kilometre. This is one of the most densely populated rural areas in Kenya given that most of the people here are found in the rural area. This high population density is now forcing some people to migrate to other districts to settle there. However the real date on the migration in the district is not available.

Table 2: Population density per Division

Division	1999		2002	
	No.	Density	No.	Density
Luanda	92465	938	102084	1035
Emuhaya	69250	928	76457	1025
Sabatia	117863	1068	130129	1179
Tiriki East	59943	618	66181	682
Tiriki West	76370	829	84317	915
Vihiga	82992	919	91632	1015
Total	498882	886	550800	978

1.6 Social, Cultural, and Economic Characteristics

The abundance of rain enables the district to rear and grow several crops and fruits including tea, horticultural crops, coffee, and French beans that are vital for agro- based industries. These activities are having a toll on the environment, as most of them are done not on a very environmental sustainable manner. This has caused the encroachment of the environmentally delicate areas such as river banks, hilly areas and forested areas.

There is a very high poverty incidence in the district. During the 1999 population census it was shown that the poverty levels was 65% and in 2002 this increased to 68%. The income levels are very low in 2002 per capita income recorded as KSh. 2000/=. Poverty has led to people exhausting all agricultural land especially through poor agricultural practises. This in done has led to encroaching on the forest reserves and ecologically fragile areas like swamps, sloppy and hilly areas and dams to earn a living. Cultural sites are also being destroyed to pave way for agricultural land.

Most of the poverty reduction strategies in the district are geared towards increasing industrial activities within the district through the Jua kali sector, brick making and the exploitation of the mineral resources in the district like gold. All these activities are having negative impact on the environment. Industrialisation has the potential for emission of pollutants into the air and water, and bringing up informal settlements. Brick making and mineral exploitation is leading to many open pits in many places within the district have a danger to many accidents occurring.

The district is also rich in culture. This is exemplified through various cultural activities in the district. In the district every 26th of December there is a cultural celebration where the culture of various sub tribes in the district is exhibited. These include the prowess of rain making among the Banyore sub tribe, the Tiriki and Maragoli circumcision rites and various traditional dances and foods. The district is also famous with the traditional circumcision forests among the Tiriki that are well conserved specifically for the rite of passage.

CHAPTER TWO

2.0 ENVIRONMENT AND NATURAL RESOURCES

2.1 Soils and land use

The major soils found in the district are acrisols which are deep well drained and slightly acidic covered with humic top soils from both volcanic and basement complex with yellowish red loams derived from sediments and basements.

Humic nitosols and ferrosols are also found but to a smaller extent especially on the southern parts of neighbouring Vihiga district. The soils are generally shallow and rocky and are favourable for oil, root, and cereal and horticultural crop production.

2.2 Land use changes

There are significant land use changes in the district due to increased demand for arable land. There is serious encroachment of riverine ecosystems and wetland for cultivation. Wetlands in particular are being reclaimed for settlement and farming activities. The hilltops have been encroached for farming and settlement, which has led to severe land degradation through soil erosion.

Table 3 shows the land use types in the district.

Table 3: Land Use types

Main food crops produced	Maize, beans, sweet potatoes, sorghum, finger millet and groundnuts
Main cash crops	Tea, tea, coffee and horticultural
Total acreage under food crops (potential) ha	40,000 ha
Total Acreage under cash crops in ha:	
Main livestock bred	Dairy cattle, Dairy goat, goats, sheep, poultry
No. of fish ponds	507
Area under fish ponds	80,100sq. metres
Size of Gazetted forest	4,160 ha
Size of non-gazetted forests	Not Available

Source: District Development Plan (2002-2008)

Land Tenure

Most land in the district is still held under freehold and absolute ownership. The Municipal and County Council hold some sections of land especially in urban centres as trust land.

Gradually, there is tendency to put more land to industrial and commercial uses as more urban centres and markets come up while the old ones expand. However, Most of the land is still under agriculture, specifically sugarcane farming and settlements. Due to population increase most agricultural land is now being converted to settlements.

There is increased subdivision of land in the district into smaller uneconomical holdings. This is because the rapidly increasing population combined with the cultural practice of land inheritance from fathers to sons.

Land use information systems have not taken root in the management of land in the District. This attributed to lack of expertise in the field and the necessary technology.

Land uses in the district include agriculture and rural settlements, which are the most predominant. Other land uses are commercial/urbanization and industrialization to a smaller extend. Most land in the district is still suitable for agriculture and livestock farming.

It has been the mandate of the various departments like agriculture, water, public health, the local authorities and even the provincial administration through the Chief's Act to integrate environment concerns in land use planning. This has not been very effective especially due to what was the sectoral nature of environment law.

Key environmental issues

- Poor land tenure system which excludes women and youth from ownership and control of land
- Land mortgaging which allows lease without prior family consent
- Gender disparities in land ownership
- Small farm holdings

Proposed Interventions

- Legislative measures should be taken to allocate land to the landless
- Estate succession procedures should be made easy taking into consideration women and youth rights inheritance
- Government to enforce limits on sub-division of land into small uneconomic units

2.3 Agriculture, livestock and fisheries

2.3.1 Agriculture

The district receives adequate amount of rainfall, which are evenly distributed in most seasons. These are very conducive for agricultural production in most of the years. However in some seasons the rains are erratic with heavy down pours followed by prolonged dry spells.

Most farms in the district are not mechanised as the farms are very small human labour is mostly utilised in crop production.

Although there is some level in the use of organic farming, the use of fertilisers and certified seed is pegged at 30% of the recommended packages, which has resulted into low yields hence non-achievement of the potential.

The district still remained food deficit requiring over 600,000 bags of cereals to meet the demand from neighbouring Districts of Nandi, Uasin Gishu, Lugari, Trans Nzoia, Kakamega and Vihiga.

To address food insecurity, the Agriculture department through the extension approach continued to emphasise on

- The introduction and multiplication of new imported cassava and sweet potato varieties, which are picking up very fast in the whole district.
- Rehabilitation of Banana orchards through improved management and introduction of high yielding TC materials.
- Alternative high values cash crops for local consumption and “export” to earn cash for buying maize. E.g. traditional vegetables, Asian vegetables, improved bean varieties.

Production of essential commodities has continued to go down as a result of cheaper source from outside the district and a combination of other factors controlled by external market forces e.g. price of inputs and market demand. Most consumers eating habit has remained the same, regarding maize as food while other starch alternatives are existing

Soil conservation technologies geared in soil fertility improvement continued being given priority in addressing the low level of fertiliser utilisation. ICRAF, ICIPE and KARI were promoting technologies friendly to resource poor farmers through the partnership of the

ministry of Agriculture. Information dissemination and acquisition of suitable germplasm for the shrubs/ trees continued being addressed.

Fanya juu and retention ditches were the most commonly constructed structures with reinforcement of the embankments with Napier grass. Fodder trees along the structures has picked up very well with farmers practising zero grazing farming i.e. calliandra and mulberry.

Tea remained the most important cash crop due to organised market and regular payments (monthly). The major challenges facing the industry include,

- ❖ High labour costs for plucking, weeding, pruning
- ❖ Unfavourable weather conditions e.g. hailstorm, prolonged dry spells.
- ❖ Poor roads impassable during wet seasons
- ❖ Expansion by growing smaller uneconomical units
- ❖ Two conflicting SACCOs handling payments

Coffee production remained on a declining trend as farmers morale/attitude is still bottom low/negative, due to non-payment of delivered produce. As a result most plantations are neglected, and slowly being up-rooted.

The four main societies namely Wamondo Lunyerere, Jebrok and Bunyore with a total of 10 factories are receiving very little cherry and Mbuni Coffee types.

2.3.2 Livestock Production

Table 4 shows the livestock population figures and their distribution in the divisions as at the end of the year 2004

Table 4: Livestock production data

	Luanda	Emuhaya	Vihiga	Sabatia	T/West	T/East	Total
1. Cattle							
(a) Grade	2500	6800	2900	5700	3200	2000	23100
(b) Zebus	15900	35000	28600	17400	11000	50000	157900
2. Chicken							
(a) Indigenous	74400	41000	100000	54000	40000	80000	389400
(b) Layers	5400	1900	4500	3700	12000	500	28000
(c) Broilers	N/A	NILL	NILL	2000	2000	N/A	4000
(d) Cockerels	N/A	200	3000	700	2000	N/A	5900
(e) Others	1600	N/A	500	1200	10000	1500	14800
3. Pigs	600	500	30	320	900	500	2850
4. Hives-KTBH	130	270	14	90	197	105	806
-Trad.	20	370	5	50	250	220	915
-Langs.	70	15	27	30	102	223	477

5.Goats							
(a)Small E. Africa	1600	4500	9300	3300	5000	900	24600
(b) Dairy goats	33	190	210	200	42	40	715
6. Sheep	2900	6500	1400	3400	3000	1000	17300
7. Rabbits	1000	1200	N/A	2600	4000	350	9150
8. Donkeys	38	N/A	N/A	N/A	N/A	120	158

NB: Others include – Turkeys, Geese, and ducks.

There has been an increase in all the enterprises. This could be associated with farmers diversifying in their production to contain certain risks. Increase in indigenous cattle could be attributed to small land sizes and also farmers keeping some for cultural/traditional functions.

The dairy industry produced on average 8 litres of milk per cow per day for grade cattle, while local Zebus gave on average 4 litres of milk per cow per day. Milk produced was estimated at 18.4 million litres from the dairy herd while 18.2 million litres was realised from Zebu herd. The amount of milk produced met only 54% of total milk requirements. Most of this milk was sold through hawking and or contractual verbal agreements. Milk produced fetched the farmers shs.570 million and a litre of milk was sold at shs.25.00.

Luanda dairy farm continued to produce and buy milk from other farmers and process it into products like Yoghurt, Mala, Milk shake, sell fresh milk as well as providing A.I. services to the farmers.

On breeding, both LDP acquired bull schemes, private bull schemes and GOK A.I. services and private A.I. schemes were utilised. The charges ranged from shs.200/= to shs.300/= per service for LDP bull schemes while private bull custodians charged between 250/=and shs.500/= per service.

A.I. schemes charged between shs.400/= to 3,500/= per service depending on source of semen and this excluded transport.

In the Poultry industry exotic layers produced a total of 5.6 million eggs while indigenous birds gave 15.6 million eggs. A total of 21.2 million eggs were produced fetching the farmers Kshs.106 million, an egg going for shs.5/=. However it should be noted that most of the farmers are going in for the indigenous poultry production due to high initial capital requirement by the exotic birds production. This has born fruit as a Vihiga District Farmers Group (VDFG) was formed to co-ordinate farmer activities towards promotion of local birds.

This has resulted into holding 15 farmer workshops and 6 meetings. This group meets every second Monday of the month to deliberate on issues affecting them.

Dairy goat keeping is becoming a major undertaking among the farmers due to ever-diminishing land sizes. This was particularly so in Vihiga and Sabatia divisions where farmers have taken up the enterprise. A bottle of goats milk was sold at shs.30/= per 750 mls bottle. Most of the goats produced on average three bottles of milk per day.

The breeds kept are mainly German Alpines, Toggenburgs and their crosses.

NGOs like Africa Now, CPDA-Christian Partners Development Agency and IIRR-International Institute of rural Reconstruction have been promoting this enterprise by procuring the breeding stock for farmers groups.

On Bee keeping there was appreciable improvement as other partners like Africa Now provided some Langstroth hives for farmer groups to improve on their production. Sheep and pig production also showed improvement in their production.

2.3.3 Fisheries production

The main fisheries activity in this district is fish farming. Although a lot of fish is sold in our market centres, they come from our neighbouring districts along Lake Victoria.

The main fish species farmed in this district include *Oreochromis niloticus* and *Clarias gariepinus*. Currently the district has 372 active fish farmers who own 530 operational ponds of 89,607 m². Average yearly production from these ponds ranges between 1000 – 15000kg. This earns the farmers an estimated kshs.100,000/= - 150,000/= annually.

Key Environmental Issues

- Pollution of rivers and streams due to the release of agro-chemicals that drain from the farms
- Air pollution
- Soil erosion due to cultivation on hilltops and steep slopes
- Inadequate soil and water conservation measures
- Water pollution due to effluent discharge from tea and coffee processing factories
- Water catchment degradation due to human encroachment

Proposed Intervention

- Promote soil and water conservation measures.
- Proper disposal of agrochemical wastes.
- Promote occupational health and safety measures.
- Enforcement of relevant regulations.
- Capacity building on proper handling and use of chemicals.
- Promote use of clean and appropriate technology both in production and processing stages.

2.4 Water resources

Introduction

Water is an essential resource for life. Although the availability of freshwater varies widely with geographical location, Earth's water cycle is an abundant provider. Both natural conditions and human activities affect the quantity and quality of available water.

Land-use sometimes leads to water pollution, which may render the water supply unfit for various human uses, including drinking. It can also profoundly affect natural biological systems, leading to the over fertilisation or eutrophication of lakes or to the accumulation of unsafe levels of organic residues and metals in fish and other marine life, for example.

Surface water

Vihiga District has only three forms of surface water, that is, rivers, dams and reservoirs and the wetlands. There is only one permanent river in the district, which is river Yala. It has three main tributaries that traverse across the district. These tributaries are Edzawa, Zaaba, and Garagoli. Table 7. shows the major river Yala (table 5) tributaries in Vihiga district

Table 5: Major river Yala tributaries in Vihiga district

Tributary	Approximate length(km)	Approximate area Covered(km ²)
Edzawa	37.5	171
Zaaba	17.0	82
Garagoli	18.2	68
	Total	321

Two water storage basins (dams) have been built around the district. They have a total filled capacity of 100,000m³ and their total area comprises of 500m². We also have one water pan with the filled capacity of 25,000m³. One dam is now completely filled up with silt from agricultural land while the other is 50% silted up.

There are approximately 17 wetlands in the district. Some of these wetlands have been completely reclaimed for farming purposes. The type of crops grown includes maize, beans, blue gums, Napier grass, vegetables etc. These crops are not appropriate for wetland conservation. There is need to gazette these wetlands. There is also need for communities to be trained on wetland conservation.

Ground water

Ground water is water that occurs in underground stream, channels, artesian basins, and other bodies in the ground. This water bearing formation are either shallow or deep seated.

Ground water occurrence potential in Vihiga district can be termed to be moderate to fairly good as evidenced by numerous source springs throughout the district.

The geological forms exposed in the area are Kavirondian, Nyanzian, Granites and Basalts. Consequently ground water is located in vertical faults zones, and in the slightly weathered, unaltered and highly fractured zone just above the bedrock. The groundwater-bearing formation in the district can be classified as:

- ❖ Kavirondian water bearing formation
- ❖ Nyanzian Rhyolites water bearing formation
- ❖ Nyanzian Meta-basalts water bearing formation
- ❖ Granites water bearing formation

Groundwater as a source of water for domestic and other use is fairly developed and utilised either by hand dug wells or boreholes. Hand dug wells are less reliable since water level varies with season. Boreholes are more reliable where water are struck in deep formation.

Areas found around Nyangori, Tigoi, and Madzui have been found to be of less ground water potential and unsuccessful wells were drilled.

Water found in deep aquifers is mostly of good quality as most boreholes are properly sited and located.

Groundwater recharge in the district is by local infiltration of rainwater. However natural vegetation of equatorial type has been completely decimated and most areas in the district is now under small scale intensive agriculture. This is likely to affect ground water recharge rate.

Catchment status

Vihiga district acts as the catchment area for river Yala and other small tributaries leading to Vihiga district. This catchment has been severely affected by deforestation and other poor methods of farming. Almost all riverbanks and wetlands have been encroached into. This is evidenced the turbidity of the water in the rivers. Evidence is on the decrease of the amount of water discharged from most springs as it decreases.

Key Environmental Issues

- Biodiversity loss due to clearing of vegetation
- Overgrazing
- Draining and reclaiming of wetland due to human encroachments
- Unsustainable exploitation of wetland resources

Proposed interventions

- Biodiversity conservation
- Setting up District and Community Wetland Conservation and Management Programme
- Identification and gazettement of wetlands for sustainable management
- Promoting community participation to reduce conflict in wetland use
- Enforcement of relevant environmental legislations

2.5 Forestry and wildlife resources

2.5.1 Forestry

Vihiga District does have some existing natural or manmade forest. There are two gazetted forest areas namely Kibiri which is the south most end of the vast Kakamega forest and the degraded Maragoli hills forest. We also have pockets of cultural and religious forest in the district (table 6).

Table 6: Types and status of Forests

Type of forest	Extent (Ha)	Location	Forest Uses	Status				Proposed intervention
				Gazetted	Under trust land	Private	% Degraded	
Maragoli hills	469	Vihiga division	Protected	Gazetted	--	--	100%	Rehabilitation
Kibiri	3691	Tiriki East	Protected	Gazetted	--	--	--	Involve community in conservation
Kaimosi mission forest	1000	Tiriki East division	Conservation, plantation	Private	--	--	5%	Rehabilitate degraded areas
Tiriki cultural forests	50 Ha	Tiriki East and west divisions	Initiation	Trust land	--	--	> 5%	--
Bunyore cultural forests	18.4	Luanda	Rain making	Trust land	--	--	>5%	--

Generally the threat facing these forests include grabbing, boundary encroachment, overgrazing, illegal logging, and conflict of interest between cultural and modern believes

The intervention is to educate people on the environmental importance of these forests, increased public participation in the management of the forests.

2.5.2 Wildlife

The district which is endowed with the eastern most end of the Guenno Congolian rain forest is endowed with a variety of wildlife that inhabits this forest area Major mammals found in the Kibiri forest area include mainly the colobus monkeys although other species of apes are also found. There are more than 400 species of birds that inhabit mostly the forest area. The forest is also rich in reptiles and many insect species. Being an equatorial rain forest the forest is also home a rich variety if trees and shrubs that are found nowhere else in Kenya.

2.6 Biological diversity and conservation

2.6.1 Biodiversity data and information

- a) Flora – Like is for most areas of Kenya where crop husbandry is the major land use system, the flora is for most parts of Vihiga district disturbed and replaced with fast growing exotic species.

Remnants of the original tree cover can still be found only in the gazetted forest Nature Reserve, along riversides in some Tiriki Cultural forests and rain making groves of the Banyore tribe.

Apart from the gazetted area, most of these natural forest remnants are under intense pressure despite concerted efforts for their conservation.

The main exotic species that are replacing the indigenous flora in Vihiga are mainly selected for the commercial suitability and they include *Eucalyptus spp*, *Pinus patula*, *Cupressus lusitanica*, *Gravellea robusta*, *Persea americana*, *Zyzigum cuminii*.

Some of the exotic species are especially the *Eucalyptus spp* are posing ecological problems especially when improperly sited near swamps and water sources. Foreign pests have also ravaged some of them and at the moment the *Eucalyptus* Chalcid pest is posing an environmental challenge in the divisions of Luanda, Vihiga and Emuhaya.

On a more positive note, the District has witnessed the registration of several environmental conscious groups who are advocating the preservation of the natural floral system. This has led to the domestication of important indigenous trees like *Prunus africana*, *Maesopsis eminii*, *Markhamia lutea*, *Olea spp* and *Cordia abyssinica*. These C.B.O's are also supplementing the government through the forest department to conserve the remaining areas of natural flora.

- b) Fauna - Historically the big animals were very common in this region due to plenty of their habitats. These included Lions, Leopards, Buffaloes, Hippos and Antelopes.

As the population grew and more land for settlement was sought, most of these animals were driven off their habitats in Vihiga districts.

The major animals now common in the district and their status is as shown below:-

- i) Colobus monkey – endangered – it is a common delicacy.
- ii) Baboon – endangered due to reducing habitat
- iii) Small antelopes – endangered by poachers
- iv) Civet cats – endangered by reduced no. of prey.
- v) Birds – Quite a variety occurs in the gazetted forest. Their nesting areas have been reduced by deforestation in the farmlands.
- vi) Reptiles – Occur commonly in Kibiri Forest. Very few crocodiles in River Yala.
- vii) Fish and Frogs – River bank cultivation, over fishing, illegal fishing methods and draining of swamps has considerably reduced the habitats of fish and frogs and hence their members.

- C) Microbes – Microbes are an important link in the energy transformation chain because of their parasite and symbiotic existence. They release micronutrients into the biosphere and make them available to higher life forms.

However increased injection of inorganic chemicals in form of fertilisers, herbicides, acaricides, fungicides and antibiotics into the food chain has greatly interfered with their natural roles. The consequence can be seen in reduced soil productivity and natural occurring edible mushrooms.

Key Environmental Issues

- Droughts
- Water and pasture shortages.
- Fires.
- Loss of habitats
- Human- wildlife conflict

Proposed Interventions

- Reforestation programme
- Develop water infrastructure.
- Create environmental awareness
- Enhance community participation in the biodiversity conservation.

CHAPTER THREE

3.0 HUMAN SETTLEMENT AND INFRASTRUCTURE

3.1 Human settlement and planning

Most land in the district is still held under freehold and absolute ownership. The Municipal, town council and County Council hold some sections of land especially in urban centres as trust land. There is tendency to put more land to industrial and commercial uses as more urban centres and markets come up while the old ones expand. However, Most of the land is still under agriculture, specifically tea and substance farming, and settlements. Due to population increase most agricultural land is now being converted to settlements.

There is proliferation of slums in the urban centres as a result of abuse to Physical land use plans especially by the respective local authorities.

The area residents' still lack proper shelter and housing both in the rural areas and urban centres.

Key Environmental issues

- Inadequate physical planning
- Inadequate infrastructure
- Inadequate enforcement of relevant legislation

Proposed Interventions

- Undertake comprehensive physical planning
- Develop / improve existing infrastructure.
- Enhance enforcement of laws

3.2 Human and Environmental Health

The common diseases in District include malaria, diarrhoea, Tuberculosis, HIV/AIDS, respiratory tract infections and Gastro enteritis infections through consumption of contaminated water or food.

The HIV/AIDS pandemic is of great concern in the District. The prevalence rate for HIV/AIDS stands at 11%. Malaria accounts for 50% of the sicknesses reported within the District.

The main precursor factors include poor disposal of wastes especially used containers and excavations/used quarries. Water borne disease cases are high in rural areas due to poor latrines, unprotected water sources and poor water handling.

Key Environmental issues

- Inadequate waste management system
- Water borne diseases

Proposed Interventions

- Develop waste management system
- Develop / improve existing infrastructure.
- Enhance enforcement of laws
- Create awareness on environmental health

3.3 Communication Networks

The district's infrastructure is mainly composed of roads and telecommunications network. There is rampant soil erosion along the road systems. Un-maintained culverts cause soil erosion by discharging collected run-off water to farms. An additional factor for concern has been illegal construction of structures along road reserves that endangers both road users and the tenants. The wear and tear of the road network has also been an issue of concern from the growing number of vehicles using the road network. Table 7 shows the district's communication networks.

Table 7: Communication Networks

Transport facilities	
Total kilometers of roads:	801
Earth roads	423
Rural access roads	
Muram roads	262
Bitumen (Tarmack)	116
Total length of railway line	0
Number of airstrips	0
Communication	
Number of household with telephone connection	282
Number of private and public organizations with telephone connections	688
Mobile phone coverage	80%
Number of public booths	48
Number of post/sub-post offices:	25
% Of households without radios	not available

Source: District Development Plan (2002-2008)

3.4 Social Economic Services and infrastructure

Water

The districts statistics on water and sanitation are shown in table 8.

Table 8: **Water and Sanitation**

Water and Sanitation	
Number of households with access to piped water	12,000
Number of households with access to potable water	22,000
Number of permanent rivers	4
Number of wells	50
Number of protected springs	200
Number of boreholes	14
Number of dams	2
Number of households with roof catchments	99,188
Average distance to nearest potable water point	1km

Source: District Development Plan (2002-2008)

Major sources of pollution

Major pollution sources are Jua Kali garages where waste oil is indiscriminately discharged into environment. There is also improper effluent management from residential, commercial and industrial establishments like coffee factories and unplanned food kiosks. Both solid and liquid refuse in urban settlements like Vihiga municipality and Luanda town council and other up coming markets are of great concern.

Other wastes of concern in the district include polythene bags and other plastics, broken glasses, metallic wastes and scrap metals mainly from Jua Kali.

Industrial effluents are mainly from Mudete tea factory and some coffee factories. However, these are treated to satisfactory levels before release into the environment. Air pollution is mainly by Mudete tea Factory and the motor vehicle industry.

Key environmental issues

- Waste pollution
- Inadequate awareness creation
- Inadequate enforcement of relevant legislations

Proposed intervention

- Develop waste management systems
- Awareness creation
- Enforcement of relevant legislations

3.5 Health facilities

The district's health facilities are shown in table 9.

Table 9: Health Facilities

The most prevalent diseases	Malaria, Upper Respiratory infections, pneumonia
Doctor/patient ratio	1:50,000
Number of hospitals	3
Number of health centres	20
Number of private clinics	57
Average distance to health center	5km

Source: District Development Plan (2002-2008)

Key environmental Issues

- Inadequate public health care services
- Poor attitude towards family planning services
- Ignorance on the health service available
- High malnutrition rates due to ignorance

Interventions

- Provide health facilities especially through CDF programme
- Provide trained personnel to run the facilities
- Create awareness

3.6. Energy sector

3.6.1 Types and Status of Energy Sources

There are various sources of energy in the district. This include:, wood fuel, solar energy. There are several fuel petrol stations in the district that supply people with petrol, diesel and paraffin to meet the local demand for these products.

Firewood

The immediate environmental effect of the current firewood shortage is vegetation clearance and loss of plant species diversity. There is a need for active promotion of efficient firewood burners and establishment of wood lots specifically for domestic firewood requirements.

Most of the firewood sold in rural and sub-urban areas in the district comes from forests i.e. Kakamega, Kaimosi and Nandi Forests. Although the forest department allows forest adjacent communities to harvest dead wood as firewood, this arrangement is not sustainable since the firewood demand exceeds that which can be supplied from forests. In order to preserve the existing forest, there is an urgent need to development commercial firewood production wood lots in the areas adjacent to these forests.

Firewood combustion using the traditional three stones is considered very inefficient, as most of the heat is lost. Additionally most traditional kitchens are poorly ventilated leading to serious in house pollution. The in house pollution is contributing to increased cases of respiratory diseases especially among women and young children, their usual companions. This calls for an urgent need to design kitchens and combustion stoves that minimize in house pollution.

Charcoal

There is need to address this charcoal shortage through establishment of woodlots for commercial charcoal production. Introducing efficient charcoal production kilns in the district may enhance this enterprise. Producing charcoal from the farms rather than the forests will create alternative income sources to the local people as well as preserve the forests that are currently the main charcoal source.

Paraffin, gas and electricity

High investment costs in gas burners and the high cost of LPG prevents most middle and low-income households from using gas for heating. Therefore, the major energy interventions geared towards environmental conservation should be based on sustainable production of firewood and charcoal. There is also need to expand the rural electrification program at subsidized prices.

Wind power, solar and biogas

There is minimum effort made to harness these relatively cheap and sustainable energy sources within the district. There is an urgent need to develop an energy supply strategy that aims at harnessing these underutilized energy sources within the district.

Table 10 shows the energy supply statistics in the district.

Table 10: Energy Supply

Number of households with electricity connections	2,400
Number of trading centres with electricity	41
% Rural households using solar power	1
Households using firewood/charcoal	97%
Households using: Kerosene Gas Biogas	60%

Source: District Development Plan (2002-2008)

Key Environmental issues

- Deforestation
- Over reliance on firewood and charcoal.
- Soil erosion,
- Siltation and pollution of water systems.

Proposed interventions

- Enforcement of relevant regulations
- Enhance planting of trees on hill tops and other suitable areas
- Introduction of efficient affordable energy technologies.

CHAPTER FOUR

4. O INDUSTRY, TRADE AND SERVICES

4.1 Industrial Sector

Types of Industries, Production and consumption pattern

Vihiga district is not endowed with many industrial activities as many people predominately engage in substance agriculture. There exist a few industries in the district that are agricultural based. These include Mudete tea factory in Sabatia division, a Jaggery in Luanda division and nine coffee-pulping factories trotted in all divisions of the district. Other industrial activities in the district include the informal Jua Kali who specialises in making household furniture, metal, and motor vehicle garages. These are found in major shopping and market centres all over the district. Brick making is another industry that is spring up very prominently in the district in the recent past. For the green tea market access is through the Kenya Development tea agency while the coffee produces in mainly marketed through the co-operative societies. The products of the Jua Kali industries are normally locally consumed. There is a major proliferation of car washing activities in the district.

Trends Industrial Development

Most industries in the district are yet to employ the latest industrial technology that will reduce the impact of their activity on the environment. For example although Mudete tea factory have significantly improved their effluent disposal measures, they still heavily depend on the wood fuel as a source of energy. These have a negative impact on the environment in terms of air pollution and deforestation. Most of the coffee factories are yet to employ the best waste management measures in their operations.

There is therefore need for all the tea, coffee factories, and the jaggeries to carry out yearly environmental impact assessment. Other establishments include the Jua Kali establishments, garages, and brick making individuals.

Key Environmental Issues

- Water pollution by Agro-based industries, car washing near rivers and garages
- Biodiversity loss through break making

Proposed Interventions

- Enhance water regulations
- Promote Cleaner Production Technologies

- Conserve biodiversity
- Create environmental awareness

4.2 Trade Sector

Types of trade

Trade in the district is predominantly done on small scale involving mostly household goods. Most of the goods are sourced from outside the district and the district is a net import of goods. Some agricultural goods are sold out of the district and this is only on a minimal scale. Most of the goods sold in the district are already packaged before they enter the market. Most of the packaging is done using plastic bags, which is a major cause of pollution in the district. Cash crops produced include tea and coffee in most cases these are sold to the tea factory and co-operatives for onward processing and selling to the outside market.

Production and consumption pattern

There are over 2233 business premises in the district mostly dealing in domestic household goods. Most agricultural products produced in the district and sold is mostly tea and coffee. There is ready market for these products through co-operatives and Mudete tea factory. However the farmers are not satisfied with the prices offered for their products.

The biggest constraints to trade in the district have been identified as lack of infrastructure like good roads and market information. There is generally poor entrepreneurial attitudes and jealousy among traders. The other constraints include cumbersome and expensive licensing procedures and insecurity.

Key Environmental issues in Trade

- Solid waste pollution
- Inadequate enforcement of relevant legislations
- Inadequate awareness

Proposed interventions

- Develop waste management systems
- Enforcement relevant legislations
- Create environmental awareness

4.3 Service Sector

A number of financial institutions in the district, mainly banks, provide credit to the public for either farming or business activities.

Table 11: Banks and Financial Institutions

Number of banks	2
Number of other financial institutions	4
Number of micro-finance institutions	3

Source: District Development Plan

4.4 Tourism sector

The district is endowed with many sites that can be for tourist attraction, this include gazetted forest areas and hills that are very good scenery. The traditional forest of the Tiriki and the Bunyore, and their culture can also act as tourist attractions (table 12).

However this sector is not well developed in the district. There are on going efforts by various stakeholders to tap this potential.

Table 12: Tourists attraction facilities

No. of trading centres	50
No. of Hotels	6
No. of Tourist class hotels	4
Main tourist attractions	Kibiri forest, stone carving, caves and Jesus foot prints on rocks in the district, cultural forests

4.5 Mining and quarrying

4.5.1 Mining

Types of mining, quarrying operations and extraction pattern

Although not compared to other districts in Kenya, Vihiga district has a potential for mineral exploitation. Notable among them is the Gold deposit that was once exploited by the colonialists in the 1930s on a large scale. Nowadays individuals do gold exploitation on a small scale along the river valleys. Gold mining is done at Edzava, West Maragoli, Chavakali, and Shaviringa Locations.

The southern part of the district is dominated by rugged granitic hills. Kavirondian and Nyanzian rock system dominates the geological formation. These rocks have a high potential for exploitation as building stones and ballast.

4.5.2 Quarrying

There are very little quarrying activities in the District. However, there is a lot of murrum digging all over the district. This is usually carried out by the department of roads.

There are also brick making activities in the district. Although in the past this was only for domestic needs, nowadays these activities are becoming more commercialised.

The quarries usually leave open quarries which are dangerous. Some have been rehabilitated but others have not. The quarries main environmental concern they are the breeding grounds for mosquitoes there are also a cause of disaster.

4.5.3 Sand Harvesting

Sand harvesting is done on small scale in the Yala and Garagoli rivers. Also sand harvesting is done in south Maragoli of Vihiga division. The sand harvesting activities have not yet resulted into major environmental problem but still need to be regulated.

Key Environmental Issues

- Uncoordinated sand harvesting
- Land degradation
- Destruction of habitats

Proposed Interventions

- Formation of sand harvesting groups/CBOs
- Development of sand harvesting plans
- Regulation of sand harvesting through proper enforcement of EMCA, 1999
- Rehabilitation of the damaged sites by planting the appropriate tree species and establishing the appropriate soil conservation measures.

CHAPTER FIVE

5.0 ENVIRONMENTAL HARZARD AND DISASTERS

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

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

The Major disaster in the district is lightening. In the past years, lightening has been a major threat in the district due to frequent rainfall, 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 need to install lightening arrestors.

Anthropogenic factors causing land degradation such as deforestation of catchments areas, poor agricultural practices, inappropriate land use systems and changing living conditions are potential natural hazards. The heavy rains and inadequate maintenance of the roads and bridges leads to a lot of environmental destruction. Supervision of funds for road maintenance will need to be enhanced.

Currently there is a big drive in the district by the Pan African paper mills to increase the planting of trees in the district to satisfy this need. However the drive has focused on the planting of Eucalyptus trees but there is need to balance the different species of trees.

Key Environmental Issues

The following are the potential environmental issues in relation to hazards and disasters in the district:

- Lightening
- Deforestation
- Soil erosion

Proposed Interventions

District Disaster Management Committee and Divisional Disaster Committees should be strengthened in order to;

- Identify all possible disasters
- Prepare an integrated scenario - specific contingency plan in anticipation of potential disasters
- Act in cases of an emergency.
- Update inventory of disaster response resources (human, material and equipment), both private and public.
- Prepare and implement a comprehensive public sector awareness programmes through regular public *barazas*, seminars, school among others.

CHAPTER SIX

6.0 ENVIRONMENTAL EDUCATION, INFORMATION AND TECHNOLOGIES

6.1 Status of Environmental Education

The district has a number of formal education institutions including primary, secondary and tertiary. Most of the formal subjects taught in these institutions have an element of environmental Education incorporated. Some of the environmental issues integrated include proper farming and animal husbandry, personal and environmental hygiene, knowledge of conservation on natural resources among others.

There is also non-formal education in environment going on in the district. This is mainly undertaken by government agencies, CBOs, NGOs traditional and church institutions. Most of the issues taught by these institutions include proper farming methods, conservation of water catchment areas, and personal hygiene among others. Table13 show status of Environmental Education in the District

Table 13: Status of Environmental Education (EE) in the District

Type of EE	Programmes	Key players	Challenges	Remarks
Formal	Institution based clubs	Schools	Inadequate material and funding, lack of exposure	Gaining momentum with NEMA in district
Informal	Forest, water, and soil conservation	DFO, Department of Agriculture, water department, NEMA, NGOs, CBOs	Inadequate material and funding, lack of exposure	People are now appreciating importance of environmental conservation

6.2 Public Awareness and Participation

The public participation in environmental education in the district has recently been emphasised (Table14). The areas mainly emphasised include public health, Proper farming practises, conservation of water catchment areas, conservation of forests etc.

Table 14: Status of Environmental awareness and participation in the district

Programmes	Key players	Challenges	Remarks
Waste management	NEMA, Public health department, local authorities, NGOs, CBOs, Religious groups	. Inadequate facilities and funds . Lack of interest by the public	People are now appreciating importance of environmental conservation
Conservation of the water catchment areas	NEMA, Water resources management authority, Forest Department, NGOs, CBOs, Religious groups	. Encroachment into water catchment areas . Lack of facilities and funds	People are now appreciating importance of environmental conservation
Proper farming method	Department of agriculture, NEMA, NGOs, CBOs, Religious groups	. Lack of facilities and funds	Take up of knowledge still slow

6.3 Technologies

Table 15 show the different technologies applied in the district and the challenges being experienced

Table 15: Technologies applied in the district

Types of technologies	Key players	Challenges
Organic farming	Ministry of Agriculture, ICRAF, NGOs, CBOs, Farmers	. Lack of resources . Lack of initiative to adopt new ideas
Pest Management	Ministry of Agriculture, ICRAF, ICIPE, NGOs, CBOs	. Lack of resources . Lack of initiative to adopt new ideas
Energy saving Jikos	Ministry of energy, ICIPE, NGOs, CBOs	. Lack of resources . Lack of initiative to adopt new ideas
Soil conservation	Ministry of Agriculture, ICRAF, NGOs, CBOs, Farmers	. Lack of resources . Lack of initiative to adopt new ideas

6.4 Environmental information systems

6.4.1 Types and sources of Environmental Information

In the district there are several forums where environmental information sharing is done. This is mainly done during the public barazas, workshops, meetings, and field days. It is also important to note that there are several publications with environmental information circulating in the district. These include 3 daily newspapers and several weeklies.

The biggest constraint in the dissemination of Environmental education is the limited number of documentation centres in the district. There is only one documentation centre in the district that is freely accessible by the public. Resources to provide and equip more centres are largely lacking. There is also no proper coordination, networking and collaboration among various institutions.

There is therefore need for more resources, coordination, networking and collaboration among the various institutions for the environmental education to reach as many people as possible.

Table 16 shows the different information and data types in the district.

Table 16: Information and data types in the district.

Data Type	Institution	Format	Access
Topography/ infrastructure	District Physical planner	Maps and report	At a cost
Soils and hydrology	District Agriculture and water office	Maps and reports	Free
Climatology /air and water quality	District water office	Maps and reports	Free
Land use	District physical planner office	Maps and reports	Free
Natural resources	Forestry, DDO, geology	Maps and reports	Free
Demographic data	District statistic office	Reports	Free
Economic data	District Development office	Reports	Free

Status of Environmental Information management systems

The information, which is available, is shared without any restraint and is available upon request. The information is informed of annual reports and sectoral reports such as District Development plans and poverty reduction strategy paper.

There is still lack of capacity in terms of human, financial and equipment on the ground to generate data and information on environment.

6.5 Indigenous knowledge

The indigenous knowledge is a preserve of the old people and sages. It is mainly about issues such as on set of rains, when there will be drought and hunger and calamities.

Key Environmental Issues

- Inadequate environmental information materials for distribution and reference
- Inadequate facilities and equipment
- Inadequate documentation of IK

Proposed Interventions

- Develop and improve circulation of the materials
- Translation of scientific information into simple format for the general public
- Build adequate facilities and equipment
- Documentation of IK

CHAPTER SEVEN

7.0 ENVIRONMENT GOVERNANCE AND INSTITUTIONAL FRAMEWORKS

7.1 Overview

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

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

7.2 Status of Environmental Governance and Institutional Arrangement

7.2.1 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 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
- Noise and Excessive Vibration Pollution Control Regulations 2009

Other Sectoral Legislations for Environmental Management

- Public Health Act,
- Forest Act 2004,
- Wildlife Act,
- Water Act 2002,
- Mining Act,
- Occupational, Health and Safety Act 2007,
- Factories Act

7.4 Multilateral Environmental Agreements (MEAs)

Kenya has signed and ratified a number of MEAs and therefore is bound by the requirements of the agreements. Development partners have supported environmental management activities through these instruments.

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

- Poverty eradication programmes.
- Natural resource conservations and gender issues.
- Environmental health.
- Capacity building
- Access to clean drinking water
- Reduced child mortality
- Environmental sustainability

However, there is need to scale up the programmes to include more partners in order to enhance the community involvement in the domestication of MEAs in the entire 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

MDGs being implemented in district

- Eradicate extreme poverty
- Improve maternal health
- Improve access to clean drinking water.
- Universal basic education
- Net working and partnership
- Reduce child mortality
- Combat HIV/AIDS, malaria and other diseases
- Environmental sustainability

Constraints in the implementation of these MEAs/MDGs

- Lack of financial resources
- Failure to honour commitments by developed world
- Inadequate policies
- Extreme poverty
- Poor planning and implementation
- Inadequate integration of plans and programs
- Inadequate monitoring and evaluation

Proposed interventions

- Good planning and adequate financing of projects
- Development and implementation of policies
- Integration of plans and programs
- Monitoring and Evaluation
- Establish environmental committees at lower levels
- Training environment committee on their roles
- Conducting environmental campaigns
- Training environmental managers on prosecuting cases

Challenges in Environmental Governance

- Low financial support, capacity interrelate EMCA
- Conflict in mandates
- Low levels of MEAs implementation

- Inadequate enforcement of set legislations and regulations
- Inadequate public participation
- Misconception of the EIA and EA requirements and long term benefits
- Inadequate capacity of lead agencies, PECS and DEC's in environmental management
- Gazettement of statutory institutions under EMCA creates a vacuum after expiry of their tenure.

Key Environmental issues

- Noncompliance with environmental regulations
- Conflicting laws and regulations
- High cost of environment impact assessment and audit experts for small projects
- Weak enforcement of environment laws
- Inadequate environment standards and regulations
- Inactive District Environment Committee

Proposed interventions

- Harmonize environmental laws and policies
- Gazette more Environmental Inspectors and Prosecutors
- Create awareness on environment laws and regulations at all levels
- Strengthen District Environment Committees
- Gazette environment standards
- Review the EMCA to enable capture emerging issues
- Capacity building for law enforcement officers

CHAPTER EIGHT

8.0 IMPLEMENTATION STRATEGY

8.1 Overview

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

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

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

8.2 Monitoring and evaluation

Monitoring and evaluation will be carried out in using participatory approaches where stakeholders are involved at all stages. It will be undertaken on continuous basis through meetings and field visits. Reports will be discussed at all stages but quarterly reports will be prepared and reviewed. Evaluation will be undertaken periodically preferably on annual basis in the line with the performance contracting period in the public service. The purpose of evaluation is to ensure efficient and effective implementation as well as ensuring that environmental concerns have been addressed and integrated in development process. It will involve documentation of best practices for the purpose of replication. The implementation strategy will be evaluated using the matrices below.

Water Supply	Inadequate water	Reduce Water borne diseases		“
Land Use	Development Control	Develop and Adopt Development Plans	Physical Planning Department	“
	Yield Improvement	Yield Improvement		“
	Waste management	Disease/Pest Control	Min. of livestock	“
		Development of Waste Management systems	Min. Local Govt, County Councils	“
	Unplanned settlements	Strategic Zoning Plan for Luanda Township and other towns	Min. of lands, Physical planning Dept	“
	Poor Farming Methods	Improve farming methods and using farm-yard manure	Ministry of Agriculture	“
	Mining and Quarrying	Improve on quarrying and mining methods	MEMR, NEMA	“
	Brick Making	Gully formations	NEMA, Local Authorities	“
Environmental Education	Inadequate awareness	Creation of awareness	Min. of Education, KFS, WRMA, MEMR, NEMA	“
Industries and other business activities	Water pollution	Protect water springs	WRMA Local Authorities	“
	Air Pollution	Enforce EMCA	NEMA, Local Authorities	“
	Poor waste management	Promote Cleaner Production Technologies	WRMA, Ministry of Labour, Local Authorities	“
Health	Inadequate Health Facilities	Health Facilities Maintenance	MOH, Community	“
	Control of Prevention of Major Environmental Health Related	<ul style="list-style-type: none"> • Protection of water sources; 	MOH, Min. of Public health and Sanitation	“

	Communicable Diseases	<ul style="list-style-type: none"> • Construction of toilets 		
		Purchase of land for expansion of Public Markets	Local Authorities	“
		Control and Prevention of Major Environmental Health Related Communicable Diseases	Ministry of Health and Local Authorities	“

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 Environment Action Plan Committee and which shall consist of:

- a) the Permanent Secretary in the Ministry for the time being responsible for national economic planning and development who shall be the chairman;
- b) the Permanent Secretaries in the Ministries responsible for the matters specified in the First Schedule or their duly nominated representatives;
- c) four representatives of the business community to be appointed by the Minister;
- d) representatives of each of the institutions specified in the Third Schedule;
- e) five representatives of non-governmental organizations nominated by the National Council of Non-Governmental Organizations;
- f) representatives of specialized research institutions that are engaged in environmental matters as may be determined by the Minister; and
- g) a Director of the authority who shall be the secretary.

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

38. Provisions of the National Environment Action Plan

The national environment action plan shall: -

- a) contain an analysis of the natural resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time;
- b) contain an analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational equity;
- c) recommend appropriate legal and fiscal incentives that may be used to encourage the business community to incorporate environmental requirements into their planning and operational processes;

- d) recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development;
- e) set out operational guidelines for the planning and management of the environment and natural resources;
- f) identify actual or likely problems as may affect the natural resources and the broader environment context in which they exist;
- g) identify and appraise trends in the development of urban and rural settlements, their impacts on the environment, and strategies for the amelioration of their negative impacts;
- h) propose guidelines for the integration of standards of environmental protection into development planning and management;
- i) identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general adverse impacts on the environment;
- j) 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.

REFERENCES

GOK: Vihiga District PRSP: Consultation Report (2001 – 2004)

GOK: Vihiga District Development Plan 2002 –2008

GOK: Vihiga District State of Environment Report 2004