
Government of Kenya


National Environment Management Authority

# NATIONAL ENVIRONMENT RESEARCH AGENDA

# (2008 -2030)

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## LIST OF ABBREVIATIONS

**AAS** - African Academy of Sciences
**ACC -** African Conservation Centre
**ACTS -** African Centre for Technology Studies
**AEPRN** -African Energy Policy Research Network
**AMREF**- The African Medical Research Foundation
**ASALs** - Arid and Semi Arid Lands
**AWF** - African Wildlife Foundation
**AWN** - African Water Network
**CABI** - Centre for Agricultural Bioscience International
**CAAC** Catchment Area Advisory Committees
**CNA** - Climate Network Africa
**CBD** - Convention on Biological Diversity
**CCD -** Convention to Combat Desertification
**CDA** - Coast Development Authority
**CDM** - Clean Development Mechanism
**CDM** - Centre for Disaster Management
**CGIAR -** Consultative Group on International Agricultural Research
**CITES** - Convention on International Trade in Endangered Species of Wild Fauna and Flora
**CSA** - Capacity Self-Assessment
**DEAP** - District Environment Action Plan
**DEC** - District Environmental Committees
**DFID** - Department for International Development
**DRSRS** - Department of Resource Surveys and Remote Sensing
**DVS** - Department of Veterinary Services
**EA** - Environmental Audit
**EAWS** - East African Wildlife Society
**EEZ** - Exclusive Economic Zone
**EIA** - Environmental Impact Assessment
**ELCI** - Environment Liaison Centre International
**EMCA** - Environment Management and Coordination Act
**EP&RC** -Environmental Planning and Research Coordination
**ERA**- Environmental Research Agenda
**ERB** - Electricity Regulatory Board
**ERS** - Economic Recovery Strategy
**ERSP** Environmental Research Service Provider
**ERSWEC** – Economic Recovery Strategy for Wealth and Employment Creation
**EU** - European Union
**FAO** - Food and Agriculture Organization
**GBM** - Greenbelt Movement
**GDP** - Gross Domestic Product
**GEF -** Global Environment Facility
**GMO**s - Genetically Modified Organisms
**GoK -** Government of Kenya
**GWh** - Giga Watt Hour
**IBAs** - Important Biodiversity Areas
**ICRAF** - International Centre for Research in Agroforestry
**IGAD-CPAC** Climate Prediction Application Centre
**ILRI** – International Livestock Research Institute
**IMTR** - Institute for Meteorological Training and Research
**IOMAC** -Agreement on the Organization for Indian Ocean Marine Affairs
**ITCZ** - Inter Tropical Convergence Zone
**IRCs -** International Research Centres
**IUCN** - International Union for Conservation of Nature
**JICA** - Japan International Cooperation Agency
**JKUAT-** Jomo Kenyatta University of Agriculture& Technology
**KAM**- Kenya Association of Manufacturers
**KARI** Kenya Agricultural Research Institute
**KDHS** Kenya Demographic Health Survey
**KEBS** - Kenya Bureau of Standards
**KEIN** - Kenya Environmental Information Network
**KEFRI** - Kenya Forestry Research Institute
**KEMRI** Kenya Medical Research Institute
**KMFRI** - Kenya Marine & Fisheries Research Institute
**KENGEN** - Kenya Energy Generating Board
**KEPHIS** - Kenya Plant Health Inspectorate Service
**KPLC-** Kenya Power and Lighting Company
**KFS-** Kenya Forest Service
**KIPI** Kenya Industrial Property Institute
**KIPPRA** - Kenya Institute for Public Policy Research and Analysis
**KIRDI-** Kenya Industrial Research & Development Institute

**KMD-** Kenya Meteorological Department
**KNAS-** Kenya National Academy of Sciences
**KSS** - Kenya Soil Survey
**KTDA-** Kenya Tea Development Authority
**KU** - Kenyatta University
**KWAHO**- Kenya Water for Health Organization
**KWS** - Kenya Wildlife Service
**MDGs** - Millennium Development Goals
**MEAs** - Multilateral Environmental Agreements
**MOU** - Memorandum of Understanding
**MU** - Moi University
**MW** Mega Watts
**NBSAP** - National Biodiversity Strategy & Action Plan
**NCST-** -National Council for Science and Technology
**NDPs** - National Development Plans
**NEAP** National Environment Action Plan
**NEIC** - National Environmental Information Centre
**NERSC-** National Environment Research Steering Committee
**NEMA -** National Environment Management Authority
**NETFUND-** National Environmental Trust Fund
**NETWAS-** Network for Water and Sanitation
**NMK-** National Museums of Kenya
**NPL-** National Land Policy
**NRIs-** National Research Institutions
**NWCPC-** National Water Conservation and Pipeline Corporation
**PEAP** - Provincial Environment Action Plan
**PEC**- Provincial Environmental Committees
**PES** - Payments for Environmental Services
**POPs** - Persistent Organic Pollutants
**PRB**- Population Reference Bureau
**PRSP** - Poverty Reduction Strategy Paper
**RCMRD-** Regional Centre for Mapping of Resources for Development
**SoEs** State of Environment Reports
**SRO**- Strategic Research Objectives
**SSA** - Sub-Saharan Africa
**STI** - Science, Technology and Innovation
**UN** - United Nations
**UNEP** - United Nations Environment Programme
**UNFCCC** - United Nations Framework Convention on Climate Change
**USAID** - United States Agency for International Aid
**WAC** - World Agroforestry Centre
**WRMA** - Water Resource Management Authority
**WRUA** - Water Resources Users Associations
**WSP** - Water Service Providers
**WSRB** - Water Service Regulatory Board
**WWF** - World Wildlife Fund

# EXECUTIVE SUMMARY

The National Environment Management Authority (NEMA) was established under the Environment Management and Coordination Act (EMCA) of 1999. EMCA, 1999 and NEMA Strategic Plan (2008-2012) accentuate the need for effective coordination of environmental research in the country. In 2007, NEMA Board of Management recommended that this fundamental strategic objective of the Authority be reinforced within the Department of Environmental Planning and Research Coordination (EP&RC) Department through a National Environmental Research Agenda (ERA) that will promote sustainable development in Kenya as a result of demand-driven environmental research.

The purpose of the ERA is to highlight the environmental research priorities for Kenya in a long-term perspective up to 2030 in line with Kenya Vision 2030 but with sufficient flexibility to address immediate needs, short term priorities and future problems. The ERA is expected to provide direction to future scientific research to inform environmental management in Kenya. The formulation of the ERA was undertaken in conformity to the Kenya Vision 2030, EMCA (1999), the Draft National Environmental Policy (Working Document 3), NEMA Strategic Plans, NEAP (2009), State of Environment (SOE) reports, Agenda 21, and the UN-MDGs among others.

The roadmap through which the ERA was developed involved comprehensive collation and review of documents and intensive and extensive consultation with relevant institutions and stakeholders. A comprehensive gap-analysis in environmental research was conducted that provided an insight of strengths, weakness, opportunities and threats (SWOT) to environmental research in the country, in addition to the identification of priority research areas. The following core research themes were identified during the ERA process, particularly for the First Medium Term Plan (MTP 2008-2012) of Vision 2030:- Climate change adaptation and coping strategies; Environmental economics; Biodiversity conservation and management of invasive species; Indigenous environmental knowledge; Environmental restoration including rehabilitation and protection of forests, rivers and wetlands; Water resources management and conservation; Protection of wildlife corridors and migratory routes; Waste management; Disaster management and management of trans-boundary ecosystems

Eight Strategic Research Objectives (SROs) derived from the thematic areas and the SWOT analysis are:

1. To ensure the effective management of the land environment, sustainable resource utilization and enhanced soil conservation
2. To facilitate effective management of water resources and the aquatic environment
3. To support the effective protection of the atmospheric environment
4. To strengthen the conservation of biodiversity and ecosystems
5. To reduce the negative impacts of economic development on environment, promote more effective management of human settlements, urban development, and enhance public health and safety
6. To strengthen information gathering and documentation on indigenous environmental knowledge (IEK) and promote its application in environmental management and conservation
7. To promote the appropriate design, development and application of economic instruments and incentive measures for economic valuation of environment and natural resources accounting for sustainable development
8. To generate scientific information for effective domestication and localization of MEAs and other international processes with environmental agenda.

Lessons learnt from the ERA process included the following:-

- The previous focus of Government-supported environmental research in Kenya concentrated on the biological environment with over 40% of the past environmental studies concentrating more on biodiversity especially wildlife issues and about 10% focusing on ecosystems especially wetlands, mountains and the coastal environments. About 5% of the research considered land, soil and water issues whiles the remainder on human-environment interactions and impacts.
- Most of the previous environmental research on biodiversity and ecosystems in the country was conducted by foreign scientists and most of the findings are located in universities, research institutes and bilateral offices in foreign countries.
- Although Kenya is hosting a number of important UN Agencies and International Research Centres (IRCs), their involvement and support in local environmental research has been marginal probably because of lack of clear direction from government in terms of priority areas for research.

- Most sections of EMCA (1999) are well considered by environmental research already undertaken in the country. However, the availability of this information, including its location, are unknown to government institutions including NEMA thereby leading to erroneous identification of unnecessary research gaps by environmental management institutions. This can lead to duplication of research effort and waste of research funds.
- The lack of a clear environmental research agenda has affected the delivery of scientific findings due to poor coordination and weak funding mechanisms including weak systems for information uptake and sharing as well as sharing of institutional research funding.

The following recommendations emerged from the ERA process:-

- NEMA should launch, publicize, and implement the ERA in order to give direction to future environmental research in Kenya,
- The government through NEMA should use the ERA to influence local environmental research by International Research Centres (IRCs), international environmental NGOs and UN Agencies in Kenya, bilateral and multilateral partners in order to benefit more from their support in environmental research,
- NEMA should establish a National Environment Information Centre (NEIC) to inform end users including government on environmental research undertaken in the country including the locations of vital scientific information expected from the ERA,
- NEMA should undertake a comprehensive search and create a register and database of environmental research in Kenya for all the relevant EMCA (1999) sections as a tool for compliance and enforcement monitoring including the formulation of new and review of existing EMCA regulations, and
- Annual review and prioritization of research activities in the ERA should be undertaken according to the prioritization strategy recommended in the ERA in order to validate the specific research themes for each year.

It is expected that the ERA will become a focal reference point for all environmental research in Kenya and will offer. It should encourage participation from different stakeholders comprising of universities and academia, National Research Institutions (NRIs), International Research Centres (IRCs) in Kenya, UN agencies, environmental NGOs and CBOs, Civil Society Organization, private sector to collectively harness all the talents and efforts for environmental management. The ERA

will also through this 'participatory approach' enhance environmental awareness in the country. Implementation of the research activities through various institutional collaborative mechanisms within the defined timeframe will be paramount in ensuring that the projected outputs are realized to guide in effective management of the environment and natural resources.

# FOREWORD

# PREFACE

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# OVERVIEW OF THE ENVIRONMENT RESEARCH AGENDA DEVELOPMENT

NEMA was established to coordinate a wide range of environmental management activities being undertaken by various environmental lead agencies in Kenya as well as promote integration of environmental considerations into development policies, programmes and projects. Science-driven decision making is consequently an important requirement to inform NEMAs' environmental regulatory cycle in the formulation of various sectoral environmental regulations, standards and guidelines

Environmental research plays a critical role in management of environment in the country by identifying emerging environmental issues and providing appropriate solutions and informing policy making and planning processes. . This was the basis for which an Environment Research Agenda (ERA) was developed (a) to support and inform environmental and sustainable management; (b) to ensure environmental research that goes beyond science by incorporating societal values and perspectives; and (c) to ensure environmental research that will enable environmental policy issues to be addressed within NEMA but also in other relevant sectoral lead agencies.

The specific purpose of the Environment Research Agenda formulation is:-

a) To highlight the long-term environmental research priorities for Kenya up to 2030 in accordance to Kenya Vision 2030 but with the flexibility to address short term priorities, immediate needs and emerging problems of the future,
b) To provide direction to future scientific research and inform environmental management in Kenya,
c) To provide a document that will assist in the undertaking of high quality, relevant and timely research and ensure appropriate knowledge transfer mechanisms for good environmental management in the country,
d) To provide an overview of critical research needs for NEMA in order for the Authority to ensure good environmental management in the country,
e) To guide environmental research in Kenya for improved regulatory compliance enhanced environmental conservation and environmental sustainability, and

f) To ensure that NEMA and other relevant partners provide a united and influential front to funding agencies and research providers in terms of identifying research priorities for the present and future.

## ENVIRONMENTAL RESEARCH AGENDA PROCESS, ROADMAP AND KEY MILESTONES

Preparation of the Environmental Research Strategy was a highly participatory process. Habitat Consultants were engaged to guide the NEMA team in preparing a comprehensive agenda and their Terms of Reference (Annex 1) are as summarized as follows:

1. Assessment of EMCA to determine the existing research gaps,
2. Assessment of how NEMA has faired in environmental research,
3. Reviewing the technical capabilities of the environmental research agencies in Kenya,
4. Developing a suitable environmental information management strategy for information collation and sharing,
5. Developing key goals, objectives and principles that will guide the National Environmental Research Agenda, and
6. Developing a National Environmental Research Agenda that contains the following among others:
    a) Conceptual and theoretical framework,
    b) Problem analysis so that the rationale for the priority intervention areas is clear,
    c) A comprehensive list of priority research interventions,
    d) Key principles that will guide the research agenda,
    e) Integration of the ERA to Vision 2030, MDGs and other ongoing processes at national, regional and international levels,
    f) Appropriate timeframes within which the ERA can be implemented and clear upstream activities that will institutionalize the agenda,
    g) A clear implementation matrix,
    h) A clear resource mobilization strategy,
    i) A report on the status of the environmental research agencies,
    j) A comprehensive environmental information management strategy, and

k) A clear programme for the First Medium Term Plan of the ERA in accordance to Kenya Vision 2030.

The process was done in accordance with the following steps in order to address the terms of reference (Annex I):-

i) Pre-assessment consultations and discussions with NEMA to formulate the ERA approach and methodology,
ii) Preparation of questionnaires, checklists and other ERA process tools and instruments,
iii) Collation and review of documents through desk work,
iv) Identification of and consultation with relevant institutions,
v) Research Agenda consultative workshops
vi) Validation and adoption of the Research Agenda

## APPROACH TOOLS AND METHODOLOGIES

The Environmental Research Agenda was developed in a systematic manner through documentation of all Environmental Research Service Providers (ERSPs) in the country and their research capacity status; an analysis of previous environmental research, environmental research gaps identification and finally, an agenda was generated from the gap analysis in line with Vision 2030, NEMA Strategic Plans, EAPs, SoEs and MDGs. The following tools and methodologies were employed in order to address the goals and objectives of the ERA process:-

### i) Desk Review

This involved a thorough search, acquisition and review of existing information related to environmental research in Kenya. The following key documents were reviewed among others:

- Sessional Paper no. 6 of 1999 on Environment and Development (GoK 1999b),
- Draft National Environmental Policy (Working Document 3),
- EMCA (1999) and related regulations,
- Other sectoral environmental policies including those on wildlife, forestry, fisheries, land, water, ASALs, wetlands, mining among others,
- National Environment Action Plans (NEAP, 1994 and 2009),
- Sectoral environmental legal frameworks,

- State of Environment Reports (SoEs),
- National Biodiversity Strategy & Action Plan (NBSAP),
- Capacity Self Assessment (CSA) reports for NEMA and other relevant lead agencies,
- NEMA Strategic Plan (2008-2012); and other sectoral strategic plans,
- Kenya Vision 2030, and
- Country reports on the achievement of UN-MDGs and other international processes such as Conference of Parties (CoPs) to the Multilateral Environmental Agreements (MEAs).

**ii) Environmental Research Analysis**

An intensive analysis of previous environmental research in Kenya was undertaken by thoroughly screening the national registers of research permits in the National Council for Science and Technology (NCST) and the Ministry of Education, Science & Technology. A sample of 18,000 research topics submitted in the applications for research authorization in the last 40 years between 1967 and 2007 were screened out of which a sub-sample of 1 581 topics were selected for thorough analysis. This topics were committed to an intensive mathematical analysis mainly to establish the following: - (a) details of the Environmental Research Service Provider (ERSP) especially their nationality; (b) source of funding; (c) environmental areas of focus; (d) relevance with regard to Sessional Paper No. 6 of 1999 on Environment and Development and also the Draft National Environmental Policy (Working Document 3) (GoK 1999b); and (e) relevance with regard to EMCA (1999) and related regulations.

**iii) Institutional Consultations**

Intensive consultations were undertaken with key informants in relevant institutions. The following institutional clusters were selected and considered in the consultations:- (a) state universities, (b) national research institutions (NRIs), (c) relevant lead agencies, (d) international research centres (IRCs) in Kenya and (e) environmental NGOs. A comprehensive research gap analysis was undertaken to establish research gaps in order to eventually know the areas where, research is not effectively informing environmental policy and legal enforcement at the institutional level.

## SCOPE OF THE ENVIRONMENTAL RESEARCH AGENDA

Relevant environmental research areas to guide and inform environmental management, policies, EMCA (1999), have been outlined in the ERA. The environment comprising of land environment,

aquatic environment, biodiversity and ecosystems, social environment have been outlined and synergies and linkages including international cooperation. The lifespan and timeframe for the ERA was set as 2008–2030 in accordance with Kenya Vision 2030, EMCA (1999), the Draft National Environment Policy (Working Document 3), NEMA Strategic Plans, NEAP (2009) and the UN-MDGs.

The National Environmental Research Agenda (ERA) is therefore expected to serve as a coordinating framework for environmental research in Kenya. It is expected to establish a focal point of all environmental research and maintain a database of the environmental research conducted around the country. It will encourage collaborative participation from a variety of stakeholders and serve as a tool for mobilization of resources for targeted environmental research.

## STRUCTURE AND COMPONENTS OF THE ENVIRONMENTAL RESEARCH AGENDA

The Environmental Research Agenda has been developed to be as simple as possible, and as such, easily understood by all stakeholders including the general public. The outline of the ERA is as shown below.

| Chapter | Components & functions |
|---|---|
| Introduction | ► Overview of the state of environment in Kenya<br>►Environmental impacts of different economic sectors |
| Environmental governance | ► Environmental policies<br>►Sectoral acts<br>►Institutional frameworks |
| State of environmental research in Kenya | ►Trend analysis on previous environmental research<br>►Environmental research gaps |
| The national environmental research agenda | ►ERA foundations<br>►Role of NEMA in the ERA<br>►Environmental information management strategy<br>►Funding mobilization strategy<br>►Implementation action plan |

# CHAPTER ONE: INTRODUCTION

Kenya is situated on the eastern coast of Africa lying astride the equator with a total area of 581,700 $km^2$ (224,962 sq mi), including 11,230 $km^2$ (4,336 sq mi) of water. It is bordered to the north by Sudan and Ethiopia, to the east by Somalia, to the South East by the Indian Ocean, to the south by Tanzania, and to the west by Lake Victoria and Uganda as shown in Figure 1. The country has a total land boundary length of 3,477 km (2,161 mi) and a 608 km (333 mi) coastline.


**Figure 1:** *Map of Kenya (Mwaura 2007)*

The environment in Kenya consists of a wide range of natural ecosystems including arid and semi arid areas, savanna, forest, marine and coastal ecosystems, as well as inland freshwater and saline ecosystems (Figure 1). In addition the country has 14,300 $km^2$ and 143,100 $km^2$ of territorial waters and Exclusive Economic Zone (EEZ) respectively in the Indian Ocean. The country has over 35 000 known species of flora and fauna for which remarkable conservation efforts have been made

with about 53 national and international protected areas including 5 Biosphere Reserves, 4 Ramsar Sites and 3 World Heritage Sites (Mwaura, 2007). The country, like the rest of the world, has a rapidly expanding built environment in the urban areas.

Kenya's economy relies heavily on the country's environment and natural resources both in terms of people's livelihoods and contribution to the national economy. The exploitation and competition for the country's limited natural resources continues to jeopardize the state of environment, mainly due to unsustainable exploitation. Some of the key environmental challenges in the country include deforestation, soil erosion and water pollution mainly due to rapid population growth, which increases the demands for food, water, energy and other necessities. The other proximate drivers of environmental degradation in Kenya are poverty and inappropriate technology. Kenya is currently classified as a Low Forest Cover Country (LFCC) with less than 3% forest cover, which is below the FAO minimum benchmark of 10%. The problem of invasive species has also emerged as a serious issue in the recent past.

## 1.1: STATE OF ENVIRONMENT IN KENYA

The state of the environment in Kenya including the management and environmental challenges can be considered in terms of the physical environment, biological environment and the human or social environment.

### 1.1.1: THE PHYSICAL AND BIOLOGICAL ENVIRONMENT

#### i) Land Environment

Approximately17% (9.4 million ha) of the total land area (576,000 $km^2$) in Kenya, is of high to medium potential and the remaining 85% (~ 461,360 $km^2$) is arid or semi-arid land (ASAL). The latter is spread in over 19 districts around the country and supports about 25% of Kenya's population (Situma, 2003). The ASALs are predominantly used for livestock production and wildlife conservation (Figure 2). The country is characterized by three main land tenure regimes, namely; private or freehold land, communal and government land. Increased population in recent decades has led to excessive pressure on arable land in high rainfall areas with subsequent spill over into the marginal ASALs (GoK 2005b). This excessive human pressure on fragile ASAL ecosystems has accelerated land degradation through poor land use, inappropriate farming practices and

deforestation. Increased human population has meant that the traditional cultivation and grazing systems, which allowed land to 'rest' and regain fertility, have collapsed and fallow periods have progressively been getting shorter with disastrous impacts on land productivity. The country on the overall experiences a wide range of land related environmental challenges especially land degradation, soil erosion, invasive species and deforestation.

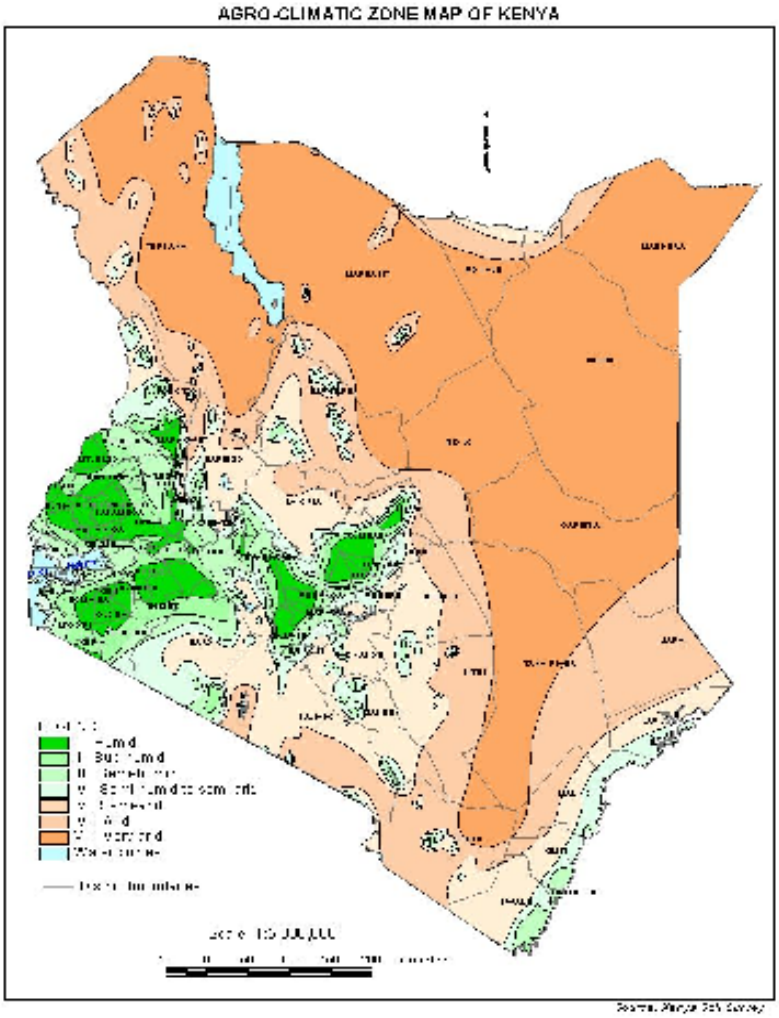



**Figure 2:** *Agro-Climatic Zone Map of Kenya (Mwaura, 2006)*

Kenya's current forest cover is approximately 1.7% of total land area in contrast to the internationally accepted level of 10%. Of these, 2 million ha are natural forests while 0.24 million ha are planted forests. Natural forest types include coastal forests such as the Shimba Hills and

Arabuko-Sokoke forests, lowland forests such as the Chyulu and Taita Hill forests which are part of the Eastern Arc forest ecoregion, upland dryland forests such as Karura and Ololua forest in the Nairobi region and high altitude afro-montane forests such as the forests around Mt. Kenya, Mt. Elgon, the Aberdares, and the Mau Complex. The Kakamega forest in western Kenya represents one of the few areas of tropical rainforest in the country. The key challenges facing forest ecosystems in Kenya include: - (a) upgrading the country's forest cover towards the standard minimum threshold of 10%, (b) management and sustainable utilization of forests, (c) economic valuation of forest ecosystem goods and services, (d) disaster management especially management of fire outbreaks, (e) management of trans-boundary forests such as Mt. Elgon forest, and (f) amelioration of the impact of climatic change on forest ecosystems.

**ii) Aquatic Environment**

Only a small part of the Kenya environment is characterized by aquatic environment in form of rivers, lakes and ocean. The Tana and Athi Rivers are the largest, longest permanent rivers in the country. The other key rivers include Ewaso Ngiro, Uaso Ngiro, Turkwell, Mara, Gucha, Sondu Miriu, Nyando, Yala, Malewa, Njoro, Mbaruk, Molo, Lumi and Perkerra. The major environmental issues facing rivers in Kenya include contamination with erosional deposits, agrochemicals such as fertilizers and biocides and industrial effluents. Most rivers are also affected by municipal and domestic wastewater inputs.

Lakes in Kenya occupy approximately 2% of Kenya and the major ones include: - Lake Victoria, L. Turkana, L. Baringo, L. Nakuru, L. Naivasha and L. Magadi. The Kenyan lakes also include transboundary ones like Lake Victoria as well as L. Jipe and L. Challa in Taita Taveta which can raise unique cross-border environmental issues. Kenya has already designated five lakes as Ramsar Sites including Lake Nakuru which is famous worldwide due to its large populations of the Lesser Flamingo. The other Ramsar Sites include Lake Naivasha, L. Baringo, L. Bogoria and L. Elementaita. Most lakes in Kenya are usually receptors of agricultural, residential and industrial wastes from the catchment areas. The surface areas and lake levels of most lakes in Kenya have been declining in recent years.

Kenya, with a 608 km long coastline including approximately 9000 $km^2$ of territorial waters within the 12 nautical miles has a significant oceanic environment (Okemwa *et al.* 2004, GoK 2008b). This

includes the Exclusive Economic Zone (EEZ), which is 200 nautical miles wide. The coastline of Kenya borders Somalia to the north and Tanzania at the south, with an almost continuous fringing coral reef running parallel to the coastline (GoK 2008b). Some of the key issues facing the oceanic environment include insecurity, pollution, endangered species and invasive species.

The country has a wide range of wetlands which occupy approximately 2% of the country. These ecosystems are threatened by rapid growth in human population and increasing demand for wetland resources (Koyo *et al* 2005). The government policy has occasionally wrongly supported the conversion of swamps, marshes, bogs and river deltas for agriculture or aquaculture. Some of them have been filled with domestic and urban-industrial wastes, while others have been drained to create room for urban development. The major causes of environmental pollution in wetlands include agricultural fertilizers and organic wastes that cause eutrophication as well as biocides and industrial wastes including heavy metals and hydrocarbons which contaminate the environment.

The aquatic environment in Kenya is the source of vital water resources in the country. Kenya is classified as a chronically water-scarce country which means that not only does it have one of the world's lowest annual per capita water replenishment rates, but it is also among the countries that have not effectively exploited their limited water resources. A country is categorized as "water-stressed" if its annual renewable freshwater supplies are between 1,000 and 1,700 $m^3$ per capita and "water-scarce" if its supplies are less than 1,000 $m^3$ per capita (Mogaka *et al*, 2006). This, together with the long-term degradation of the existing water resources in Kenya, makes the country very vulnerable to perturbations in water supply, particularly from climate variability. The country's natural endowment of freshwater is limited by an annual renewable freshwater supply of only 647 $m^3$ per capita. By comparison, Kenya's neighbours, Uganda and Tanzania have annual per capita renewable freshwater supplies of 2,940 and 2,696 $m^3$ per capita per year respectively (Mogaka *et al*, 2006). Almost 75% percent of households in Kenya depend solely on groundwater for drinking water especially in the arid and semi-arid areas and in a few communities along the Indian Ocean. Recent studies show that the predicted aggregate demand of water in the country will rise to 5,552 $Mm^3$ per year in 2020 which would still be within the country's safe yield (8,447 $Mm^3/yr$), although the cost of supplying each additional increment of water is likely to rise steeply as readily accessible sources are progressively exploited (Mogaka *et al*. 2006).

**iii) Atmospheric and Space Environment**

Kenya lies across the equator and experiences a wide variation in climate due to its physiographic diversity. The Inter-Tropical Convergence Zone (ITCZ) has considerable influence on the country's climate. The country has a relatively wet, narrow tropical belt along the coastal region, with widespread arid and semi-arid areas (ASALs) behind it. Thereafter, the land rises steeply into the highland environments with more humid climate. The country has a mean annual average rainfall of about 500 mm, which varies widely between 250 mm in the ASALs to 2,000 mm in the highland and mountain environments. It is estimated that approximately 66% of the country receives less than 500 mm of rainfall annually (Mwaura 2006).

The key sources of atmospheric contamination in Kenya include emissions from factories and motor vehicles, smoke from biofuels, and smoldering of copper cables and old tyres. Kenya does not have any consistent air quality monitoring stations except those which are established on an *ad hoc* demand-driven basis. However, an inventory on persistent organic pollutants, targeting dioxins and furans has recently been undertaken (GoK 2007a). The inventory identified that open burning of wastes as one of the largest sources of air pollutants in the country (GoK 2007a).

The risk of climate change is one of the most significant challenges facing human society in the 21st century including Kenya. According to Orindi and Murray (2005) some of the anticipated impacts of climate change in East Africa will include decreased rainfall and rise in increased temperature and evaporation in dryland areas, higher frequency of drought spells, severe water shortage, change in planting seasons, reduced forest cover and arable land, increased outbreak of fungal attacks and insect infestations in agriculture due to changes in temperature and humidity, decline in crop yield and biomass production, increased risk of food shortage and famine, increased malaria transmission and national health care burden, and sea level rise within the coastal region. One of the major challenges in environmental research is to identify appropriate adaptation mechanisms and coping options for the expected impacts of climate change (IPCC 2001).

**iv) Biodiversity and Ecosystems**

Kenya is considered as one of the mega biodiversity countries in the world due to its superiority in diversity and abundance of species which is manifested in its wildlife and varied ecosystems (NEMA 2005). The large wildlife populations in the expansive rangelands of Kenya like the Maasai Mara

have long been recognized as a world heritage. Consequently, Kenya's environment forms part of 5 of the 8 world biodiversity hotspots of international importance which are also part of the world's 34 important biodiversity areas (IBAs). These are:- (i) the Indian Ocean Islands such as Lamu and Kisite, (ii) coastal forests such as Arabuko-Sokoke, (iii) Afro-montane forests such as Mt. Kenya, Aberdares and Mt. Elgon, (iv) Guineo-Congolian forests such as Kakamega forest, and (v) northern drylands which are part of the distinct Horn of Africa biodiversity region. In addition, the country has a significant number of endemic species in various important biodiversity areas (IBAs) around the country. The country's biodiversity consists of an estimated 35,000 known species of plants and animals including approximately 21 575 insects, 1133 birds, 314 mammals, 191 reptiles, 180 freshwater fish, 692 marine and brackish fish and 88 amphibians (NEMA 2005).

Kenya is endowed with a variety of terrestrial and aquatic ecosystems as a result of the spectacular physiographic diversity ranging from the coastal belt, the Nyika Plateau, the Highlands, Lake Region and the Rift Valley. The variety of natural ecosystems in Kenya can be summarized into the following prime categories:- (a) forest ecosystems, (b) rangeland ecosystems, (c) inland aquatic ecosystems including rivers, lakes and wetlands, and (d) coastal and marine ecosystems.

### 1.1.2. THE SOCIO-ECONOMIC ENVIRONMENT

#### i) Population

Kenya's people encompass more than 40 tribes who include a mixture of northern Bantus, Nilotes, Cushites, Arabs, Asians and Europeans. Kenya's population has increased tremendously by 28% from 6,416,000 in 1950 to 8,189,000 in 1960, by 37% to 11,253,000 in 1970, by 46% to 16,466,000 in 1980, by 36% to 22,400,000 in 1987, and by 24% 27,885,000 in 1995. The population of Kenya was 28.7 million in 1999. In 2005 the population was estimated by the United Nations at 33,829,590 with a growth rate of 2.5% p.a. with the <15 year bracket accounting for 44%, the 16-64 year bracket for 52% and the >65 year bracket for only 4%. Figure 3 shows projections in population at 36.5 million in 2010 and over 60 million in 2030 (Mwaura 2007).

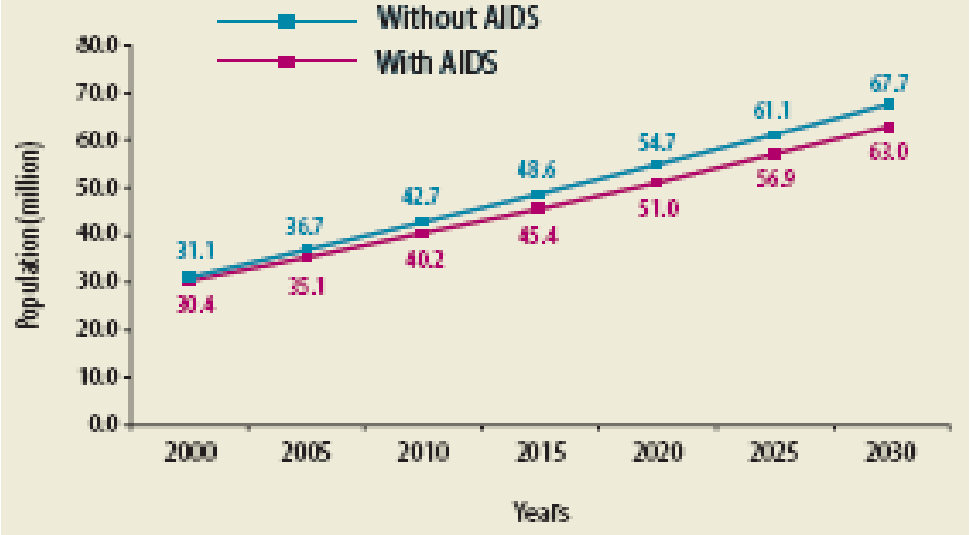



**Figure 3:** *Population projection in Kenya (Mwaura 2007)*

The average population density in the country is 59 persons/km$^2$ although the density is as high as 1000/km$^2$ in some areas. About 75% of the population lives on only 10% of the country. The Population Reference Bureau (PRB) estimated that in 2001, only 33% of the population lived in urban areas with Nairobi, the capital city having a population of 2,205,000 and Mombasa, the main seaport having an estimated population of 465,000 (PRB, 2002). The high population density in some parts of the country has serious implications on environment and health leading to a wide range of problems including overcrowding, emergence of slum settlements, resource overuse and disease.

The urban built environment in Kenya has a major impact on the environment. It is responsible for the loss and conversion of natural resources especially forests and wetlands. It is also a major cause of environmental pollution including the widespread problem of solid wastes. Cities and towns are the major contaminants of the atmosphere through the increased use of fossil fuels in factories and by automobiles. Urban areas have also affected the state of rivers, lakes and wetlands, including the coastal environment as a result of urban effluent and solid wastes. The urban built environment has also been the main conduit for the spread of alien invasive species.

Only 30% of the 142-gazetted urban settlements in the country have sewerage systems and only 28% of the urban areas are connected to properly maintained sewerage systems (Mogaka *et al* 2006). Most urban areas are characterized by an escalating problem of informal and unplanned slum

settlements such as the Kibera slum in Nairobi which is considered to be one of the largest in Africa with an average density of 2000 people per hectare (Plate 1). Slum settlements have a wide range of environmental problems.

**Plate 1:** *An aerial view of Kibera slums showing the polluted Nairobi dam at the (Right top corner (Mwaura 2007))*

### ii) Socio-economic development

According to Mogaka et al, (2006) Kenya has a Ksh 672 billion ($8.4 billion) economy, which is heavily reliant on the environment in terms of natural capital. The country's economy grew by an average of 6% over the 1964-1980 period and 4.1% over 1980-1990 period. The period 1990-2002 was a period of a declining growth of 1.9 % (GoK 2002).

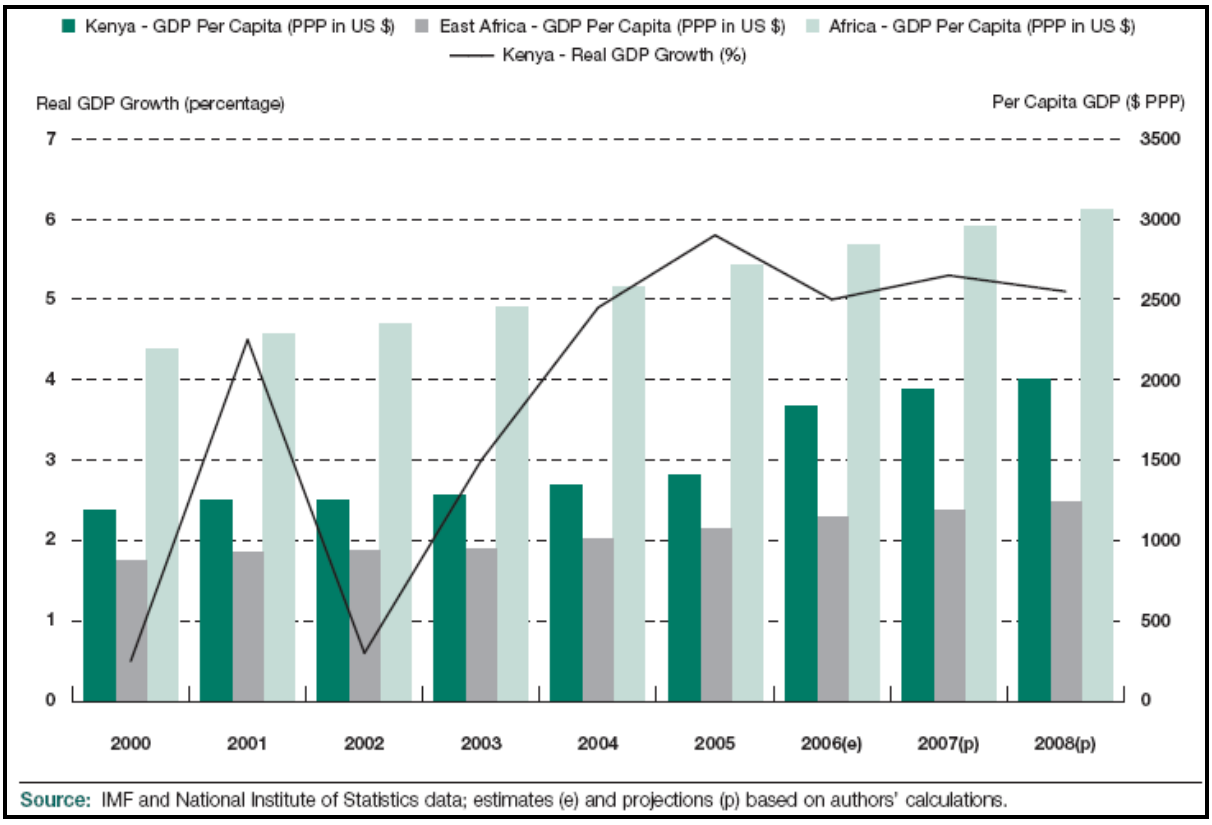



**Figure 4:** *The recent economic trends in Kenya (Mogaka et al. 2006)*

Since 2003, Kenya has made tremendous effort to get the economy back on track through the Economic Recovery Strategy (ERS) with the GDP growth rate shooting back to 5.8 % by 2005 (Figure 4). However this trend was seriously interrupted by the political instability after the 2007 general elections. Most economic sectors in the country depend on environment and natural resources and have significant impacts on the state of environment.

### 1.1.3: AGRICULTURE AND ENVIRONMENT

The agriculture sector is the mainstay of Kenyan economy accounting for 25% of the Gross Domestic Product (GDP). The total area used for agriculture in Kenya is about 19% of the total land surface. Agriculture is the main source of livelihood for the people of Kenya because about 75% of the population depends on the sector either directly or indirectly. In addition, the sector contributes towards most of the national food requirements, provides over 70% of agro-industrial raw materials, and 45% of total government revenue (Mogaka *et al.* 2006). Figure 5 shows the recent trends in Kenya's agricultural sector.

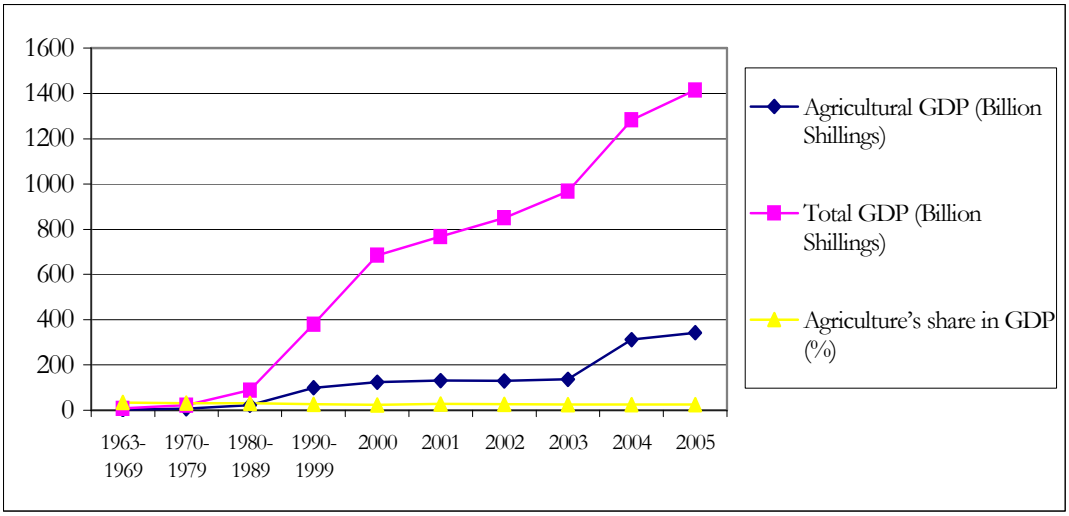



**Figure 5:** *Agricultural GDP as a share of total (1963-2005) GDP (Mogaka et al. 2006)*

Kenya is considered to have the most advanced agricultural sectors in East Africa, with a strong input of science, technology and innovation (STI) and an advanced agricultural extension network. Compared with their neighbours, Kenyan farmers use more fertilizers at 35 kg/ha, although this is still far below the world average at 94 kg/ha. In Tanzania, fertilizer use is 7 kg/ha, which is very low and less than half of the average level for Africa at 18 kg/ha.

The expansion and intensification of the agricultural sector especially through horticulture has resulted in increased use of agrochemicals which has led to a number of environmental problems especially water pollution. Other environmental challenges associated with the sector include: - (a) poor early warning system on droughts, (b) weak prediction of the impact of global warming, (c) weak mechanisms for non-point agricultural pollution control, (d) lack of information on the impacts of agro-biotechnology especially the introduction of Genetically Modified Organisms (GMOs), and (e) land degradation and soil erosion.

### 1.1.4: TOURISM AND ENVIRONMENT

Tourism is the second largest foreign exchange earner after agriculture in Kenya. It accounts for 7% of the GDP and 9% of the total formal employment. The tourism sector is heavily dependent on the vast beauty of the Kenyan environment which includes landscapes, wildlife, ecosystems and the rich diversity of cultural, historical and archeological resources in the country. It is estimated that 70% of gross tourism earnings in Kenya and 5% of total GDP can be attributed to Kenya's rich wildlife

heritage (Emerton, Ndugire, & Bokea 1997). The country has 59 spectacular game parks and reserves covering about 8% of the total land area. However it is estimated that the protected areas in Kenya contain only about 30% of the country's wildlife while the rest operate outside the national network of protected areas. This wildlife has recently become a major attraction for the establishment of a wide range of community-based ecotourism initiatives around the country.

Wildlife, which is a mainstay for the tourism sector depend heavily on the quality of environment including availability of food and water. However, some parts of the country such as the coastal region, the tourism sector has a significant impact on the environment. Some of the key environmental challenges associated with the sector include: - (a) management of solid and liquid wastes from the tourism infrastructure, (b) sustainable management of wildlife habitats and ecosystems, (c) involvement of communities in tourism sector, (d) conservation and promotion of indigenous knowledge in tourism management, and (e) rapid decrease in the populations of some of the key wildlife species especially the rhino, grey zebra, elephant and lion among others.

### 1.1.5: LIVESTOCK PRODUCTION AND ENVIRONMENT

Livestock production is a prominent economic activity in Kenya particularly in the pastoral areas, where it employs up to 80% of the population. Livestock rearing in the ASALs has been growing at a rate of about 2.2% in recent years. Most livestock production areas are also home to a wide range of wildlife species, which has often created conflicts in terms of transmission of diseases, competition for pasture and livestock predation. Other key environmental challenges facing the sector include:- (a) control livestock-induced land degradation especially through overgrazing, (b) emerging invasive species especially *Prosopis julliflora*, (c) controlling the spread of pests and diseases, (d) creation of alternative livelihoods, and (e) environmental impacts of increased sedentalized lifestyles.

### 1.1.6: FISHERIES AND ENVIRONMENT

The fisheries sector accounts for about 0.3% of GDP and provides employment for about 0.5 million people in Kenya. The country's total annual fish production is estimated at 150,000 tonnes (GoK 2005b). Fish provides an important source of protein and therefore plays an essential role in public health and contributes directly toward poverty eradication. Fresh water fisheries account for almost all the fish production in Kenya and Lake Victoria is the country's principal fishery. Although the Kenyan coastline and EEZ are highly productive, they remain poorly exploited, mainly due to

lack of appropriate technology and inadequate funding. Kenya marine fisheries account for only 4% of the total fish output. Water pollution is a major threat to the fishery sector in Kenya particularly in terms of export to countries with strict food safety standards. Other key environmental challenges facing the sector include:- (a) control of siltation and eutrophication, (b) protection of water catchments in order to sustain fish habitats, (c) sustainable fisheries development and management, (d) management of invasive and alien species, and (e) impact of climatic change on the fishery sector.

### 1.1.7: MANUFACTURING SECTOR, INDUSTRIAL DEVELOPMENT AND ENVIRONMENT

Kenya's industrial sector is one of the largest in sub-Saharan Africa. The sector currently contributes approximately 10% to the GDP, employs 13% of the labour force and contributes 27% of the country's exports. The sector has an additional 1.3 million small-scale manufacturers in the informal sector. The industrial and manufacturing sector, with over 2000 manufacturing units, is highly fragmented geographically with Nairobi and Mombasa having 50% of all industries in the country. Some of the other leading urban centres include Nakuru with 6.5%, Kiambu with 4.0% and Kisumu 3.85% (GoK 2007a).

The Kenyan goal in Vision 2030 is for the country to become fully industrialized by year 2030. As the country pursues its industrialization policy, it is expected that there will be increased demand for environmental resources especially water, energy and industrial raw materials to sustain the affected growth. Recent estimates, for example, show that industrial water demand is expected to grow from 220,000 $cm^3$ per day in 1990 to 366,000 $cm^3$ per day by 2000 and 491,000 $cm^3$ per day by 2010. One of the major environmental challenges in the industrial sector is waste management. Currently, most industrial and manufacturing areas in urban environments are key sources of partially treated or non-treated wastes, into the surface and ground water. Other important environmental challenges associated with the sector include:- (a) identification of minimum waste production levels, (b) effective regulation and management of toxic and hazardous chemicals, (c) control of noise and air pollution, and (d) adoption of cleaner production technologies.

### 1.1.8: ENERGY AND ENVIRONMENT

Kenya's energy sector can be subdivided into the "commercial" and "traditional" categories. The former relies heavily on oil and electricity and the latter on bio energy. Figure 6 shows the overall profile of the energy sector in Kenya. Firewood remains the predominant household source of

energy in rural areas. About 63.8% of Kenyan households use firewood for cooking while 13.3% use charcoal. Bioenergy exerts a lot of pressure on the forest resources in the country. It is estimated that the overall charcoal needs in Kenya is approximately 300 tonnes per month or 3600 tonnes per year which is extremely expensive to the environment as a result of the damage to forests. The heavy over reliance on wood fuel at the household level also affects human health due to the risk of respiratory diseases. Some of the key environmental challenges in the energy sector include: - (a) mechanisms for diversification of energy sources, (b) provision of clean energy, (c) pollution control, and (d) promotion of private production and distribution of energy.

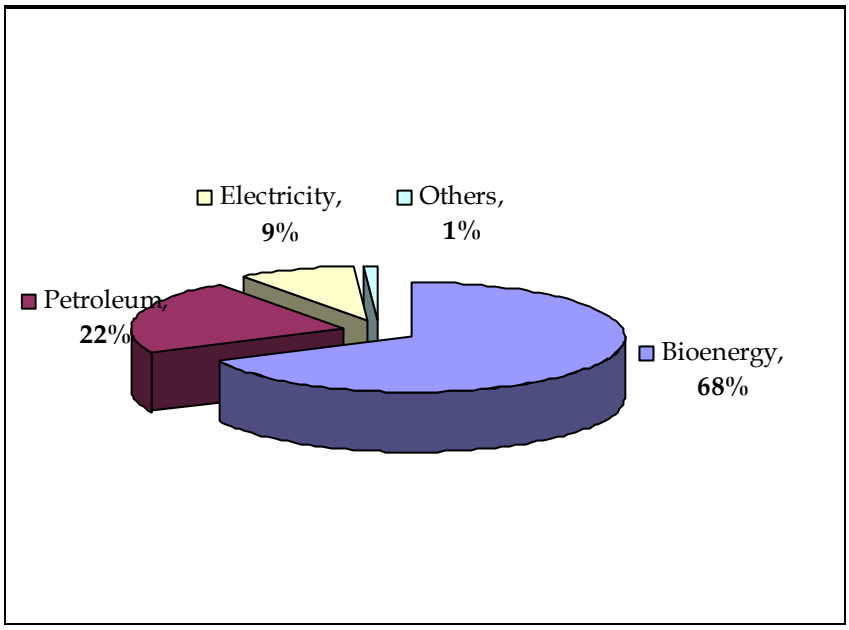



**Figure 6:** *The energy sector in Kenya (Mogaka et al. 2006)*

### 1.1.9: MINING SECTOR AND ENVIRONMENT

Kenya has a great potential for mineral resources exploration and development (Mathu & Davies 1996). However, the key mineral resources which are currently exploited in Kenya include soda ash, fluorspar, barite, gypsum, salt, dimension stones, silica, manganese, zinc, wollatonite, graphite, kaolin, copper, nickel, chromite, pyrite, and phyrochlore (Kariuki 2002). Some coal deposits have recently been discovered in Eastern Kenya and the prospects for discovery of oil and natural gas in Kenya are also quite high. Currently about 200 local and foreign companies are involved in exploitation and exploration of minerals in Kenya. The main method of mining in Kenya is open cast method. The environmental impacts associated with mining and quarrying in Kenya include disturbances of flora and fauna, landscape modification and negative hydrological impacts. Other

environmental challenges facing the mining sector in Kenya include:- (a) control of dust and noise pollution, (b) occupational health and safety issues, (c) compliance to EIA/EA regulations, (d) land use planning, and (e) rehabilitation of mined environments.

### 1.1.10: TRADE AND ENVIRONMENT

Kenya's domestic and international trade is dominated by agro-based goods and products from the industrial and manufacturing sector. In recent years, domestic trade in Kenya has experienced an increasing influx of imported goods due to market liberalization. A number of these products have short shelf life and contribute to increasing volume of wastes (Mogaka *et al.* 2006). Some of the challenges facing the trade sector in Kenya include: - (a) management of trade-related solid and liquid waste, (b) adoption of the clean development mechanism (CDM), (c) regulation and management of toxic and hazardous chemicals, (d) control of noise in the trade environment, (e) application of economic instruments and environmental friendly technologies in the trade arena, and (f) management of plastic and non-biodegradable wastes.

# CHAPTER TWO: ENVIRONMENTAL GOVERNANCE IN KENYA

Environmental governance in Kenya is implemented through a wide range of policies, legislations, regulations, standards and institutions established for the purpose of environmental management in the country. Most of the instruments for environmental governance in Kenya have evolved from important global fora such as the Stockholm Conference on Human Environment of 1972 in Sweden and the UN Conference on Environment and Development (UNCED) of 1992 in Rio de Janeiro, Brazil and thereafter in Johannesburg in 2002. The following section outlines environmental policies, sectoral Acts, legal and institutional framework that govern environmental governance in Kenya

## 2.1: POLICIES ON ENVIRONMENT, SECTORAL ACTS, LEGAL AND INSTITUTIONAL FRAMEWORK IN KENYA

The environment in Kenya is a very important asset especially because it offers a home for the Kenyan people and habitats to a wide range of biodiversity. The environment sustains the livelihoods of the Kenyan society and also provides critical natural capital for economic development. Environmental policies are usually accompanied by legal frameworks because the latter provide vital instructional regulations to be followed in order to operate within environmental policies. The government of Kenya has formulated a wide range of policies for sustainable development and environmental conservation as highlighted below.

### 2.1.1: ENVIRONMENT: SESSIONAL PAPER NO. 6 OF 1999 ENTITLED "ENVIRONMENT AND DEVELOPMENT", EMCA, 1999 AND DRAFT ENVIRONMENT POLICY

The Sessional Paper considered a wide range of environmental issues and challenges and eventually formed the basis of the formulation and enactment of the Environmental Management and Coordination Act (EMCA) in 1999 (GoK 2008a). National Environment Management Authority (NEMA) was established under the Environment Management and Coordination Act (EMCA) of 1999. The Act provides overall responsibilities for the management and coordination of the environment in Kenya. Under the EMCA, NEMA has the mandate of ensuring overall coordination, planning, regulation and enforcement of environmental standards and overall compliance with the Act. The mandate is clearly defined in Section 9 (1) of the Act, as follows:

*"The object and purpose for which the Authority is established*
*is to exercise general supervision and co-ordination over all matters relating*
*to the environment and to be the principal instrument of Government*
*in the implementation of all policies relating to the environment."*

The Ministry of Environment and Mineral Resources (MEMR), in the recent past, embarked on the formulating an environmental policy which is currently in draft form as was considered in the ERA process. The guiding principles underpinning the draft environment policy include the following:-

(a) **A Right to a Clean and Healthy Environment:** Every person in Kenya has a right to a clean and healthy environment and has the duty to safeguard and enhance the environment,

(b) **A Right to Development:** The right to development will be exercised taking into consideration the economic, social and environmental needs,

(c) **Ecosystem Approach:** An integrated ecosystem approach to conserving environmental resources will be adopted and enhanced to ensure that all ecosystems are managed as a whole while also providing a range of benefits to people,

(d) **Total Economic Value:** Integrating the benefits that ecosystems generate into the national accounting system, programmes and projects,

(e) **The Principle of Sustainable Use:** Environmental resources will be utilized in a manner that does not compromise the quality and value of the resource, or degrade the carrying capacity of supporting ecosystems,

(f) **Inter- and Intra-generational Equity:** The management of environmental and natural resources will be based on long term view where present generations make choices that will benefit future generations,

(g) **Public Participation Principle:** A coordinated and participatory approach to environmental protection and management will be enhanced to ensure that the relevant government agencies, local authorities, private sector, civil society and communities are involved in planning, implementation and decision making processes,

(h) **The Principle of Subsidiarity:** The management of the environment and natural resources will be through decentralization and devolution of authority and responsibilities at the lowest level possible,

(i) **The Precautionary Principle:** will apply entailing that ecological, cultural, economic social, intrinsic and aesthetic value of environmental management are identified and the impacts of human uses on those values are determined, before decisions are made**,**

(j) **The Polluter and User Pays Principle:** The polluter and users of environmental and natural resources shall bear the full environmental and social costs of their activities, and

(k) **International Cooperation:** Multilateral environmental agreements (MEAs) and regional instruments will be domesticated and implemented for better environmental management of shared resources.

### 2.1.2: LAND: DRAFT NATIONAL LAND POLICY AND ACTS

The vision of the National Land Policy process is to develop "A National Land Policy (NPL) that will eventually guide the country towards a sustainable and equitable use of land". It seeks to provide public policy guidance on a wide range of issues, including land management and development (Okidi *et al* 2006). The draft NPL has a clear vision to integrate and synergize with EMCA (1999) as follows;

> *" to achieve an integrated and comprehensive approach to the management of the environment and natural resources, all policies, regulations and laws dealing with land-based resources shall be harmonized with the framework established by the Environmental Management and Coordination Ac (EMCA, 1999)"*

Land tenure: There are several types of land tenure regimes in Kenya and different legal frameworks for each regime (Okidi *et al* 2008). Individual ownership of land ensues after the process of land consolidation and adjudication. The Registered Land Act and the Transfer of Property Act govern this regime in Kenya. **The Registered Land Act** applies to the land formerly held under customary law, namely native reserves and trust land, which has been registered. The Act delimits an individual's or legal entity's property rights to such land after the process of consolidation, adjudication and registration. Trust land in Kenya consists of areas that were occupied by natives during the colonial period and which have been consolidated, adjudicated and registered in individuals' or group names and native land that has not been taken over by the government. Such land is governed by the **Trust Lands Act** which is vested in local authorities designated as councils. Conservation responsibilities of the Council include the management of wildlife, water and forest resources.

Group or community ownership in Kenya operates through the institution of the group ranch. The operative statute in this regard is the **Land (Group Representatives) Act**. Finally, the taking up of by the colonial government and the assumption of title to all land in the Crown gave the

government the power to assume rights over land. Upon independence, the Crown Lands Ordinance became the **Government Lands Act (Cap 280).** The categories of government land in Kenya include forest and wildlife reserves, other government reserves, townships and other urban centres, alienated government land and open water bodies. The various legislations associated with the land sector are administered through the Ministry of Lands.

### 2.1.3: ARID AND SEMI ARID LANDS: DRAFT NATIONAL POLICY FOR THE SUSTAINABLE DEVELOPMENT OF ARID AND SEMI ARID LANDS

The Draft National Policy for the Sustainable Development of Arid and Semi Arid Lands envisions these areas under three perspectives, namely, the short-term (5 years), the medium-term (10-15 years) and the long-term (25-30 years) In the short term, this policy envisages that:- (a) the needs of poor people in the ASALs will be reflected in all national policy and planning frameworks, (b) that the vulnerability of poor people to climatic shocks, particularly droughts and floods, will be reduced and capacities strengthened to respond to climate change, and, (c) that ASAL inhabitants will benefit from systems of good local governance (GoK 2007c). In the medium term, the policy envisages that national efforts for attracting sustained investments by government, the private sector and development partners in various priority areas such as physical infrastructure, livestock production and marketing, water resources development, education and human capital development, health, tourism, trade and industry will be made. In the long-term, the government envisions a vibrant ASAL economy with strong linkages to non-ASAL economic systems, and contributing significantly to national economic development (GoK 2007c).

### 2.1.4: WATER: NATIONAL WATER POLICY AND WATER ACT, 2002

The present policy for the management of the water sector in Kenya can be traced to the launch in 1974 of the National Water Master Plan whose primary aim was to ensure availability of potable water, at a reasonable distance, to all Kenyans. Building on this experience, the Government developed a full fledged policy, the National Water Policy in 1999 (GoK 1999). The policy has tackled issues pertaining to water resources management, water and sewerage development, institutional framework and financing of the water sector.

The policy states that the Government's role in the water sector would be redefined away from direct service provision to regulatory functions. Service provision would be left to municipalities, private sector and communities. The policy also stated that the Water Act, (Cap 372) would be

reviewed and updated with attention to the transfer of water facilities from government custodianship. Regulations would also be introduced to give other institutions the legal mandate to provide water services and to provide mechanisms for regulation. The policy justified the handing over; arguing that participatory management of water resources would encourages proper operation and maintenance.

A new Water Act was enacted in 2002, which transformed the institutional framework for water governance. The Act established a number of institutions for the management of water and sanitation, namely; the Minister, the Director of Water Resources, the Water Resources Management Authority (WRMA), the Water Services Regulatory Board (WSRB), Water Service Boards (WSBs), Water Service Providers (WSPs), Catchment Area Advisory Committees (CAACs), Water Resources Users Associations (WRUAs), the National Water Conservation and Pipeline Corporation (NWCPC), the Water Services Trust Fund (WSTF) and the Water Appeal Board (WAB). The WRUAs are forums for the resolution of conflicts and co-operative management of water resources in catchment areas.

### 2.1.5: WETLANDS: DRAFT NATIONAL POLICY ON WETLANDS CONSERVATION AND MANAGEMENT

The Government, by ratifying the above policy, recognized the vital ecological functions and socio-economic services that wetlands provide. The formulation of this policy was in response to the government's obligations and commitment under the Ramsar Convention. The policy aims to address the threats, concerns and activities related to wetlands within a national context (GoK 2005d). It seeks to ensure that the plans and programmes of the government and all wetland stakeholders promote conservation and sustainable or wise use of wetlands, in order to enhance their ecological functions and provision of benefits for the present and future generations. The policy provides a framework for actions to improve institutional and organizational arrangements, address government policies, and legislation and increase knowledge and awareness of wetlands and their values, review the status of and identify priorities for wetlands in a national context, and address problems at specific wetland sites (GoK 2005d).

### 2.1.6: COASTAL AND MARINE ENVIRONMENT

In Kenya, there are two principal instruments that provide direction to the management of the coastal and marine environment under national jurisdiction. There are the Maritime Zones Act

adopted in 1989 and the Proclamation by the President of the Republic of Kenya in respect of the Exclusive Economic Zone and the Territorial Waters issued on 9 June 2005 (GoK 2008b). The key institutions for this area include the Coast Development Authority (CDA), Kenya Police and the Kenya Navy.

### 2.1.7: FORESTS: NATIONAL FOREST POLICY AND FOREST ACT, 2005

The goal of the National Forest Policy is to enhance the contribution of the forest sector in the provision of economic, social and environmental goods and services. The policy addresses local and global forestry issues in Kenya including management challenges in order to ensure fair contribution of the forestry sector in economic development. The implementation of the policy is expected to improve the social welfare of the Kenyan population without compromising environmental conservation (GoK 2005a, KFS, 2008)).

A new Forest Policy, 2005 was enacted in 2005 based on the recognition that forests play a vital role in the stabilization of soils and groundwater, thereby supporting the agricultural sector, and that they play a crucial role in protecting water catchments in Kenya and moderating climate by absorbing greenhouse gases. The Act further recognizes that forests provide the main locus of Kenya's biodiversity and a major habitat for wildlife. The new legislation seeks to enhance environmental governance by incorporating participatory and collaborative management of forests through involvement of communities not only as interested groups but also as key stakeholders. The Act establishes the Kenya Forest Service (KFS) as a body corporate entrusted with the overall responsibility for the administration of the Act.

### 2.1.8: WILDLIFE: WILDLIFE POLICY AND WILDLIFE ACT

Kenya's initial wildlife policy is embodied in the Sessional Paper No. 3 of 1975 entitled *"A Statement on Future Wildlife Management Policy in Kenya"*. This policy was reviewed in 2007, to provide a framework for conserving, in perpetuity, Kenya's rich diversity of species, habitats and ecosystems for the well being of its people and the global community (GoK 2007d). In support of this goal, the government is committed towards the adoption of the ecosystem approach to wildlife conservation and management throughout the country. Further, the government will encourage partnerships between relevant government agencies, private sector, NGOs and communities. In addition, government encourages a range of participatory approaches through the devolved entities, the regional and district committees and the Constituency Wildlife Associations (CWAs), to mainstream

and empower communities to participate in the conservation and management of wildlife and related planning, implementation and decision making processes. The Revised Wildlife Policy, along with the enabling wildlife legislation, provides the framework that should enable the country to better conserve and manage wildlife for the present and future generations. The wildlife sector in Kenya is managed through the Wildlife (Conservation and Management Act) which is under the custodianship of the Kenya Wildlife Service (KWS).

### 2.1.9: NATIONAL OCEAN AND FISHERIES POLICY

The National Ocean and Fisheries Policy is anchored on the strategy paper for the Ministry of Fisheries Development aimed at creating favourable legal and regulatory framework for the sustainable development of the fisheries sector including the oceanic environment (GoK 2006a). The policy has taken into consideration the Strategy for Revitalization of Agriculture (SRA) for 2004-2014, National Food Policy (1981-1994), the Poverty Reduction Strategy (PRSP) of 2001 and the Economic Recovery Strategy for Wealth Creation and Employment Creation (2003-2007). Within the framework of the above nationwide economic policies, the overall objective of the National Ocean and Fisheries Policy is to create an enabling environment for a vibrant fishery sector providing optimal and sustainable benefits, alleviating poverty, and creating wealth taking into consideration gender equity. The policy is designed to achieve various specific objectives ranging from promotion of sustainable utilization of fisheries resources, promotion and development of responsible and sustainable aquaculture to active involvement of fisher communities in fisheries management, while taking into consideration environmental conservation (GoK 2006a).

### 2.1.10: NATIONAL POLICY ON MINERAL RESOURCES AND MINING

This National Policy on Mineral Resource and Mining sets out principles that will guide the government in the reforms of mining sector and promote sustainable minerals investment (GoK 2006b. The initiatives contained in the policy are directed not only at large-scale mining but also at small-scale mining operations. This offers opportunities to support rural livelihoods and local entrepreneurship. In this respect, the policy recognizes that small-scale mines require assistance in their efforts to operate in economical and environmentally sustainable manner. One of the key guiding principles of the National Policy on Mineral Resources and Mining is to ensure that Kenya's mineral endowment is managed on sustainable economic, social and environmental basis with equitable sharing of the financial and developmental benefits of mining between investors and all Kenyan stakeholders. The mining sector is regulated under the Mining Act in which all un-extracted

minerals are vested in the government making it an offence for any person to deal with minerals without authorization. The key institutions in charge of the sector are the Ministry of Environment and Mineral Resources and the Department of Geology and Mines.

### 2.1.11: NATIONAL DISASTER MANAGEMENT POLICY

The National Disaster Management Policy emphasizes preparedness on the part of the government, communities and other stakeholders to Disaster Risk Reduction activities (GoK 2007b). In this regard, the policy aims at the establishment and strengthening of disaster management institutions, partnerships, networks and mainstreaming Disaster Risk Reduction in the development process so as to strengthen the resilience of vulnerable groups to cope with potential disasters. The Ministry of State for Special Programmes in the Office of President is expected to coordinate Disaster Risk Reduction initiatives within a unified policy framework in a proactive manner at all levels (GoK 2007b). According to the policy, Disaster Risk Management will encompass a full continuum of issues from disaster preparedness, relief and rehabilitation, mitigation and disaster prevention. The policy aims to increase and sustain resilience of vulnerable communities to hazards through diversification of their livelihoods and coping mechanisms. This entails a shift from the short term relief responses to disasters. The policy is expected to go a long way in preserving life and minimizing suffering by providing sufficient and timely early warning information on potential hazards that may result to disasters. It also aims at alleviating suffering by providing timely and appropriate response mechanisms for disaster victims (GoK 2007b).

### 2.1.12: AGRICULTURE SECTOR

The legal framework for the agriculture sector comprises laws at three operative levels. The first level consists of legislations that set broad principles and goals for the management of the agricultural environment (Okidi *et al* 2008). The three most important legislations at this level are the Environmental Management and Co-ordination Act, the Physical Planning Act, and Wildlife (Conservation and Management) Act. The second level consists of legislations directed specifically at the management of agrarian resources including the Agriculture Act, Irrigation Act, Forest Act, Mining Act and Water Act. These legislations are further complicated by others designed to ensure a healthy environment in the utilization of agrarian resources. These include the Crop Production and Livestock Act, the Stock and Produce Theft Act, Plant Protection Act, Seeds and Plant Varieties Act, Plant Control Products Act and Animal Diseases Act, and Fertilizers and Animal Foodstuffs Act. The third level consists of legislations directed at discreet production activities within the

agrarian sector. Among these are the Tea Act, the Coffee Act, Sisal Industry Act, Cotton Act, Fisheries Act and the Kenya Meat Commission Act. The key institutions involved in the enforcement of various agrarian legal frameworks include the Ministry of Agriculture, KEPHIS, KTDA and the Coffee Board of Kenya.

### 2.1.13: ENERGY SECTOR

Kenya is considered as an energy poor country with no oil, gas or coal. Its water resources are scarce and the forest cover is small and diminishing rapidly. However, Kenya is one of the leading producers of geothermal energy in Africa although the current production at approximately 130 MW is still fairly small but the full potential is said to be in the range of 3000-5000 MW. Kenya's energy law consists of the Energy Act, the Petroleum Act, the Petroleum Act and the Electric Power Act. The Energy Act is aimed at consolidation of Kenya's energy law and regulatory institutional framework. It was accented to by the President on 28 December 2006 and is in the process of being operationalised. The sector is managed by several institutions including the Ministry of Energy, Kenya Energy Generating Company (KENGEN), Kenya Power and Lighting Company (KPLC) and the Electricity Regulating Board (ERB).

### 2.1.14: NATIONAL BIOSAFETY FRAMEWORK

The National Biosafety Framework consists of the mechanisms put in place to regulate the environmental risks of the biotechnology sector. The aim of the framework is to balance technological benefits of the industry with appropriate environmental and human health safeguards. In Kenya, the framework consists of the National Biosafety Act of 2009. The Act seeks to align the national regulations with the Cartagena Protocol on Biosafety, which Kenya signed in 2000 and ratified in 2003. The main objective of the National Biosafety Act is:- (a) to ensure an adequate level of protection in the transfer, handling and use of genetically modified organisms (GMOs) resulting from modern biotechnology that may have an adverse effect on the environment; and (b) to establish a transparent and predictable process to review and make decisions on such GMOs and related activities (Okidi *et al* 2008). The Act identifies the regulatory agencies for the legislation which include the Ministry of Health, Department of Veterinary Services (DVS), Kenya Bureau of Standards (KEBS), KEPHIS, Kenya Industrial Property Institute (KIPI), Kenya Wildlife Service (KWS), Pest Control Products Board (PCPB) and NEMA. The lead agency for the enforcement of the Act will be the National Biosafety Authority.

#### 2.1.15: URBAN SECTOR

Several instruments have been used for a long time to control and regulate activities which are likely to cause environmental pollution in urban areas of Kenya, namely, the Water Act (Cap 372), Public Health Act (Cap 242), Merchant Shipping Act (Cap 389), and Factories Amendment Act (1990). These instruments, according to Kamau (2005) have the following functions: (1) listing activities which can be termed as polluting and specific pollutants which are subject to control; (2) specifying the water bodies and aquatic life for which protection should be provided; and (3) establishing mechanisms for the prevention of pollution and empowering relevant authorities to establish standards, issue permits, monitor pollution, inspect pollution sources, and take remedial measures in case of pollution. Recently a new law in Occupational Safety and Health Act (OSHA, 2008) has also been enacted to regulate the urban working environment.

## 2.2: MULTILATERAL ENVIRONMENTAL AGREEMENTS (MEAS)

At international level, Kenya is a party to a wide range of global and regional MEAs including conventions, treaties and protocols, which is a clear indication of a strong commitment towards environmental security (Manek 2001). Environmental research is necessary to support Kenya's international commitments in the domestication and implementation of these MEAs. The global and regional MEAs to which Kenya is a party to, are listed below.

#### 2.2.1: LAND ENVIRONMENT

1. United Nation Convention to Combat Desertification (UNCCD).

#### 2.2.2: MARINE ENVIRONMENT

1. Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, and
2. Agreement on the Organization for Indian Ocean Marine Affairs (IOMAC).

#### 2.2.3: ATMOSPHERE

1. Convention for the Protection of the Ozone Layer (Vienna Convention),
2. United Nations Framework Convention on Climate Change (UNFCCC) – Kyoto Protocol, and
3. Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol).

**2.2.4: BIODIVERSITY**

1. Convention on Biological Diversity (CBD),
2. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),
3. Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar),
4. Convention of Migratory Species of Wild Animals (CMS) or (Bonn Convention),
5. UNESCO World Heritage Convention,
6. Protocol on Biosafety (Cartagena Protocol),
7. Lusaka Agreement on Cooperative Enforcement Operative Enforcement Operations directed at Illegal Trade in Wild Fauna and Flora,
8. Convention for the Establishment of the Lake Victoria Fisheries Organization,
9. Agreement Preparation of a tripartite Environmental Management Programme for Lake Victoria,
10. Memorandum of Understanding between the Republic of Kenya and the United Republic of Tanzania and the Republic of Uganda for Cooperation on Environment Management, and
11. The treaty for the Establishment of the Eastern African Community; and

**2.2.5: WASTES AND CHEMICALS**

1. Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal (Basel Convention), and
2. Stockholm Convention on Persistent Organic Pollutants (POPs).

The overall objective of Kenya's involvement in MEAs is to complement the country's efforts in environmental management. Kenya's goal is to improve its capacity for the implementation of such MEAs which is expected to eventually boost national economic growth and poverty eradication while contributing towards the global ecosystem integrity. Five national MEA implementation capacity intervention areas have previously been identified and prioritized as follows:-

1. Mainstreaming MEAs into national policies and legal frameworks,
2. Information and public awareness on MEAs,
3. Policy and legal reforms to streamline coordination and MEA implementation,
4. Institutional capacity strengthening for implementation of MEAs, and
5. Domestication of MEAs at the grassroots level.

# CHAPTER THREE: STATE OF ENVIRONMENTAL RESEARCH IN KENYA

## 3.1: ENVIRONMENTAL RESEARCH INSTITUTIONS

The detailed analysis of previous environmental research in Kenya undertaken during the ERA process revealed that the country has a strong network of Environmental Research Service Providers (ERSPs) whose profile is given in Annex II (Heinrich Boll Foundation, 2006). Annex II shows that ERSPs are mainly characterized by public universities, National Research Institutions (NRIs) which are supported by the Government of Kenya within different public institutions. Other ERSPs include foreign universities, local and international environmental NGOs, bilateral organizations and the UN agencies. Kenya is also a hosting a number of International Research Centres (IRCs) such as ICRAF, ILRI and ICIPE among others. The ERA process evaluated the environmental research operations by the ERSPs and established that investment by these institutions for environmental research varies from one organization to another and also changes from time to time as highlighted below.

## 3.2: TRENDS AND FOCUS AREAS OF ENVIRONMENTAL RESEARCH

### 3.2.1: TREND ANALYSIS ON ENVIRONMENTAL RESEARCH AND ENVIRONMENTAL RESEARCH SERVICE PROVIDERS (ERSPS)

**i) Analysis on Environmental Research in Kenya (1967-2007)**

The trend in environmental research in Kenya was obtained from the register of research permits and available records from the ERSPs over a period of forty years (1967 to 2007). Figure 7 shows a progressive increase in the number of environmental studies up to the late 1970s followed by a decline in research investment during the 1980s and 1990s until the 2000s after which the investment increased. This trend is closely associated to the state of politics and governance in the country after independence which improved after the early 2000s. There has been no significant increment of investment in environmental research after the enactment of the Environmental Management and Coordination Act (EMCA, 1999).

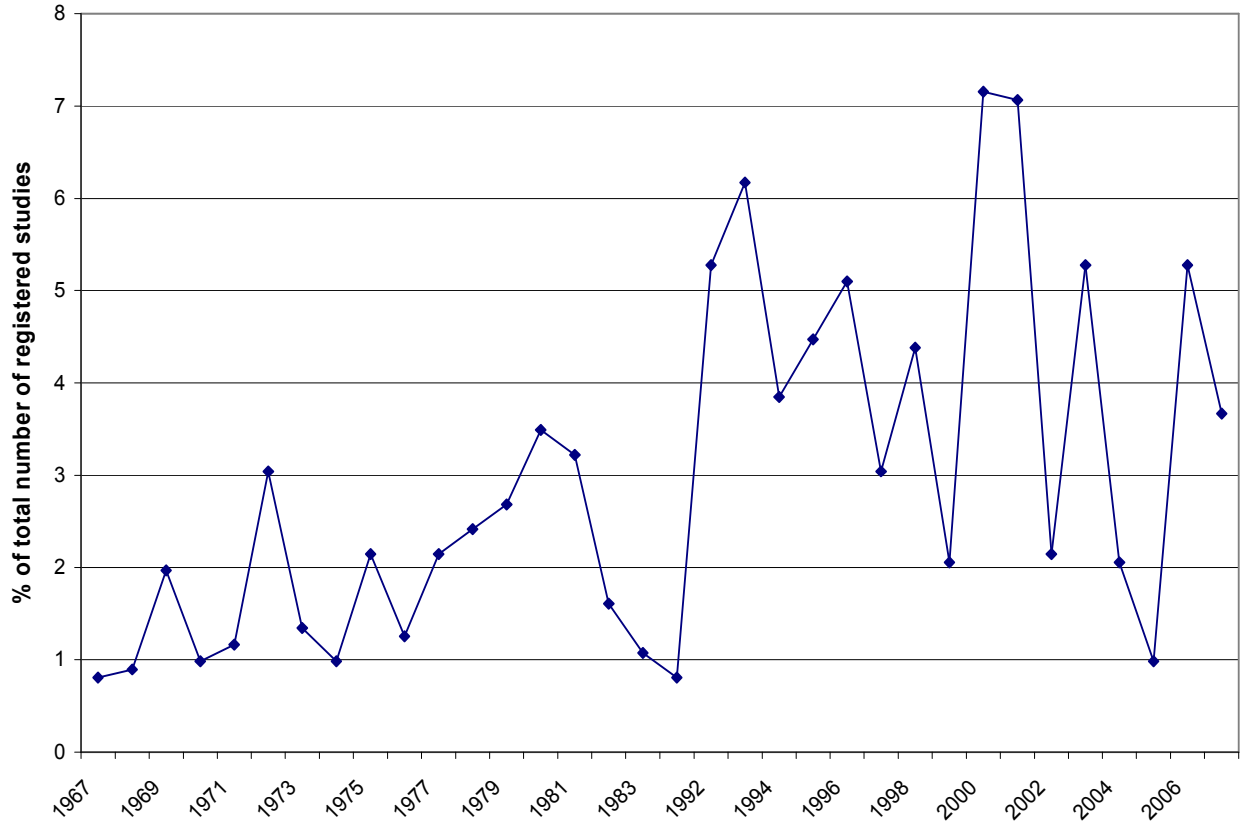



**Figure 7:** *A profile of the trend in number of registered environmental research studies in Kenya in 1967-2007*

### ii) Analysis on Environmental Research Service Providers (ERSPS)

The trend in the participation of local scientists in environmental research shows that environmental research was mainly dominated by foreign scientists in the 1960s, 1970s and 1980s in Figure 8. This can be attributed to the poor state of scientific capacity in the country after independence because the country was focused more on other sectors of public service instead of environmental research. Indigenous environmental scientists was also few at the time due to limited training capacity in the country, with only one key centre of scientific research at University of Nairobi, which had a low key focus on the environment.

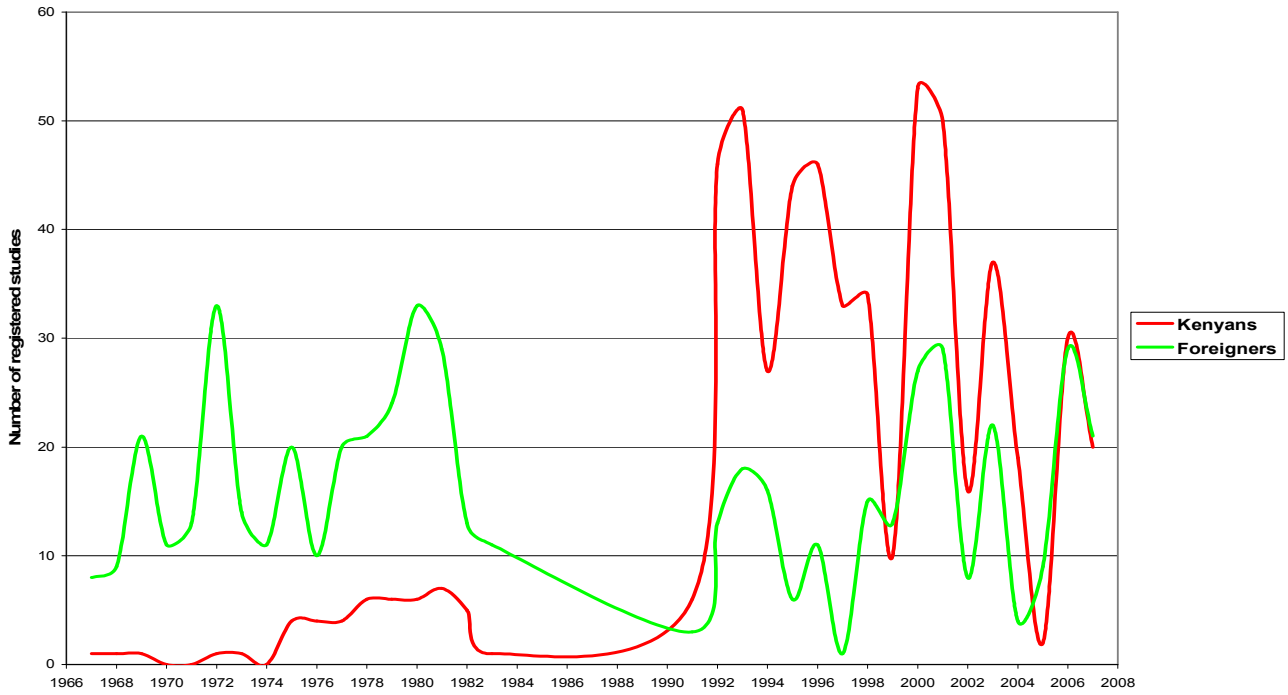



**Figure 8:** *A profile of Kenyan and foreign scientists involved in environmental research in Kenya in 1967-2007*

The analysis of research institutions engaged in environmental research in Kenya showed that both the University of Nairobi and Moi University were dominant in undertaking environmental studies between 1967 and 2007 (Figure 9). This pattern emanates from the fact that the former is one of the oldest institutions in the country with a well established network of environmental related programmes in a wide range of departments, schools, institutes and centres; while Moi University, was among the first to introduce a fully- fledged School of Environmental Studies in the early 1990s. The trend was reversed after the early 1990s especially following the initial establishment of additional universities in the country like Kenyatta University and Jomo Kenyatta University of Agriculture & Technology, which also introduced strong environmental programs.

Foreign universities and foundations had a strong lead in environmental research. This corroborates the findings on active involvement of foreign scientists in local environmental research. Foreign universities and scientific research institutions accounted for 40.4% of all the environmental research studies registered and permitted by the Government of Kenya between 1967 and 2007. University of Nairobi accounted for 13.7% while Moi University accounted for 9.9%. It is most likely that the involvement of foreign researchers has resulted in the movement of large amounts of scientific

information and probably environmental specimens to the foreign world especially countries in Europe and North America. The involvement of foreign scientists in environmental research decreased significantly in the 1990s due to the negative impact of the political situation in Kenya on bilateral aid.

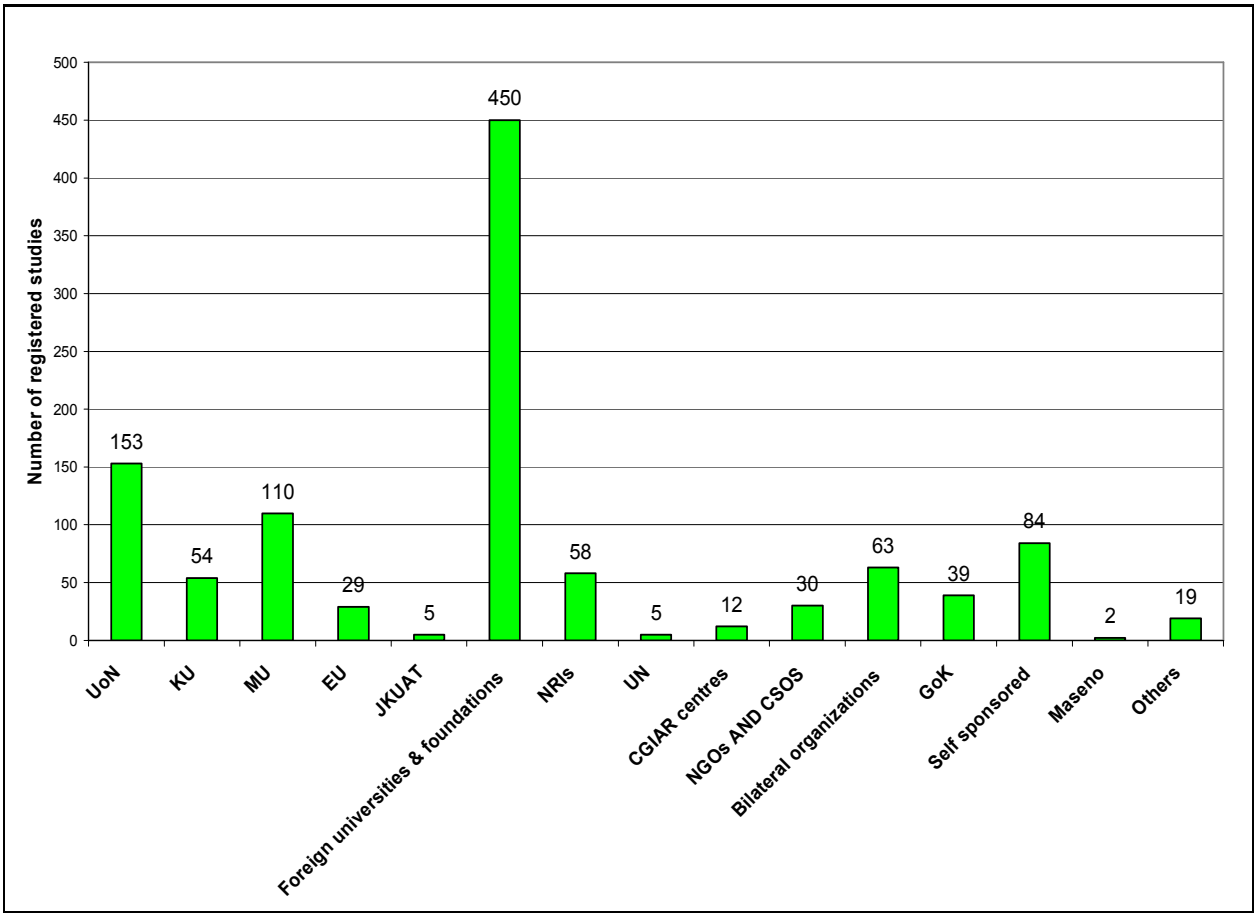



**Figure 9:** *A summary of the institutions undertaking environmental research in Kenya*

### 3.2.2: ANALYSIS ON AREAS OF ENVIRONMENTAL RESEARCH FOCUS

Between 1967 and 1980, environmental research in Kenya was characterized by a strong focus on the biological environment especially wildlife and issues on human environment. However, between 1981 and 2007, there has been more research on the human environment in comparison to the physical and biological environment (Figure 10). The analysis of previous environmental research showed that although land and water research in Kenya has mainly been dominated by foreign scientists (Figure 11), Moi University has been the lead institution on research in physical

environment but with a heavier focus on the aquatic environment. The University of Nairobi has conducted more research on land environment probably because it has one of the oldest schools on agricultural sciences (Figure 11). The ERA process also established that most of the research on biodiversity and ecosystems in the country has been conducted by foreign scientists, which means that most of the findings are in foreign countries. This is shown, for example, by the location of East African biodiversity data and information. According to an analysis of the availability of biodiversity data and information for East Africa, over 50% of the vital biodiversity data and information was located in European and North American institutions (Figure 12).

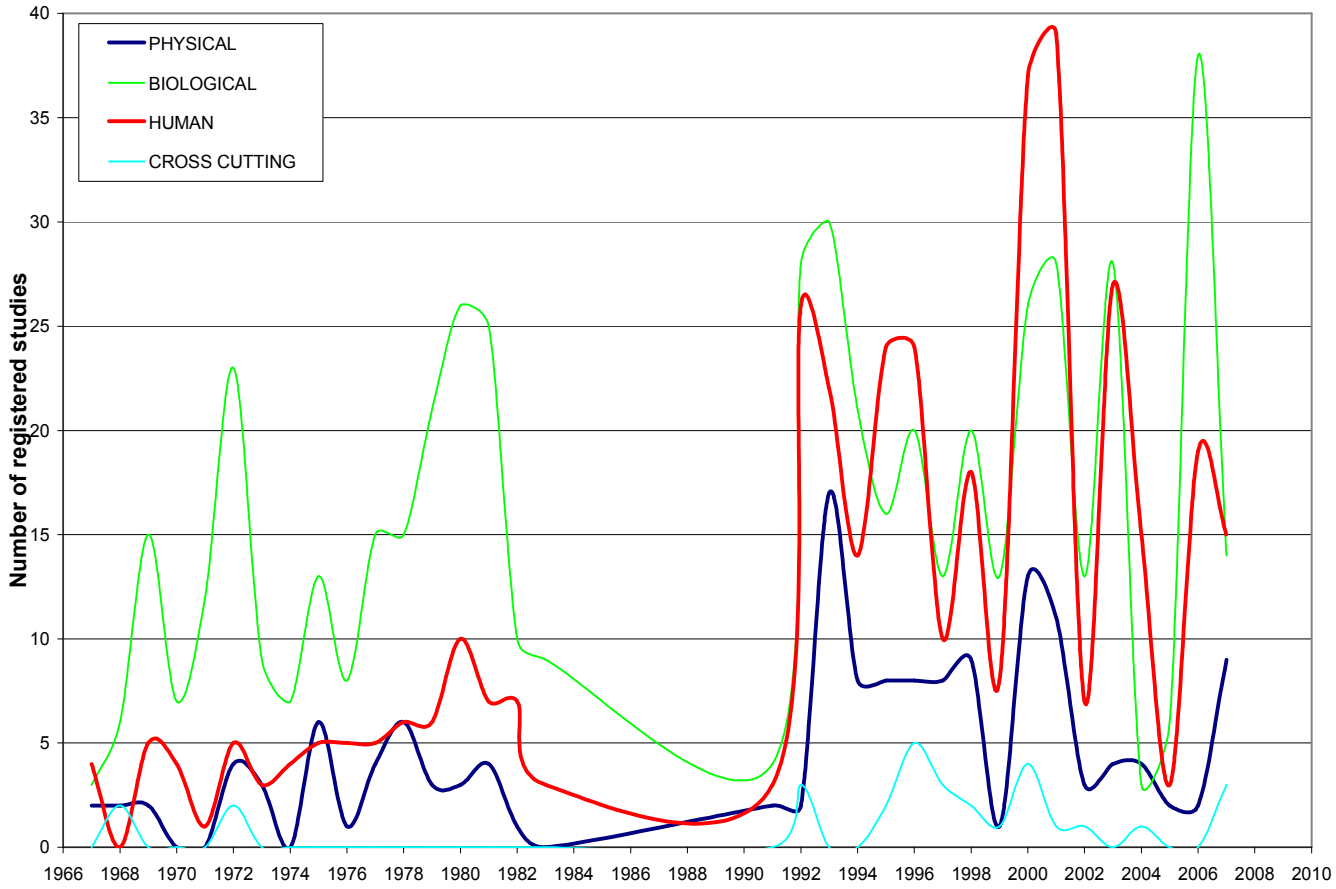
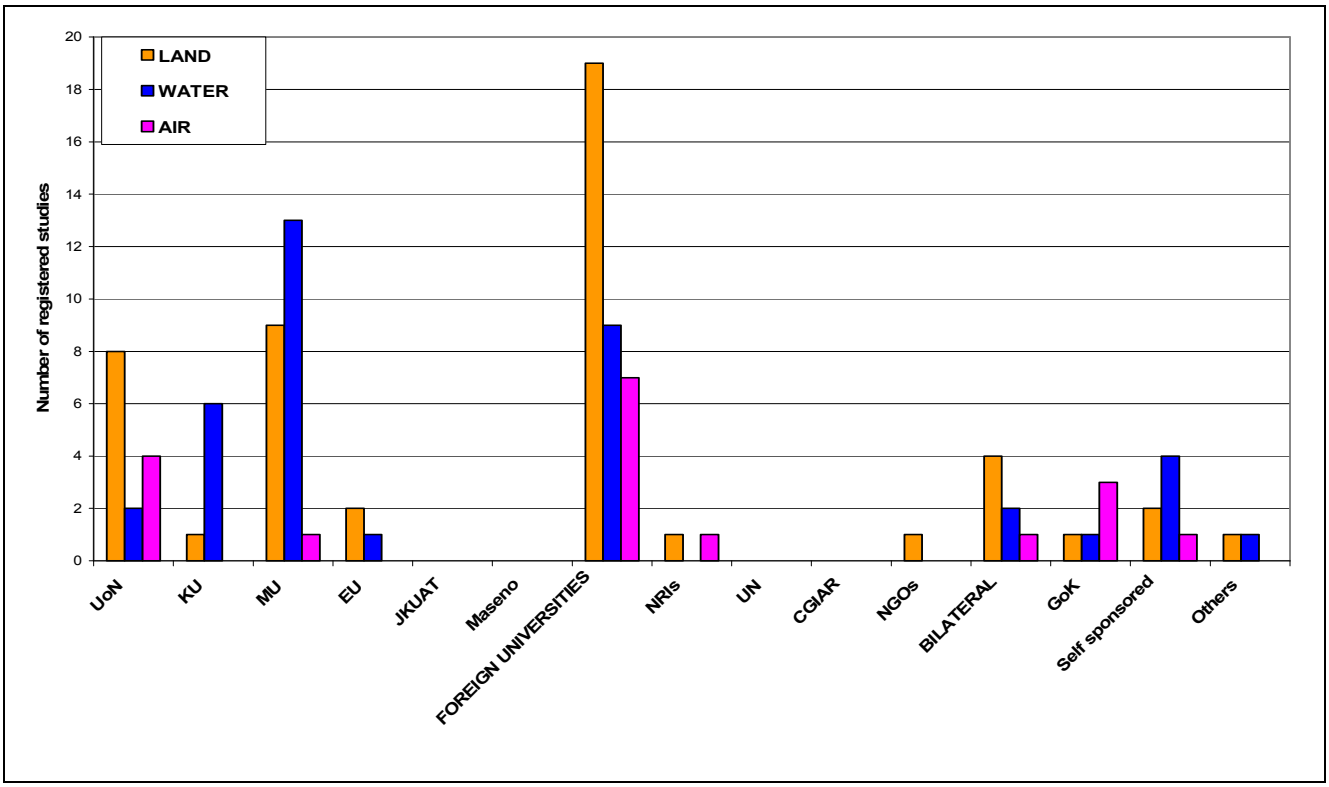
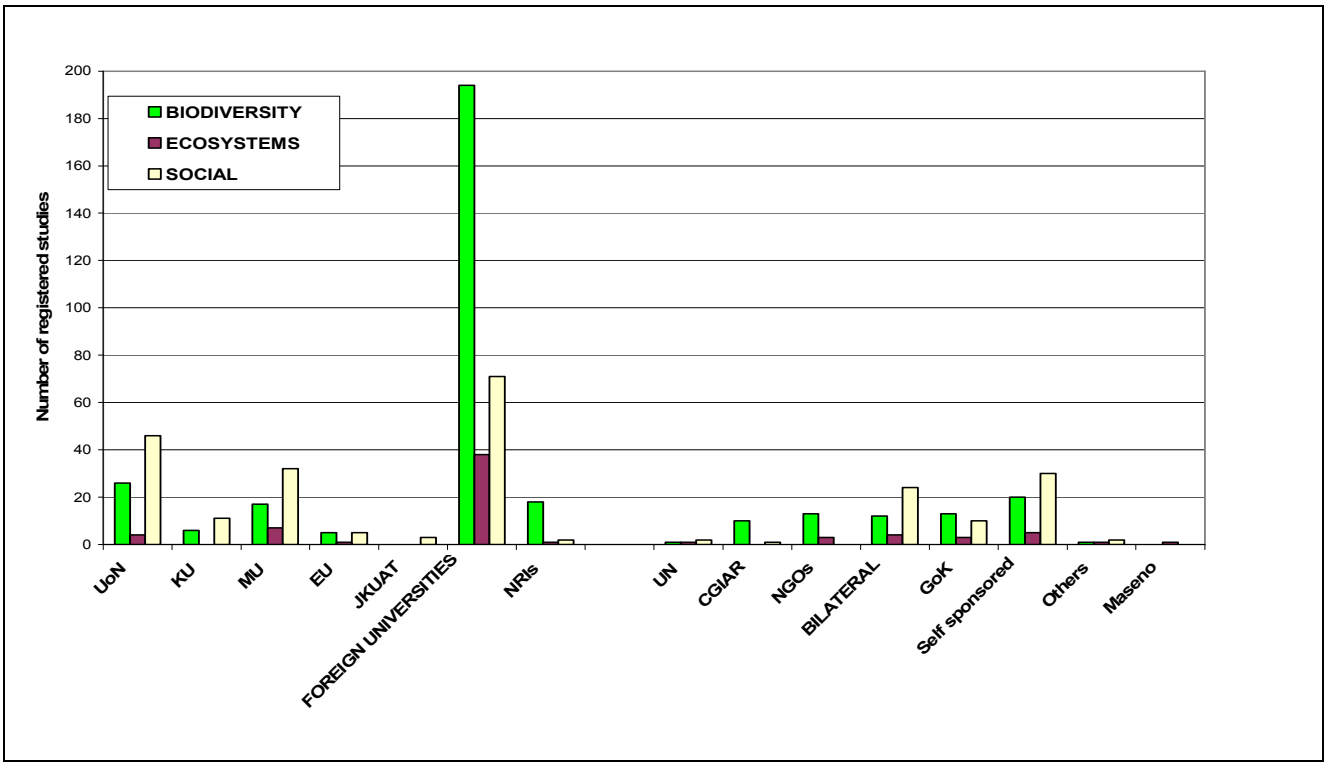



**Figure 10:** *A profile of the environmental thematic areas of focus in environmental research in Kenya (1967-2007)*




**(a)** Physical Environment




**(b)** Biodiversity, ecosystems and human environment

**Figure 11 (a) & (b):** *A profile of the institutional interests in various thematic areas of environmental research in Kenya in 1967-2007*

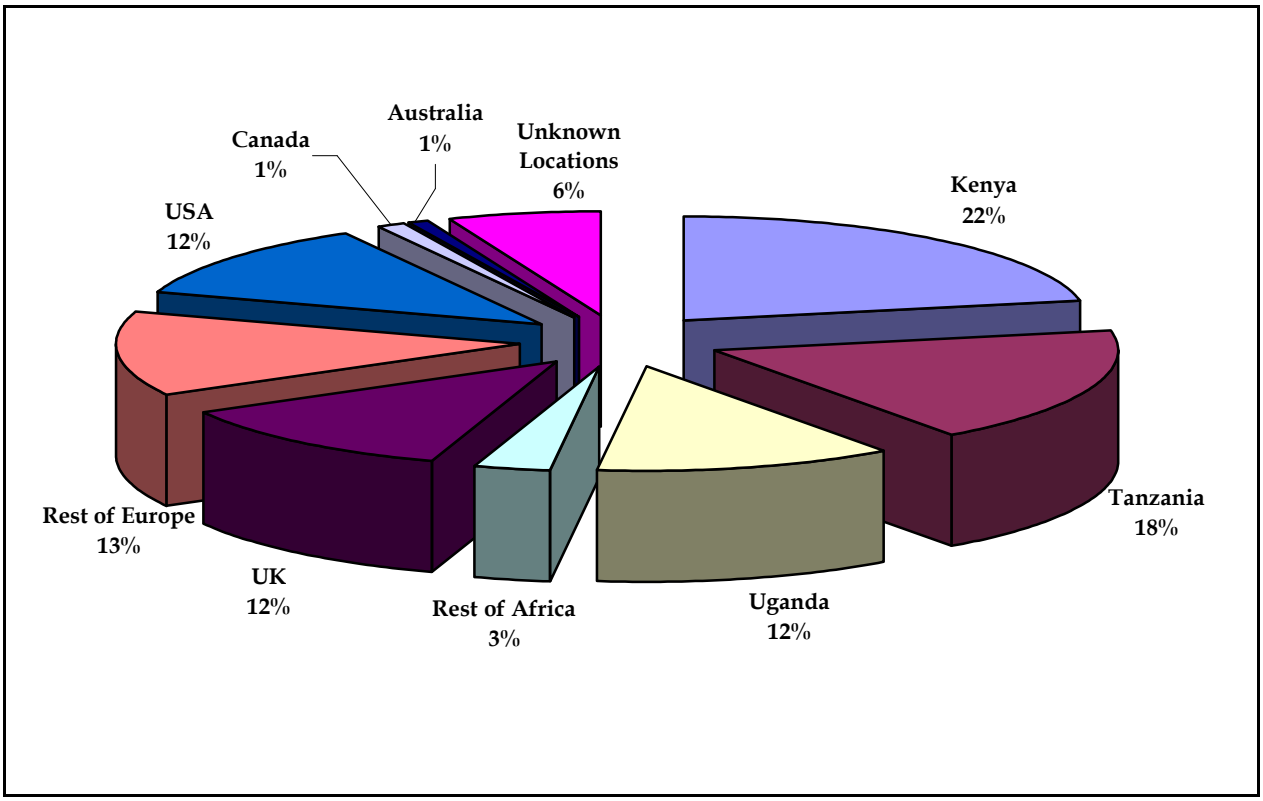



**Figure 12:** *Location of East African biodiversity data and information from environmental research*

## 3.3 ENVIRONMENTAL RESEARCH GAP ANALYSIS

An analysis of environmental research gaps was conducted for the Environmental Policy, EMCA, 1999 in addition to other gaps identified by stakeholders. The gaps identified were as follows:

### 3.3.1 RESEARCH GAPS IN ENVIRONMENTAL POLICY

The typology of environmental research undertaken in Kenya was cross-checked against the typology of issues in the National Draft Environment Policy, in order to identify key areas of policy research gaps. The overlapping profile as shown in Figure 18 illustrates that some of the policy thematic areas are well covered in the environmental research already undertaken in Kenya. These include:- (a) biodiversity (b) forestry, (c) wildlife, (d) water resources and pollution, (e) energy and

environment, (f) waste management, and (g) environmental health and public health. The following policy thematic areas were considered to be moderately covered:- (a) wetlands, (b) landscapes and land degradation, (c) agriculture and irrigation, (d) mining, (e) fisheries (f) atmosphere and air pollution, (g) toxic and dangerous chemicals, (h) radiation, (i) disaster management, and (j) sustainable consumption and production. Finally the following policy thematic issues were considered to be marginally covered:- (a) climate change, (b) drought and desertification, (c) mountain ecosystems, (d) human settlements, (e) EIA & EAs, and (f) international cooperation (Figure 13).

The following policy research gaps were identified based on country status and focus of previous environmental research:-

1. Noise pollution and management,
2. Climate change adaptation and coping mechanisms,
3. Drought and desertification,
4. Air pollution and quality standards,
5. Trade and environment, and
6. International cooperation and implementation of MEAs.

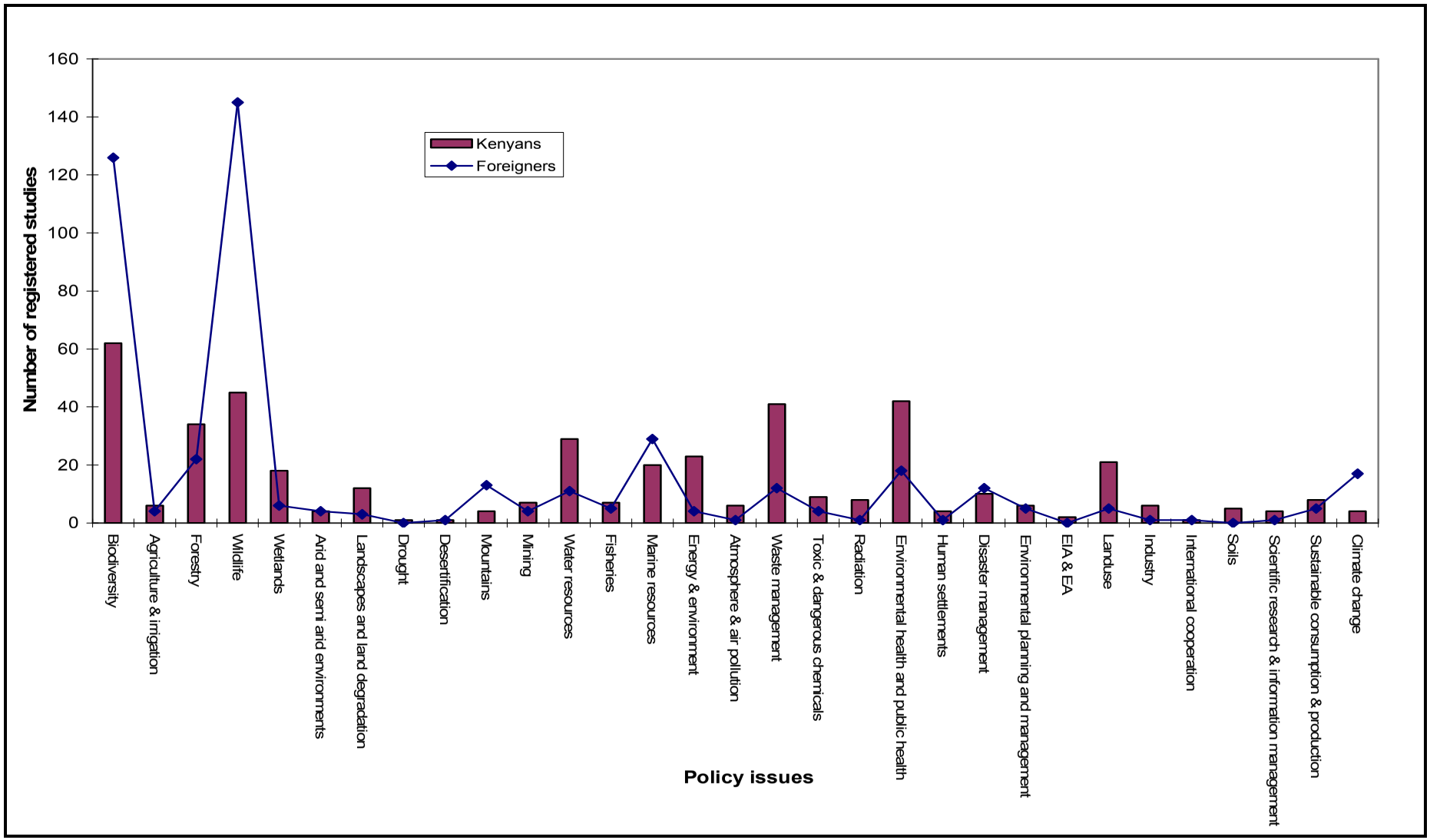



**Figure 13:** *Environmental research and policy in Kenya*

### 3.3.2 ANALYSIS OF RESEARCH GAPS IN EMCA, 1999

The typology of environmental research undertaken in Kenya was cross-checked against the typology of issues in the EMCA, in order to identify key research gaps. The overlapping profile as shown in Figure 14 showed that the following EMCA sections areas were well covered in previous environmental research undertaken in the country: - (a) Section 50 on conservation of biological diversity, (b) Section 51 on conservation of biological diversity *In-situ*, and (c) Section 69 on environmental monitoring. Similarly, the following EMCA sections were considered moderately covered: - (a) Section 42 on protection of rivers, lakes and wetlands, (b) Section 43 on protection of traditional interests, (c) Section 55 on protection of the coastal zone, (d) Section 58 on EIA, and (e) Section 92 on regulation of toxic and hazardous materials (Figure 14). The following EMCA sections were marginally considered in previous environmental research:- (a) Section 45 on identification of hilly and mountainous areas, (b) Section 47 on measures for management of hilltops, hillsides and mountainous areas, (c) Section 48 on protection of forests, (d) Section 49 on conservation of energy and planting of trees and woodlots, (e) Section 53 on access to genetic resources of Kenya, (f) Section 54 on protection of environmentally significant areas, (g) Section 68 on environmental audit, (h) Section 74 on effluent discharge, (i) Section 78 on air quality standards, (j) Section 82 on emissions by motor vehicles and other conveyances, (k) Section 86 on standards for waste, (l) Section 88 on waste licensing, (m) Section 89 on licensing for waste disposal sites, (n) Section 94 on standards of pesticides and toxic substances, (o) Section 108 on issue of environmental restoration orders, and (p) Section 124 on conventions, agreements and treaties on environment (Figure 14). Table 1 outlines the specific Sections and research areas proposed in EMCA, 1999.

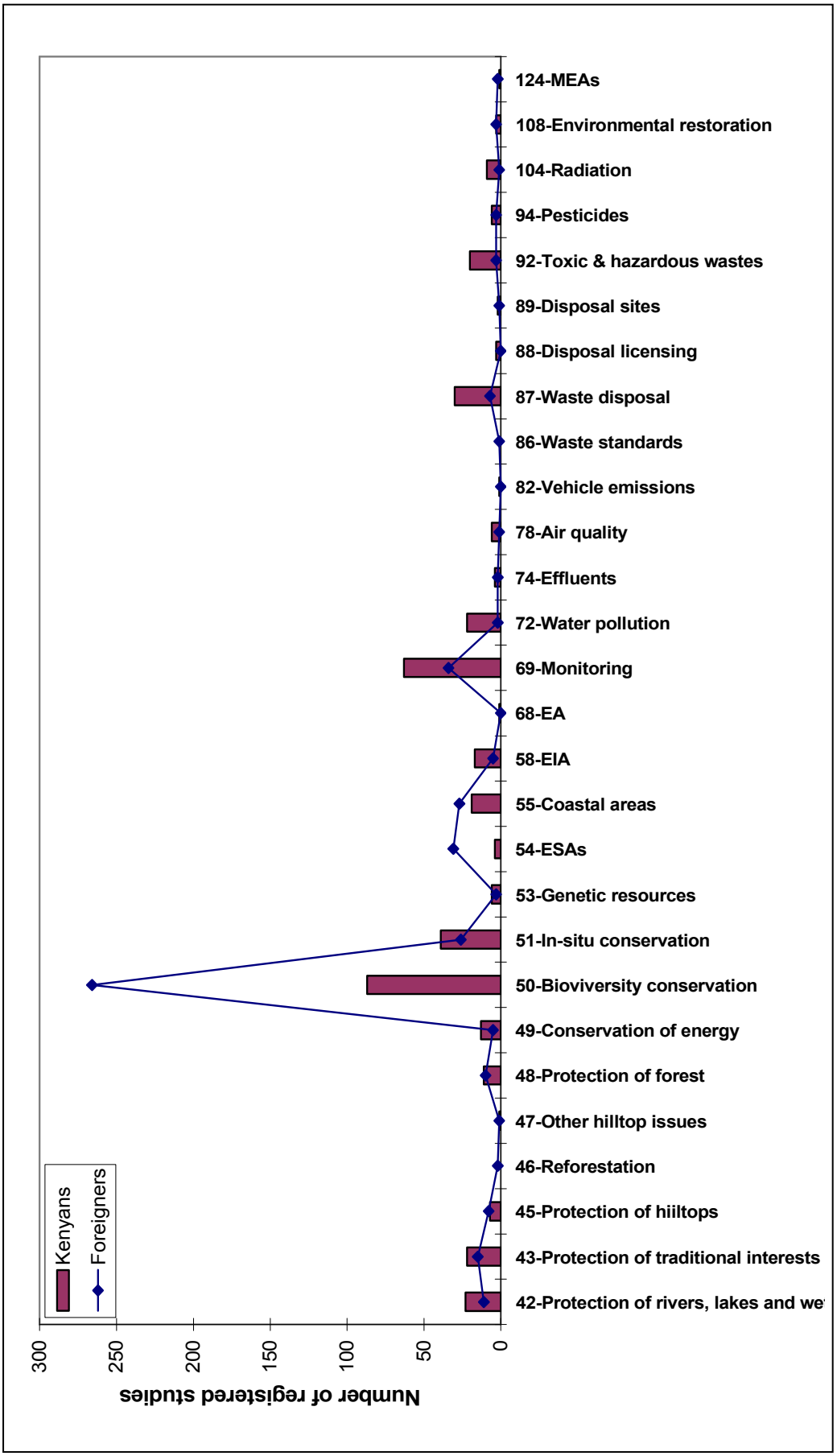



**Figure 14:** *Environmental research and the Environmental Management and Coordination Act (EMCA, 1999) research gap analysis*

**Table 1:** EMCA, 1999 Research Gaps Analysis

| EMCA,1999 SECTIONS | AREAS FOR RESEARCH AND ENFORCEMENT |
|---|---|
| **Section 46:** Reforestation and afforestation of hilltops and mountainous areas. | ▪ Criteria for identification of ESAs<br>▪ Inventory and mapping of the state of environment in hills and mountains<br>▪ National landuse guidelines and regulations for utilization of critical watersheds |
| **Section 47:** Other measures for management of hilltops, hill sides and mountainous areas. | ▪ Criteria for identification of ESAs<br>▪ Inventory and mapping of the state of environment in hills and mountains<br>▪ National landuse guidelines and regulations for utilization of critical watersheds |
| **Section 51:** Conservation of biological resources *in-situ*. | ▪ Documentation and preservation of IEK<br>▪ Regulations for the protection of intellectual property rights<br>▪ Integrating indigenous environmental knowledge (IEK) in environmental management and conservation. |
| **Section 52:** Conservation of biological resources *ex-situ*. | ▪ National criteria and regulations for designation and protection of threatened species – e.g. Sandalwood, *Aloe*<br>▪ Regulations for the establishment and management of private and community *ex-situ* facilities such as gene banks, wildlife sanctuaries, botanic gardens and zoos<br>▪ Regulations for access, transfer and sharing of environmental materials from private and community *ex-situ* conservation facilities particularly gene banks |
| **Section 54:** Protection of environmentally significant areas (ESAs). | ▪ Criteria for identification and designation of ESAs<br>▪ National guidelines for management of ESAs in private property and communal areas<br>▪ National guidelines for rehabilitation of degraded ESAs<br>▪ Funding mechanisms for ESAs in private property and communal areas |
| **Section 56:** Protection of the ozone layer | ▪ National guidelines and regulations on the release of ozone-depleting substances |

Table 1 Cont…

| EMCA,1999 SECTIONS | AREAS FOR RESEARCH AND ENFORCEMENT |
|---|---|
| **Section 57:** Fiscal incentives | ▪ Identification of appropriate economic and other incentives and dis-incentives for environmental protection |
| **Section 80:** Licensing emissions | ▪ Criteria for the licensing and regulation of contaminant emissions e.g. GHGs |
| **Section 82:** Emissions by motor vehicles and other conveyances | ▪ National emission standards |
| **Section 86:** Standards for wastes | ▪ National guidelines and regulations on the management of landfills and incinerators<br>▪ National regulations for industrial waste transfer and recycling<br>▪ National regulations on waste disposal by members of public<br>▪ National regulations on ship breaks, oil spills and management of ballast water<br>▪ National regulations on industrial thermal pollution |
| **Section 87 to Section 89:** On waste handling, transfer, recycling and disposal | ▪ National guidelines and regulations on the management of landfills and incinerators<br>▪ National regulations for industrial waste transfer and recycling<br>▪ National regulations on waste disposal by members of public<br>▪ National regulations on ship breaks, oil spills and management of ballast water<br>▪ National regulations on industrial thermal pollution |
| **Section 91 to Section 92:** On Hazardous Waste | ▪ Criteria for classification of hazardous wastes<br>▪ National guidelines and regulations for the management of each category of hazardous wastes |
| **Section 101:** Standards for noise | ▪ Noise emission standards<br>▪ National guidelines for abatement of unreasonable noise and vibration pollution. (loudspeaker, automobile horns, firework ratings) |
| **Section 112:** Environmental easements and environmental conservation orders, | ▪ National regulations on restoration of degraded environments e.g. quarries, sand mines<br>▪ National criteria for economic cost estimates of environmental damages<br>▪ National criteria for estimation of the monetary value of environmental restoration orders |

### 3.3.3 ADDITIONAL RESEARCH GAPS IDENTIFIED AT INSTITUTIONAL AND STAKEHOLDER CONSULTATIVE LEVEL

A number of additional research areas were identified and proposed to be incorporated into the research agenda by institutions, stakeholders and NEMA fraternity during the consultative workshops. These included areas in agriculture, wildlife, aquatic environment, environmental governance and information systems and the urban environment, climate change, biodiversity and ecosystem as shown in Box 1.

**Box 1:** Additional Environmental Research Areas identified at institutional and stakeholders' workshops

**Aquatic Environment**

- Alternative livelihoods sources to reduce fishing pressure particularly in Lake Victoria and other satellite lakes
- Development of a database for invasive species and monitoring and surveillance
- Development of value addition technologies for fish and fish products
- Research on eutrophication of aquatic environments and fishing environment degradation
- Flood plain fisheries enhancement system
- Identification of fishery specific management regimes
- Inventory of fish species in aquatic environments
- Production of a certified fish seed to enhance fish farming in the country
- Spatial and temporal studies of wetlands
- Water budgets for protected areas such as Lake Nakuru, Amboseli and Tsavo
- Management of the coastal and marine environments

**Agriculture**

- Effects of disposing expired dressed seeds
- Identification of improved farming systems to enhance natural resources management
- Environmental risk assessment of transgenic crops and GMOs
- Maximum residue levels for major crops in Kenya

**Cross-cutting issues-Climate Change**

- Impacts of climate change (disease incidences, lake levels, floods and droughts)
- Impacts of climate change on biodiversity
- Climate change mitigation and adaptation

Box 2: continued

**Environmental Governance and Information Systems**

- Scientific research and information management
- Legal frameworks for communicating research findings for implementation
- Enhancing implementation of MEAs and other international processes
- Integration if indigenous knowledge in environmental management
- Documenting environmental ethics
- Assessing the levels of awareness on environmental protection
- Impact of EMCA on sustainable development (Regulations and Standards)

**Wildlife**

- Establishment of ecological carrying capacities of conservation areas
- Establishment of minimum viable wildlife conservation areas
- Identification of wildlife migratory corridors and dispersal range
- Inventory and mapping of bush meat poaching and impacts in Kenya
- Wildlife economics and benefit sharing mechanisms
- Wildlife and livestock interactions at the interface between local community and the protected area
- Management of buffer zones around the protected areas

**Urban Environment**

- Impact of urban transport to the environment
- Management of urban hazardous waste
- Natural and industrial disasters
- Noise pollution in urban areas
- Poverty and urban environmental degradation
- Impacts of urban practices on environment
- Urban planning and the environment

**Biodiversity and ecosystems**

- Biodiversity and human health
- Environmental impacts on human health
- Environmental/biodiversity economic valuation
- Mechanisms for compensation of environmental services
- Criteria and indicators for ecological integrity
- Criteria for gazettement of Environmentally Significant Areas
- Identification of alternatives to methyl bromide for wood treatment
- National land use guidelines
- Incentives for renewable energy

## 3.4: ENVIRONMENTAL RESEARCH FUNDING

Figures 15 and 16 shows the 1967-2007 trends in environment research investment by different institutions and research funding agencies in Kenya. The figures show that the investment by government in research increased gradually after independence up to the late 1970s after which the funding almost stagnated until the late 1990s. Funding for environmental research increased during the last seven years following the changes in governance. This increase could also be attributed to the rising interest and public concern for environmental security.

The funding of environmental research through bilateral aid in Kenya increased progressively in 1980s to an all-time high in the early 1990s after which the funding decreased to marginal levels after 2003 (Figure 15). The analysis showed that the number of self-sponsored environmental research increased in the early 1980s to an all-time high in 2007 probably as a result of greater environmental awareness and public concern, improved economic status and the introduction of self-sponsored university education in Kenya in the 2000s (Figure 15). Figure 16 shows a comparative analysis of environmental research investment among the universities and other ERSPs. The analysis showed that although the country is hosting several UN agencies like UNEP, UN-HABITAT, and International Research Centres (IRCs) including CGIAR centres like WAC-ICRAF, ILRI, and ICIPE, their investment in local environmental research is marginal probably because of their international status (Figure 16). Figure 17 shows the environmental research profile for WAC-ICRAF, one of the key IRCs based in Kenya. The figure shows the sporadic nature of research investment in Kenya.

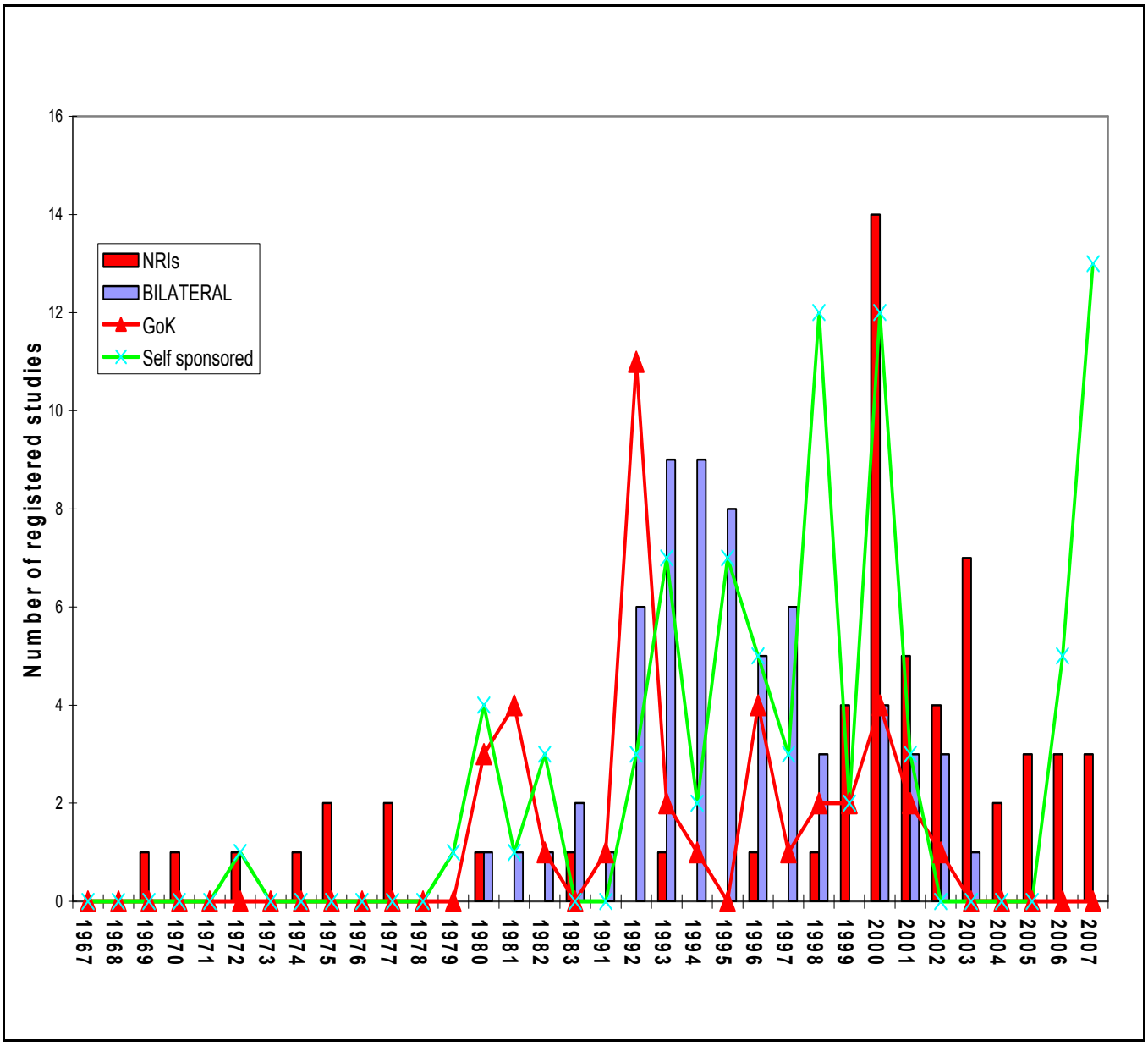
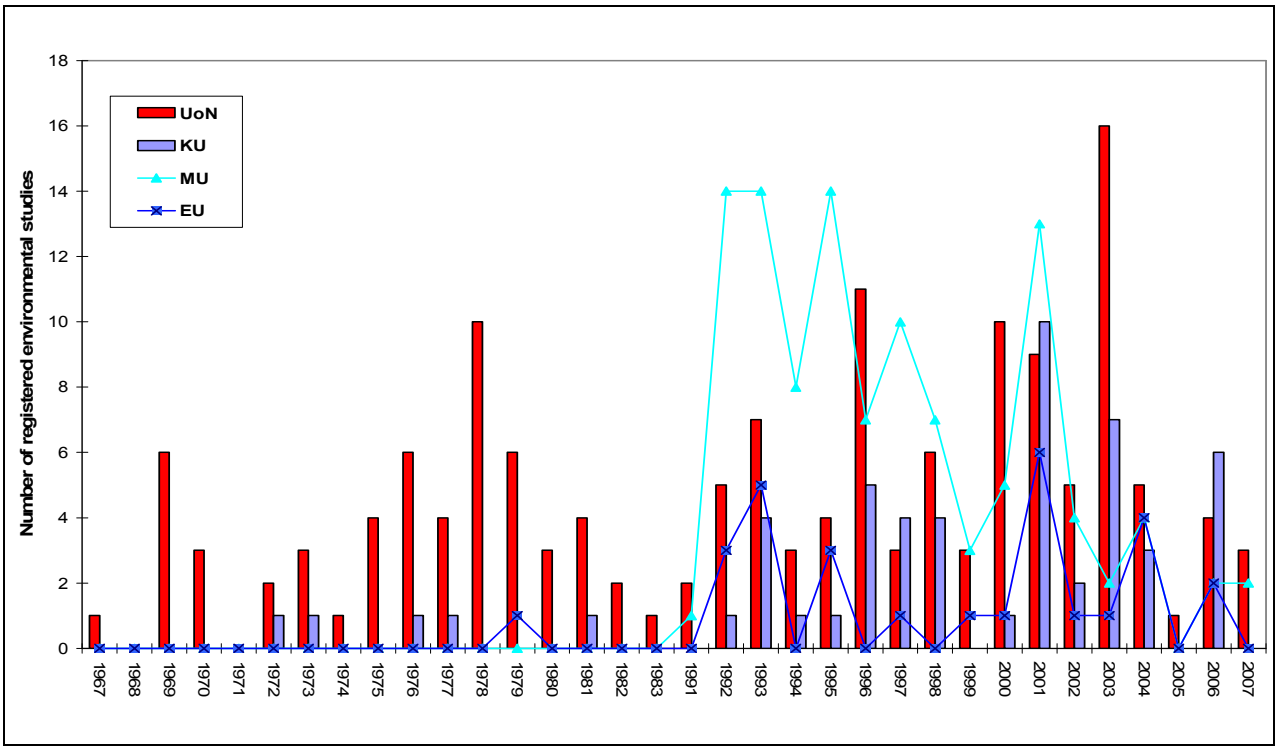
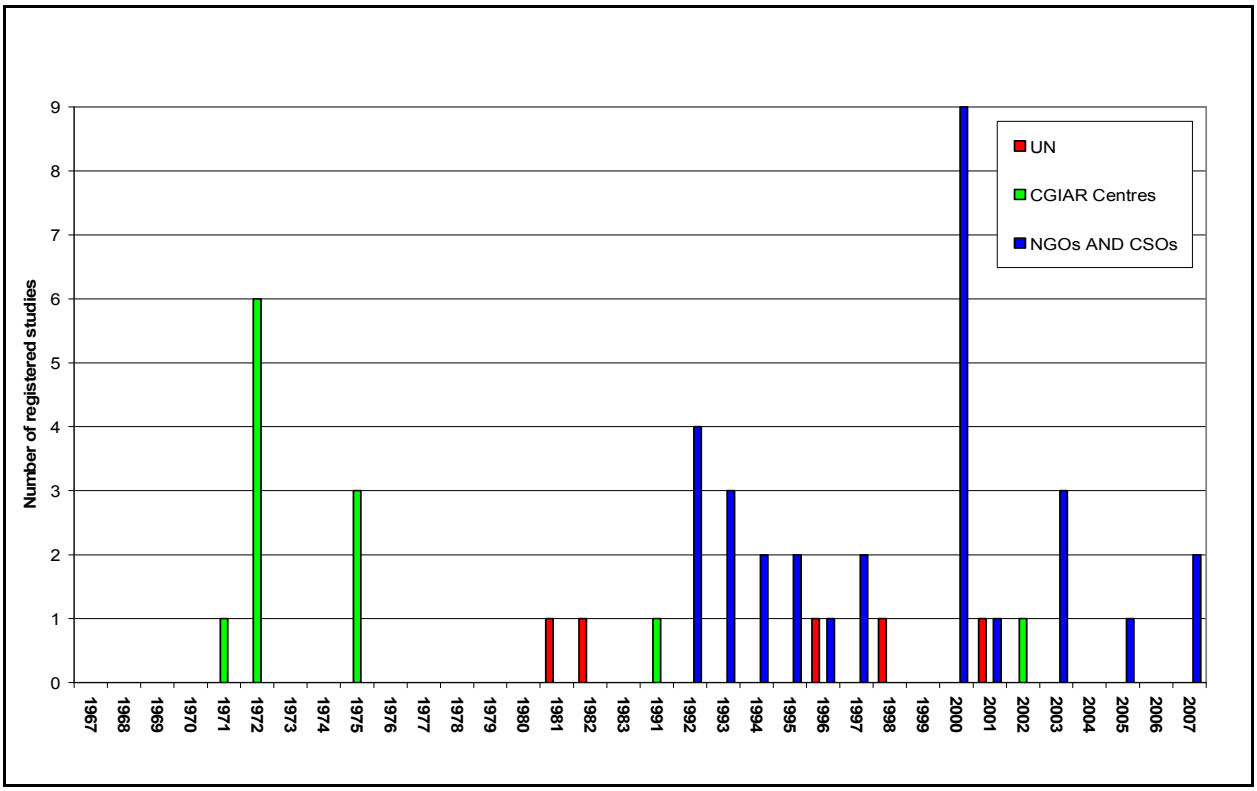



**Figure 15:** *A profile of the trend in environmental research investment by government and other partners in Kenya in 1967-2007*




**(a)** State universities




**(b)** UN agencies, IRCs (CGIAR), NGOs and CSOs

**Figure 16: (a) & (b):** *A profile of the trend in environmental research in various research institutions in 1967-2007*

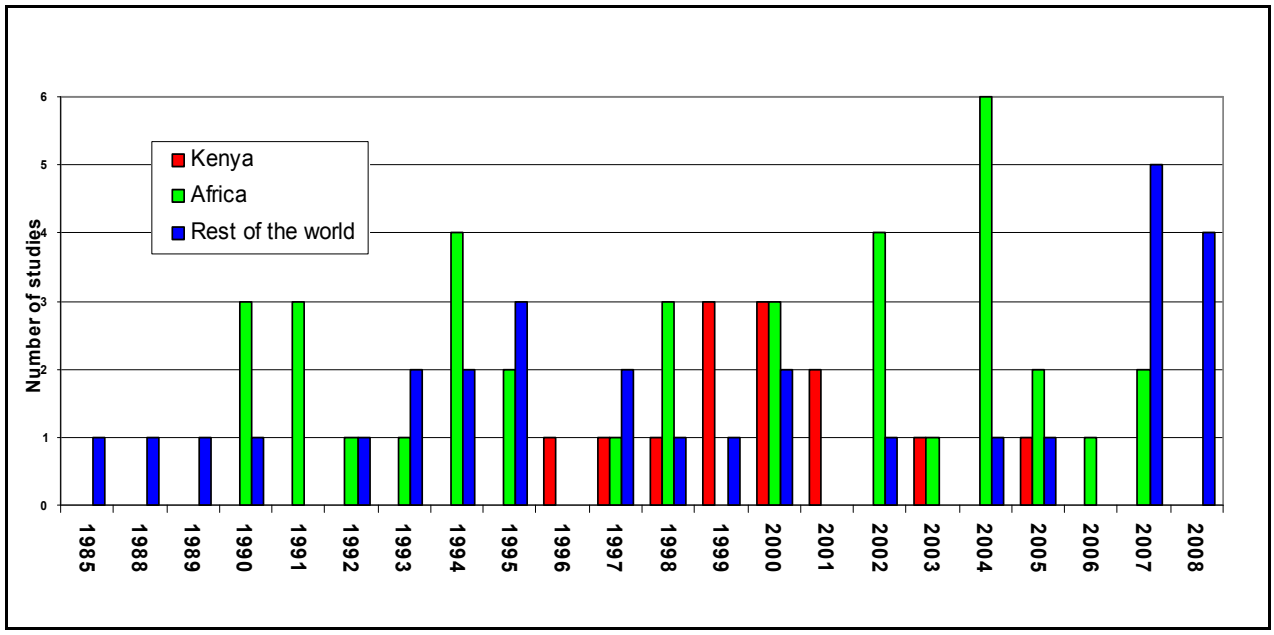
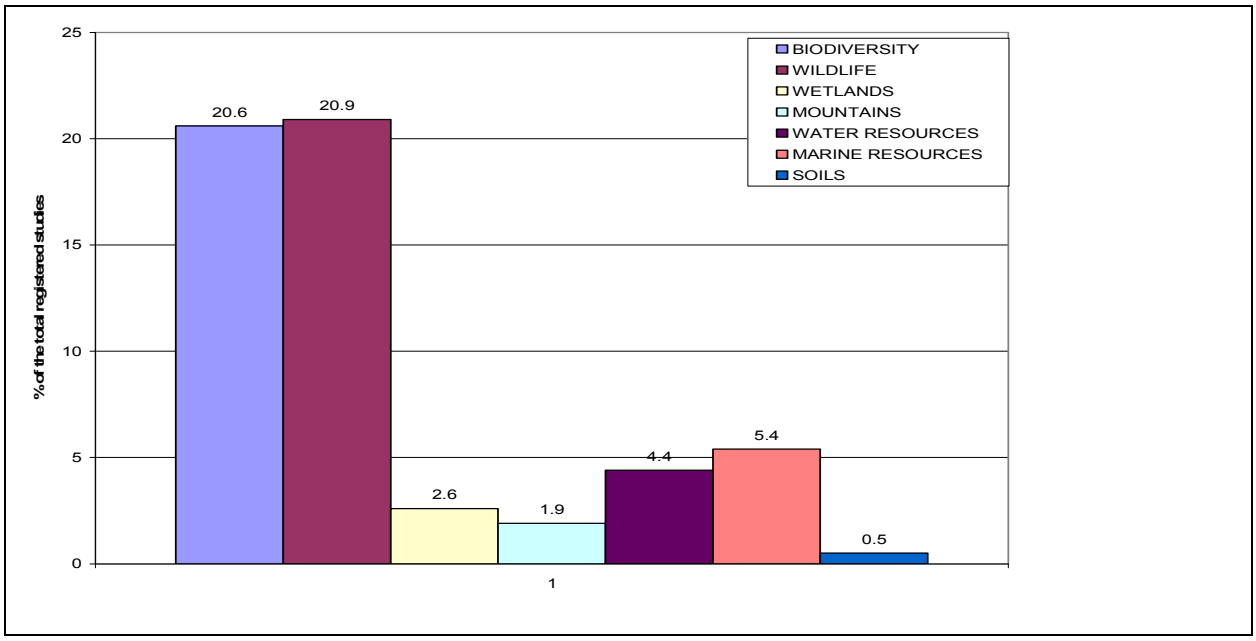



**Figure 17:** *A profile of WAC-ICRAF environmental research in Kenya*

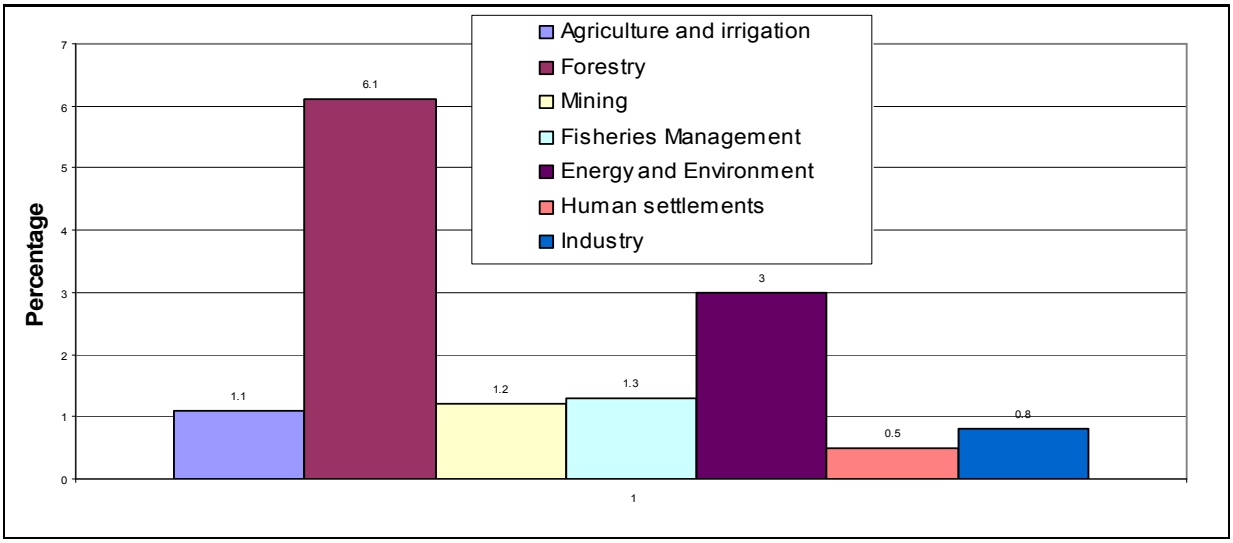
The low key involvement of the IRCs in the country can also be attributed to the lack of a clear Environmental Research Agenda (ERA) which Kenya can use to lobby for increased involvement in local research. However, the international environmental NGOS with country or regional offices in Nairobi such as AWF, WWF, ACTS, and ACC among others have significantly engaged or funded local environmental research.

### 3.4.1: PROPOSED FUTURE FOCUS FOR GOVERNMENT-FUNDED ENVIRONMENTAL RESEARCH

The previous focus of government-supported environmental research in Kenya shows that most research has concentrated on the biological environment with over 40% of the past environmental studies concentrating on biodiversity especially wildlife issues and about 10% focusing on ecosystems especially wetlands, mountains and coastal areas. About 5% of the research has considered land, soil and water while the remainder on human-environment interactions and impacts (Figure 18).




(a) Natural & physical environment




**(b)** Human environment

**Figure 18 (a) & (b):** *A summary of the core areas of focus for environmental research in Kenya (1967-2007)*

## 3.5 DECISION CRITERIA FOR THE ENVIRONMENTAL RESEARCH AGENDA

The decision criteria for identification and selection of research interventions in Chapter IV are based upon the gap analysis undertaken on previous environmental research in Kenya against the unconsidered needs for sustainable environmental management in the country. The decision criteria

was informed by literature review and also by the sectoral institutional consultations undertaken during the ERA process which generated a wide range of issues in the national environmental management institutions which are yet to be informed by scientific research. Most importantly, the decision criteria are based on the lessons learnt from the review and analysis of the environmental research. The focus of environmental research in Kenya is systematically detailed in Chapter 4 which constitutes the core of the ERA.

# CHAPTER FOUR: THE NATIONAL ENVIRONMENTAL RESEARCH AGENDA (2008-2030)

## 4.1: VISION FOR THE ENVIRONMENTAL RESEARCH AGENDA

The vision for the Environmental Research Agenda is:

"**To promote a clean and healthy environment through demand-driven environmental research for sustainable development in Kenya"**

### 4.1.1: DOCUMENTS SUPPORTING THE VISION OF ENVIRONMENTAL RESEARCH AGENDA

The vision for the ERA stated above is mainly guided internally by the Environmental Management and Coordination Act (EMCA) 1999, the National Environmental Action Plans (NEAP) frameworks, NEMA Strategic Plan 2008-2012, the Draft National Environment Policy, Kenya Vision 2030, and externally by MDGs as explained below:-.

#### 1. Environmental Management and Coordination Act (EMCA) 1999

Section 9 (2) of the Environmental Management and Coordination Act (EMCA) 1999 empowers NEMA to undertake, among others, the following activities which have an environmental research dimension as outlined in EMCA, 1999 are:-

(a) coordinate the various environmental research activities being undertaken by environmental lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects with a view of ensuring proper management and rational utilization of environmental resources,

(b) take stock of the natural resources in Kenya and their utilization and conservation;

(d) examine landuse patterns to determine their impact on the quality and quantity of natural resources, and

(e) carry out surveys which will assist in the proper management and conservation of the environment.

(h) undertake and coordinate research, investigation and surveys in the field of environment and collect, collate and disseminate information about the findings of such research, investigation or surveys

## 2. The National Environment Action Plan Framework

The Environment Management Coordination Act (EMCA) 1999 provides for the formulation of the National, Provincial and District Environment Action Plans (NEAPs, PEAPs and DEAPs) every five years. The current National Environment Action Plan (NEAP 2009) is the second for the country after succeeding the first NEAP of 1994. The NEAP highlights priority theme areas and activities for the country towards achieving sustainable development. NEAP preparation and implementation is guided by national priorities as contained in major policy documents including the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC), the National Development Plans and the Districts Development Plans. The objective of these NEAPs is to integrate environmental concerns in development planning and implementation. The ERA has integrated the key research interventions identified in the NEAP (2009) as part of the priority activities to be undertaken in the next five years. This will enable the ERA to serve as a legally binding agenda in respect to the current and subsequent NEAP frameworks.

## 3. NEMA Strategic Plan 2008-2012

The ERA is aligned to the NEMA Strategic Plan 2008-2012 which has highlighted the key research considerations of EMCA (1999) as follows:-

a) Taking stock of the natural resources in Kenya and their utilization and conservation,
b) Establishing and reviewing in consultation with relevant lead agencies, landuse guidelines,
c) Examining land use patterns to determine their impact on the quality of natural resources,
d) Carrying out surveys which will assist in the proper management and conservation of the environment, and
e) Undertaking and coordinating research, investigations and surveys in the field of environment and collecting and disseminating information about the findings of such research, investigations and surveys.

## 4. The Draft National Environment Policy

The government of Kenya has formulated a wide range of policies for sustainable management and conservation of the environment and natural resources. There is a Sessional Paper No. 6 (1999) on Environment and Development and a draft environmental policy, which ERA has made reference to.

## 5. Kenya Vision 2030

The overall aim of Vision 2030 is to ensure a nation that has a clean, secure and sustainable environment by 2030 (GoK 2007a). Vision 2030 proposes intensified application of Science, Technology and Innovation (STI) to raise productivity and efficiency levels across the economic, social and political pillars of national development. It recognizes the critical role played by research and development (R&D) in accelerating economic development in all the newly industrializing countries of the world.

The immediate goals for 2012 as outlined in the First Medium Term Plan (2008-2012) include: (i) increasing forest cover from less than 3% at present to 4%; and (ii) lessening by half all environment-related diseases (iii) securing wildlife corridors and migratory routes (iv) devolving a national land use master plan (v) formulating waste management systems (vi) improving water resources management (viii) establishing a national disaster management programme (viii) dealing with the problem of invasive species and (ix) promoting trade in environmental services (GoK 2007b).

## 6. Millennium Development Goals

The Kenya Government endorsed the Millennium Declaration at the Millennium Summit in September 2000. The vision and mission of the ERA is, therefore, externally guided by the desire to meet the UN Millennium Development Goals (MDGs) by the year 2015. The Millennium Development Goals represent a renewed global effort around: (1) eradicating extreme poverty and hunger; (2) achieving universal primary education; (3) promoting gender equality and empowering women, (4) reducing child mortality; (5) improving maternal health; (6) combating HIV/AIDS, malaria and other diseases; (7) ensuring environmental sustainability; and (8) developing a global partnership for development. The MDGs goals build on, and contribute to, on-going national frameworks, initiatives and processes such as the Kenya Vision 2030. Goal 7 of the MDGs is centred on environment as shown in Box 2.

**Box 3:** MDG7 - Environmental Sustainability

**Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources**

25. Proportion of land area covered by forest
26. Ratio of area protected to maintain biological diversity to surface area
27. Energy use (kg oil equivalent) per $1 GDP (PPP)
28. Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons)
29. Proportion of population using solid fuels

**Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation**

30. Proportion of population with sustainable access to an improved water source, urban and rural
31. Proportion of population with access to improved sanitation, urban and rural

**Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers**

32. Proportion of households with access to secure tenure

**UNDP (2005)**

Millennium Development Goal 7 (MDG7) focuses on environmental priorities related to sustainable development and poverty reduction. MDG7 includes three targets and eight indicators for monitoring the status of forest cover, biodiversity protection, energy use, emissions of $CO_2$ and consumption of Ozone Depleting Substances (ODS), use of solid fuels, access to safe drinking water and sanitation systems, and access to secure tenure. These targets require adequate environmental research in order to identify appropriate technologies and other solutions.

## 4.2: THEORETICAL AND CONCEPTUAL FRAMEWORK

The overall aim of the ERA is to ensure environmental sustainability in Kenya in accordance to the spirit of Agenda 21; the Programmes of Action (PoA) of the World Summits for Sustainable Development (WSSDs); and the Programmes of Action (POA) for various Conferences of Parties

(COPs) to the major Multilateral Environmental Agreements (MEAs) to which Kenya is a party. Figure 19 shows the theoretical and conceptual framework for the ERA.

The framework shows that the ERA was generated from key national documents which offer upstream guidance for environmental management in the world including Kenya. The key backbone documents for the ERA included the Millennium Ecosystem Assessment (MA), Kenya Vision 2030, the Draft National Environment Policy, the Environmental Management and Coordination Act (EMCA 1999), the National Environmental Action Plan NEAP (2009), the National Biodoversity Strategy and Action Plan (NBSAP), NEMA Strategic Plans and the UN-MDGs. The global MA, and national State of Environment (SoE) reports and feedback from institutional consultations undertaken during the ERA process also informed ERA. The ERA was mainly conceived in terms of research gaps that must be addressed in future environmental research in Kenya in order to strengthen the process of environmental management in the country. The research gaps therefore constitute the backbone of the ERA implementation matrix.

It is expected that the ERA outputs will inform and provide regulated and purposive direction to the Environmental Research Service Providers (ERSPs) in terms of the key areas focus for upcoming research activities in the country. By using the ERA, ERSPs should be able to generate demand-driven environmental knowledge and technology, which can inform government policy on environmental management. Such knowledge, new technology and guidelines for better environmental practice, should also enhance the quality of enforcement for EMCA (1999) including the formulation of more science-driven EMCA regulations. The outputs of the ERA are expected to trickle down to the Provincial and District Environmental Committees (PECs and DECs) to guide the environmental management in a scientific way. Figure 19 shows that the ERA is ultimately intended to influence the state of environment through better environmental management by government as well as better environmental practices by the society. The conceptual design of the framework for the current and future ERAs will mainly be informed by the state of all sectors of environment in the country as shown in Figure 19.

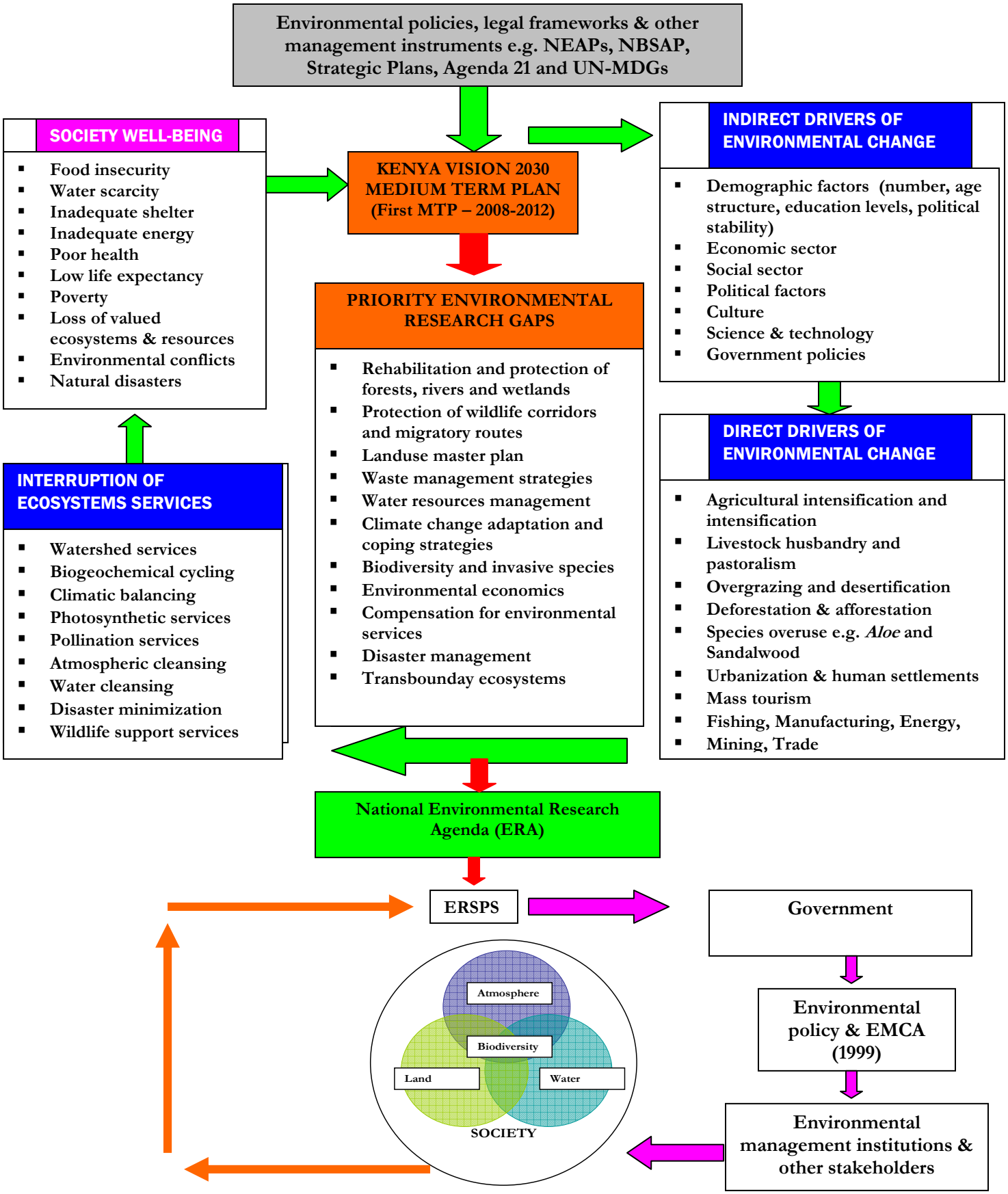



**Figure 19:** *The Theoretical and Conceptual Framework for the Environmental Research Agenda*

## 4.3: STRATEGIC GOAL

The Strategic Goal of the ERA is aligned to Goal 2 of the NEMA Strategic Plan (2008-2012) for the EP&RC Department which is:-

"**Ensuring effective coordination of environmental research in Kenya**"

## 4.4: SUPPORTING OBJECTIVES AND PRINCIPLES

The following four supporting objectives and corresponding principles will sustain the Strategic Goal:-

**Objective 1**: To provide timely and authoritative direction to environmental research.

This is mainly about having input to the government science direction, strategic priorities, and funding allocation. It is also about partnering with Environmental Research Service Providers (ERSRS). This objective recognizes the key role which NEMA should play in coordinating environmental research in Kenya. The principles to support this objective are:

- Prioritizing research according to national needs,
- Avoiding duplication of research efforts, and
- Ensuring that NEMA plays a leadership role in coordinating environmental research

**Objective 2**: To catalyze and enhance science delivery, environmental research, capacity, and research targeting.

This objective focuses on ensuring an enabling environment for environmental research including smooth communication with the ERSPs. The principles to support this objective are:

- Developing a strategy for prioritizing of research according to NEMA's needs,
- Ensuring communication with ERSPs,
- Determining the research capacity needs of the ERSPs,
- Providing a mechanism for greater institutional interaction and cross-sectoral collaboration, and
- Using the ERA as an instrument for resources mobilization and allocation

**Objective 3**: To promote scientific research uptake and implementation.

This objective focuses on ensuring that scientific outputs are useful to NEMA and other environmental lead agencies and that environmental research results are applied in a timely manner. The principles to support this objective are:

- Ensuring delivery of research outputs that can be applied for operationalization of EMCA, 1999 and its subsidiary legislations,
- Ensuring timely application of research outputs by various entities,
- Promoting effective two-way communication between science and policy within government, private sector and civil society, and
- Providing a mechanism to attract central government funding for environmental research.

**Objective 4**: To ensure research feedback and updating.

This objective is about providing processes for governance and keeping the ERA alive and regularly updated. The principles to support this objective are:

- Disseminating the ERA to the end users,
- Providing a strategy for periodic review and update of the ERA, and
- Developing a feed back mechanism for the ERA.

## 4.5: ROLE OF NEMA IN THE ENVIRONMENTAL RESEARCH AGENDA

Successful implementation of ERA will largely depend on how well the proposed governance structures will be coordinated. Figure 20 proposes the governance structure that reflects the two-way communication to and from the highest decision making organ (NEC) to various environmental institutions that form the foundation of this structure through their environmental research information input. The Government of Kenya has established public and research institutions that are mandated to carry out research in a variety of areas of environmental concern. These include public universities and National Research Institutions (NRIs) such as KARI, KEFRI, KEMRI, and KIRDI, and KEPHIS. Additional to these are non-governmental institutions including the International Research Centres (IRCs) such as ICRAF, ILRI, and ICIPE; UN agencies and environmental NGOS such as IUCN, WWF, AWF and ACC which can support environmental research in the country.

The implementation structure consist of:- (**a**) the National Environment Council (NEC), (**b**) NEMA Board of Management, (**c**) NEMA Management, (**d**) Director, Environmental Planning and Research Coordination (EP&RC) Department and (**e**) a National Environmental Research Steering Committee (NERSC) to be coordinated under the Department Environmental Planning and Research Coordination. The NERSC will be directly responsible for the implementation, monitoring and evaluation of the ERA. Roles and responsibilities for each committee in environmental research are elaborated as follows:

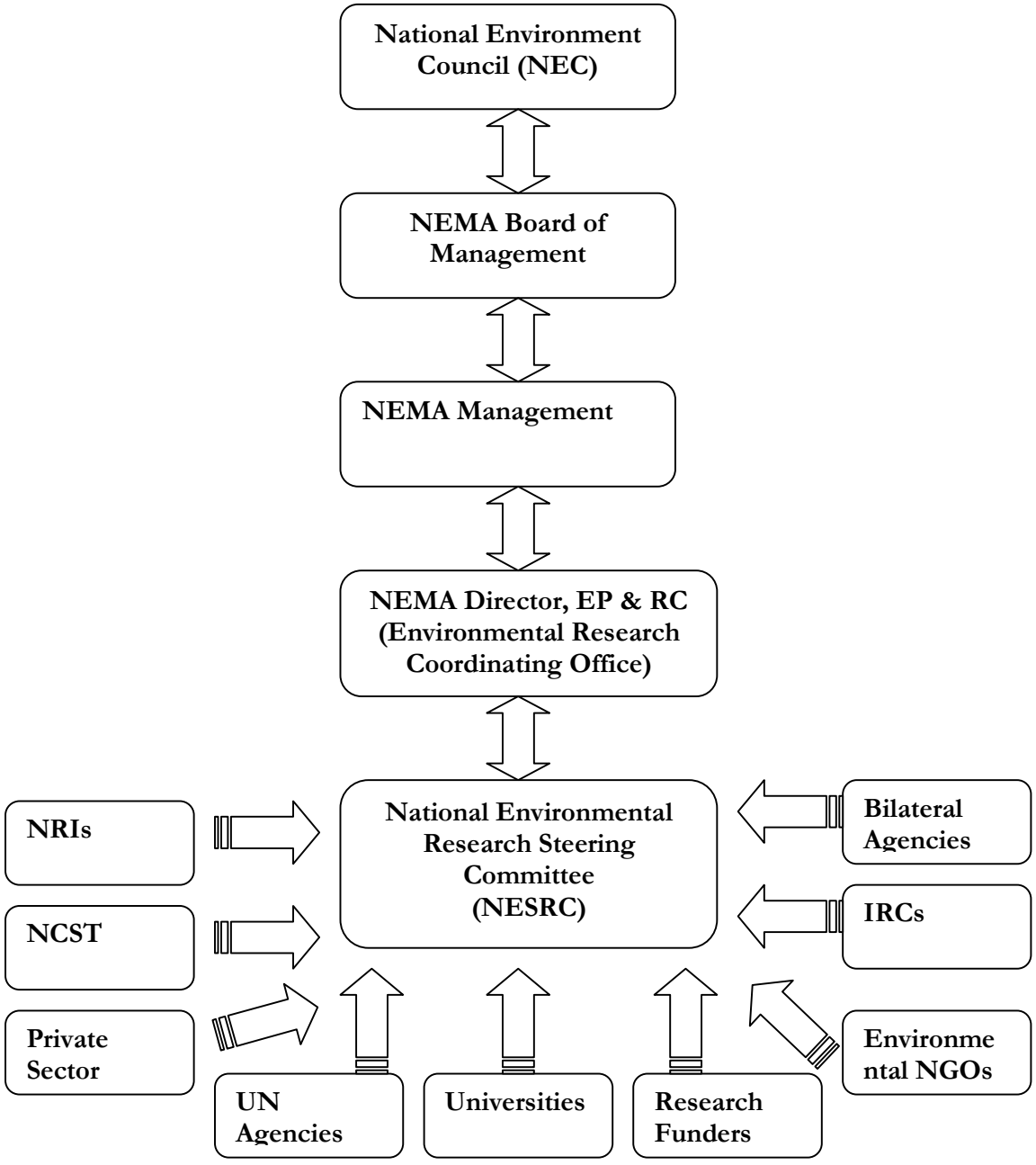



**Figure 20:** *Structure for Implementation of the Environment Research Agenda (ERA)*

### i) National Environment Council (NEC)

The National Environment Council is established under Part III Section 4 of EMCA, 1999. It is chaired by the Minister of Environment and Mineral Resources and membership drawn from Permanent Secretaries representing ministries specified in the First Schedule of EMCA, 1999; two representatives of public universities; two representatives of specialized research institutions; three representatives of the business community; two representatives of NGOs active in the environmental field and the NEMA Director-General who is the Secretary.

The NEC will therefore provide top leadership in NEMA for the implementation of the ERA. The recommended functions of NEC in the ERA are as follows:-

a) Policy formulation and direction setting,
b) Promoting institutional and cross-sectoral collaboration, and
c) Performing such other functions as are assigned under EMCA, 1999.

### ii) NEMA Board of Management

The NEMA Board of Management is composed of a Chairman, Permanent Secretary (Ministry of Environment and Mineral Resources), NEMA Director-General, three (3) Directors and seven (7) members (non public officers). The NEMA Board of Management has several committees, two of which are relevant for the ERA. These are:- (a) Research, Planning and Development Committee and (b) Finance and Establishment Committee. The committees will work hand in hand in the implementation of the ERA. The overall functions of NEMA Board of Management in the ERA are as follows:-

a) Giving policy and strategic direction for ERA,
b) Responsible for the overall implementation of the ERA,
c) Receiving recommendations on the ERA from the Research, Planning and Development and Finance and Establishment Committees for adoption and implementation, and
d) Vetting NEMAs annual targets and work plans for the ERA,
e) Ensuring resource allocation for ERA implementation, monitoring and evaluation, and
f) Making recommendations on the strategic areas of environmental research to the NEC

### iii) NEMA Management

NEMA Management is composed of a Chairman, who is the Director General and all Directors i.e. (**a**) Director, Finance and Administration, (**b**) Director, Compliance and Enforcement (**c**) Director, Environmental Planning and Research Coordination, (**d**) Director, Environmental Education, Information and Public Participation and (**e**) Director, Legal Service Department. Each of the five departments plays an integral role in realizing the overall mandate of the Authority, and in particular, interlinking departmental functions to provide a regulated and purposive direction to the environmental management in the country. The NEMA regulatory framework (Figure 21) outlines departmental roles in the ERA process to enhance the quality of enforcement for EMCA (1999) including the formulation of science-driven regulations and standards identified in the gap analysis.

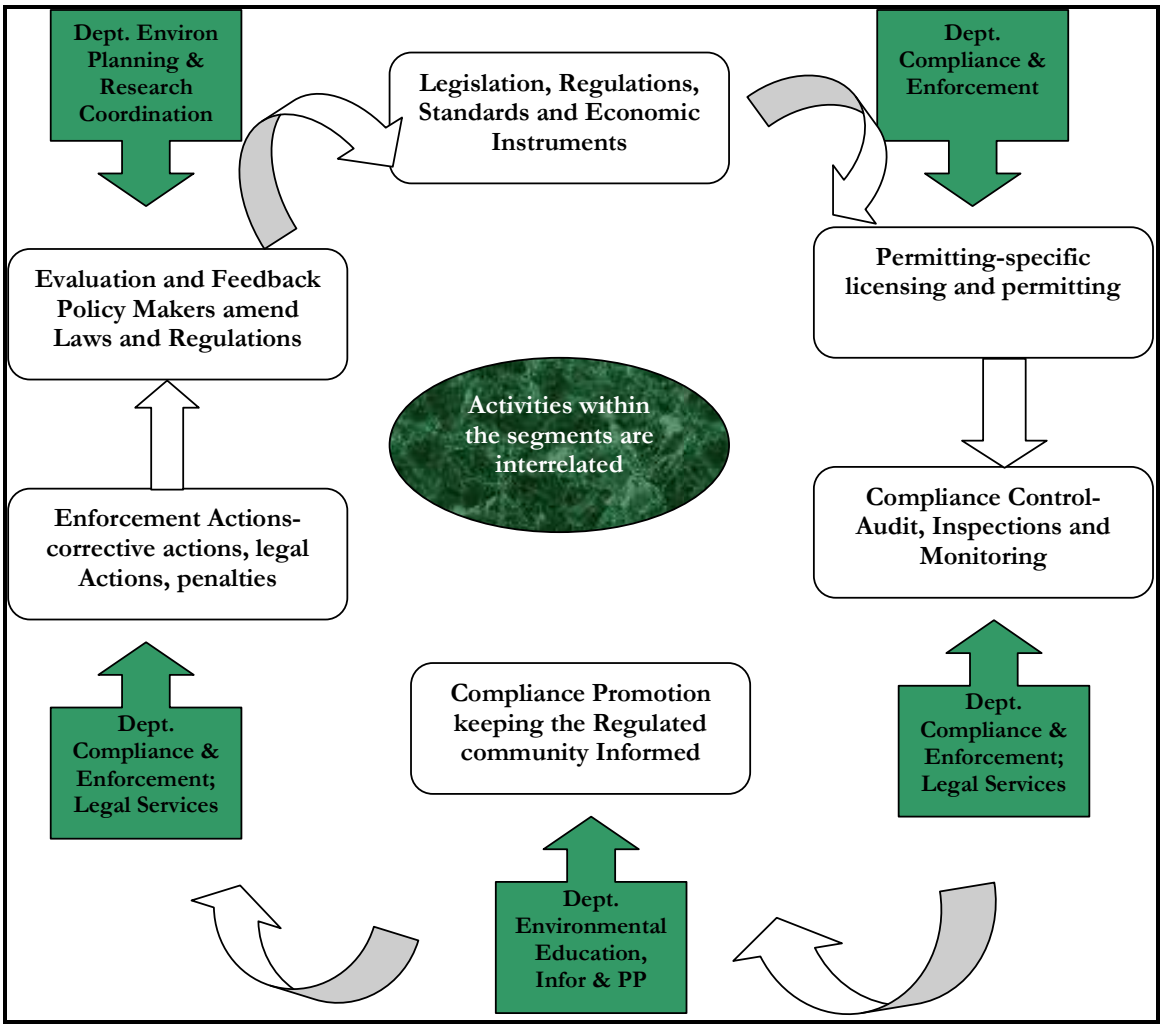



**Figure 21:** *The NEMA environmental regulatory cycle*

The overall functions of NEMA Management in the ERA are as follows:-

i) Incorporating ERA into annual targets and work plans,
ii) Responsible for the overall implementation of the ERA allocating departmental roles
iii) Ensuring resource allocation for ERA implementation, monitoring and evaluation
iv) Making recommendations on ERA to be presented to the Research, Planning and Development and Finance and Establishment Committees for adoption and implementation, and
v) Making recommendations on the priority environmental research areas to the NEMA Board of Management

**iv) Department of Environmental Planning and Research Coordination**

**The Environmental Research Coordination Office** will be established in the Department to coordinate the implementation of the ERA. The Director, EP&RC Department will be responsible for ensuring that the department undertakes its mandate for the implementation of the ERA. The Director will also chair the National Environmental Research Steering Committee (NERSC). Functions of EP&RC in the ERA are as follows:-

a) Annual prioritization of the ERA interventions according to the prioritization strategy
b) Communicating feedback on environmental priority areas to NEMA and NERSC
c) Coordinate preparation and implementation of annual ERA action plans in consultation with all departments
d) Informing the NEMA Board of Management on the strategic areas of environmental research,
e) Undertaking and co-coordinating research, investigation and surveys in the field of environment and collecting, collating and disseminating information about the findings of such research, investigation or survey

Figure 22 shows the annual prioritization process of the ERA interventions to ensure that research efforts are focused, timely and most relevant to the dynamic nature of environmental research in the country. Research prioritization will also enhance resource allocation for the most critical areas identified at all levels.

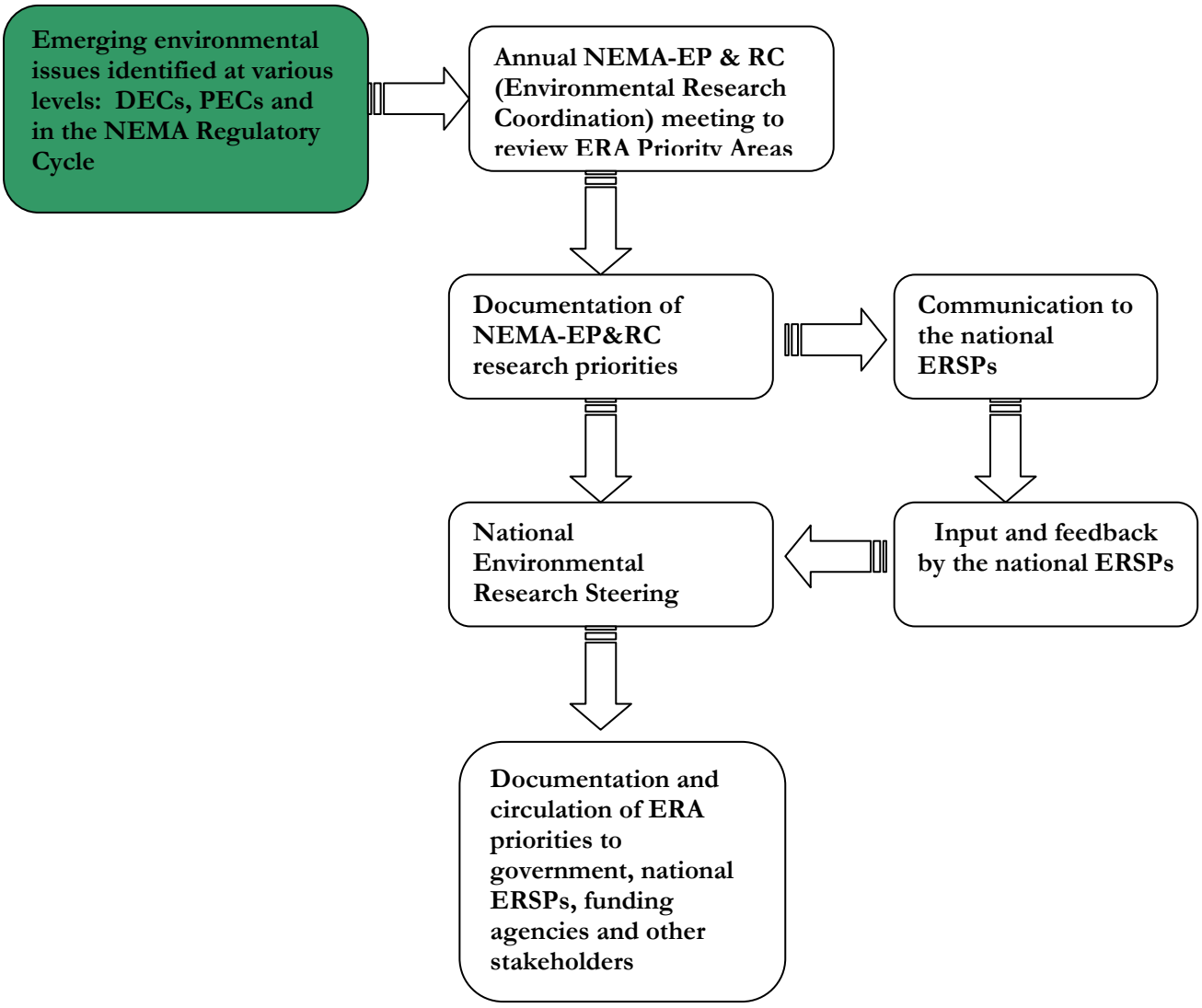



**Figure 22:** *NEMA Research prioritization flowchart at various levels*

The Department of Environmental Planning & Research Coordination will play a major role in reviewing the research priority setting in the ERA as they are exposed to the latest environmental research challenges in the country and will therefore understand what is required, especially in the short term. An annual research prioritization meeting will be necessary for the EP&RC Department to identify areas of environmental research that will need attention in the short, medium and long term according to the ERA timeframe. It is anticipated that Environmental Research Service Providers (ERSPs) will have significant input in the research prioritization meetings through the National Environmental Steering Committee (NERSC).

The NEMA research priorities need to be communicated both to internal and external audiences particularly the NEMA Board of Management and the National Environmental Council, but also key local and international research providers to assist them with their strategic planning process. It will be necessary to prepare a high level ERA message each financial year to be presented to the government in order for the research priorities to be captured at national policy and planning.

**v) National Environmental Research Steering Committee (NERSC)**

The NERSC will be established and coordinated in the Department of Environmental Planning and Research Coordination. The NERSC will be a multi-stakeholder organ whose membership is proposed to consist of the following:

1. NEMA – The Chair
2. National Council of Science and Technology (NCST)
3. Public universities – 2 members (rotating)
4. Private universities – 1 member (rotating)
5. NRIs – 2 members (rotating)
6. IRCs - 1 member (rotating)
7. UN-Agencies – UNEP
8. Environmental NGOs - 2 members (rotating)
9. Private Sector: Kenya Association of Manufacturers and/or Kenya Private Sector Association
10. Bilateral agencies - 2 members (rotating)

The specific mandate of the NERSC is as follows:

a) Making recommendations and informing the EP&RC department on the strategic areas of environmental research,
b) Regular prioritization of the ERA research interventions according to the prioritization strategy
c) Budgeting for the national environmental research interventions,
d) Soliciting of research funding both locally and internationally,
e) Vetting proposals and commissioning environmental research projects, and
f) Co-ordinating research as well as managing and disseminating the environmental research findings

## 4.6: ENVIRONMENTAL INFORMATION MANAGEMENT STRATEGY

The ERA is expected to generate a wide range of vital environmental information which should eventually inform policy and regulatory enforcement in many different institutions that deal with environment. The ERA through the NERSC will establish a well structured Environmental Information Management System (EIMS) for information sharing. It is recommended that a National Environmental Information Centre (NEIC) be established within the EP&RC Department. The proposed structure of the EIMS for the ERA is shown in Figure 23.

The objectives of the EIMS include the following:-

a) Facilitating the acquisition, absorption and communication of environmental knowledge and information,
b) Promoting environment information integration and synergism,
c) Promoting exchange of environmental information and eliminate duplication and overlap,
d) Facilitating the transfer of research findings and environmental information from the ERSPS to a national information hub within NEMA, and
e) Enhancing means of information dissemination including publishing and on-line services.

The EIMS is expected to benefit immensely from the recently established Kenya Environmental Information Network (KEIN) as shown in Figure 23. KEIN is a multi-stakeholder capacity building process that aims to harness and improve access to information and knowledge to support the management of Kenya environment resources as assets of sustainable development. The National Environmental Information Centre (NEIC) in the EP&RC Department will provide linkage to KEIN.

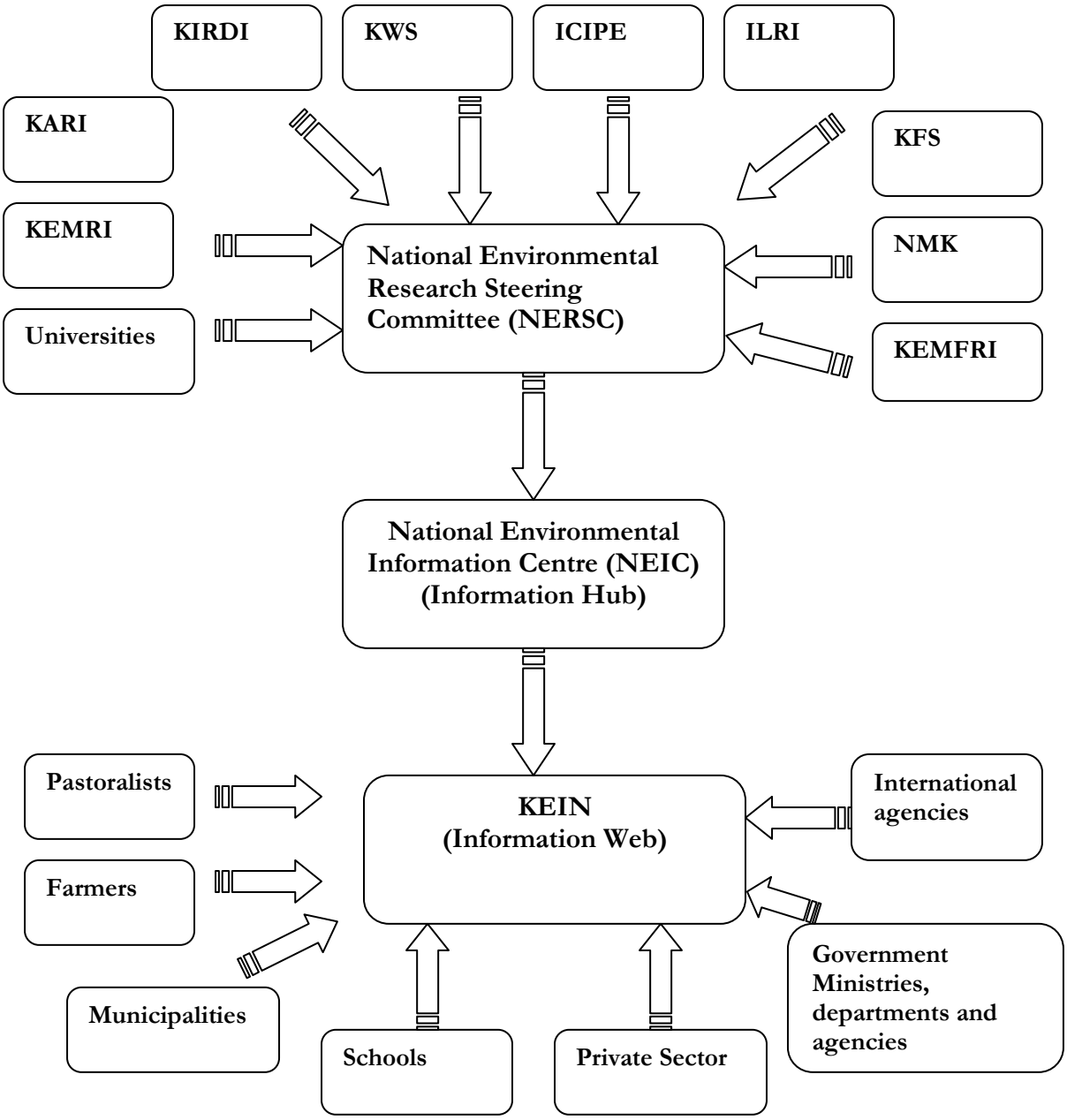



**Figure 23:** *The proposed Environmental Information Management System for ERA*

## 4.7: FUNDING MOBILIZATION STRATEGY

Resources mobilization for the ERA will entail proposal development for funding. This will be a core function of the Environmental Research Coordination Office, under the department of EP&RC that will network with the NERSC and other stakeholders in order to develop joint proposals for funding

in addition to networking with development partners to market proposals. Some of the key windows for the funding of the ERA are summarized below:-

**a) Government Funding**

The ERA should qualify for exchequer funding as NEMA is an integral institution of the government in the implementation of Kenya Vision 2030 including the First Medium Term Plan (2008-2012) as well as the NEAP (2009). Collaboration with other national research institutions in terms of cost sharing and cost effectiveness is crucial in this endeavor.

**b) The National Environment Trust Fund (NETFUND)**

The EMCA (1999) established the NETFUND in Part III section 24 (1). The key function of the NETFUND is resource mobilization to facilitate research intended to further the requirements of environmental management, capacity building, environmental awards, environmental publications, scholarships and grants. NEC and the NEMA Board of Management should explore ways in which the NETFUND could support the implementation of ERA.

**c) UN Agencies, other Organizations and International Processes**

This involves the development bankable research proposals for funding on the one hand and sourcing and identification of funding partners within and among the bilateral and multilateral aid agencies, UN agencies such as UNEP, UNDP, UNCTAD, UNFPA and other international offices such as MEAs Secretariat, Commission on Sustainable Development (CSD), World Bank, World Trade Organization (WTO), Food and Agriculture Organization (FAO), World Health Organization (WHO), International Fund for Agricultural Development (IFAD), and environmental NGOs. International processes such as the United Nations General Assembly (UNGA) can also be considered in the funding of studies relevant to the process.

**d) Public-Private Partnerships**

The NERSC will explore ways in which public-private partnerships can be used to support the implementation of the ERA. This can be accomplished through short-term, medium-term and long-term MOUs with individual industries and companies or business associations such as the Kenya Association of Manufacturers (KAM) and Kenya Private Sector Association (KEPSA). Some of the potential entry points for PPPs entry points could include integration and mainstreaming of business

and private sector operations with government operations in the broad area of economics of environmental policy, and use of private sector surpluses (profits) for environmental improvements.

**e) Regional Networking**

The ERA can easily be integrated into the regional research programs through which an additional window for funding can be established. Some of the on-going research programs which could be considered in order to absorb some of the ERA research interventions are highlighted below:-

**i) Lake Victoria Research Initiative (VicRes)**

VicRes is a regional research initiative that offers research grants in various disciplines related to promotion of poverty eradication and sustainable livelihood and natural resources management within the Lake Victoria Basin. It is a unique window for supporting inter- and multi-disciplinary research that would contribute towards poverty reduction and environmental restoration in the Lake Victoria Basin. VicRes was established in 2002 through a series of consultations involving academics, researchers and stakeholders drawn from universities and research organizations in East Africa, and Sida/SAREC. It is funded by Sida/SAREC.

**ii) Western Indian Ocean Marine Science Association (WIOMSA)**

The Western Indian Ocean Marine Science Association (WIOMSA) promotes the educational, scientific and technological development of all aspects of marine sciences throughout the Western Indian Ocean region with a view toward sustaining the use and conservation of the marine environment and oceanic resources. WIOMSA provides research grants for studies in the coastal environment on regular basis.

**iii) Horn of Africa Regional Environmental Network (HoA-REN)**

HoA-REN is a network of members and partners consisting of environmental CBOs, NGOs and higher learning institutes from the six countries in the Horn of Africa, namely Djibouti, Eritrea, Ethiopia, Kenya, Somalia and Sudan. Members of the network are endogenous civil society organizations and higher learning and research institutes. Partners of the network consist mainly of non-endogenous (international) organizations working on environmental issues in the region. The network promotes intensive cooperation among and exchange of

information and experiences between endogenous NGOs, CBOs, research institutions and universities in The Horn of Africa. In addition HoA-REN also partners with government bodies, businesses and international organizations to achieve an optimal impact on the ground. The Horn of Africa Regional Environment Centre in Addis Ababa serves on the one hand as the secretariat for the Network, and on the other hand it facilitates and supports cooperation between member organizations and other environmental actors, including private sector and government.

**iv) Other Partnerships and Processes**

Other frameworks which can be considered including the East African Community (EAC), Inter-Governmental Authority on Development (IGAD), Common Market for Eastern and Southern Africa (COMESA), African Union (AU) COMESA, AU, and NEPAD among others.

## 4.8: STRATEGIC RESEARCH OBJECTIVES

Eight Strategic Research Objectives (SROs) were derived from the following core research themes from the Kenya Vision 2030 including the First Medium Term Plan (2008-2012), key sectors of environment, key emerging issues in the environment domain, as well as stakeholders' recommendations during the consultative workshops.

- Climate change adaptation and coping strategies,
- Environmental economics,
- Biodiversity conservation and management of invasive species,
- Indigenous environmental knowledge,
- Environmental restoration through rehabilitation and conservation of forests, rivers and wetlands among others,
- Water resources management and conservation, ,
- Protection of wildlife corridors and migratory routes,
- Pollution and waste management strategies,
- Disaster management,
- Management of transboundary ecosystems, and
- Environmental governance

The Strategic Research Objectives (SROs) are as follows:-

**SRO1**: To ensure the effective management of the land environment, sustainable resource utilization and enhanced soil conservation,

**SRO2**: To facilitate effective management of water resources and the aquatic environment,

**SRO3**: To support the effective protection of the atmospheric environment,

**SRO4**: To strengthen the conservation of biodiversity and ecosystems,

**SRO5**: To reduce the negative impacts of economic development on environment, promote more effective management of human settlements, urban development, and enhance public health and safety,

**SRO6**: To strengthen information gathering and documentation on indigenous environmental knowledge (IEK) and promote its application in environmental management and conservation,

**SR07**: To promote the appropriate design, development and application for economic instruments and incentive measures, valuation of environment and natural resources accounting for sustainable development, and

**SRO8**: To generate scientific information for effective domestication and localization of MEAs and other international processes with environmental agenda.

## 4.9: IMPLEMENTATION ACTION PLAN FOR THE ENVIRONMENT RESEARCH AGENDA

The action plan prioritizes areas of research interventions, identifies lead institutions and allocates timelines for short-time (0–3 yrs): 2008-2012; medium-term (4-6 yrs): 2013-2020 and long-term (7–12 yrs): 2021 – 2030 for the Strategic Research Objectives

The following matrices summaries the ERA implementation matrix developed based on the existing research needs in Kenya as identified in the comprehensive gap analysis during the ERA process. A list of research partner institutions, in addition to government institutions have been identified for research collaboration at the end of the matrices. In addition, Annex II provides a list of Lead environmental research institutions with a summary of their profile and mandates.

**Table 2:** Implementation Matrix for the Strategic Research Objective on Land Environment

**SRO1: To ensure good management of the land environment, sustainable resource utilization and enhanced soil and water conservation**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 1. Assessment of the impact of climate change on the state of land resources, land cover, landuse and other human activities (VH) | ▪ Reports and maps on land resources future land cover and land use scenarios<br>▪ Reports on the expected natural resource transformations | Public universities, KMD, DRSRS, IMTR, CAN, NEMA, KARI, Ministry of Land, UoN | 2008-2015 (MDG 7-Target 9; NEAP 2009) |
| 2. Assessment of the state of land resources, land use and other human activities (M) | ▪ Land resources and landuse reports | Public universities, KMD, DRSRS, IMTR, CAN, NEMA, KARI, Ministry of Lands | 2008-2015 (MDG 7-Target 9; NEAP 2009) |
| 3. Identification and documentation of climate change adaptation, mitigation measures and coping options for different ecological zones (VH) | ▪ District reports on climate change mitigation and adaptation mechanisms and coping options<br>▪ National communications to UNFCC | Public universities, KMD, DRSRS, IMTR, IGAD–CPAC, CAN, NEMA, UoN | 2008-2012 (NEAP 2009) |
| 4. Environmental assessment of the impact of environmental disasters and risks (H) | ▪ Past and future trends on drought and desertification<br>▪ NEMA guidelines on environmental disaster early warning and response<br>▪ Maps of vulnerable areas, reports on drought and desertification | Public universities, KSS, KARI, DRSRS, KEFRI, IMTR, IGAD – CPAC, NEMA, Ministry of State for Special Programmes & CDM | 2008- 2012 (Vision 2030) |

**Table 2 Cont..**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 5. Develop criteria for identification and strategies for rehabilitation and restoration of degraded land environments (H) | ▪ Criteria for identification of degraded land environments<br>▪ Techniques and methods for rehabilitation of degraded landscapes such as eroded areas and landslide zones<br>▪ Regulations on restoration of degraded landscapes | Public universities, KARI, KSS, DRSRS, Relevant Government Ministries , NEMA, KFS & Department of Mines and Geology | 2008-2015 (MDG 7-Target 9; NEAP 2009) |
| 6. Environmental status assessment and vulnerability analysis of hills and mountains (VH) | ▪ National ecosystem reports<br>▪ Environmental vulnerability indicators<br>▪ District hotspot maps for vulnerable hills and mountains | Public universities, NMK, DRSRS, KEFRI, KFS & KWS, Nature Kenya, KNAS, NEMA, WRMA | 2021-2030 (Vision 2030) |
| 7. Review the existing criteria for identification of ESAs (M) | ▪ Reviewed national criteria for designation of ESAs<br>▪ National guidelines on the management of ESAs | NEMA, universities, DRSRS, KFS, other NRIs | 2008-2015 (MDG 7-Target 9) |
| 8. Develop guidelines on the management of ESAs (H) | ▪ National ESA management guidelines | NEMA, universities, DRSRS, KFS, other NRIs | 2008-2015 (MDG 7-Target 9) |
| 9. Identification, mapping and documentation of environmentally significant landscapes and ESAs (M) | ▪ District checklists and environmental profiles of ESAs<br>▪ National database of ESAs and country ESA report<br>▪ NEMA guidelines on the management of ESAs | Public universities, KEFRI, Nature Kenya, KNAS, NEMA KWS & NMK, | 2008-2015 (MDG 7-Target 9) |
| 10. Identification and mapping of critical wildlife migration corridors, dispersal and buffer areas for protected areas and their management challenges (VH) | ▪ Wildlife migration corridor reports<br>▪ District profiles, SOE reports and site maps<br>▪ National regulations for the protection of sites | Universities, NEMA, KWS, KFS, NMK, KEFRI, WRMA, , DRSRS, KEMFRI, Ministry of Regional Development | 2008-2012 (Vision 2030 First MTP) |

**Table 2 Cont..**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 11. Assessment of the environmental impact of exotic tree species like Eucalyptus to landscapes and landuse (VH) | ▪ National resource economic reports<br>▪ NEMA guidelines on the introduction and management of exotic species<br>▪ Regulations and Guidelines on on-farm tree species | MU, KFS, KEFRI, KARI, KEPHIS, KNAS, Nature Kenya, NEMA | 2021-2030 (Vision 2030) |
| 12. Analysis of the impact of pesticides and toxic substances on land environments and development of national guidelines for pesticide management(H) | ▪ SOE reports and hotspot maps<br>▪ Guidelines/manuals and standards for management of pesticides and toxic substances | Public universities, KEPHIS, KARI, KEBS, KNAS, NEMA, PCPB & POPS Secretariat | 2008-2012 (NEMA-SP, NEAP 2009) |
| 13. Inventorize emerging terrestrial invasive and alien species in different landscapes and ecological zones, and assess their impacts and control mechanisms (VH) | ▪ District inventory reports on terrestrial invasive and alien species<br>▪ National report and district hotspot maps<br>▪ National database and control methods<br>▪ NEMA regulations on the handling of invasive and alien species | Public universities, NMK, KARI, DRSRS, KEFRI, KEPHIS, KWS, KNAS, Nature Kenya, NEMA, KFS | 2008-2012 (NEAP 2009) |
| 14. Undertake research for the development of national landuse guidelines (H) | ▪ National landuse guidelines<br>▪ Reports on socio-economic factors driving land-use<br>▪ Land tenure systems in relation to property rights | Universities, NMK, DRSRS, KEFRI, KWS, Nature Kenya, KNAS, NEMA, Ministry of Lands, Ministry of Agriculture, KARI | 2008-2012 (NEMA-SP) |
| 15. Identification of suitable methods for the rehabilitation of abandoned mines, quarries and sand excavation sites (H) | ▪ Techniques and methods for abandoned mines, quarries and sand excavation sites rehabilitation<br>▪ NEMA regulations on restoration of abandoned mines, quarries and sand excavation sites | Universities, KARI, KSS, KFS, DRSRS, Relevant Government Ministries, NEMA | 2008-2012 (NEAP 2009) |

**Table 2 Cont…**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 16. Assessment of state of environment for important catchments and watersheds (VH) | ▪ District SOE reports<br>▪ National regulations and guidelines on utilization and management of catchment areas and watersheds<br>▪ Criteria and strategies for rehabilitation and restoration of water catchments and watersheds | Public Universities, DRSRS, KWS, KNAS, Nature Kenya, NEMA, MWI, WRMA, KFS, WRMA & KEWI | 2008-2012 (Vision 2030 First MTP; NEAP 2009) |

**Table 3:** Implementation Matrix for the Strategic Research Objective on Marine Environment

**SRO 2: To facilitate effective management of water resources and the aquatic environment**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 1. Assessment of the impact of climate change on the state of aquatic resources and human activities within the aquatic environments (H) | ▪ Environmental modeling reports on future states of aquatic environments<br>▪ Environmental modeling reports on future states of aquatic environments<br>▪ Strategies for adaptations, coping options and/or mitigation | Public universities, KMD, DRSRS, IMTR, CAN, NEMA, Climate Change Secretariat, WRMA, KEMFRI & WRMA, KWS | 2008-2012 (Vision 2030) |
| 2. Identification and documentation of climate change adaptation mechanisms in aquatic environments (VH) | ▪ National report on climate change adaptation mechanisms and coping options | Public universities, KMD, DRSRS, KEMFRI, FoD, IMTR, NEMA, UoN | 2008-2012 (Vision 2030) |

**Table 3 Cont….**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 3. Develop criteria for identification and strategies for rehabilitation and restoration of water catchments and watersheds (VH) | ▪ Techniques and methods for rehabilitation of degraded catchments and watersheds<br>▪ Regulations on rehabilitation of degraded catchments and watersheds | Public universities, JKUAT, NMK, KSS, KARI, KEFRI, KWS, KNAS, Nature Kenya, DRSRS, NEMA, WRMA, KFS | 2008-2012 (NEAP 2009) |
| 4. Assessment of sea level, shoreline, beach and estuarine changes and their environmental impacts (M) | ▪ SoEs<br>▪ Livelihood impact reports | Public universities, DRSRS, KMFRI, DoF, CDA, NEMA | 2008- 012) (NEMA-SP) |
| 5. Assessment of the environmental state of wetlands ecosystems (H) | ▪ State of wetlands reports<br>▪ Wetland specific state of wetland reports<br>▪ Regulations/Guidelines for the management of wetlands in rural and urban areas | KWS, KEMFRI, NMK, DoF, NEMA & WRMA | 2008-2012 (NEAP 2009) |
| 6. Wetlands cover change assessment (VH) | ▪ National wetland cover change report | KWS, KEMFRI, NMK, DoF, NEMA & DRSRS | 2008-2012 (NEAP 2009) |
| 7. Assessment of the levels of thermal pollution in rivers (M) | ▪ Thermal pollution reports<br>▪ National thermal pollution standards, regulations and guidelines<br>▪ NEMA thermal pollution regulations | Public universities, KMFRI, KIRDI, KEBS, KNAS, , NEMA, WARMA & KEWI | 2008-2010 (NEMA-SP; 2008-2012 NEAP 2009) |
| 8. An assessment of the coastal and marine ecosystems within the continental shelf and EEZ of Kenya (M) | ▪ Coastal and marine SoE report | Public universities, KMFRI, NMK, KARI, DRSRS, KEFRI, KWS, KNAS, NEMA (CBD) | 2008-2010 (NEMA-SP) |

**Table 3 Cont…**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 9. Identification of suitable methods for the conservation and rehabilitation of degraded coral and mangrove ecosystems (H) | ▪ Ecosystem restoration methodology report<br>▪ NEMA regulations for the protection of wetlands in rural and urban areas | Public universities, DRSRS, DoF, CDA, NEMA & KEMFRI | 2008-2010 (NEMA-SP) |
| 10. Inventorize emerging aquatic invasive and alien species in different aquatic environments, their ecological impacts and control mechanisms (H) | ▪ District inventory reports on aquatic invasive and alien species<br>▪ District hotspot maps<br>▪ National report and hotspot<br>▪ National database<br>▪ NEMA regulations on the handling of invasive and alien species<br>▪ Control methods<br>▪ Database/Repository | Public universities, KMFRI, KEPHIS, KWS, KNAS, CABI, DRSRS, NEMA, WRMA-KEWI, & NEMA | 2008-2012 (NEAP 2009) |
| 11. Development of ambient water quality standards (H) | ▪ Review of current standards | KEWI, WRMA & KEWI, KEBS | 2008-2030 |
| 12. Research on drinking water technologies (M) | ▪ Guidelines on water treatment | KEWI & WARMA, KIRDI | 2008-2030 |
| 13. Assessment of the state of water quality in rivers and other water sources in relation to the national water quality regulations 2006 (H) | ▪ State of water quality reports<br>▪ Pollution points and sources identified<br>▪ Control strategies/methods identified | Public universities, KARI, KMFRI, KIRDI, KEBS, KNAS, KWAHO, WARMA, KEWI, NEMA | 2008-2010 (NEMA-SP) |

**Table 3 Cont…**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 14. Analysis of the impact of pesticides and toxic substances in aquatic environments (M) | ▪ SoE reports and hotspot maps<br>▪ National regulations for the protection of the aquatic environments including rivers, lakes and coastal areas against environmental pollution<br>▪ Assessment and monitoring reports | Public universities, KARI, KMFRI, KIRDI, KEBS, KNAS, UNEP, NEMA, PCB, WARMA | 2008-2012 (NEMA-SP, NEAP 2009) |
| 15. Assess the effectiveness of waste water treatment technologies (M) | ▪ Guidelines on water treatment | KEWI, WARMA, KIRDI | 2008-2030 |
| 16. Development and identification of biological indicators of water quality (M) | ▪ Suitable biological indicators for national use | KEWI, Ministry of Water, WARMA, NEMA, Fisheries, Public universities, UoN | |
| 17. Environmental assessment of the impacts of introducing alien fish species into aquatic environments (M) | ▪ Environmental impact reports<br>▪ Regulations on the introduction of fish species | KMFRI, Public universities, KNAS, Fisheries Department, NEMA | 2008-2012 (NEMA-SP, NEAP 2009) |
| 18. Development of standards for certification of fish seeds introduced into the aquatic environment (M) | ▪ National standards for certification of fish seeds | KMFRI, KEBS, KNAS, DoF, NEMA | 2008-2010 (NEMA-SP) |
| 19. Assessment of the vulnerability status of aquatic environments (M) | ▪ Biannual district environmental reports<br>▪ Vulnerability hotspot maps | KMFRI, KEBS, KNAS, NEMA | 2008-2012 (NEAP 2009) |
| 20. Environmental impacts of aquaculture (M) | ▪ Impact reports<br>▪ Biannual audit reports<br>▪ Audit action plans | KMFRI, KEBS, KNAS, NEMA | 2021-2030 (Vision 2030) |

**Table 3 Cont…**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 21. Environmental characterization and assessment of bio-economic potential for extreme aquatic environments especially thermal springs and geysers (M) | ▪ Environmental profiles of extreme environments<br>▪ Country report on the economic potential of extremophiles | Public universities, NMK, KEFRI, WRMA, Regional Development Authorities, KWS, DRSRS, KEMRI, FD, Ministry of Energy, KENGEN, UoN | 2021-2030 (Vision 2030) |
| 22. Assessment of pollution status in coastal and marine environments (H) | ▪ Biannual audit reports<br>▪ Audit action plans | Public universities, KMFRI, KWS, NEMA | 2013-2020 (Vision 2030) |
| 23. Undertake an inventory of degraded aquatic environments (H) | ▪ District reports on degraded aquatic areas<br>▪ Hotspot maps<br>▪ Livelihood impact reports | Public universities, NMK, KARI, KMFRI, DRS, KEPHIS, KWS, KNAS, NEMA | 2008-2012 (NEAP 2009) |
| 24. Develop criteria for identification and strategies for rehabilitation and restoration of environmentally degraded aquatic environments (H) | ▪ Inventory of degraded aquatic environments such as stream banks, lakeshores and dams<br>▪ Techniques and methods for rehabilitation of degraded aquatic environments<br>▪ NEMA regulations on degraded aquatic environments | Public universities, NMK, KARI, KMFRI, DRS, KEPHIS, KWS, KNAS, Nature Kenya, WARMA, NEMA, Department of Mines and Geology | 2008-2012 (NEAP 2009) |

**Table 4:** Implementation Matrix for the Strategic Research Objective on Atmosphere

**SRO 3: To support the management of the atmospheric environment and prevention of air pollution**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 1. Modeling the expected climatic change patterns in different ecological zones (H) | ▪ Comprehensive climate change forecast reports for the different ecological zones of Kenya | Public universities, KMD, IMTR, KNAS, NEMA, UoN | 2013-2020 (Vision 2030) |
| 2. Development of climate change indicators for national planning (VH) | ▪ A profile of climate change indicators for Kenya | Public universities, KMD, IMTR, KNAS, NEMA, KFS, UoN | 2008-2012 (Vision 2030) |
| 3. Undertake a survey to establish the level of atmospheric pollution in urban areas around in the country (H) | ▪ National air pollution baseline survey report<br>▪ Pollution hotspot maps<br>▪ NEMA air pollution regulations | Public universities, KIRDI, KEBS, IMTRI, KNAS, NEMA (Climate Change Office), UoN | 2008-2015 (MDG 7, Target 9) |
| 4. An inventory of air pollution and air quality levels in urban and rural environments and key industrial installations (H) | ▪ An inventory of polluting levels in different urban zones<br>▪ Air pollution reports and hotspot maps<br>▪ Characterization of automobile emissions | Public universities, KMD, IMTR, KNAS, NEMA, UoN | 2008-2012 (NEAP 2009) |
| 5. An inventory of sources of ozone depleting substances (M) | ▪ Inventory reports<br>▪ Inventory of ODS sources and hotspots | Public universities, KIRDI, KEBS, KNAS, NEMA, (National ozone office), KMD | 2008-2015 (NEAP 2009); MDG 7, Target 9) |
| 6. Develop mechanisms for domestication of CDM to enhance public participation in the global carbon trade (H) | ▪ CDM schemes and mechanisms for public participation in different ecological zones | Public universities, KMD, IMTR, KNAS, AAS, NEMA, (Climate change office), MEMR | 2008-2015 (MDG 7, Target 9) |

**Table 5:** Implementation Matrix for the Strategic Research Objective on biodiversity and ecosystems

**SRO 4: To strengthen the conservation of biodiversity and ecosystems**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 1. Comprehensive inventory and mapping of country biodiversity profile (H) | ▪ Country biodiversity report<br>▪ A profile of species and their status | Public universities, KARI, DRSRS, KEFRI, KMFRI, KWS, KNAS, KEFRI, KWS, NMK, KFS, NEMA | 2008-2015 (NEAP 2009; MDG 7, Target 9) |
| 2. An inventory and status of the world biodiversity hotspots in Kenya (H) | ▪ Current status of biodiversity hotspots | Public universities, NEMA, KFS, KMFRI, KWS, NMK | 2008-2015 (MDG 7, Target 9) |
| 3. Assess the status of endangered species in the mangroves, coral reefs and other related coastal and marine ecosystems (H) | ▪ Assessment reports | Public universities, NMK, DRSRS, KEFRI, KMFRI, KWS, KNAS, NEMA | 2008-2010 (NEMA-SP) |
| 4. Development and management of guidelines for management of endangered species (VH) | ▪ Review the national biodiversity action plan | NEMA, KWS,NMK, KARI, DRSRS, KEFRI, KMFRI, KWS, NEMA | 2008-2012 |
| 5. Assessment of the impact of climate change on the state of biodiversity and ecosystems (H) | ▪ Reports and maps on future biodiversity and ecosystem change scenarios<br>▪ National report on climate change adaptation mechanisms and coping options | Public universities, DRSRS, IMTR, NEMA, NMK, KMD, KWS | 2008-2012 (Vision 2030) |
| 6. Biotechnology and biosafety studies (H) | ▪ Sectoral biosafety reports<br>▪ National biosafety regulations and guidelines | Public universities, KARI, KEPHIS, KNAS, NCST, UoN | 2013-2020 (Vision 2030) |

**Table 5 Cont….**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 7. Identification and documentation of climate change mitigation, adaptation mechanisms and coping options for different ecosystems (VH) | ▪ National report on climate change adaptation mechanisms and coping options | Public universities, KMD, DRSRS, IMTR, NEMA, UoN | 2013-2020 (Vision 2030) |
| 8. Environmental assessment of the biotechnology sector and potential impact of GMOs on environment (VH) | ▪ National status report on biotech sectors in Kenya such as agro-biotechnology and forestry biotechnology<br>▪ Environmental impact report<br>▪ Environmental Health and Safety<br>▪ National regulations on importation, introduction and management of transgenic crops and GMOs | Public universities, KARI, KEPHIS, ACTS, KNAS, NCST, NEMA, UoN | 2008-2010 (NEMA-SP) |
| 9. An inventory of the state of *ex-situ* biodiversity collections and assessment of the management capacity (H) | ▪ A report on plant species collections in state, communal and private gene banks, seed banks, arboreta, aquaria and botanic gardens<br>▪ A report on animal species in state, communal and private sanctuaries, zoos, aquaria<br>▪ Strategies and mechanisms for more effective conservation of genetic resources | Public universities, NMK, KARI, DRSRS, KEFRI, KMFRI, KWS, KNAS, NEMA | 2013-2020 (Vision 2030) |
| 10. Capacity building for community conservation of threatened species (H) | ▪ Species specific capacity building reports<br>▪ Training manuals for the communities<br>▪ Awareness materials | Public universities, NMK, KARI, DRSRS, KEFRI, KMFRI, KNAS, NEMA, KWS, KFS | 2021-2030 (Vision 2030) |

**Table 5 Cont….**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 11. Identification of suitable strategies for regulating bio-prospecting and curbing bio-piracy (H) | ▪ Reviewed NEMA regulations on bio- prospecting and curbing bio- piracy in place<br>▪ Bioprospecting regulations<br>▪ Regulations for curbing biopiracy | Public universities, KARI, KEPHIS, KNAS, NCST, KIPPRA, NEMA | 2008-2010 (NEMA-SP) |
| 12. Assessment of countrywide status for threatened plant species such as Sandalwood (*Osyris lanceolata*), *Olea* spp and *Brachylaena huillensis* (VH) | ▪ Species status reports<br>▪ Criteria for designation of threatened plant species<br>▪ NEMA regulations for the protection of threatened species | Public universities, NMK, KARI, DRSRS, KEFRI, KMFRI, KWS, KNAS, NEMA, KFS | 2008-2010 (NEMA-SP) |
| 13. Assessment of countrywide status for threatened flora and fauna (H) | ▪ Species status reports<br>▪ Inventory and assessment reports<br>▪ National Strategy for designation and conservation of threatened animal; species | Public universities, KWS, DRSRS, KEFRI, KMFRI, KWS, KNAS, NEMA | 2008-2015 (NEAP 2009; MDG 7, Target 9) |
| 14. Environmental impact of disposal of expired dressed seeds (M) | ▪ Environmental impact report<br>▪ National guidelines on the disposal of expired seeds | Public universities, KARI, KEPHIS, KEBS, Seed companies, Min of Agriculture, NEMA | 2021-2030 (Vision 2030) |
| 15. Develop criteria for identification and management of biological ESAs (H) | ▪ NEMA criteria for identification and designation of ESAs<br>▪ National database of ESAs | Public universities, NMK, KEFRI, KWS, KNAS, Local Authorities, Private Land owners, DRSRS, KFS, NEMA | 2008-2012 (Vision 2030) |

**Table 5 Cont…**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 16. Bioprospecting for industrial products in different ecosystems especially the drylands (M) | ▪ District bioprospecting reports | Public universities, NMK, KARI, KEFRI, KEMRI, KWS, KNAS, NEMA, Ministry of Northern Kenya and other semi-arid Lands, UoN | 2021-2030 (Vision 2030) |
| 17. Identification of appropriate compensation mechanisms for environmental services such as watershed services, environmental cleansing and wildlife support in rural areas (M) | ▪ Compensation mechanisms and schemes reports for different environmental services<br>▪ Livelihood impact reports | Public universities, KIPPRA, KNAS, NEMA, KFS, KWS, NMK, KEFRI, WRMA, Local Authorities, | 2008-2012 (Vision 2030) |
| 18. Assessment of the environmental impact of bio-ethanol plants such as *Jatropha circus* (H) | ▪ Bioprospecting reports | Public universities, NMK, KARI, KEFRI, KWS, KNAS, Ministry of Energy, JKUAT | 2021-2030 (Vision 2030) |
| 19. Propagation of high potential plants e.g. medicinal plants (M) | ▪ Species-specific propagation reports | Public universities, NMK, KARI, KEFRI, KWS, NEMA, KEMRI, Ministry of Agriculture | 2021-2030 (Vision 2030) |
| 20. Assessment of the diversity and abundance of insect pollinators in the key food production districts and ecological zones (M) | ▪ District state of pollinators reports<br>▪ National guidelines on the preservation of agricultural insect pollinators | Public universities, KIPPRA, KNAS, NEMA, KFS, KWS, KEFRI, WRMA, Ministry of Agriculture, UoN, NMK | 2008-2020 (NEAP 2009) |
| 21. Identification and documentation of climate change mitigation, adaptation mechanisms and coping options in rural areas (H) | ▪ National report on climate change mitigation, adaptation mechanisms and coping options | Public universities, KMD, DRSRS, IMTR, NEMA | 2013-2020 (Vision 2030) |

**Table 6:** Implementation Matrix for the Strategic Research Objective on social environment

**SRO 5: To promote more effective management of human settlements and minimize negative impacts on environment and enhance public health and safety.**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 1. Assess the compliance levels of the noise pollution regulations (M) | ▪ Noise pollution regulations<br>▪ Compliance reports | Public universities, KEBS, Local Authorities, NEMA, KIRDI, NCST, KNAS | 2008-2012 (NEMA-SP, NEAP 2009) |
| 2. Assess compliance for the national waste management regulations (VH) | ▪ District waste compliance reports | Public universities, KIRDI, KEBS, NCST, KNAS, Min of Health, Min of Social Services, Provincial Administration, Local authorities, NEMA, WRMA | 2008-2012 (NEMA-SP), (Vision 2030 First MTP) |
| 3. Develop district directories of industrial waste for waste recycling planning (H) | ▪ Directories of industrial waste<br>▪ District waste reports<br>▪ Guidelines on waste transfer stations<br>▪ District waste transfer feasibility reports | Public universities, KIRDI, KEBS, NCST, KNAS, AAS, ACTS, UN-Habitat, Min of Health, Local authorities, KAM, NEMA | 2013-2020 (Vision 2030) |
| 4. Assessing effectiveness of methods and technologies for waste management in the country (e.g. Dandora Dumpsite) (VH) | ▪ Site-specific waste disposal and management reports<br>▪ Guidelines on segregation of waste at source and waste disposal techniques<br>▪ Guideline on waste transfer stations | Public universities, KIRDI, KEBS, NCST, KNAS, Min of Health, Min of Social services, Provincial Administration, Local authorities, KAM, NEMA, JKUAT | 2008-2012 (NEAP 2009, MDG 7, Target 10) |

**Table 6 Cont….**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 5. Assessment of the potential use of organic waste for energy generation (M) | ▪ Feasibility reports<br>▪ National guidelines on use of organic waste | Public universities, KIRDI, KEBS, NCST, KNAS, Min of Health Min of Social services Provincial Administration, Local authorities, KAM, NEMA, Ministry of Energy | 2021-2030 (Vision 2030) |
| 6. Inventory of sources and types of wastes, environmental impacts and management strategies (H) | ▪ District inventory reports<br>▪ District waste impact reports | Public universities, KIRDI, KEBS, NCST, KNAS, KAM, National Cleaner Production Centre, NEMA, Local Authorities | 2008-2012 (NEAP 2009) |
| 7. Environmental impacts of urban and peri-urban agriculture (H) | ▪ Environmental impact reports | Public universities, KARI, NCST, KNAS, Min of Agric, Min of Metropolitan Development, NCC, Relevant NGOs, NEMA, UoN | 2013-2020 (Vision 2030) |
| 8. Impacts of environmental pollution on human health (M) | ▪ District impact reports | Public universities, KEMRI, Min of Public Health and Sanitation. Local authorities, Relevant NGOs, NEMA, DOHSS | 2013-2020 (Vision 2030) |
| 9. Identification, mapping and zoning of environmental disaster hotspots (VH) | ▪ District disaster hotspot maps and reports for different disasters such as landslides, floods, earthquakes, tsunamis, volcanic eruptions | Public universities, NMK, KNAS, Private land owners, Local authorities, Min of Culture and National Heritage, Relevant NGOs, Physical Planners Association of Kenya, NEMA, Relevant NGOs, Metropolitan Ministry, CDM , Ministry of State for Special Programmes | 2008-2010 (NEMA-SP) |

**Table 6 Cont…**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 10. Development of national environmental disaster management plans (V) | ▪ NEMA guidelines on response and contingency plans for different disasters such as landslides, floods, earthquakes, tsunamis, volcanic eruptions | Public universities, NMK, KNAS, Private land owners, Local Authorities, Min of Culture and National Heritage, Relevant NGOs, Physical Planners Association of Kenya, NEMA, CDM, Ministry of State for Special Programmes | 2008-2010 (NEMA-SP) |
| 11. Assessment of state of technology covering issues such as enabling environment for technology transfers and adoption of green technologies (M) | ▪ Report on technology transfer and adoption mechanism for green technologies | KIPI, Public universities, KIRDI, KNCPC, JKUAT | 2008-2015 (MDG 8, Target 18) |
| 12. Develop an inventory of sustainable technologies (M) | ▪ District registers of sustainable technologies | KIPI, Public universities, , Ministry of Trade, ministry of Agriculture, KARI, NEMA, KIRDI, KNCPC | 2008-2010 (NEMA-SP) |
| 13. Behavioral studies on adoption of sustainable technologies (M) | ▪ Technology adoption report | KIPI, Public universities, KIRDI, KNCPC, Ministry of Trade, Ministry of Agriculture, KARI, NEMA | 2008-2010 (NEMA-SP) |
| 14. Develop a framework for providing incentives for adoption of incentives for adoption of appropriate technologies (M) | ▪ Incentive profiles | KIPI, Public universities, KIRDI, KNCPC | 2008-2010 (NEMA-SP) |
| 15. Assessment of environmental ethics and public perception on environment (H) | ▪ Environmental ethics and perception reports for different regions in the country | Public universities, Kenya institute of Environmental Assessors, National Bureau of Statistics, NEMA, NCAPD | 2008-2012 (NEAP 2009) |

**Table 6 Cont….**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 16. Inventory and documentation of community participation and benefit sharing in environmental conservation (H) | ▪ A country profile of community conservancies | Public universities, NMK, KEFRI, KMFRI, KWS, Nature Kenya, NEMA, NCAPD, KFS, NGOs | 2008-2012 (NEAP 2009) |
| 17. Identification of green technologies in different economic sectors including green energy (M) | ▪ A profile of environmentally best practices (EBP) | Public universities, KIRDI, KNCPC, KAM, KEPSA, Ministry of Industrial Development, NEMA | 2008-2015 (MDG 7, Target 9 |
| 18. An assessment of impacts of trade on environment (M) | ▪ Impacts of trade and environment reports<br>▪ NEMA guidelines on trade and environment | Public universities, KIPPRA, Horticulture companies, Kenya Fresh Produce Exporters, KEPHIS, MoA, Min. of Trade, Artisanal Fisheries, NEMA | 2008-2020 (Vision 2030) |
| 19. Assess the environmental impact of refugee camps and IDP camps in the country (H) | ▪ Environmental impact reports | Public universities, NMK, KEFRI, KMFRI, KWS, NEMA, KFS, NCAPD | 2008-2012 (Vision 2030) |
| 20. Assessment of the achievements of NEMA's enforcement of EMCA (1999) on sustainable development and state of environment by district (VH) | ▪ District impact reports<br>▪ SEA guidelines<br>▪ State of environment reports<br>▪ NEAP reports | Public universities, NEMA | 2008-2012 (Vision 2030) |
| 21. Environmental health research to enhance disease presentation (M) | ▪ State of environment and disease reports | NCAPD, NEMA, Public universities | 2008-2012 (Vision 2030) |
| 22. Assess the mechanisms for integrating population and environmental concerns in development planning (H) | ▪ Country report on cross-sectoral integration | NCAPD, UoN-PSRI, NEMA, Public universities | 2008-2012 (Vision 2030) |

**Table 6 Cont…**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 23. Comparative in-depth studies on sewage flow in the dry and wet seasons (M) | ▪ Sewage flow reports | NCAPD, NEMA, Public universities | 2008-2012 (Vision 2030) |
| 24. Assess the adequacy and effectiveness of the emergency assistance provided in the country during disasters (H) | ▪ National disaster report | NCAPD, NEMA, Public universities, CDM | 2008-2012 (Vision 2030) |
| 25. Evaluate the level of integration and impact of environmental health education (EHE) in the curriculum at all levels of education. (M) | ▪ National EHE report | NCAPD, NEMA, Public universities, KU | 2008-2012 (Vision 2030) |
| 26. Identification of strategies for the management of emerging technologies (e.g. Telecommunication base transmitter stations, biotechnology, ICT) | ▪ National strategy reports | Relevant institutions, NEMA | 2008-2030 |
| 27. Undertake case studies on sustainable development indicators (VH) | ▪ Report on indicators for sustainable development indicators<br>▪ Best practices for sustainable development indicators reports | Public universities, NEMA | 2008-2012 (MDG 7) |

**Table 7:** Implementation Matrix for the Strategic Research Objective on environmental information management

**SRO6: To strengthen information gathering and documentation on Indigenous Environmental Knowledge (IEK) and its application in environmental management and conservation**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 1. Assessment of indigenous knowledge systems for environmental management (H) | ▪ Inventory of available indigenous knowledge.<br>▪ Best practice model case studies reports<br>▪ NEMA guidelines on IEK and intellectual property rights<br>▪ Methods for integration of IEK in environmental management | Public universities, NMK, NEMA, KIPI, NMK | 2008-2012 (NEAP, 2008) |
| 2. Documentation of indigenous environmental knowledge (IEK) systems (H) | ▪ NEMA catalogue of IEK types in different districts, communities and regions | Public universities, NMK, NEMA, KIPI, NMK | 2021-2030 (Vision 2030) |
| 3. Identification of methods for the integration of IEK in environmental management (H) | ▪ IEK management system | Public universities, NMK, NEMA, KIPI, NMK | 2012-2015 (Vision 2030) |

**Table 8:** Implementation Matrix for the Strategic Research Objective on environmental economic valuation

**SR07: To promote the appropriate design, development and application for economic instruments and incentive measures, valuation of environment and natural resources accounting for sustainable development**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 1. Develop suitable economic instruments for environmental management (M) | ▪ Profiles of economic instrument s e.g. CDM, PES schemes | Public universities, KWS, KFS, KIPPRA | 2008-2015 (MDG 7, Target 9 |
| 2. Undertake case studies on economic valuation and assessment techniques (H) | ▪ Case study reports | Public universities, KIPPRA, KNAS, NEMA, Ministry of Planning and Vision 2030, KEBS, MU | 2008-2012 (Vision 2030) |
| 3. Comprehensive total economic valuation (TEV) of the Kenyan environment (M) | ▪ National TEV report | Public universities, KIPPRA, KNAS, NEMA, Ministry of Planning and Vision 2030 | 2008-2012 (NEAP, 2008) |
| 4. Undertake an economic valuation of aquatic natural resources (H) | ▪ National report<br>▪ District economic valuation report | Public universities, KIPPRA, KNAS, NEMA, KFS, NMK, KEFRI, WRMA, Regional Development Authorities, KWS, DRSRS, KEMFRI | 2013-2020 (Vision 2030) |
| 5. Economic valuation of wetland ecosystems (H) | ▪ District wetland valuation reports | KWS, NEMA, KEMFRI, NMK, DoF, KWF | 2008-2012 (NEAP 2009) |
| 6. Economic valuation of the coral reef and mangrove ecosystems in Kenya (H) | ▪ Economic valuation reports | Public universities, KMFRI, KFS, NMK, KARI, DRSRS, KEFRI, KWS, KNAS, NEMA (CBD) | 2008-2010 (NEMA-SP) |

**Table 8: Cont…**

| Research interventions and priority (VH=Very High, H= High, M=Medium) | Expected outputs | Task responsibility (Lead institution(s) underlined) | Timeframe & timing criteria |
|---|---|---|---|
| 7. Undertake valuation of terrestrial natural resources (M) | ▪ Aquatic valuation reports<br>▪ NEMA guidelines for economic valuation of specific natural resources | Public universities, KIPPRA, KNAS, NEMA, KFS, NMK, KEFRI, WRMA, Regional Development Authorities, KWS, DRSRS, MEMR | 2008-2012 (Vision 2030) |
| 8. Assessment of the economic impacts of biotechnology sector on livelihoods (M) | ▪ Public perception reports on biotechnology<br>▪ Biotechnology adoption and livelihood impact reports | Public universities, KARI, KEPHIS, ACTS, KNAS, NCST, Ministry of Agriculture, Biotechnology Trust Fund | 2013-2020 (Vision 2030) |
| 9. Economic valuation of biodiversity within various terrestrial and aquatic ecosystems (H) | ▪ Ecosystem-based economic valuation reports | Public universities, KIPPRA, KNAS, NEMA, KFS, KWS, NMK, KEFRI, WRMA | 2008-2012 (NEAP 2009) |
| 10. Assess the performance and application of economic instruments and incentive measures (VH) | ▪ Inventory of incentive measures<br>▪ Best practices of incentive measures | Public universities, KIPPRA, KNAS, NEMA, , Ministry of Finance, Ministry of Planning and Vision 2030 | 2008-2012 (NEAP, 2008) |

**Table 9:** Implementation Matrix for the Strategic Research Objective on domestication and implementation of MEAs.

**SRO8: To generate scientific information for effective domestication and implementation of MEAs.**

| **Research interventions and priority (VH=Very High, H= High, M=Medium)** | **Expected outputs** | **Task responsibility (Lead institution(s) underlined)** | **Timeframe & timing criteria** |
|---|---|---|---|
| 1. Identification of strategies and appropriate mechanisms for domestication and implementation of relevant MEAs (VH) | ▪ A profile of domestication and implementation of status of MEAs. | ALL focal institutions dealing with MEAs and other stakeholders, NEMA | 2008-2010 (NEMA-SP) |
| 2. Assessment of the impact of MEAs at the local and national levels (H) | ▪ Inventory of benefits<br>▪ Inventory of adverse effects<br>▪ Overall implication reports<br>▪ A profile of implementation challenges | ALL focal institutions dealing with MEAs and other stakeholders, NEMA | 2008-2010 (NEMA-SP) |
| 3. Developing model projects for implementing relevant MEAs (H) | ▪ Successful model projects | All focal institutions dealing with MEAS and other stakeholders, NEMA | 2008-2012 (Vision 2030) |
| 4. Identification of appropriate mechanisms of engagement for transboundary environmental research initiatives (H) | ▪ National guidelines on regional agreements on trans-boundary research<br>▪ Joint research programs and projects | Public universities, NEMA | 2008-2012 (Vision 2030) |
| 5. Undertake research to identify mechanisms for domestication of emerging MEAs and emerging environmental issues | ▪ Implementation mechanisms and coping strategies | All focal institutions dealing with MEAs, NEMA | 2008-2030 |

### 4.11.1 ENVIRONMENTAL RESEARCH PARTNER INSTITUTIONS

1. African Academy of Sciences (AAS)
2. African Conservation Centre (ACC)
3. African Centre for Technology Studies (ACTS)
4. African Wildlife Foundation (AWF)
5. African Water Network (AWN)
6. Centre for Agricultural Bioscience International (CABI)
7. Climate Network Africa (CNA)
8. East African Wildlife Society (EAWL)
9. Environmental Liaison Centre International (ELCI)
10. Greenbelt Movement (GBM)
11. International Research Centre for Agroforestry (ICRAF)
12. IGAD Climate Prediction & Application Centre (IGAD–CPAC)
13. International Centre for Insect Physiology & Ecology (ICIPE)
14. International Livestock Research Institute (ILRI)
15. Institute for Meteorological Training & Research (IMTR)
16. International Union for Conservation of Nature (IUCN)
17. Nature Kenya
18. Network for Water & Sanitation (NETWAS)
19. Regional Centre for Mapping & Resource Development (RCMRD)
20. United Nations Environment Programme (UNEP)
21. United Nations Commission for Human Settlements – UNCHS (UN-Habitat)
22. World Wide Fund for Nature (WWF)
23. Western Indian Ocean Marine Association (WIOMSA)
24. World Health Organization (WHO)

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# ANNEXES

## ANNEX 1: TERMS OF REFERENCE

1. To identify, characterize and document the network of researchers in the field of environment;
    - Develop a comprehensive description of key beneficiaries in Government, and others in the public sector; in the private sector, especially research organizations and individual scientists of environmental information and data;
    - Describe institutions capable of providing NEMA products and services which may also be the main provider of not for profit research services as well as being important users of research data; local and community groups and local government; NGOs and grass roots organizations; the media, the education, research and academic community among others;
    - Determine and show how access to information and related information sharing tools and services (especially those available through the Internet and related technologies) that can facilitate action for research for sustainable development;

2. To identify the problems or constraints research can help overcome and to show how this is so;
    - This includes a description of the issues and trends affecting decision making and the flow of information in the country;
    - The consultancy will document the state of information flow across sectors of society, the economy, between government agencies, between the government and non-governmental organizations. The role of all sectors of civil society in decision making for sustainable development needs to be explored;
    - This analysis will include an inventory of key knowledge resources, especially those that are in computer readable format, i.e. key databases, datasets, text and images useful to decision makers for sustainable development;
    - Policies, local capacity and especially the availability of human resources capable of meeting the needs of informed decision making and of contemporary information management are part of this consultancy;
    - Policies on access to government information and public participation are to be documented;
    - To assess the benefits of the State of Environment Reports in research;

- To determine or identify and, where possible, to document opportunities for enhancing and/or strengthening networking for environmental research;

3. To identify environmental information needs and sources
   - To review and document the Authority's emerging research needs with regard to development of regulations and guidelines on various thematic areas and define how these can be undertaken with special emphasis on Compliance and Enforcement;
   - To review existing regulations and define research areas for further enhancement of their implementation and enforcement.
   - The availability of expertise in various research thematic areas such as mammology, ornithology, herpetology, land use, wetlands, and various other expertise, and other related technical capacities (such as ability to use various up to date technologies) needs to be documented;
   - Capacity to use and apply technologies and management practices such as geographic information systems (GIS) used for contemporary environmental management will be documented;
   - The potential of involving expatriated nationals as a source of expertise in support of the research strategy needs to be documented in this consultancy;

4. To review the existing research networks
   - Documenting the policy environment for environmental research, access to information, freedom of expression, freedom of access to information (especially public information and information on the state of the environment), national information policies and/or strategies, what are the existing networks in the different areas?
   - Among international networks, the network of the United Nations Environment Programme (UNEP): Infoterra, the global environmental information referral system and other activities of Earth watch and Development Watch, especially the Environment and Natural Resources Information Networks (ENRIN) need to be determined.

5. To establish the potential long-term sources of research funding
   - To identify possible partners in the private sector, and including NGOs, as well as public sector or other non-profit actors, to carry forward an eventual NEMA Environmental

Research Agenda with a view to making it self sustaining. This applies especially to the provision of computer networking services, and especially the Internet, for the benefit of actors for information exchange and research funds.

- The elements of a business plan need to be elaborated to justify the strategy. A description of the market outlook for the agenda given the existing level of communications services needs to be documented. The environmental research programme must quickly become self-sustaining. The consultancy will determine the opportunity for sustainability of an eventual research strategy.

6. To formulate a comprehensive NEMA Environmental Research Agenda
   - Identify key objectives for the specific activities of the programme? (e.g. priority research areas, information exchange, sustainable development issues, capacity building, information for policy makers, etc...)
   - Identify key modes of operation of the programme (e.g., meetings, journals, scientific conferences, e-mail, on-line data bases, electronic conferencing, etc.). What inputs are needed to ensure that these can take place?
   - Establish the relationship between the existing governmental and non-governmental networks, both from a substantive, and from technical (e.g., for electronic networks) points of view.

**ANNEX 2: LEAD ENVIRONMENTAL RESEARCH INSTITUTIONS**

| Institution | Contact details | Profile summary | Mandate |
|---|---|---|---|
| **1. State Universities** | | | |
| University of Nairobi (Public universities)– Departments of Geography and Environmental Studies, Chemistry, School of Built Environment, Centre of Biotechnology, Institute of Nuclear Science | P. O. Box 30197 Nairobi 00100 G.P.O<br>Tel: +254 02 318262<br>Fax: 254 02 318262<br>Website- www.Public universities bi.ac.ke | The oldest and largest state university with a vision to provide dynamic leadership in teaching, research, consultancy and extension services in Geography and Environmental Studies. It provides dynamic leadership in teaching, research, consultancy and extension services in Geography and Environmental Studies | Environmental science research in, land, soil, water, air, biodiversity and ecosystems, radiation science, solid waste, and effluent management |
| Moi University (MU), School of Environmental studies | P.O. Box 3900<br>Eldoret, Kenya<br>Tel: +254 (0)53 43013/43263/43244<br>Fax: +254 (0)53 43149<br>Website- www.mui.ac.ke | Established as a part of the declared national policy towards preparation for the rational management of natural resources and the environment for sustainable development in Kenya | Environmental studies, biological, chemical, physical and social research |
| Kenyatta University (KU)<br><br>(Institute of Environmental Studies) | P.O. Box 43844-00100<br>Nairobi<br>Tel: +25420810901, +25420811622, +25420812722,<br>Fax: +25420811575<br>Website: www.ku.ac.ke | The Institute of Environmental Studies and Human Sciences was created in July 2003. It conducts teaching and research over the broad range of areas which is crucial to understanding the interactions between the natural and human components of the environment | Environmental studies, biological, chemical, physical and social research |
| Egerton University (EU) | P.O. Box 336 – 20115 Egerton<br>Tel: 051-221792<br>Website: www.egerton.ac.ke | The faculties of agriculture, environment and natural resources are involved in a wide range of environmental research. | Environmental research on agro ecosystems and natural resources |
| Jomo Kenyatta University College of Agriculture and Technology – Institute of Energy and Environment (JKUAT) | P.O. Box 62000-00200<br>Nairobi<br>Tel.: +067-52711 or +254-020 - 4448679<br>Web: www.jkuat.ac.ke | Undertakes environmental research on green technologies | Undertaking research in horticulture, biotechnology and energy sectors |

| Institution | Contact details | Profile summary | Mandate |
|---|---|---|---|
| **2. National Research Institutions (NRIs) and Lead Agencies**<br>Nairobi National Museums (NMK) | P.O. Box 40658 -00100, Nairobi,<br>Tel: +254 20 374 2161<br>Fax: +254 20 374 1424<br>Website: www.museums.or.ke | Started in 1909 as a small institution by a few private individuals and grown over the years into a national museum and today has within its centres of excellence in research, numerous regional museums, thousands of sites and monuments across the country. Includes a:-<br>a) Center for Biodiversity<br>b) Kenya Resource Centre for Indigenous Knowledge (KENRIK) | Conducting of national inventory of biodiversity, monitoring of changes in biodiversity, establishment of permanent sampling plots, documentation of indigenous knowledge on Biodiversity, creation of awareness on biodiversity, development training programmes on biodiversity. Seeks to provide environmental scientists and other environmental workers with bio-geographical information, widely available, to further understanding of the environment and sustainable management of natural resources |
| The Kenya Soil Survey (KSS) | P.O. Box 57811, Nairobi, 00200, Kenya<br>Tel: +254-020-4443376, 4183301-20<br>Fax: +254-020-4183344 | Government lead agency on soil survey, mapping and monitoring | Conducting soil surveys which produce information about the soil and land resources required for accelerated and sustainable agricultural development and systematic rural land use planning |
| Kenya Agricultural Research Institute<br>(KARI) | P.O. Box 57811, Nairobi, 00200, Kenya<br>Tel: +254-020-4183720, 4183301-20<br>Fax: +254-020-4183344<br>Website: www.kari.org | A network of research centres made up of 13 national research centres, 7 regional research centres, and 7 research sub centres including<br>• National Agricultural Research Laboratories, (NARL), Kabete<br>• National Dryland Farming Research Centre Katumani<br>• National Agricultural Research Centre, Muguga | Undertakes nationwide research on food and commodities production. The principal research organs for generating and testing improved technologies. Undertakes research on the management of terrestrial and aquatic environmental pests |

| Institution | Contact details | Profile summary | Mandate |
|---|---|---|---|
| Department of Resource Surveys and Remote Sensing (DRSRS) | Ministry of Environment & Mineral Resources<br>P. O. Box 47146-00100,<br>Nairobi, Kenya<br>Web : www.drsrs.go.ke | Government lead agency environmental and resource monitoring | Undertakes regular country-wide environmental surveys of resources using both aerial photographs and satellite imagery. In the marine sector they have surveyed mangroves and sedimentation from major rivers. Carrying out assessment studies of the rangelands through periodic surveys to provide up-to-date baseline information on the state of vegetation and general physical environment, human activities in pastoral areas, and wildlife and livestock distribution including migration and abundance. |
| Kenya Forestry Research Institute (KEFRI) | P.O. Box 20412-00200,<br>Nairobi, Kenya Tel: +254 66 32 009 / 32 891/32 892<br>Fax: +254 66 32 844 /32 009 | Established in June 1986 by to undertake forestry research and development (R&D). KEFRI has six research centres located at Muguga, Karura, Kitui, Gede, Londiani and Maseno with the headquarters in Kikuyu Division, Kiambu District | Undertakes all aspects of Forestry Research in Kenya including mangroves. Policy analysis on forest resources, research in silviculture, research in agroforestry, training of medium and high level human resources |
| Kenya Marine and Fisheries Research Institute (KMFRI) | P. O. Box 81651-80100<br>Mombasa, Kenya<br>Tel: +254-020-3746659<br>Website - www.kmfri.co.ke | Created in 1979 to take over the functions of the defunct East African Marine Fisheries Research Organization (EAMFRO) and the East African Freshwater Fisheries Research Organization (EAFFRO) in Kenya | Undertake research in - marine and freshwater fisheries, aquatic biology including environmental and ecological studies, marine research including chemistry and physical oceanography |
| Kenya Medical Research Institute (KEMRI) | P.O. Box 54840,00200<br>Tel +254 20 2722541<br>Fax +254 20 2720030<br>Nairobi, Kenya<br>Web-www.kemri.org | Established in 1979 under the Science and Technology (Amendment) Act of that year to represent the national body responsible for carrying out health science research in Kenya | To conduct research in human health and to co-operate with other organizations and institutions of higher learning in training programmes and on matters of relevant research |
| Kenya Industrial Research & Development Institute (KIRDI) | P.O. Box 30650-00100<br>Nairobi<br>Tel: +254-020-535966<br>Web-www.kirdi.go.ke | A national research institute established in 1979 under the Ministry of Trade and Industry | Undertake multidisciplinary research and development in industrial and allied technologies |

| Institution | Contact details | Profile summary | Mandate |
|---|---|---|---|
| Kenya Institute for Public Policy Research and Analysis (KIPPRA) | P.O. Box 56445, Nairobi, Kenya<br>Tel: +254 -20-2 719933/4, 2714714/5 Fax: +254- 20-2719951<br>Website: www.kippra.org | An autonomous public institute and a central source of information and advice on a wide range of policy issues | Provide quality public policy advice to the government of Kenya and to the private sector in order to contribute to achievement of national development goals |
| Kenya Bureau of Standards (KEBs) | P.O Box 00200 54974<br>Nairobi, Kenya<br>Tel: (+254 02), 605506,605550<br>Mobile: 0722202137/8, 0734600471/2<br>Fax: (+254 02) 604031, 609660,602213<br>Web : www.kebs.org | Established in July 1974 as the lead agency on standardization | Involved in the formulation of environmental standards. Offering services in Metrology, Standards, Testing and Quality Management (MSTQ), certification and accreditation. Ensures that no technical barriers to trade are created while providing services in standardization and conformity assessment |
| Kenya Plant Health Inspectorate Services (KEPHIS) | P.O. Box 49592-00100<br>Nairobi. Tel: 254-020-3597201/2/3<br>Fax: 254-020- 3536175<br>Email:<br>Website: www.kephis.org | KEPHIS is a regulatory agency for quality control of agricultural input and produce in Kenya | KEPHIS coordinates all matters relating to crop pests and disease control, advises the Director of Agriculture on appropriate seeds and planting materials for export and import |
| Kenya Wildlife Service (KWS) | P.O. Box 40241-00100, Nairobi - Kenya, Tel: (254-020) 600800<br>Fax: 603792,<br>Website: www.kws.go.ke | KWS is charged with the protection and conservation of the country's biodiversity as presented by its fauna and flora. | Wildlife policy analysis, monitoring and documentation of dynamics between wildlife and their habitats, human- wildlife conflict analysis and resolution. The Parks and Reserves research division is responsible for scientific research and monitoring |
| Kenya Meteorological Department (KMD) | P. O. Box 30259, 00100 GPO Nairobi.<br>Phone 254-20-3867880,254-20-3876957,254-20-3873682<br>Fax 254-2-3876955<br>Website: www.meteo.go.ke | The lead agency on weather forecasting and climate monitoring | Involved with provision of meteorological and climatological services to agriculture, forestry, water resources management, civil aviation and the private sector including industry, commerce and public utilities for the better exploitation and utilization of natural resources for national development |

| Institution | Contact details | Profile summary | Mandate |
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| National Council for Science & technology (NCST) | P. O. Box 30623,<br>Nairobi, Utalii House<br>Tel: +254-241349<br>+254-310571<br>Fax: +254-213215<br>Website: www.ncst.go.ke | A statutory institution of the government of Kenya, having been established in July 1977 by the Science and Technology Act. Cap. 250 of the Laws of Kenya | Providing machinery for making available to the Government advice upon all matters relating to the scientific and technological activities, and for coordination of research and experimental development |
| Institute for Meteorological Training and Research (IMTR) | P.O. Box 30259 – 00100 GPO<br>Ngong Road Nairobi<br>Tel: 254 (0)20 3867880-5.<br>Fax: 254 (0)20 3877373/3867888/3876957<br>Website: www.meteo.go.ke | A UNDP/WMO Project supported by nine countries in Eastern and Southern Africa and hosted by Kenya. It comprises a centre component at the Kenya Meteorological Department and a University component in the Department of Meteorology, University of Nairobi | Trains personnel from Kenya and other parts of English-speaking countries in Africa in various fields of meteorology and also carries out meteorological research. Research reports on rainfall patterns and other areas relevant to desertification have been published by scientists from the institute and more projects are in progress. Results from the various activities at the institute are important knowledge on climate and assist in developing techniques to combat desertification |
| Kenya National Academy of Sciences (KNAS) | P.O. Box 39450, 00623<br>Nairobi<br>Phone: (254-20) 311714<br>Fax: (254-20) 311715<br>Website: www.knas.g3z.com | The Kenya National Academy of Sciences founded in 1983, is a learned, non-political, non-sectarian organization that includes all branches of knowledge. It has a current membership of 117. Members are elected from among citizens of the Republic of Kenya of a certain academic standing | The Academy seeks to foster the transformation of the Kenyan economy through: synthesizing and disseminating knowledge; promoting the advancement of science and technology; facilitating coordination among the different groups of scientists and potential users of science and technology; improving resource utilization through research; enhancing cooperation through international agreements and programmes; providing the government with scientific and technological information for policy formulation and execution |

| Institution | Contact details | Profile summary | Mandate |
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| Nature Kenya | P.O. Box 44486, Nairobi, Kenya<br>Nairobi National Museums<br>Tel: +254 20 374 9957<br>Fax: +254 20 374 1049<br>Website: www.naturekenya.org | Nature Kenya is the business name (in Kenya) of the East Africa Natural History Society (EANHS). The Society was established in 1909 and is the oldest conservation organization in Africa. The aim of Nature Kenya is to promote the study and conservation of the natural environment, in eastern Africa | Promote readily accessible sites for research and training by Kenyan scientists. Sensitize planners and decision makers on the importance of specialized habitats such as seasonal wetlands and highland forests |
| Greenbelt Movement (GBM) | P.O. Box 67545-00200, Nairobi<br>Tel: +254 20 387 3057 /387 1523<br>Website: www.greenbeltmovement.org | A grassroots NGO founded in 1977 by Prof. Wangari Maathai, the 2004 Nobel Peace Laureate. GBM Kenya focuses on environmental conservation, community development and capacity building | Mobilizing community consciousness for self-determination, equity, improved livelihoods and securities, and environment conservation. GBM is guided by the values of volunteerism, love for environmental conservation, pro-action for self-betterment, accountability, transparency and empowerment |
| **3. Regional Research Institutes** | P. O. Box 24916, Nairobi, Kenya<br>Miotoni Road, off Ngong Road<br>Tel: +254 20 884 620/884 401-4<br>Website: www.aasciences.org | Founded in 1985 in Trieste, Italy, at the inauguration of the Third World Academy of Sciences (TWAS) and devised the concept of the African Academy of Sciences (AAS) | Promotes and fosters the growth of scientific community in Africa and its utilization of science driven development. It sensitizes the interaction of the scientific, political and industrial leadership in Africa's development and creation of a science culture for modernization and sustainable development. |
| African Academy of Sciences (AAS) | | | |
| Regional Centre for Mapping of Resources for Development (RCMRD) | P.O. Box 632-006, Ruaraka, Kenya<br>Tel.: +254-860227<br>Web – www.rcmrd.org | A regional centre which deals with environmental remote sensing | Environmental monitoring and mapping using satellite data to consider various aspects of environment including land use and land cover change |

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| The African Centre for Technology Studies (ACTS) | P.O. Box 45917, Nairobi, ICRAF Complex, United Nations Avenue, Gigiri<br>Tel: +254 20 722 4700/722 4000<br>Fax: +254 20 722 4701/722 4001 | Its members include the Governments of Kenya, Malawi, Malta, Uganda and Ghana, as well as the International Centre for Research in Agro forestry (ICRAF) and the Third World Academy of Sciences (TWAS) | ACTS research and capacity building activities are organized in five programmatic areas namely biodiversity and environmental governance, energy and water, security, agriculture and food security, human health, and science and technology literacy. |
| The African Medical Research Foundation (AMREF) | P.O. Box 27691-00506, Nairobi, Wilson Airport<br>Tel: +254 20 699 4000 / 699 4444<br>Fax: +254 20 609 518<br>Website: www.amref.org | Africa's largest indigenous health charity, and for 44 years in partnership with local communities, governments and donors, has worked to research and alleviate Africa's health problems. AMREF headquarters have been in Nairobi since it was founded in 1957. It has country programmes in Kenya, Uganda, Tanzania, South Africa, Mozambique and Ethiopia and major projects in Southern Sudan and Rwanda | Capacity building of local organizations and institutions, monitoring and evaluation of its health programmes and<br>activities, applying social sciences to sanitation, training community women groups in primary health care, dissemination of information on primary health care |
| African Water Network (AWN) | South B Melili Road<br>Nairobi<br>Tel: 556943<br>Website:<br>www.africawaternetwork | Africa Water Network (AWN) is a collective of water workers and activist in African working towards achieving unfettered access to water for all especially that marginalized through active campaigns against policies which are inimical to the marginalized in society | Monitoring and documentation of quality of drinking water, monitoring the impact of development projects on water resources, maintenance of a database of information concerning community water schemes and traditional technologies |
| Climate Network Africa (CNA) | P.O. Box 76479, Nairobi, Kenya<br>Tel: +254 20 545 241/<br>Fax: +254 20 559 122 | Established in May 1991 as an initiative of a group of NGOs and institutions to lobby and advocate for relevant policy changes on climate change related issues in Africa.<br>started in May 1991 as an initiative of a group of NGOs and institutions to lobby and advocate for relevant policy changes on climate change related issues in Africa | Collecting and disseminating meteorological information, maintaining and managing a database on environmental NGOs, conducts training related to climate networks, information exchange and communications technologies |

| Institution | Contact details | Profile summary | Mandate |
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| IGAD Climate Prediction & Application Centre (IGAD-CPAC) | P.O Box 10304-00100<br>Kenya Met Department<br>Nairobi, Kenya<br>Tel. : +254 20 578340/2735002<br>Website: www.dmcn.org | A regional centre which deals in climate monitoring and prediction | Undertakes climate monitoring and climate change research |
| African Wildlife Foundation (AWF) | P.O. Box 48177-00100, Nairobi<br>Tel: +254 20 271 0367/272 1037<br>Fax: +254 20 271 0372<br>Website: www.awf.org | AWF was formed 40 year ago and has focused exclusively on the continent of Africa and played a major role in ensuring the continued existence of some of Africa's most rare and treasured species such as the elephant, lion, the mountain gorilla, rhinoceros and cheetah | Protecting endangered species, strengthening the capacity of community organizations in wildlife conservation, implementing wildlife projects, publishing books and reports on wildlife and ecosystems |
| African Conservation Centre (ACC) | P.O. Box 15289-00509, Nairobi, Karen, Off Langata Road, Opp Hillcrest Preparatory School<br>Tel: +254 20 891 360 or 891 751<br>Fax: +254 20 891 751<br>Website: www.conservationafrica.org | The African Conservation Centre grew out of a Wildlife Conservation Society program and was registered in 1995 | Developing and implementing fresh approaches to the conservation of biological resources |
| East African Wildlife Society (EAWS) | P.O. Box 20110-00200, Nairobi,<br>Tel: +254 20 387 4145<br>Fax: +254 20 387 0335<br>Website: www.eawildlife.org<br>EAWLS Building, Riara Road | Established in 1956 through the amalgamation of the Wildlife Societies of Kenya and Tanzania and the Uganda Wildlife Conservationists. | Monitoring and documentation of state of fauna and flora, networking, advocacy/lobbying for greater enforcement of the law regarding conservation of fauna and flora, documentation and dissemination of scientific findings |

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| Network for Water and Sanitation (NETWAS) | P.O. Box 15614-00503, Nairobi, Tel: +254 20 890 555 /9 Fax: +254 20 890 553 / 4 Website: www.netwas.org | A capacity building and information network for Africa focusing on water, sanitation and the environment | Scientific studies on water and sanitation problems with the participation of communities, dissemination of information on water and sanitation |
| African Energy Policy Research Network (AEPRN) | P.O. Box 30979-00100, Nairobi, Tel: +254 20 387 1467/387 2744 /387 3714 Fax: +254 20 386 1464 /387 6870 Website: www.afrepren.org | Established in 1989 and operating mainly in Eastern and Southern Africa, the African Energy Policy Research Network (AFREPREN) aim is to bridge the gap between energy policy research and policy. The Network brings together 106 African energy researchers and policy makers from Africa | Since its initiation, AFREPREN has successfully implemented over 90 research projects involving 234 African researchers and policy makers in 19 countries of Eastern and Southern Africa and forged close collaborative links with West, Central and North African energy researchers and policy makers |
| African Forestry Research Network (AFRN) | P.O. Box 24916, Nairobi Tel: (254-2) 884401-5 Fax: (254-2) 884406 Web: www.afornet.org | The African Forest Research Network (AFORNET) is a network of African forest research scientists. Its goal is to promote quality research on the use, management and conservation of African forest and tree resources | Launched in 1998, the African Forest Research Network (AFORNET) is a network of African forest research scientists. Its goal is to promote quality research on the use, management and conservation of African forest and tree resources. It also aims at the strengthening of multi-disciplinary and multi-country research |
| **4. International Research Centres (CGIAR)** | P.O. Box 30709 Nairobi 00100, Kenya P.O. Box 30799, Nairobi Tel + 254-20 422 3000 Website: ILRI-Kenya@cgiar.org | The International Livestock Research Institute (ILRI) works at the crossroads of livestock and poverty, bringing high-quality science and capacity-building to bear on poverty reduction and sustainable development | Undertake research related to natural resource management including: - integrated crop/livestock systems; pastoral system research focusing on grazing management studies under different pasture systems |
| The International Livestock Research Institute (ILRI) | | | |
| World Agroforestry Centre (The International Centre for Research in Agroforestry (ICRAF) | P.O. Box 30677-00100, Nairobi, Tel: +254 20 524 000 Fax: +254 20 524 001 Gigiri, Nairobi Website: www.worldagroforestry.org | Started life in 1977 as an information agency and an advocacy organization, promoting the use of agroforestry in solving the problems of resource poor farmers | Agroforestry and utilization of trees and shrubs for crop and livestock production |

| Institution | Contact details | Profile summary | Mandate |
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| **5. International NGOs**<br>The International Union for Conservation of Nature (IUCN) | P.O. Box 68200, Nairobi, Kenya<br>Tel: +254 20 890 605/13<br>Fax: +254 20 890 615<br>Website: www.iucn.org<br>IUCN EARO, Wasaa Conservation Centre, Langata | The IUCN was founded in 1948 as the International Union for the Protection of Nature (or IUPN) following an international conference in Fontainebleau, France. The organization changed its name to the International Union for Conservation of Nature and Natural Resources in 1956 | Involved in collection of environmental data, analyzing the causes and effects of environmental destruction, giving advice on effective environmental management to the Government, publishing environmental research findings in books and reports on environmental education |
| Environment Liaison Centre International (ELCI) | P.O. Box 72461, Nairobi, Kenya<br>Tel: +254 20 387 6114 /9<br>Fax: +254 20 386 2175<br>Website: www.elci.org | An international non-governmental, non-profit organization, established in 1974, with the aim of strengthening communication and co-operation between NGOs and civil society. It also acts as liaison between NGOs and the United Nations Environment Programme (UNEP), building the capacities of environmental NGOs in developing countries, and encouraging the advisory role of NGOs through the international environmental conventions and organs of the United Nations | Promotion of networking among NGOs working on environment and development issues, exploring more effective techniques for networking among NGOs in developing countries, documentation and dissemination of best environmental practices, promotion of information exchange among NGOs on biodiversity and desertification issues, publication of scientific information |
| The World Wide Fund for Nature (WWF) | P.O. Box 62440-00200, Nairobi, ACS Plaza, 5th Floor, Lenana Road<br>Tel: +254 20 387 7355 / 387 6373<br>Fax: +254 20 387 7389<br>Website: www.panda.org/earpo | Established 1961, WWF to conserve nature and ecological processes through a combination of action on the ground, national and international advocacy work to establish appropriate policies, and international campaigns to highlight and demonstrate solutions to crucial environmental problems | Undertaking and funding scientific research for conservation of fauna and flora, conservation of wetlands, promotion of sound techniques for forest resources management, provision of advisory services on environmental conservation to the government and NGOs |
| CABI | P.O. Box 633 Village Market, Nairobi,<br>Tel: +254 20 722 4450<br>Fax: +254 20 712 2150<br>Website: www.cabi.org | The Organization operates from six centres worldwide, in Kenya, Malaysia, Trinidad, Pakistan, Switzerland and the UK. | A dynamic group of highly qualified scientists with an international remit dedicated to tackling some of the world's most challenging problems in agricultural sustainability and biological diversity |

| Institution | Contact details | Profile summary | Mandate |
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| Civil Society Organizations | | | |
| Kenya Water for Health Organization (KWAHO) | P.O. Box 61470, Nairobi<br>Tel: +254 20 271 7951<br>Fax: +254 20 271 8730<br>Website: www.kwaho.org | A national NGO whose efforts are geared towards providing sustainable water and sanitation for the disadvantaged communities in the country. Its existence dates back to 1976 when it was launched as a UNICEF/NGO Water for Health Project by the National Council of Women of Kenya (NCWK) | Scientific research on water, sanitation and health, development of micro- water projects at community level, training community groups in improved water and sanitation management |
| **6. Bilateral Agencies** | | | |
| Department for International Development (DFID) | P.O. Box 30465, Nairobi, Kenya<br>Tel: +254 20 271 7609<br>Fax +254 20 284 4000<br>Website: www.dfid.gov.uk | DFID's main focus is on how the environment contributes to poverty reduction and sustainable development in developing countries, as measured by progress towards the Millennium Development Goals (MDGs). The specific environmental goal is MDG 7, to 'ensure environmental sustainability' | Funding scientific initiatives on sustainable poverty reduction, enhance quality of evidence and effectiveness of monitoring of critical developments, ensuring politicians and government officials are more accountable in the formulation and implementation of forestry policies and legislation, ensuring better understanding of roles, rights and responsibilities encapsulated in the forest policy and legislation |
| Japan International Cooperation Agency (JICA) | P.O. Box 50572-00200, Nairobi<br>Rahimtullah Towers, Upper hill Road,<br>Tel: +254 20 272 4121-4<br>Fax: +254 20 271 8202<br>Website: www.jica.go.jp/kenya | Founded in 1974, the Japan International Cooperation Agency is an implementation agency for technical assistance, focusing on institution building, organization strengthening and human resources development that will enable developing countries to pursue their own sustainable socio-economic development. JICA was transferred to an independent administration institution in October 2003. | Funding scientific research on human resources development, agricultural development, population, AIDS, and health and medical care, and environmental protection |

| Institution | Contact details | Profile summary | Mandate |
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| United States Agency for International Aid (USAID) | P.O. Box 30677-00100, Nairobi,<br>Tel: +254 20 862 0000<br>Fax: +254 20 862 2680 /1 / 2<br>Website: www.usaid.gov | The US-Kenya economic cooperation goes as far back as Kenya's pre-independence in the late 1950s and early 1960s. | Funding scientific research to enhance sustainable management of forest resources in target areas, strengthen forest related research capacity, improve environmental management, facilitate institutional development of NEMA through capacity building, technical assistance and material support for effective implementation of EMCA, enhance Sustainability at Arabuko-Sokoke Forest through improved NRM by and for Stakeholders, and deliver biodiversity-driven sustainable livelihoods and tools and technologies for NRM |
| **7. UN Agencies**<br>Global Environment Facility (GEF) | Division of Global Environment Facility, DGEF<br>P.O. Box 30552-00100, Nairobi<br>Tel: +254 20 7624 165<br>Fax: +254 20 7624 041<br>Website: www.unep.org/gef<br>United Nations Avenue | Launched in 1991, the GEF funding to developing countries to achieve global environmental benefits in six focal areas addressing Biological diversity, Climate change, International waters, Land degradation, Persistent organic pollutants, and Ozone layer depletion | Funding scientific research for the protection of the global environment |
| United Nations Environment Programme (UNEP) | UNEP Regional Office for Africa (UNEP/ROA)<br>P.O. Box 30552, Nairobi, Kenya<br>Tel: +254 20 762 1234<br>Fax: +254 20 762 3927<br>Website: www.unep.org<br>United Nations Avenue | A United Nations' organization established in 1972 composed of member states, and is a secretariat charged with the responsibility of carrying out the member states decisions. UNEP's secretariat composed of about 890 staff (about 490 international staff and 400 locally recruited staff), is charged with the implementation of the member states decisions | UNEP's mandate was expanded and re-articulated by the Nairobi declaration adapted in1997 to be the leading global environmental authority that sets the global environmental agenda which promotes the coherent implementation of the environmental dimensions of sustainable development within the United Nations system and that serves as an authoritative advocate for the global environment |