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1.0 INTRODUCTION

In pursuit of human welfare, development in Kenya has over the years been fairly rapid. This, coupled with a high rate of population growth, has exerted excessive demand on available resources, thus increasingly subjecting them to degradation and in some cases total destruction. It is therefore necessary to adopt development strategies that use nature's resources sustainably. Since independence, the government has been advocating proper environmental management. This has been articulated in various policy statements, government directives and pronouncements, sessional papers, and development plans. The Government position was articulated at the Earth Summit in Rio de Janeiro in 1992 by H.E. President Daniel Toroitich arap Moi when he said

“...the integration of development and environment is the only viable path to a sustainable future.”

The Government's commitment to proper environmental management is demonstrated by the adoption of the National Environment Action Plan (NEAP) and the establishment of public environmental institutions. Notable among these institutions are the Ministries of Environmental Conservation and Natural Resources, National Environment Secretariat, the Kenya Wildlife Service, and the Permanent Presidential Commission on Soil Conservation and Afforestation. Additionally, the Government has established the posts of Environment Officers at the district level and revitalized district environment committees. Capacity requirements are provided by national universities and other educational institutions that offer courses in environmental studies.

It is to be noted that various political parties' manifestos recognize the importance of environmental conservation and protection.

The Government recognizes the important role played by both non-governmental organizations (NGOs) and the private sector and has provided support and encouragement to their environmental efforts. The Government also values the support of the United Nations and its agencies as well as foreign governments and organizations. In this regard, the Government participated in the first United Nations Conference on Human Environment in Stockholm, Sweden in June 1972. This conference established the United Nations Environment Programme (UNEP). UNEP, with its headquarters in Nairobi, is charged with the task of spearheading, catalysing, and coordinating sound global environmental practices to enhance a healthy and good quality environment for humankind.

Concern for environmental planning has a long history in Kenya. Reference to integrating environment and economic issues was made in the country's development plan as far back as 1974. The 1974-78 plan noted that competition and conflicts between land use interests were growing and that there was need for greater co-ordination between the various arms of government in order to address these effectively. The subsequent development plan (1979-83) stressed the need for environmental inputs in the national planning process pointing out that environmental considerations must pervade development decisions at every level.

Kenya has developed a large number of initiatives in the environment and natural resources sector. However, there has been no strategic approach integrating environmental concerns into the de-

velopment planning process until the adoption of the National Environment Action Plan (NEAP) in 1994. The urgency of this concern is reflected in the 1994-96 development plan which calls for a sessional paper on sustainable development to set comprehensive guidelines and strategies for government action. The sustainable development concerns were succinctly stated by H.E. President Daniel Toroitich arap Moi when he warned in Nakuru in 1985 that

“...prospects for future progress are ominously linked to the way we protect and exploit the land and its flora and fauna”

The Government has developed this Sessional Paper setting out comprehensive policy guidelines towards achieving sustainable development and in response to the increasing concerns regarding the effects of development on the environment.

2.0 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT CHALLENGES

Kenya strives to move along the path of sustainable development to meet the needs of the present generation without compromising the ability of the resource base to meet those of future generations. However, the development process in the country is at a stage at which land use interests such as agriculture, tourism, ranching, wildlife management, forestry, water conservation, mining, manufacturing, human settlements, and infrastructure development are often conflicting. This is exacerbated by the mismatch between population and economic growth together with inadequate policies governing land use. Additionally, existing policies and programmes are either poorly implemented or lack harmonization and coordination. These inadequacies especially those governing management of the resource base have resulted in widespread environmental degradation.

Sustainable utilization and management of the natural resource base is crucial as most people are dependent upon natural resources like soil, water, animals, plants, and their products for their basic needs. In this connection, agriculture and tourism are not only major foreign exchange and revenue earners, but also important in employment generation. The degradation of natural resources will affect economic productivity and poverty levels.

Land is the primary resource base for all human activities. Present land use practices often disregard land potentials, carrying capacities, and limitations of land resources as well as their diversity and distribution.

Kenya's population currently estimated at 30 million has been growing at the average rate of 2.4% per annum. This growth has exerted tremendous pressure on natural resources, especially land, which has also led to encroachment of marginal areas, enhancing desertification and loss of genetic resources. The high population growth rate also has negative impact on urban development resulting from rural-urban migration leading to the development of slums and related problems in human settlements.

As the country strives to accelerate the pace of development, environmental concerns become more evident. It is difficult to quantitatively place an economic value on natural resources, hence, short-term economic gains made through their exploitation often overshadow the long-term irreversible damage caused to the environment. Out of the justifiable need to create more jobs and enhance economic development, policy makers and planners often ignore the negative consequences to the environment.

Planning and development policies affect the behaviour and attitudes of those involved in the development process. In the past, many projects and programmes were executed without due regard to their impacts on the environment. For example, agricultural activities have triggered environmental problems such as soil erosion and uncontrolled use of agricultural chemicals. Soil erosion leads to siltation that in turn affect dams, fisheries, and tourism, among others. The uncontrolled use of agricultural chemicals has polluted land and water resources posing danger to human health. Industrial activities often pollute water, land, and air. Chemical poisoning due to the accumulation of toxic substances in water and in inhabited and pasture lands is a major environment hazard. Marine pollution is

primarily a result of oil spills, agricultural activities, domestic, and industrial effluents. Mining and quarrying activities also constitute a source of land degradation as well as water and air pollution, while open mines are an additional source of aesthetic degradation. Over-grazing and over-stocking reduces the carrying capacity of land and leads to land degradation. Loss of genetic resources often result from clearing of vegetation.

Tourism which enhances economic development also contributes to environmental degradation. In some wildlife areas and coastal beaches heavy use, visitor congestion, and associated ecological impacts on habitats and wildlife reduce biodiversity, resource capability, and visitor enjoyment.

Kenya has placed a high priority on the development of energy resources based mainly on hydropower and to a lesser extent on thermal and geothermal sources. Large hydropower generation schemes have been initiated for the supply of both industrial, commercial, and domestic energy. The impacts of these on the environment has been loss of biodiversity, resettlement, cultural and social disruption, and an increase in the incidence of water-borne diseases. Increased woodfuel use has also had adverse environmental effects. In addition, use of inefficient energy technologies contributes to environmental problems.

Environmental management tools including laws relating to the management of internationally shared resources, trans-boundary issues, environmental economics and accounting, and environmental impact assessments have not been adequately developed for effective environmental management.

Environmental protection, management, and development as inseparable entities should consider broad issues that bind together people, resources, development, and environment. Consequently, environment and development issues should be considered as integral activities.

2.1 POVERTY REDUCTION

Poverty leads to over-use and destruction of the environment where short-term development goals and practices are pursued at the expense of long-term environmental sustainability. This degradation enhances poverty because the resource base is unable to support the population.

International economic policies on trade and debt servicing as well as inadequate domestic policies, practices, and infrastructure for trade further exacerbate poverty. These policies are major constraints to the attainment of long-term food security goals, sustainable economic growth, and improved standards of living. Poverty contributes to:

- a) A high population growth rate. A rapidly growing population will increase pressure on available resources and retard improvement in living standards.
- b) Excessive deforestation by communities for agriculture, human settlements, and also in search of woodfuel, poles, and other forestry products.
- c) Rural-urban migration which exacerbates unemployment, de-

velopment of slums, and constraints in the provision of social and health services.

- d) A reduction in arable land leading to over-exploitation and degradation of land-based resources; destruction of the ecological balance; mismanagement of arid and semi-arid lands; and increased uneconomic sub-division of the land.
- e) Overstocking in arid and semi-arid lands leading to the destruction of fragile ecosystems.
- f) Burdening of existing infrastructure such as sanitation, transport, water distribution, and housing.
- g) Cultural, moral, and social disorientation and decadence leading to inability to appreciate the virtues of social behaviour, and of a well managed environment.
- h) Hunger and malnutrition due to lack of resources required to provide basic needs.

Sustainable development should in the long-term ameliorate the negative effects of poverty, provide basic needs, and meet peoples aspirations for a better life. Economic, ecological, and equity issues remain major concerns in the national development process and hence their integration forms the focus of this Sessional Paper. The eradication of poverty and hunger, greater equity in income distribution, and human resource development remain major challenges.

3.0 PRINCIPLES, GOALS, AND OBJECTIVES

The Government's fundamental principles, goals, and objectives with respect to environmental management and conservation are as follows:

3.1. PRINCIPLES

- ✓ a) Environmental protection is an integral part of sustainable development.
- b) The environment and its natural resources can meet the needs of present as well as those of future generations if used sustainably.
- c) All people have the right to benefit equally from the use of natural resources as well as an equal entitlement to a clean and healthy environment.
- ✓ d) Poverty reduction is an indispensable requirement for sustainable development.
- e) Sustainable development and a higher quality of life can be achieved by reducing or eliminating unsustainable practices of production and consumption; and by promoting appropriate demographic policies.
- f) Endogenous capacity building is essential for development, adaptation, diffusion, and transfer of technologies for sustainable development.

- g) Indigenous/traditional knowledge and skills are vital in environmental management and sustainable development.
 - h) Effective public participation is enhanced by access to information concerning the environment and the opportunity to participate in decision-making processes.
 - i) Public participation, including women and youth, is essential in proper environmental management.
 - j) For sustainable development the polluter pays principle should apply.
 - k) Access to judicial and administrative proceedings, including redress and remedy, is essential to environmental conservation and management.
 - l) Private sector participation in environmental management is essential for sustainable development.
 - m) Effective measures should be taken to prevent any threats of damage to the environment, notwithstanding lack of full scientific certainty.
 - n) Peace, security, development, and environmental protection are interdependent and indivisible.
 - o) International co-operation and collaboration is essential in the management of environmental resources shared by two or more states.
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3.2 OVERALL GOAL

✓ *The overall goal is to integrate environmental concerns into the national planning and management processes and provide guidelines for environmentally sustainable development.*

3.2.1. Specific Goals

- a) *To incorporate environmental management and economic development as integral aspects of the process of sustainable development.*
 - b) *To promote maintenance of a quality environment that permits a life of dignity and well-being for all.*
 - c) *To encourage sustainable utilization of resources and ecosystems for the benefit of the present generations, while ensuring their potential to meet the needs of future generations.*
 - d) *To promote maintenance of ecosystems and ecological processes essential for the functioning of the biosphere.*
 - e) *To promote the preservation of genetic resources, biological diversity, their cultural values and their natural heritage.*
 - f) *To incorporate indigenous knowledge, skills, and interests for effective participation of local communities in environmental management and sustainable development.*
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3.3. OBJECTIVES

- ✓ a) To conserve and manage the natural resources of Kenya including air, water, land, flora, and fauna;
- b) To promote environmental conservation with regard to soil fertility, soil conservation, biodiversity, and to foster afforestation activities;
- c) To protect water catchment areas;
- ✓ d) To enhance public awareness and appreciation of the essential linkages between development and environment;
- e) To initiate and encourage well coordinated programmes of environmental education and training at all levels of society;
- f) To involve NGOs, private sector, and local communities in the management of natural resources and their living environment;
- g) To support a coordinated approach to policy formulation on environment matters;
- ✓ h) To ensure all development policies, programmes, and projects take environmental considerations into account;
- i) To ensure that an acceptable environmental impact assessment report is undertaken for all public and private projects and programmes;
- j) To develop and enforce environmental standards; ✓

- k) To enhance, review regularly, harmonize, implement, and enforce laws for the management, sustainable utilization, and conservation of natural resources;
- l) To provide economic and financial incentives for sustainable utilization, conservation, and management of natural resources;
- m) To apply market forces, taxation and other economic instruments including incentives and sanctions to protect the environment and influence attitudes and behaviour towards the environment;
- n) To ensure adherence to the "polluter pays principle"; and, ✓
- o) To develop adequate national laws regarding liability and compensation for the victims of pollution and other environmental damage.

4.0 ENVIRONMENT AND DEVELOPMENT ISSUES

4.1 BIOLOGICAL DIVERSITY

Biological diversity (biodiversity) is all life forms and all life processes on which such life forms depend and of which they are part. Kenya has biological resources that are of considerable domestic and international economic and intrinsic value. The country has about 35,000 known species of animals, plants, and micro-organisms. These are fundamental to human well-being.

The present exploitation rates of many of the biological resources, on which the country's economic development largely depends, is unsustainable. Natural ecosystems that store water, protect the soil, or shelter unique plants and animals have been degraded or converted to other uses. Some introduced species have proliferated and become a threat to indigenous biodiversity.

The maintenance of biological diversity is necessary to sustain and improve agriculture, forestry, fisheries, and wildlife resources. For example, there are a number of indigenous cattle, sheep, and goat breeds in Kenya which have the ability to survive in adverse environments.

Plants play an enormous role in the maintenance of ecosystem balance, enhancing the survival of other living creatures and maintaining healthy habitats. Indeed they form the basis of primary production upon which all other living organisms depend. But the potential value of indigenous flora in Kenya is largely undiscovered. Thus, the potentially beneficial germplasm is largely untapped for its value in agriculture, horticulture, medicine, agroforestry, industry,

etc. Some of this germplasm is faced with extinction, and it is probable that some species will disappear even before they are recorded. Efforts are being made to explore, characterize, and quantify these unique habitats containing rare species which are threatened with extinction.

The main causes of loss of genetic resources and habitats are: ecosystem and habitat degradation and destruction, perturbations of ecological processes including climate change and pollution effects; and unsustainable demand on particular species of commercial and aesthetic value.

Advances in biotechnology have revolutionized developments in agriculture, human health, forestry, and industry. Biotechnology research and development in Kenya is at a rudimentary stage. The reason for this is the lack of qualified scientific capacity, institutional capacity, and financial resources. With adequately trained manpower in biotechnology it will be possible to assess any new biotechnology and determine if it is appropriate for Kenya. Trained personnel will also determine priorities and design research projects which have biosafety considerations. Some imported technology may be hazardous to the environment and health.

4.1.1 Institutional and Legal Arrangements

Institutions currently involved in biodiversity conservation, utilization, and management include the National Environment Secretariat, the National Museums of Kenya, the Kenya Wildlife Service, the Forest Department, the Fisheries Department, Kenya Agricultural Research Institute, and the Department of Resource Surveys and Remote Sensing. Several NGOs are also involved.

4.1.2 Environmental Challenges

These include:

- Uncoordinated policy and institutional arrangement for biodiversity conservation and management
- Inadequate incentives to stimulate local community participation in biodiversity conservation and development
- Absence of a system to measure the economic value of biological resources
- Inadequate inventories of plants and animals, especially those with social, spiritual, aesthetic, economic, and cultural values
- Absence of a comprehensive policy on research and development in biotechnology
- Absence of regulatory mechanisms and guidelines on biotechnology

The Government will endeavour to:

- a) *Coordinate the development and implementation of a national biodiversity strategy and action plan under the ministry responsible for environmental matters;*
- b) *Develop and maintain an inventory of all vital habitats in the country, and create a biodiversity information data base of all plant and animal species, indicating their potential use, and prepare plans for conservation and management of such areas;*

- c) Identify species which are rare and endangered with a view to protecting them from extinction through the establishment, where necessary, of more biosphere reserves, national monuments, nature reserves, national parks and reserves, botanical gardens, arboreta, and through their propagation and captive breeding;
- d) Promote research into all alien species which could threaten biodiversity;
- e) Develop a comprehensive policy on research and development in biotechnology and biosafety;
- f) Formulate scientific criteria for ascertaining biotechnological products that are unsafe for environment and humankind and develop biosafety guidelines for safe use and disposal of genetically modified organisms (GMOs);
- g) Encourage studies on aspects of genetic engineering and biotechnology that are beneficial to humankind, making use of genetic variability within the available raw materials, along with such other technological innovations as may be deemed necessary;
- ✓ h) Encourage the participation of local communities in biodiversity conservation and management; and create incentives for effective conservation of biodiversity by local communities;
- i) Devise means to measure the value of unexploited natural resources, especially biodiversity, in economic terms;
- j) Translate into practical conservation actions the provisions of the international conventions and agreements relating to

- conservation of biodiversity to which Kenya is a party;
- k) Review intellectual property rights as they relate to biotechnology in Kenya. Harmonize legislation to enable the protection of inventions arising from biotechnological activities at both primary and secondary level;
- l) Support research and development of genetic markers for use in tissue typing, mapping genetic diversity in wildlife species, rapid propagation of disease free crops, molecular markers assisted plant breeding; in vitro conservation of germplasm of indigenous and commercial vegetatively grown crops; and genetic conservation and improvement, especially for fish and local varieties of domestic animals; and
- m) Develop human and institutional capacity to identify, study, and develop microbial resources.

4.2 LAND AND LAND-BASED RESOURCES

Kenya has diverse landforms ranging from the coastal plains, the Nyika Plateau to the savanna grasslands and the highlands on both sides of the Rift Valley. The highlands are dominated by Mt. Kenya, the Mau Escarpment, Mt. Elgon, and the Aberdare Ranges. The vast expanse of the North-Eastern Province varies from flat semi-desert in the east to the more rugged country west of Lake Turkana.

Some of the landforms are habitats to rare or unique species of fauna and flora. These habitats include the caves of Chyulu Hills and Mount Elgon, the Mrima-Jombo Hills in Kwale District, and parts of the Indian Ocean coastline, off and on the beaches.

Land is a physical entity that includes wetlands, rangelands, mountains, minerals, and soils. It supports both flora and fauna. These resources interact to provide essential services such as the recycling of wastes and materials, formation of soils, moderation of climate and the water cycle, and the maintenance of the productive capacity of the ecosystem.

Land is the basic capital and resource on which development is based. It provides primary human requirements such as food, fibre and fuel, while supplying raw materials for manufacturing, as well as providing space for human habitation and recreation.

Rising human requirements are placing ever increasing demands on land. Some of these demands often conflict in terms of land use. It is essential to resolve these conflicts and move towards more sustainable use of land and its natural resources.

The Government will endeavour to collaborate with appropriate institutions and groups, and to give priority to promoting efficient use of land and land resources, and to creating mechanisms to facilitate active involvement by all concerned in decision-making. An integrated and coherent approach to planning and management of land resources is essential to sustainable resource utilization.

4.2.1 Agricultural Practices and Land Use

Agriculture contributes about 25% of the Gross Domestic Product (GDP), produces most of the basic food requirements, generates 60% of the foreign exchange earnings and provides about 70% of Kenya's agro-based industrial raw materials and almost all employment opportunities in the rural areas. Medium and high

potential lands constitute about 20 per cent of the country's total land area and have high population densities. These have led to both intensive and extensive farming which is likely to cause depletion of soil nutrients unless appropriate farming practices are employed including the use of manure and judicious use of agro-chemicals.

Land use policies and practices such as introduction of cultivation and new crops and cropping systems, sub-division of land, settlements and related activities, irrigation schemes, and sedentary farming and livestock management have often been promoted with little regard to their impacts on the environment. Their impacts are now being seen in form of widespread land degradation especially in arid and semi-arid lands (ASALs), land use conflicts, unsustainable use of resources, loss of biodiversity, soil erosion, increased incidences of poverty, etc.

4.2.1.1 Soil Conservation

Soil is one of the most important life support systems. The process of soil formation takes many years. However, if not protected, it can irretrievably be lost in a short period of time. It is, therefore, through sound soil conservation and agricultural practices, that this vital resource can be safeguarded from loss and degradation.

Soil degradation is the decline in soil quality. This degradation could be due to mismanagement by various human activities including agriculture, livestock keeping, human settlements, transport infrastructure, industrial activities, as well as physical, biological and chemical processes. In addition, natural disasters such as floods cause soil degradation through erosion and loss of soil nutrients, essential chemicals and fertilizers. The effects of soil erosion are soil

loss, siltation and sedimentation. Adverse effects of siltation on the marine environment include the destruction of coral reefs and other marine resources. Similar effects are observed in other water bodies such as dams and lakes.

The rapid changes from subsistence to a cash economy have had a major impact on the management and conservation of soil. Apathy due to uncertainties associated with land ownership contributes to soil degradation, while intensive cultivation of marginal land often leads to erosion. Land and resource tenure systems vary across the country, depending on climate, the main economic activity, and cultural traditions. Soil conservation practices such as tree planting, construction of gabions and terraces may be delayed or hampered by a lack of security of tenure. There are considerable opportunities for the government, the private sector, non-governmental organizations, and local communities to cooperate in soil conservation programmes.

4.2.1.2 Environmental Impacts

The major impacts on the environment by agriculture are a result of poor land management and agricultural practices. Population pressure, for example, in the medium and high potential areas has induced migration into arid and semi-arid lands where the environment is fragile and crop production risky. The opening up of these lands to arable agriculture often involves the clearing of vegetative cover thus exposing the soil to erosion processes. Where arable agriculture has substituted livestock rearing and wildlife, the result has been low level production and the shifting of livestock to more arid zones where consequent overstocking has led to serious degradation.

The land tenure system and cultural norms relating to land ownership, coupled with a fast growing population, have led to the uneconomic sub-division of land in some areas. These sub-divisions have in turn led to unsuitable management practices. The result is a reduction in the carrying capacity and the degradation of the environment.

The factors influencing sub-division of land and intensive agricultural activities in arid and semi-arid lands (ASALs) have been brought about by the need to change to a cash economy, changing habits and lifestyles, economic expectations, the demands of a rapidly increasing population, and many other modernization forces. The impact(s) of these factors on the environment are expected to intensify. Consequently, it is necessary to assess their impacts on the environment and subsequently implement programmes to mitigate the negative ones.

Chemical fertilizers, pesticides and fungicides are important for the development of agriculture. The use of these agro-chemicals has steadily increased and made positive contribution in raising agricultural production. However, their use has also had severe pollution effects in some cases. For example, in coffee growing areas, the negative effects of certain residue chemicals and fertilizers have been observed in some soil and water systems.

4.2.1.3 Institutional and Legal Arrangements

The ministry responsible for agriculture and livestock development is the lead agency in matters of agriculture. Other major institutions involved in agricultural activities include the Office of the President; the ministries responsible for environmental conservation, natural resources, planning and national development, co-operative

development, research, technical training and technology, local government, energy, lands and settlement, water resources, and related state corporations and parastatals, as well as private organizations.

There exists various legislation for the promotion and management of agriculture. However, the principal legislation is the *Agriculture Act* (Cap 318). The Act provides for development of agricultural land in accordance with accepted practices of good land management and husbandry.

In addition, it provides for the conservation of soil and its fertility. The Act empowers the minister responsible for agriculture to make land preservation rules to regulate, control, and prohibit the clearing of land for cultivation, grazing, or watering of livestock with a view to protecting land against floods, landslides, formation of gullies, soil erosion, or destruction from roads and other infrastructural developments.

4.2.1.4 Environmental Challenges

These include:

- ✓ • Inadequate environmental considerations in the existing policies or legislation
- Overlaps in some existing legislation creating conflicts in law enforcement
- Land uses and agricultural practices which have little environment and resource sustainability, particularly in the ASALs

- ✓ • Inadequate educational programmes on environment, land use, and development.
- Inadequate policies on public participation and involvement in the development and implementation of environmental programmes for land use and agricultural activities in the ASALs
- Inadequate support towards the environment within the institutional arrangements in the field of agriculture
- Apathy with regard to environment and land use zoning policy, implementation and law enforcement
- Implication in some policies that other forms of land use such as conservation of wetlands, and development of indigenous woodlots are not proper land-use forms in themselves
- ✓ • Over-reliance on agro-chemicals that are potentially harmful to the soil and water, especially in cash crop farming
- ✓ • Accelerated soil erosion along river banks and in arid and semi-arid lands
- Policy that does not allow full integration of mixed cropping patterns, including agro-forestry, with certain cash crops

Towards achieving sustainable agriculture and promoting proper environmental management the Government will endeavour to:

- ✓ a) *Promote land tenure systems that enhance agricultural production and sustainable land use;*

- ✓ b) *Provide advice on sustainable land use practices in various agro-ecological zones;*
 - c) *Incorporate environmental concerns in the promotion of land use and agricultural programmes and practices;*
 - d) *Promote educational programmes on environment, land use, and development;*
 - e) *Involve the public in the development and implementation of environmental policies and programmes for land use and agricultural practices, particularly in ASALs, wetlands, and other ecologically fragile areas;*
 - f) *Promote alternative forms of livelihood such as off-farm activities, especially in ASALs, wetlands, wildlife migratory and dispersal areas, and in ecologically fragile areas;*
 - g) *Promote research into and adoption of appropriate land use systems and technology;*
 - h) *Establish mechanisms to monitor and assess the rate and extent of land degradation;*
 - i) *Popularize the use of organic manures in order to improve soil fertility, texture, and moisture; and the use of integrated pest management to combat pests;*
 - j) *Introduce economic incentives and penalties to promote soil conservation practices;*
-

- k) *Review land use policies with a view to enhancing existing policies relating to conservation and management of soil;*
- l) *Strive to achieve self-sufficiency in basic food and raw materials for local agro-based industries and for export as well as productive employment generation;*
- m) *Undertake research on various cropping systems, pest control, chemicals and fertilizer usage, land uses, water conservation, and improved extension services; and*
- n) *Institute land law reform to support sustainable development.*

4.2.2 Forest Resources

Forests cover a very small proportion of Kenya's total land area but they rank high as one of the country's most important national assets. They conserve biological diversity, water, and soil, and are a major habitat for wildlife. They supply forest products and are revenue earners for individuals, communities, the government, the private sector, and the nation as a whole.

The thrust of Kenya's forest policy is to reserve land for forests, protect and conserve forest resources, and promote tree planting for private forestry, commercial purposes, public amenities, and wildlife protection. The policy also endeavours to monitor vegetative cover changes in the arid and semi-arid lands (ASALs) in addition to establishing forest estates using improved germplasm.

Many people depend on forests for firewood, charcoal, and building materials. It has been estimated that the total use of indigenous wood

by the sawmilling industry is below potential sustainable cut from montane forests. Equally, plantation forest potential is under-utilized. The biggest threat to forest resources is poor management practices, including subsidized prices of products and services, poor accounting and auditing, availability of funds, delegation of authority and absence of environmental instruments to assess the impacts of change of use of gazetted forest lands.

Forest land is often required for agriculture, industry, human settlements, and development of infrastructure. These competing land uses have adverse environmental effects on long-term sustainability of forest resources, while continuous excisions have reduced the protected areas.

The destruction of forests is threatening ecological functions. These functions include prevention of soil erosion, protection of water catchments, wildlife habitat and conservation of valuable gene pools of fauna and flora.

Forest loss has negative impacts on agriculture and the tourism industry which are vital to the national economy. It also endangers the nation's water supplies for a large proportion of the population and causes severe siltation problems for the major hydro-electric and irrigation schemes. Excessive deforestation also upsets the carbon dioxide balance in the atmosphere which results in adverse climatic changes such as global warming. The total effect of all these is loss of biodiversity and productive potential of the land.

4.2.2.1 Institutional and Legal Arrangements

The *Forest Act* (Cap 385), is the principal legislation for the conservation, management, and utilization of forests and forest products. The *Timber Act* (Cap 386) on the other hand, regulates the export, sale, grading, inspection, and marketing of timber. The forest resources regulation is also provided for by the *Plant Protection Act* (Cap. 324), the *Seed and Plant Varieties Act* (Cap. 326), and the *Agriculture Act* (Cap 318).

The Forest Department is charged with conservation, management, and utilization of forests and forest products. Besides the Forest Department, the other major institutions include the Kenya Forestry Research Institute, national regional development authorities, the Permanent Presidential Commission on Soil Conservation and Afforestation, local authorities, NGOs, and the private sector.

4.2.2.2 Environmental Challenges

These include:

- Increased pressure to change forest land to other uses such as settlements, agriculture, etc.
 - Over-dependence on forests as major sources of woodfuel, poles and timber, resulting in unsustainable use of forests and other types of vegetative cover
 - Inadequate existing legislation as regards sustainable use of forestry resources
-

- Minimal participation by communities in the management and conservation of forest resources due to the prevailing attitude that forests belong to the state and that communities have no stake
- The need to increase forest area by replanting trees in gazetted forest land and by encouraging agro-forestry programmes
- The need to develop incentives for farmers to practice agro-forestry through appropriate market mechanisms, including charging market prices for products and services from public forests
- The need to make EIA a requirement in all developments and changes affecting forests including excisions
- An implied assumption that forest resources are almost inexhaustible, leading to indiscriminate harvesting without replacement
- The need to involve local communities or to provide legal recognition to communities involved in forest conservation and management
- The increased urban energy demands on forestry
- Inadequate management system for both industrial and indigenous forests

The Government will endeavour to:

- a) *Review the existing Forest Policy;*
- b) *Review the law relating to forestry development;*
- c) *Integrate forest management systems to conserve plant and animal species, and provide forest products for subsistence and commercial needs on a sustainable basis as spelt out in the Forestry Master Plan;*
- d) *Introduce measures to protect and preserve forests that are rich in biodiversity, have aesthetic and cultural values, serve as water catchment areas, and are particularly important to biodiversity conservation e.g: Kakamega, South West Mau/Trans Mara, Mt. Kenya, Shimba Hills, Kaya forests/shrines, Arabuko-Sokoke and Tana riverine forests;*
- e) *Identify and protect important watersheds in forest areas;*
- f) *Increase the total forest area through replanting of trees in gazetted forests, and promotion of agro-forestry practices at the private farm level;*
- g) *Develop and provide incentives for farmers practising agro-forestry through appropriate market mechanisms; and charge market rates for products and services of public forests;*
- h) *Make EIA a requirement in all development projects and programmes affecting forests, including excisions;*
- i) *Encourage sustainable utilization, conservation, and*

management of all forest lands under the County Councils and national regional development authorities;

- j) Promote and manage forest plantations of both exotic and indigenous species in order to increase supply of forest-based products and services;*
- k) Strengthen campaigns to plant trees, including indigenous ones, at private farm level to ensure availability of fuelwood and building materials, and also establish peri-urban forests;*
- l) Provide incentives for farmers and communities with large indigenous tree plantations on their farms to maintain and protect them;*
- m) Encourage development and use of appropriate sources of energy as an alternative to charcoal and wood, supported by an accelerated rural electrification programme;*
- n) Involve local communities and provide legal recognition to communities involved in forest conservation and management;*
- o) Develop and implement appropriate responses on the impacts of urban energy demands on forestry; and*
- p) Develop and implement appropriate management systems for both indigenous and industrial forests in view of the liberalized economic regime.*

4.2.3 Wildlife Resources

Wildlife constitutes an important national resource with substantial socio-economic, cultural, scientific, aesthetic, and environmental values and should be properly managed. The wildlife policy aims at managing and conserving wildlife so as to yield optimum returns in terms of cultural, aesthetic, scientific as well as economic gains. The policy recognizes two types of wildlife conservation areas: firstly, those set aside exclusively for wildlife such as parks and reserves and sanctuaries with no active development and utilization. Secondly, those areas in private, trust, or government lands which have wildlife.

The principal goals are to conserve the natural environments including their fauna and flora; to use wildlife resources sustainably for national economic development and for the benefit of local communities living in wildlife dispersal areas; and to protect people and property from injury or damage from wildlife.

Some wildlife populations declined by about one half between 1975 and 1993. The decline is largely attributed to increased human demand on land for settlement, agriculture, and livestock, within wildlife dispersal areas and migration corridors. This has heightened conflicts with wildlife conservation and management. The national parks, under the direct jurisdiction of the Kenya Wildlife Service (KWS), cover about 5 per cent of the country's total land surface, equivalent to 62 per cent of the protected areas. However, about 90 per cent of the country's biological diversity is found on lands vested in other government agencies, local authorities, or private ownership, none of which has a national mandate to conserve wildlife.

Optimal conservation of biological diversity, including wildlife migrating in and out of national parks and reserves, can be achieved if relevant agencies and local communities are involved in the management and utilization of biological resources. In certain ecological zones, wildlife conservation and management offers an ideal economic activity through tourism, including opportunities for consumptive utilization. There is, therefore, need to establish an optimal balance between devoting such lands entirely to wildlife, and demand for other human activities.

4.2.3.1 Institutional and Legal Arrangements

The current wildlife policy of Kenya was published as Sessional Paper No. 3 of 1975, and modified by the Kenya Wildlife Service Policy Framework 1991-96. Various international conventions, to which Kenya is a signatory, have further modified national policy on wildlife. Among these conventions are the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (C.I.T.E.S), the 1968 African Convention on the Conservation of Natural Resources, and the 1992 Convention on Biological Diversity.

The Kenya Wildlife Service is the only institution legally mandated to conserve and manage wildlife throughout the country. It has the sole jurisdiction of national parks and assists local authorities in managing game reserves, and plays a regulatory role in the management of private wildlife sanctuaries. The Department of Resource Surveys and Remote Sensing collects population data on wildlife; while the universities and non-governmental organizations play various roles in the study and management of wildlife. The Government encourages the work of private organizations in wildlife conservation and management.

KWS has no control over land use changes outside the national parks, including the game reserves under the jurisdiction of local authorities. In recognition of these constraints and challenges affecting conservation of wildlife the Government will review and up-date the wildlife policy and legislation.

The *Wildlife Management and Conservation Act* (Cap.376) mandates the Kenya Wildlife Service to manage and conserve wildlife. The Forest Department administers forest reserves which contain wildlife. Under a joint Memorandum of Understanding (MoU) the Kenya Wildlife Service manages wildlife in these forest areas.

4.2.3.2 Environmental Challenges

These include:

- Inadequate legal mechanisms for management of wildlife outside protected areas
- Ineffective management of wildlife populations that has often led to ecological imbalances resulting in habitat degradation
- Land sub-division in wildlife dispersal areas that has led to the destruction of wildlife habitats
- Inadequate incentives for wildlife conservation by communities in wildlife dispersal areas and migratory corridors
- Inadequate land use policies, especially control of land use changes and human activities on land with multiple uses

- Absence of protection for certain biotic/ecological communities that are rich in biodiversity (e.g. marine beaches and dunes, highland grassland, evergreen and semi-evergreen bushland)
- Absence of a comprehensive land use policy that has led to the reduction of important dispersal areas vital for the conservation of wildlife resources
- Absence of a comprehensive policy for the resolution of conflicts between wildlife, pastoralism, and other land uses

The Government will endeavour to:

- a) Review the wildlife policy and legislation;*
- b) Involve local communities and other users in wildlife conservation and management and develop mechanisms that allow communities to benefit from wildlife earnings;*
- c) Establish zones that permit multiple-use management of wildlife;*
- d) Harmonize different wildlife development and conservation activities in protected and dispersal areas;*
- e) Strengthen research capacity and use of technology aimed at enhancing conservation and management of wildlife; and*
- f) Assess the status of all vital wildlife habitats in the country and prepare management plans for their conservation and management.*

4.2.4 Wetlands

Wetlands in the country include swamps, deltas, bogs, flood plains, areas bordering water bodies such as mangrove forests, riverine ecosystems, lake shores, estuaries, coral reefs, and marine mud-flats which have moisture part of the year. The functional role of wetlands as an ecosystem in the environment is important, but is not fully appreciated. They are very productive ecosystems whose biomass production potential can be rewarding if utilized sustainably. Their multiple contributions include recharge, storage, and discharge of ground water; provision of nutrients that sustain primary productivity forming the basis of food chains; acting as filters of polluted water and silt; etc.

Wetlands are utilized on both seasonal and long-term basis through grazing, direct harvesting of plant material, and fishing. They form important habitats for fish breeding as well as other forms of life. They are major water sources for industrial, domestic, livestock, and agricultural uses and also function as natural water reservoirs and regulators as well as providing opportunities for recreation, tourism, and cultural ceremonies.

Soils in wetlands, being fertile and well-watered, have potential for agriculture and consequently present a case for their reclamation. However, wetland reclamation can have far reaching adverse environmental effects. It can increase the severity of droughts and floods, result in loss of biodiversity, and can affect soil characteristics, as well as community practices and survival. Wetlands threatened with reclamation include the Yala swamp and Kisii river valley bottoms.

Kenya is a signatory to the Ramsar Convention on wetlands conservation and management and has set aside Lakes Nakuru and Naivasha as Ramsar Sites.

4.2.4.1 Institutional and Legal Arrangements

Currently, there is no comprehensive policy and legal instruments on wetlands. The Ministry of Environmental Conservation through the Inter-Ministerial Committee on Environment (I.M.C.E) is responsible for coordination, advisory and policy development on wetlands issues. Other institutions involved in the conservation and management of wetlands include the the Water Conservation Board, the Kenya Wildlife Service, National Museums of Kenya, national regional and local authorities and non-governmental organizations.

4.2.4.2 Environmental Challenges

These include:

- Lack of a comprehensive national policy for management and conservation of wetlands
- Inadequate institutional arrangements, especially a lead institution legally mandated to develop and manage wetland resources
- Land use activities that threaten sustainable utilization, conservation, and management of wetlands resources
- Absence of integrated management plans suitable for sustainable multiple use of wetlands

The Government will endeavour to:

- a) *Formulate a national policy on the management and conservation of wetlands;*
- b) *Harmonize institutional arrangements for wetlands;*
- c) *Develop integrated management plans for sustainable and multiple use of wetlands;*
- d) *Establish and maintain an inventory of wetlands that identify, map, and describe existing wetland resources;*
- e) *Promote community participation in wetlands conservation and management and incorporate obligations and privileges under international treaties, covenants, and agreements;*
- f) *Institutionalize environmental impact assessment for all, programmes, and projects in wetlands; and*
- g) *Strengthen the study of the ecology of wetlands.*

4.2.5 Rangeland Resources

About 80% of Kenya's land area is classified as rangelands which is characterized by scanty and unreliable rainfall. The rangeland resources are enormous but the ecosystems are fragile requiring appropriate management strategies to ensure sustainable productivity. Animal production through pastoralism and wildlife management is the main form of land use.

The rangelands carry over 25% of the total human population, support more than a half of the total livestock population and a large number of various species of wildlife. These wildlife species and the human population have co-existed without adverse effects on the range resources for a long time. However, recent management practices have led to a gradual degradation of the ASAL areas mainly through increased wildlife and livestock numbers beyond the land's carrying capacity. This overstocking has consequently led to overgrazing thus lowering their productive capacities. Loss of vegetative cover has exposed vast areas to unfavourable conditions resulting in soil erosion thus triggering the desertification process. Further, lack of vegetative cover reduces water recharge into subsurface rock formations.

Policies on rangelands have focussed mainly on livestock development. These have promoted development of group ranches, company or co-operative ranching as well as communal grazing lands. Current initiatives recognize the changing land use patterns and practices including sub-division of group ranches, crop cultivation and other land use practices and aim to promote sustainable utilization and management practices such as afforestation, integrated wildlife and livestock management while providing deterrents to practices that are destructive to the environment.

4.2.5.1 Institutional and Legal Arrangements

The overall policy formulation for rangelands is under the ministry responsible for ASAL development. Other institutions involved are Office of the President, ministries responsible for planning and national development, environmental conservation, natural resources, Department of Resource Surveys and Remote Sensing as well as

national regional development authorities, local authorities, universities, NGOs, the National Museums of Kenya, and local communities.

4.2.5.2 Environmental Challenges

These include:

- Uncoordinated policy and institutional arrangements for rangeland resource management
- Absence of clear policies to support traditional land use practices
- Unsuitable land use practices, including cultivation on slopes and on fragile soils especially in ASALs
- Conflicts arising from land use practices such as agriculture, wildlife, and settlement programmes
- Absence of policies and legislation for managing land use change in rangelands
- The need for policies and regulations for sustainable management of lands under multiple uses

The Government will endeavour to:

- a) *Develop a comprehensive policy on rangeland resources management;*
- b) *Review and strengthen legislation and regulations pertaining*

to allocation, demarcation, and ownership over rangelands in order to protect the environment;

- c) Institute measures to manage livestock and wildlife populations to within the carrying capacity of the land;
- d) Discourage inappropriate conversion of ASALs into agriculture;
- e) Promote environmentally friendly farming techniques;
- f) Promote integration of wildlife and livestock management;
- g) Promote wildlife utilization as an alternative form of livelihood;
- h) Encourage and support traditional land use practices that are environmentally friendly, such as pastoralism;
- i) Make EIA a requirement for all land use changes and activities;
- j) Facilitate provision of water for livestock, wildlife, and domestic use and develop management techniques for them which incorporate environmental considerations;
- k) Formulate policies and regulations for sustainable management of lands under multiple uses;
- l) Encourage agroforestry and planting of trees suited to ASALs;
- m) Encourage collaborative efforts between government, local communities, and NGOs in the development of ASALs; and

- n) Promote research for understanding the interaction between the fauna and flora and other abiotic components in the rangelands in order to utilize them while maintaining the ecological balance.

4.2.6 Land Degradation, Drought and Desertification

Desertification is defined as "land degradation in arid, semi-arid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities." Drought is "the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels causing serious hydrological imbalance that adversely affects land resource production systems."

The ASALs comprise about 80% of Kenya's total land area while the remaining 20% are classified as high potential. There is evidence that ASALs are suffering from an increased rate of desertification and frequent drought. This situation is further exacerbated by the increasing needs of a rapidly growing population.

Studies have shown that droughts are part of the history of this region - a cyclical reality whose regularity is not clear. Droughts reduce availability of food, affect water resources, reduce incomes, increase poverty incidence, cause human and livestock deaths, and accelerate rate of land degradation.

The consequences of desertification are loss of productivity of the land, reduced animal productivity, ecological disruption, increased frequency of drought, loss of genetic diversity, degradation of water resources, and increased atmospheric dust. Desertification leads to

migration of people, social dislocation, social distress and unrest, poor health and quality of life.

4.2.6.1 Institutional and Legal Arrangements

There are numerous institutions addressing issues of desertification and drought. They range from local grassroots institutions (religious organizations, women and youth groups, and group ranches, etc.) local NGOs, government ministries, to international organizations. These institutions look at the problems from a narrow perspective depending on their specific area of interest and mandate.

4.2.6.2. Environmental Challenges

These includes:

- Absence of a national policy on drought and desertification management
- Inadequate scientific and technological knowledge on the status of desertification
- Inadequate capacity and funds to assess and map desertification
- Weak drought monitoring and early warning systems
- Uncoordinated institutional arrangement for addressing issues on desertification and drought

The Government will endeavour to:

- a) *Formulate a drought preparedness policy;*
- b) *Strengthen current drought preparedness and recovery programmes and introduce them in areas where they do not exist;*
- c) *Create awareness on the impact of drought and desertification and introduce adaptive and mitigating measures through training, outreach programmes, and seminars;*
- d) *Develop drought and desertification monitoring and early warning systems;*
- e) *Develop a national monitoring programme with district components to assess trends. These assessments will include socio-economic data and documentation of indigenous knowledge systems and technologies applied in drought and desertification management;*
- f) *Create a national drought and desertification management fund;*
- g) *Build capacity and strengthen, harmonize, and coordinate all programmes for assessing and monitoring desertification; and,*
- h) *Encourage land management techniques which promote sound environmental management, while providing deterrents to practices which adversely impact on the environment.*

4.2.7 Mountain Ecosystems

Mountain ecosystems are an important source of water, biological diversity, and key resources such as forests, and agricultural products. They also offer recreational opportunities for tourism. However, human activities adversely affect these ecosystems which are rapidly changing as they are susceptible to accelerated soil erosion, landslides, and rapid loss of habitat and biological diversity. Hence, proper management of mountain resources deserves immediate attention.

There are two broad mountain/highland systems in Kenya: the highlands to the east of the Rift Valley and those to its west. Prominent mountains/highlands found east of the Rift Valley include Mount Kenya, the Aberdare Range, Taita Hills, Shimba Hills, Iveti Hills, Mua Hills, Mbooni Hills, Ngong Hills, Chyulu Hills, the Nyambene Hills, Mount Marsabit, and the Nyiru-Ndoto and Mathews Ranges; while those to the west of the Rift Valley include Mount Elgon, the Cherangani Hills, Nandi Hills, Tugen Hills, Loita Hills, the Mau Escarpment, Seker, Loima, and Mogilla Hills.

Mountain soils are mainly influenced by topography, climate, and vegetation cover. Land use practices such as cultivation, grazing, logging, human settlements, and associated infrastructure including roads have contributed significantly to soil erosion.

Cultivation, logging, and to some extent overgrazing have reduced vegetation cover. In some cases, habitats for certain plant and animal species have been grossly interfered with and degraded. Consequently, some species are either threatened or have become extinct. Furthermore, removal of vegetation reduces infiltration capacity which subsequently increases runoff and soil erosion, reducing

stream flows, as well as adversely affecting biodiversity.

Mountains/highland ecosystems influence climate and are main water catchment zones. Interference with these ecosystems can have major impacts on land productivity, water availability, biodiversity, as well as the quality of the environment.

4.2.7.1 Institutional and Legal Arrangements

Currently, there is no comprehensive policy and legal instruments on mountain ecosystems. There is also no institution mandated to manage mountain ecosystems.

4.2.7.2 Environmental Challenges

These include:

- Absence of a comprehensive policy and legislation on sustainable management of mountain ecosystems
- Absence of an institution mandated to provide leadership in the sustainable management of mountain resources and ecosystems
- Absence of an inventory on mountain ecosystems
- Unsuitable land use activities that threaten mountain ecosystems
- Absence of integrated management plans for mountain ecosystems

The Government will endeavour to:

- a) *Develop a policy on sustainable management of mountain ecosystems;*
- b) *Establish and strengthen an institution to manage mountain ecosystems*
- c) *Devise programmes aimed at generating and strengthening scientific knowledge about the ecology and sustainable development of mountain ecosystems;*
- d) *Develop and maintain an inventory of mountain ecosystems;*
- e) *Strengthen existing institutions to generate a multi-disciplinary land/water ecological knowledge base on mountain ecosystems and identify environmentally sensitive areas that are most vulnerable to erosion, floods, landslides; and*
- f) *Promote integrated watershed development programmes along mountain slopes and forested areas, with the participation of local people, to prevent further damage.*

4.2.8 Mineral Resources

There are over 400 mineral occurrences that have been identified in the country. Mineral resources are widely distributed all over the country and are found and exploited from national parks, river beds and channels, highways and urban areas, ranches and farm forests, trustlands, government lands, lakes and coastal areas and the ocean, including in the exclusive economic zone (EEZ).

Minerals obtained are used as basic raw materials in the industrial sector involving chemical, building and construction, agriculture, ceramics, metal and engineering, gemstones and jewellery. Those of economic significance include soda ash from Lake Magadi, fluorspar from Kerio Valley, and limestone in Mombasa and Athi River for cement production. Additionally, salt extraction, sand harvesting, and quarrying have caused significant damage to the environment. In particular, mangrove ecosystems are threatened by salt extraction.

The overall goal of mineral development policy is to ensure that the nation derives maximum benefits from its mineral resources through rational exploitation of these resources while occasioning minimum environmental degradation. The role of the government is to promote, encourage, and regulate private investment into the mineral sector by providing basic geological data and necessary fiscal incentives.

Development of mineral resources impact on the environment. Exploration and exploitation create excavations that degrade the land and lead to loss of biodiversity and emit dust which pollute the air. Mineral processing discharges effluents which pollute ground and surface water.

The Rift Valley system that stretches from the Red Sea to Mozambique passes through Kenya dividing it into two parts. Its western arm goes through western Uganda and Tanzania. The Rift Valley has proved beyond doubt that it is one of the most seismically active regions in the world. The strong earthquakes at Subukia on 6 January 1928 (M=7.1), Tororo on 2 March 1966 (M=7.0), and Lake Tanganyika on 13 December 1970 (M=7) were associated with the Rift Valley. Fortunately, due to the relatively low populations in the areas where they occurred, the damage caused to life was minimal. In view of the

high seismicity associated with the Rift Valley in the East African region and Kenya in particular, it is important to establish a National Seismological Network whose primary objective is to monitor seismicity and advise the Government on mitigation measures.

4.2.8.1 Institutional and Legal Arrangements

The principal legislation regulating mining activities is the *Mining Act* (Cap. 306) administered by the Mines and Geology Department. Other provisions affecting mineral development are found in fiscal policy instruments. National regional authorities and local governments play a role especially in quarrying. Exploitation is mainly done by private sector.

4.2.8.2 Environmental Challenges

These include:

- Inadequate in-built environmental considerations in existing policies and legislation
- Inadequate funds to rehabilitate mined areas
- Insufficient regulations to require mining enterprises or bodies to rehabilitate mined areas
- Inadequate capacity to monitor environmental impacts of mining
- Absence of a comprehensive policy and legislation on the monitoring of seismicity

- Uncoordinated institutional arrangements for monitoring seismicity
- Inadequate capacity (personnel and equipment) to monitor seismicity
- Inadequate natural hazards consideration in the existing policies and legislation
- Lack of policy and legislation in areas of building codes to prevent development of unstable hazardous areas.

The Government will endeavour to:

- a) *Review mining legislation to incorporate environmental considerations, particularly environmental impact assessment;*
- b) *Provide various types of incentives and sanctions to encourage the use of environmentally friendly technologies in mineral prospecting, exploration, and exploitation;*
- c) *Make performance bonds a requirement for all mining activities to ensure restoration of mined areas;*
- d) *Promote environmentally friendly mining practices by encouraging the following activities:*
 - *Monitor geological hazards such as earthquakes and volcanic activities which may affect the environment,*

- *Ensure that the principles of sound environmental management are adhered to,*
- *Complete and up-date registration of all mining, quarrying and geological activities in the country, including the possible impacts of their activities on the environment,*
- *Maintain and continuously up-date the mineral inventory of the country,*
- *Strengthen institutional capacity for monitoring and managing environmental impacts of mining activities.*

4.3 WATER RESOURCES

Drainage systems in Kenya consist of the rivers draining to the Indian Ocean, to the Rift Valley, and to Lake Victoria. The main rivers draining to the Indian Ocean are Tana, Athi-Tsavo, and the Ewaso Nyiro that becomes subterranean after the Lorian Swamp.

The Rift Valley forms an internal drainage system that has no outlet to the sea. The lakes in the basin have high mineral content, a result of evaporated water. Salinity is highest in Lake Magadi. Other lakes in the Rift Valley basin are Naivasha, Elementeita, Nakuru, Bogoria, Baringo, and Turkana. The major rivers that drain to Lake Turkana are Turkwel and Kerio. To the west of the Rift Valley is the Lake Victoria drainage basin, drained by rivers Nzoia, Yala, Nyando, Migori, Mara, etc.

Water is vital for the sustenance of all life. In Kenya the estimated surface water potential (lakes, wetlands, rivers) is 19,590 million

cubic metres, which represents about 18% of the national annual rainfall. The estimated annual groundwater potential is 619 million cubic metres, 31% of which is in deep seated aquifers, exploitable through boreholes, and 69% is located in shallow aquifers exploitable through shallow wells.

Access to water and its availability for socio-economic and ecological demands are primarily influenced by its quantitative distribution in space and time and also by its quality. The distribution country-wide varies from one drainage basin to another. The surface runoff and groundwater recharge rates are influenced by variation in rainfall intensity, soil types, vegetation cover, and presence or absence of wetlands.

Provision of potable water and water for sanitation is viewed as being central to satisfying basic human needs. Water pollution contributes to increased incidences of water-borne diseases and reduced fish yields and threatens biodiversity. There have been cases of severe local pollution, particularly where there are intensive industrial, agricultural, or human settlement activities.

Soil erosion is a major problem in many river catchment areas. This has direct impact on the water quality and the life of reservoirs and irrigation channels and the life of aquatic ecosystems.

Flooding is a recurring problem affecting areas like the Lake Victoria basin, and the Tana River basin. Flood control, therefore, is a priority concern because of the frequency and the magnitude of the damage that floods cause. On the other hand, some ecosystems and economic regimes depend on seasonal flooding.

Kenya lakes include part of Lake Victoria, Africa's largest fresh water lake. Most other lakes are within the Rift Valley, among them, Lakes Turkana, Naivasha, Nakuru, Baringo, Bogoria, Elementaita, and Magadi. Many of the lakes in the Rift Valley are small and/or alkaline to some extent, and therefore unsuitable for use in agriculture or for domestic water needs. The levels of these lakes and their volumes fluctuate periodically. Pollution by agro-chemicals, industrial and municipal wastes, reduced water inflow and siltation are the greatest threats to these lakes.

Current water development programmes focus almost entirely on water delivery, with little concern for demand management and conservation. Water resources have an extremely high economic value. Mechanisms for managing and conserving water could result in economic benefits as well as sustainable use of this vital resource.

4.3.1. Institutional and Legal Arrangements

Management of water resources in Kenya is governed by the *Water Act* (Cap. 372) and is administered by the Water Apportionment Board. The ministry responsible for water development is the overall authority charged with planning and managing of water resources. Other major players in the water sector are the National Water Conservation and Pipeline Corporation, national regional development authorities, the National Irrigation Board, local authorities, NGOs, religious bodies, and women's groups.

4.3.2 Environmental Challenges

These include:

- Absence of comprehensive legislation on water quality and effluent standards
- Inadequate policy guidelines for managing floods
- Absence of provisions for environmental impact assessments on water projects and programmes
- Absence of guidelines delineating institutional responsibilities
- Inadequate environmental requirements in the *Water Act*, for example in the management of wetlands
- Inappropriate agricultural practices which have led to contamination of water courses and bodies through excessive use of agricultural pesticides and fertilizers
- Inappropriate technologies for disposal of municipal liquids and solid wastes
- Inadequate policy incentives and mechanisms for promoting sustainable management and conservation of water resources including harvesting of surface water

The Government will endeavour to:

- a) *Revise the existing legislation relevant to water resources, waste water, and solid or refuse disposal and agricultural practices with a view to improving water quality. Emphasis will be placed on optimum usage, storage, conservation, and re-cycling of water;*
- b) *Encourage industrialists through incentives and penalties to install pollution control and water re-cycling technologies;*
- c) *Formulate guidelines and establish standards;*
- d) *Monitor compliance by water undertakers and industrialists alike;*
- e) *Protect the country's marine environment from oil spillage and waste dumping;*
- f) *Protect water catchment areas through conservation and management laws;*
- g) *Provide incentives for rain water harvesting;*
- h) *Prioritize water allocation in quantity and quality according to domestic, commercial, industrial, and agricultural needs, and for sustenance of the environment; and*
- i) *Charge realistic rates for water usage and sewage discharge.*

4.4 FISHERIES AND MARINE RESOURCES

Fisheries contribute significantly to the country's economic and nutritional development. Fresh water fish resources dominate Kenya's fish production.

Fisheries resources in fresh water have been overharvested in many areas especially in lakes. In fact, catch per fishing effort has been dropping indicating that the maximum sustainable yield is below the present level of exploitation. Furthermore, introduction of exotic fish species has similarly altered the food-web structure in major lakes and this has led to a dramatic decline in diversity of indigenous fish species. Other factors which have affected the status of fresh water lakes and riverine fisheries include over-fishing and harvesting of brood stocks, destruction of fish habitats, siltation, pollution, and water hyacinth infestation.

Coastal and marine resources have tremendous potential for tourism and industry and shelter great biodiversity. Coastal and marine fisheries resources have experienced over-exploitation due in part to over-fishing by foreign trawlers. Over-harvesting of mangrove trees, and pollution of coral reefs, beaches, and other marine resources has been observed in many parts of the coastal region.

Kenya is party to a number of the international treaties, conventions, and protocols related to the management and conservation of both shared fresh water fisheries and marine resources, especially in the exclusive economic zone.

4.4.1 Institutional and Legal Arrangements

Currently, several organizations are involved in the management and

use of fisheries and marine resources. They include ministries responsible for water development, wildlife, fisheries, forests, environment and natural resources, tourism, transport, industry, research, national regional development authorities, and local authorities. The Kenya Marine and Fisheries Research Institute (KMFRI) and the National Museums of Kenya plays significant roles in fisheries research. These institutions often have overlapping mandates and operate under different legislation.

The statutes used to manage fisheries and marine resources include the *Water Act* (Cap 372), the *Wildlife (Conservation and Management) Act*, (Cap 376), the *Fisheries Act* (Cap 378), the *Local Government Act* (Cap 265), and the statutes governing national regional development authorities, especially the *Coast Development Authority Act* (Cap 449), and the *Lake Basin Development Authority Act* (Cap 442).

4.4.2 Environmental Challenges

These include:

- Inadequate policy guidelines and legal instruments for sustainable exploitation of fisheries and marine resources
- Conflicts between the needs of tourism, industry, commerce, settlement, fishing, and biodiversity conservation in coastal areas
- Inadequate capacity to conduct research on fisheries, marine, and coastal resources.
- Inappropriate fishing and storage technologies

- Inadequate mechanism for management of exotic species
- Inadequate capacity for managing fisheries and marine environment
- Absence of policies that support local artisanal fishing interests in the sustainable utilization of marine and fisheries resources
- Insufficient capacity to monitor, contain, and clean up oil spills

The Government will endeavour to:

- a) *Develop an integrated fisheries management plan;*
- b) *Develop a fresh water and marine resources management strategy;*
- c) *Review the roles and mandates of the various institutions empowered to manage the coastal and marine resources as well as fisheries in fresh water;*
- d) *Develop an integrated coastal and marine management plan to address biodiversity, water resources, tourism, pollution, human settlement, and industrial development;*
- e) *Encourage and promote participation of local communities in the exploitation and sustainable management of fisheries and marine resources; and*
- f) *Strengthen the capacity to respond to oil spills in coastal and marine areas.*

4.5 ENERGY RESOURCES

Energy is an essential input in the productive process of the economy and is regarded as a lubricant to the development process. Woodfuel is a major source of household energy and accounts for about 73% of total energy demand. The harvesting of woodfuel leads to deforestation and therefore is of great importance in terms of environmental consideration.

The country's energy demand is expected to grow at the rate of about 4.4 per cent per annum. Growth will be highest in woodfuel, petroleum fuels, electricity and lowest in coal. The estimated current annual supply of woodfuel is 18.7 million tonnes out of which about 28 per cent comes from gazetted forests. Due to the growing population and slow rates of reforestation, the demand for woodfuel could make forest resources exploitation unsustainable. It is necessary to protect these forest resources from over-exploitation by adopting and promoting energy conservation measures, including using economic incentives such as tariffs and pricing.

Kenya's petroleum products are mainly imported in crude form for refining at Mombasa. Environmental impacts include oil spillage and fire which may arise during transportation and storage. Spillage of oil from tankers (accidentally or otherwise) and ships adversely affects marine resources. There are also risks of air pollution from the processes of oil refining and combustion of fuels, especially in thermal generation and vehicles.

The main sources of electrical energy are hydro- and geo-thermal generation. Hydroelectric power generation is renewable and generally clean. However, damming of valleys causes negative

impacts such as displacement of local communities and interruption of their socio-economic activities, loss of biodiversity in flooded valleys, breeding grounds for disease vectors, and disruption of hydrological systems. Hydroelectric schemes also result in reduced downstream flows and flooding, with serious negative impacts particularly on riverine forests in dry areas and on the pastoral populations which are dependent on these resources for dry season browse, as well as cropping systems which depend on silt deposited by floods. The negative environmental impacts of geothermal energy development include carbon dioxide and hydrogen sulphide discharge to the atmosphere.

Other alternative sources of energy include biogas, solar, and wind energy. Their use have little or no adverse effects on the environment and their current potential have not been tapped to any significant extent.

4.5.1 Institutional and Legal Arrangements

Currently, there is no comprehensive policy and legislation to promote, regulate, and coordinate development and institutions involved in energy development.

The ministry responsible for energy is mandated to develop and coordinate energy policy formulation. The mandate includes regulation of the activities of energy sector agencies such as the KENGEN, the Kenya Power Company, the Kenya Petroleum Refinery, the National Oil Corporation of Kenya, the Kenya Pipeline Company, NGOs, and private sector organizations. The statutes used to manage the energy sector include the *Electric Power Act* (Cap 314), the *Petroleum Act* (Cap 116), and the *Petroleum*

(Exploration and Production) Act (Cap 308).

4.5.2 Environmental Challenges

These include:

- Construction of dams which cause destruction of vegetation, displacement of people and wildlife, loss of farmland, increased incidences of water-borne diseases, reduced downstream flows which affect dry season browse as well as cropping systems which depend on silt deposited by floods, and/or the inundation of important ecological systems
- Inadequate incentives for energy conservation
- Pollution by geothermal and thermal power stations and sea and road transport
- Unsustainable utilization of forest resources especially woodfuel
- Inefficient use of end technologies
- Insufficient use of solar and other alternative energy sources

In order to incorporate environmental concerns in the energy sector, the government will endeavour to:

- a) *Develop comprehensive energy policy and legislation incorporating environmental concerns;*
- b) *Make EIA a requirement for all energy projects and programmes, especially for hydroelectric, thermal and geothermal activities*

as well as those requiring wood;

- c) *Promote widespread adoption of energy efficient technologies;*
- d) *Provide economic incentives for energy conservation and encourage private investments in energy developments including alternative sources of energy; and*
- e) *Encourage research in energy conservation and end-use technologies.*

4.6 ATMOSPHERIC RESOURCES

Air is a vital life support resource for living organisms. Its quantity and quality is a major life determinant for plants, animals, and micro-organisms. About 78% of the air is nitrogen while 21% is oxygen. Other constituents include argon, carbon dioxide, neon, helium, krypton, xenon, hydrogen, methane, nitrogen oxide, and ozone. Often atmospheric resources are assumed to be unlimited as well as being safe receptors of various actual and potential impurities.

The important gaseous pollutants are carbon monoxide, hydrocarbons, hydrogen sulphide, nitrogen oxide, sulphur oxides and fluorides. Major sources of air pollution are domestic cooking and heating, electric power generation, refuse burning, industrial and vehicle fuel consumption and emissions, and industrial by-products. These pollutants are injurious to living things and property when they exceed certain levels. Gaseous emissions are often made more harmful by synergism.

Increasing atmospheric concentrations of various gases such as

chlorofluorocarbons and methyl bromide have contributed to the depletion of the ozone layer; while others threaten to bring about climatic changes including global warming, with consequences which are detrimental to life on earth. Kenya is a party to international efforts with regard to protection of the ozone layer and the control of "greenhouse gases".

Greenhouse gases in the atmosphere are increasing rapidly and disrupting the earth's radiative balance. This could result in dramatic climate changes with significant effects, particularly in the arid and semi-arid lands where rainfall is very variable and unreliable. Additionally, the rise of the sea level as a result of global warming could adversely affect coastal settlements, agricultural activities, the beaches, and infrastructure along parts of the coastal strip.

4.6.1 Institutional and Legal Arrangements

Though Kenya is a signatory to the Convention on Climate Change, there is inadequate legislation on the standards or management of air quality. Management is shared by a number of institutions who administer it from their sectoral concerns. This leads to ineffective enforcement of existing rules and regulations, exacerbated by lack of funds for adequate administration and technical capacity.

4.6.2 Environmental Challenges

These include:

- Absence of a comprehensive policy and supporting legislation for controlling atmospheric pollution and air quality

- Absence of an inventory of sources of gaseous emissions
- Inadequate information on characteristics of gases emitted and their impact on the environment, human health, and climate
- Inadequate emission standards and regulations
- Underdeveloped early warning systems and mitigation options on the dangers of gaseous emissions and their management
- Inadequate institutional capacities and coordination

The Government will endeavour to:

- a) *Formulate a comprehensive policy on the management of atmospheric pollution and air quality;*
- b) *Establish emission standards and regulations for gaseous emissions and particulate matter;*
- c) *Strengthen research and monitoring capacity for managing air quality;*
- d) *Develop and maintain an inventory of greenhouse gases and mitigating and control measures;*
- e) *Undertake impact assessment on climate change and its implications;*
- f) *Co-operate in global studies on climate change as part of Kenya's commitments and obligation to the Convention on Climate Change; and*

- g) *Establish and strengthen an institution to deal with air pollution control and management.*

4.7 WASTE MANAGEMENT

Wastes are either solid, liquid, or gaseous and can be categorized as domestic, industrial, agricultural, and municipal. The rapid population growth has increased demand for urban, agricultural, and industrial activities, thus leading to generation of vast amounts of waste into the environment.

Hazardous wastes have properties which include being radioactive, toxic, explosive, corrosive, flammable, infectious, or other characteristics causing or likely to cause danger to human health or the environment, whether alone or together with other wastes.

Inadequate management of solid wastes and effluents can have devastating and often irreversible effects on the environment. Wastes emanating from industries and factories in the form of effluents tend to find their way into waters and soils, thereby making them less habitable for living organisms. Solid wastes disposed of in open dumps or crude sanitary landfills are health hazards.

4.7.1 Institutional and Legal Arrangements

Currently there is no comprehensive policy and legislation on waste management. However, there are various pieces of legislation dealing with the management of wastes. The statutes include the *Water Act* (Cap 372); the *Public Health Act* (Cap 242); the *Pests Control Products Act* (Cap 346); the *Radiation Protection Act* (Cap 243); the *Mining Act* (Cap 306) and the *Factories and Other Place of Work Act* (Cap 514). These are implemented by various ministries

and local authorities. The implementation is however not effectively harmonized and thus they do not provide for efficient management.

The management of both solid and liquid wastes lies primarily with local authorities. Other institutions include ministries responsible for health, water resources and environmental conservation. The management of hazardous pollutants at the workplace is the responsibility of the Directorate of Occupational Health and Safety Services. In addition, NGOs and local communities play an important role.

4.7.2 Environmental Challenges

These include:

- Weak enforcement of existing laws and regulations, unrealistic penalties, inadequate human resources to monitor and enforce regulations, and cumbersome procedures
- Absence of discharge standards and methods for measuring the quality and quantity of effluents
- Inadequate incentives to encourage adoption of efficient waste management technologies
- Insensitivity of industry to the legal requirements for health and safety in the workplace
- Low priority and status given to waste management and sanitation

- Inadequate training facilities for occupational health and safety services
- Inadequate disposal equipment, sites, and infrastructure

The Government will endeavour to:

- Develop a comprehensive waste management policy, guidelines, and standards;*
- Review and harmonize existing laws on waste management;*
- Strengthen institutional capacities, including research and technologies for waste-minimization;*
- Review legal penalties with a view to making them more deterrent;*
- Encourage re-use and recycling of residues including used water and the use of low and non-waste technologies; and enhance implementation;*
- Promote the use of economic incentives such as taxes to encourage adoption of environmentally friendly technologies;*
- Enhance regional and international co-operation with a view to increasing bilateral information exchange on the control and management of wastes; and*
- Plan and implement a national awareness programme on the management of wastes to inculcate appropriate attitudes and*

values necessary for positive environmental management.

4.8 MANAGEMENT OF TOXIC AND DANGEROUS CHEMICALS

Chemicals are essential commodities for industrial development. The chemical industry manufactures various primary chemicals used for making secondary chemicals for end users, or for making other chemical products. Chemical products include mineral acids, alkalis, paints, soaps and detergents, plastic goods, tyres and tubes, pharmaceuticals, and agro-chemicals. The bulk of the raw chemicals needed for manufacturing these products are generally imported, while others are imported as finished products for end users. The use of chemicals, particularly agro-chemicals, has steadily increased and made a major contribution to agricultural production.

Most chemicals are dangerous substances. Some are deadly poisons, while others are fire hazards. Chemical accidents in work places and homes have either caused death or left thousands of victims at risk. Other living organisms in the vicinity may also be affected. Health disorders associated with the poor management of chemicals include cancer, birth defects, stillbirths, sterility, failure of vital body organs, neuropathy, and breathing disorders, among others.

4.8.1 Institutional and Legal Arrangements

Legislation for managing chemicals are scattered over many Acts; the main ones being the *Food, Drugs and Chemical Substances Act* (Cap. 254), the *Pharmaceutical and Poisons Act* (Cap. 244), the

Factories and Other Places of Work Act (Cap 514) and the Pest Control Products Act (Cap.346). These laws are administered by ministries responsible for health, labour, and agriculture.

4.8.2 Environmental Challenges

These include:

- Inadequate enforcement of standards for manufactured imported chemicals
- Use of chemicals banned or restricted elsewhere, including in their countries of origin
- Use of chemicals whose long lasting residual effects is not scientifically determined
- Mismanagement and uncontrolled use of chemicals where users are poorly informed of the possible harmful effects and where handling by unqualified persons may lead to poisoning
- Lack of compliance with manufacturing and usage standards where prescribed

The Government will endeavour to:

- a) *Enact new and strengthen existing laws to regulate the manufacture, export, import, distribution, and use of all chemicals in the country;*

- b) *Review and strengthen the Boards which are concerned with regulating the use of chemicals;*
- c) *Implement and urge international action on the implementation of UNEP's guidelines on chemical management, especially the Principle of Prior Informed Consent and the prohibition of the export/import of potentially harmful chemicals which are unacceptable for domestic purposes in the exporting country;*
- d) *Enhance bilateral co-operation in curtailing trans-boundary movement of harmful chemicals including hazardous wastes;*
- e) *Monitor status of chemical usage to ensure maximum benefits are derived from the use of chemicals and that these are not negated by the harmful consequences of their use or misuse;*
- f) *Promote public awareness on proper and safe use of chemicals;*
- g) *Cultivate goodwill and collaboration among manufacturers, distributors, and the local communities to achieve proper management of chemicals; and*
- h) *Establish a central body to coordinate, formulate institutional procedures, undertake research, monitor safety of chemicals, streamline chemical usage management in the country, and establish a national information database on chemicals.*

4.9 RADIATION MANAGEMENT

Kenya has no nuclear reactors, but makes use of radioactive substances in industry such as in the manufacture of cigarettes, rubber tyres, and

steel pipes as well as in road testing, oil exploration, health institutions, and agriculture, among others. This usage poses a danger to the public who may handle radioactive materials or wastes without adequate safeguards.

In addition, the country lacks capacity to monitor imported products and materials including food substances, chemicals, and agricultural products that may have been contaminated. The country is also vulnerable to the dumping of radioactive wastes.

4.9.1 Institutional and Legal Arrangements

Radioactive protection including control, use, importation, exportation, installation, and all issues related to radiation devices or materials is administered by the Radiation Protection Board under the *Radiation Protection Act* (Cap. 243).

4.9.2 Environmental Challenges

These include:

- Absence of a comprehensive policy and legislation on radiation monitoring and management
- Inadequate public awareness on the dangers of radioactive materials
- Absence of inventories of types, compositions, and volumes of radioactive material
- Inadequate guidelines for management of radioactive wastes

The Government will endeavour to:

- a) Strengthen the Radiation Protection Board's mandate through appropriate policy and legislation;
- b) Monitor radiation from natural and other sources;
- c) Promote public awareness on handling and disposal of radioactive substances; and
- d) Develop and maintain comprehensive inventories of sources, types, and volumes of radioactive material.

4.10 ENVIRONMENTAL HEALTH AND OCCUPATIONAL SAFETY

Environmental health problems in Kenya are tied up with socio-economic problems. The major health problems arise from inadequate or lack of housing; inadequate lighting and sanitary surroundings including inadequate excreta disposal; and poor surface water drainage and solid waste management. These environmental factors lead to prevalent transmission of diseases such as malaria, acute respiratory infections, and diarrhoeal diseases. These diseases can be prevented largely by better management of the living and working environment.

The main pollutants in the work environment include chemicals, physical agents and noise, dusts and biological agents. These pollutants cause occupational diseases and compromise safety in workplaces. Occupational diseases, hazards, accidents, as well as intolerable noise and light levels, cause or contribute to ill health or

endanger life. In addition, discharges from industries into water, soil, and the atmosphere degrade the environment.

4.10.1 Institutional and Legal Arrangements

Several legislations exist for the purpose of environmental health and occupational safety, among them the *Public Health Act* (Cap.242), the *Radiation Protection Act* (Cap.243), the *Factories and Other Places of Work Act* (Cap. 514), the *Pharmacy and Poisons Act* (Cap.244), and the *Water Act* (Cap.372). These legislations are administered by ministries responsible for health, labour, agriculture, local government, and water resources.

In addition, NGOs and religious organizations also contribute significantly towards provision of environmental health and occupational safety services.

4.10.2 Environmental Challenges

These include:

- Uncoordinated and weak enforcement of standards
- Uncoordinated planning and provision of infrastructure
- Inadequate or lack of housing
- Inadequate lighting and ventilation
- Insufficient provision and distribution of potable water

- Poor sanitary surroundings and inadequate human waste disposal infrastructure
- Absence of or inadequate surface water drainage.

In addressing the environmental health and occupational safety constraints, the Government will endeavour to:

- a) *Review and up-date policies and laws on environmental health;*
- b) *Strengthen institutional capacity as relates to environmental health services;*
- c) *Develop integrated plans for health services and disease prevention;*
- d) *Promote improved housing designs that emphasize proper ventilation, lighting, and outlets for smoke;*
- e) *Develop water and sanitation services that are affordable and are easy to maintain by the benefiting community;*
- f) *Develop efficient storm water drainage for rain water run-off and to avoid water stagnation that act as breeding grounds for disease vectors;*
- g) *Promote environmental health education;*
- h) *Provide improved health care services;*
- i) *Harmonize and co-ordinate the activities of institutions,*

including NGOs, dealing with occupational health and safety;

j) Encourage private sector involvement in the provision of occupational health and safety services;

k) Establish databases on occupational health hazards; and

l) Develop and adopt standards on noise pollution.

4.11 HUMAN SETTLEMENTS

The pattern of human settlements in the country is influenced by natural resource endowments which include availability and accessibility to land, shelter, water, food, sources of energy, as well as social amenities such as communication, health facilities, employment opportunities, and security. The accessibility of these resources and the population pressure has led to serious environmental problems in human settlements.

Although urbanization has grown rapidly, Kenya is still largely a rural society. By 1989, about 80% per cent of the population lived in dispersed rural settlements. These settlements have continued to receive minimal attention because the rural people have always provided their own forms of shelter using locally available materials. Some low density rural settlements have been seen to cause little damage to the environment. Funds and professionals that can be used to manage the expansive rural areas are extremely inadequate.

Rural settlements have environmental problems which are influenced by many factors, including cultural traditions, climate, terrain, available natural resources, and the economy. Most rural settlements,

especially in ASALs, are located near water points. Livestock too are concentrated around these settlements. Settlement activities and trampling by animals often cause serious environmental degradation. These settlements often make unsustainable demands on the woody vegetation for energy needs. As a result, the land is left bare.

In the recent past, some rural areas have received an influx of refugees whose demands have had adverse environmental impacts. These include indiscriminate destruction of vegetation, inadequate waste management, inadequate or poor housing, and disruption of local socio-economic activities.

At the same time, the once well-planned urban centres have experienced high concentrations of population with inadequately provided and maintained physical infrastructure such as housing, social facilities, utilities and amenities. Consequently, the urban environment has been seriously degraded, prone to a wide variety of health hazards, pollution, floods, fires, overcrowding, unplanned settlements, and traffic congestion.

Notwithstanding all these problems urban centres continue to attract increasing numbers of emigrants from rural areas searching for employment opportunities and better living conditions, thereby exacerbating the deterioration of the urban environment.

To compound these problems the local authorities have been unable to address the ever-increasing demands made on them by the swelling populations due to budgetary and manpower constraints. The local authorities are barely able to provide for even their recurrent expenditure; hence environmental problems hardly get addressed.

Local communities lack the necessary awareness and organizational capabilities needed to address environmental problems. Even the private sector which could contribute resources towards initiatives aimed at addressing environmental problems are not sourced.

The fact that commercial and industrial enterprises are urban based continue to encourage rural-urban migration. Once in the urban centres problems of housing, sanitary facilities, and other social amenities are exacerbated by the influx of population which was not catered for in the initial urban planning. This leads to a crippling of the financial and administrative capacity of local authorities to cope with the demand for services, eventually leading to the mushrooming of unsanitary slums and shanties, garbage accumulation, and fire risks. Other problems associated with rural-urban migration are high unemployment leading to crime, juvenile delinquency, poverty, poor health, and generally a lower quality of life for urban dwellers.

4.11.1 Institutional and Legal Arrangements

There is no comprehensive legislation on human settlements and urbanization. The institutions responsible for managing human settlements include municipal councils, town councils, and urban councils for urban settlements; and county councils and the provincial administration for rural areas. Local authorities are corporate bodies mandated to administer areas within their jurisdiction using legal powers (by-laws) derived from the *Local Government Act* (Cap 265). They provide services, construct and maintain infrastructure for the area. They also levy taxes and charge fees for services rendered. The Ministry of Local Government is mandated to ensure that local authorities are properly managed and discharge their responsibilities in accordance with the law. It is the responsibility of

the central government and local authorities to ensure the removal of wastes as well as facilitate the provision and maintenance of roads, pavements, drains, and social and public amenities.

Other organizations including the United Nations Centre for Human Settlement (UNCHS), the United Nations Environment Programme (UNEP), NGOs, private sector and community based organizations also play an important role in their different capacities.

4.11.2 Environmental Challenges

These include:

- Absence of a comprehensive policy and legislation on human settlements and urbanization
- High rate of increase in urban population ✓
- Inadequate human capacity and capability in local authorities for managing human settlements ✓
- Inadequate credit facilities and a weak financial base of local authorities ✓
- Limited access to land for human settlement ✓ ✓
- Non-adherence to planning and building standards ✓
- Inefficient dissemination of information on appropriate building technologies

- Inadequate coordination of development in human settlements
- Lack of or insufficient public awareness of environmental problems

The Government will endeavour to:

- Develop a comprehensive policy and legislation on human settlements;*
 - Develop strategies to ensure proper management, care, and protection of the urban environment to achieve sustainable human settlements development and urbanization.*
 - Upgrade and improve unplanned settlements and slum areas through the provision of basic services;*
 - Promote public awareness on the need for proper management and protection of the urban environment;*
 - Create an enabling environment in which the central government, local authorities, financial institutions, private sector, community based organizations (CBOs) and individuals collaborate in creating an urban culture to manage, care, and protect the environment;*
 - Initiate continuous educational training programmes for central government, local authorities, and the local communities in urban environmental planning and management;*
 - Initiate public awareness campaigns amongst urban dwellers*
-

aimed at increasing their responsibility and care of the environment;

- Initiate environmental impact assessment (EIA) for all urban development projects to ensure environmental concerns are taken into consideration continuously;*
 - Regulate urban development to only those areas which are suitable, avoiding ecologically fragile areas, including steep slopes, river valleys, wetlands, fertile agricultural land, and forest land;*
 - Protect and reserve water catchment areas to ensure reliable constant water supply to urban areas;*
 - Determine urban-rural interlinkages and encourage mutually beneficial relationships to develop;*
 - Ensure urban designs and development are in harmony with social-cultural characteristics of the people, meeting their needs for shelter, sanitation, and healthy living thereby taking care of vulnerable groups such as women, children, old people, and the disabled;*
 - Collaborate with the work of United Nations Centre for Human Settlement (UNCHS) and the United Nations Environment Programme (UNEP) in human settlements development;*
 - Build institutional capacity and harmonize their activities in human settlements;*
-

- o) Review building codes and strengthen enforcement of building standards;
- p) Strengthen the revenue base of local authorities and their financial management; and
- q) Promote energy-saving technologies and alternative fuels to reduce dependence on woodfuel.

4.12 DISASTER MANAGEMENT

Natural and man-made disasters cause loss of life, damage to the environment, infrastructure, and property. The major disasters in Kenya that contribute to environmental damage include earthquakes, fires, floods, lightning, drought, desertification, pest invasion, and industrial accidents.

Floods generally occur on flat or low lying lands. The effects of floods on the environment and human settlements have been aggravated by deforestation on hill slopes and river banks which increase runoff and the speed of water during heavy rains. Flooding has been experienced in the Lake Victoria basin (Kano plains), along the Tana River and Yala/Nzoia river. There is danger of downstream flooding due to possible collapse of dams in areas prone to earthquakes. Incidences of water borne diseases such as cholera, typhoid, bilharzia, and diarrhoea, among others, are worsened by floods.

Lightning strikes are experienced in areas around the Lake Victoria basin and highlands east and west of the Rift Valley. It has often resulted in loss of life and property.

Earthquakes in Kenya have been generally of low intensity and related to rift movements and volcanic activity along the rift system which cuts across Kenya. Earthquake prone areas are not yet clearly zoned. Other man-made disasters include forest fires, collapse of mine walls, and accidents related to transport. Many of these disasters have led to injuries and loss of life. Social disasters with environmental implications include sudden influxes of refugees and Human Immuno-deficiency Virus/Acquired Immuno-deficiency Syndrome (HIV/AIDS.)

4.12.1 Institutional and Legal Arrangements

Various government ministries and agencies have within their portfolios responsibilities to take precautionary and remedial measures against impacts of disasters. In 1992, the government formulated "The Drought Contingency Action Plan" and in 1994, the "National Disaster Management Programme". In 1994, the government established the Department of Relief and Rehabilitation to manage famine relief operations and the drought recovery programme through the Relief and Rehabilitation Committees at provincial, district, divisional, locational, and sub-locational levels. However, a number of environmental issues arising from disasters still persist. Floods are common in urban centres due to extensive impermeable surfaces and blocked storm-water drains. Urban and rural floods cause erosion, block drainage systems and create pools suitable for breeding by disease vectors that cause epidemics, while deposited soils have caused the silting of rivers and dams.

Floods and droughts can be predicted, but there has been inadequate preparations for their cyclic occurrences.

4.12.2 Environmental Challenges

These include:

- Absence of a comprehensive national policy and legislation on disaster management
- Insufficient public awareness services on disaster preparedness and response
- Inadequate scientific information on disaster prone areas
- Underdeveloped early warning systems on impending disasters

The Government will endeavour to:

- a) *Develop a comprehensive policy, legal, and institutional framework for managing disasters;*
- b) *Strengthen public awareness services on disasters response and management;*
- c) *Build capacity for disaster preparedness, response, and management;*
- d) *Install appropriate monitoring and early warning equipment in areas prone to disasters; and enforce building standards for resistance to earthquakes;*
- e) *Support and encourage scientific studies on disasters and their risk and management in order to avert or reduce their effects;*

- f) *Enhance regional and international co-operation in disaster management; and*
- g) *Develop and maintain inventories on zones prone to disasters.*
- h) *Coordinate, establish and maintain a National Seismological Network under the Ministry responsible for environmental matters, to monitor seismicity, prepare seismicity maps and maintain an inventory of seismic data;*
- i) *Improve on building codes taking into consideration risk factors posed by seismicity and other natural hazards;*
- j) *Identify potentially geohazardous areas;*
- k) *Create awareness of potential geohazards; and*
- l) *Strengthen the capacity and preparedness of national institutins to respond to the occurrence of geological hazards.*

5.0. IMPLEMENTATION STRATEGIES

This *Sessional Paper on Environment and Development* sets out sectoral policy guidelines for improved environmental protection and sustainable national development.

The stated goals will be achieved by integrating the management and conservation of the environment into the development process. The National Environment Action Plan sets out strategies for sustainable environmental management. This Sessional Paper has further refined these strategies by including the priorities for action. In addition, the government will assess the costs and benefits of particular approaches to environmental management. The implementation and evaluation of the proposed strategies will be administered by a body with adequate authority, capacity, and capability.

5.1 PRIORITIES FOR ACTION

This Sessional Paper sets out status, issues, challenges, and proposes actions for the environment spectrum. Priorities for implementation are:

- review of environmental policies and legislation, including environmental impact assessment (EIA);
- establishment of a national environment management authority;
- enhancement of human resource development;

- establishment of the environment planning process and its integration in the national development process;
- curtailment of loss of biodiversity and land degradation;
- improvement of forestry and wildlife management and arid and semi-arid lands management;
- development and implementation of public awareness programmes;
- evaluation of social and environmental dimensions of development and settlements, including agricultural policies.

Local communities and the private sector will be encouraged to collaborate or to initiate programmes as well as implement them.

5.2 HUMAN RESOURCES DEVELOPMENT

The ability of a country to sustain development is determined to a large extent by the capacity of its people and institutions to fully appreciate and efficiently manage complex environment and development issues. This requires technological, scientific, managerial, and institutional capacities. Knowledge and skills at the individual and institutional levels are necessary for policy analysis, institutional building, and efficient management.

5.2.1 Training and Institutional Capacity Building

There is need to expand training programmes and strengthen institutional capacity in environmental management. This will

require a participatory strategy involving the public and private sectors, NGOs and local communities at all levels.

The Government will endeavour to:

- Determine the capacity and capability requirements and identify priorities;*
- Strengthen the capability of training institutions and universities to fulfil their mandate with regard to environmental concerns and sustainable development;*
- Develop and maintain inventories of capacities on human resources;*
- Coordinate and implement policies and strategies on human resource development;*
- Enhance transfer of technology and technical cooperation between Kenya, and both regional and international communities; and*
- Build capacity within government and the private sector for integrating environmental concerns into development plans.*

5.2.2 Public Awareness and Environmental Education

Information is essential in proper environmental management and sustainable resource utilization. Information is required to assess problems, define objectives, set targets, and to facilitate implementation. Currently, there is inadequate capacity to develop

and carry out environmental information dissemination programmes using the various media. In addition, the media has limited access to factual information about the environment, while most media workers have not been trained to report on environmental issues.

Environmental education, both formal and non-formal, is vital to changing people's attitude to appreciate environmental concerns. A long-term education programme focussing on all levels of environmental education and society is desirable.

As a capacity building tool, formal environmental education is used to increase awareness, improve extension services, sensitize people on environmental issues, and build institutional capacities. Non-formal environmental education is also intended to benefit people outside the formal education system. In the long run, an educated public can appreciate and thereby contribute positively towards environmental conservation and sustainable resource utilization.

The Government will endeavour to:

- a) *Develop a national strategy on environmental education (EE).*
- b) *Involve the mass media in providing environmental information;*
- c) *Prepare information packages in a simple language for extensive use in educational institutions and at other levels of the society;*
- d) *Develop appropriate information, education, and communication programmes and strategies that use radio, television, documentary films, newspapers, magazines, "barazas", songs, plays, and posters to disseminate information emanating from environmental activities;*

- e) *Support and provide in-service courses on environmental management for policy and decision makers, planners, managers, teachers, and industrialists;*
- f) *Incorporate environmental education into extension work as well as the regular school, college, and university curricula as a mandatory subject; and*
- g) *Enhance partnerships for cooperation and collaboration in EE by involving local communities and the informal sector in dissemination of environmental information.*
- h) *Promote utilization of indigenous knowledge in EE.*

5.2.3 Co-operative Development and the Environment

Co-operatives as development agents are mechanisms through which the environment can be managed sustainably, as they cover all sectors of the economy. Among the co-operatives that already impact on the environment are fisheries, timber, handicraft, and agriculture at both farm level and at the plant processing level. In this connection, the co-operative movement with its enormous membership and wide coverage is one of the channels through which public involvement in environmental management can be intensified.

Co-operatives can encourage their members to be environmentally friendly in the use of forest resources and products (timber and handicraft) and in the development of agro-forestry and farm forestry. Fishing co-operatives can be used to encourage and promote participation of local communities in the sustainable utilization and management of fisheries, wetlands, and marine resources, while

agricultural co-operatives provide channels for promoting the adoption of sustainable agricultural practices. Co-operatives can also promote environmentally effective grazing systems as well as awareness on the dangers of inappropriate conversion of ASALS into agriculture.

Co-operative members use chemicals in livestock and crop management; co-operatives therefore offer an opportunity to influence the attitudes and behaviour of communities with regard to safe use of chemicals, while ensuring that maximum benefits are derived from chemical usage. Co-operatives could be particularly useful in finding solutions for the management of discharges from agricultural and industrial concerns; those involved should be well educated on the need to promote environmentally friendly procedures and technologies, and be well informed on the options available.

Sustainable development is dependent on a conducive environment. Co-operatives are vehicles through which this relationship can be fostered at the community level.

The Government will endeavour to:

- a) *Involve the co-operative movement in environmental management;*
- b) *Develop education, information, and public awareness programmes for promoting sustainable natural resources use and a safe environment through co-operative organizations; and,*

- c) *Develop collaborative mechanisms between the ministries and sectors involved in environment and co-operatives.*

5.2.4 Environmental Information Systems

The availability of accurate and timely information is essential to decision makers and the general public for sound environmental management.

Considerable environmental information already exists. However, there is need to continually collect and disseminate information required to assess trends and the state and evolution of ecosystems, natural resources, pollution, and socio-economic variables. Timely access to information already collected requires strengthening existing capacities in collecting, storing, analysing, and retrieving.

The Government will endeavour to:

- a) *Review the existing national environmental information systems and services in order to make them better suited for decision-makers in public, private, and informal sectors;*
- b) *Strengthen decision support systems by using creative approaches to ensure that the vast amount of data and information required in decision making for sustainable environment management are readily available;*
- c) *Encourage environmental information networking; and*

- d) *Promote use of appropriate indigenous knowledge and skills, technology, and practices.*

5.2.5. Environmental Management and Population Growth

The population of Kenya has been growing rapidly from 7.8 million in 1962 to about 30 million in 1999. The high population growth rate has resulted in unsustainable use of land and land based resources. Population demands have also strained government expenditure, especially in the provision of social services.

As a result of the increase in population, the number of the poor and of vulnerable groups has increased significantly. Poverty contributes to unsustainable resource use and to environmental degradation. Poverty reduction as well as public involvement in environmental management, particularly by women and youth, are essential to proper environmental management. Public participation is crucial to the successful implementation of environmental conservation programmes.

Women interact with the environment in a variety of ways. They are major players in natural resource use and economic development. Women are the majority among the labour force involved in food production and make significant contributions to food storage, processing, and marketing. Women are also major users of woodfuel, water, chemicals, detergents, etc. They have distinct areas of knowledge of particular environments and plants, their ecology and their uses. Women's extensive knowledge can make a crucial contribution to the long-term understanding and management of the environment.

Incorporation of environmentally positive traditional and cultural values and practices in modern methods of environmental management can contribute significantly to sustainable resource use for present and future generations.

Sustainable development can be achieved with the support and cooperation of an informed public. Two great challenges facing our society are to manage population growth within the productive capacity of the national economy; and to enable the people to have a full appreciation of their environment.

The Government will endeavour to:

- a) *Encourage Kenyans to have family sizes which are sustainable;* ✓
- b) *Reduce poverty by developing and implementing programmes that increase living standards as well as promote equity;*
- c) *Improve education attainment levels of both females and males;*
- d) *Enhance the capacity of educational institutions to provide relevant knowledge and skills;*
- e) *Develop education programmes to create awareness and a culture favourable to sustainable use of natural resources;*
- f) *Plan settlements and land use and adopt land tenure systems that take into account environmental protection, food production and security;*

- g) *Improve the standard of living of the people through the development and implementation of appropriate population programmes as integral parts of other development programmes;*
- h) *Promote and integrate population and environmental education in the formal school system and other institutions of learning; and*
- i) *Strengthen the role of women in the design, management, and implementation of population and environment programmes.*

5.3 ENVIRONMENTAL PLANNING

Since independence in 1963, successive periodic development plans have been an essential component of national development efforts. The development plans have emphasized growth in agriculture, manufacturing, tourism, and infrastructure as well as human resource development. The focus has been on increasing economic value.

On environmental matters, the development plans have mainly emphasized conservation and protection. Links between development plans for other activities and the environment are either lacking or inadequate. Environment and development have therefore not yet been effectively integrated at the planning and management levels. The adoption of the National Environment Action Plan (NEAP) in 1994 marked a significant step towards integrating environmental matters in the development planning process.

In its efforts to integrate environmental concerns into the national planning and development processes, the Government will endeavour to:

- a) *Establish a national environmental action planning committee under the national environment management authority which will comprise representatives from government, industry, commerce, professional societies, research centres, universities, and NGOs;*
- b) *Establish provincial and district environmental planning committees;*
- c) *Require the national environment action plan committee to prepare periodic national environment action plans for consideration and adoption by the National Assembly;*
- d) *Require the provincial and district environment committees to prepare periodic environmental action plans for their respective administrative areas;*
- e) *Develop, introduce, and incorporate environmental economics and accounting into the national accounting systems;*
- f) *Increase resource allocation for environmental management and protection; and*
- g) *Devise mechanisms for coordinating and harmonizing the development and implementation of environmental plans with national, sectoral, provincial, and district development plans.*

5.4 ENVIRONMENTAL LAWS

There does not presently exist a framework statute on the environment. Environmental management in Kenya is currently characterised by

an amalgam of sector-specific statutes. Such statutes, estimated to be 77 in number, deal with:

- environmental segments such as soil, forests, lakes and rivers, wildlife, plant varieties, etc.;
- human activities that impact on the environment such as agriculture, mining, industrial processes, etc.; and
- issues of environmental health and standards.

There is a consensus within and outside government that a comprehensive statute is an essential ingredient of an efficacious legal scheme for environmental management. The comprehensive legislation would be designed to achieve two principal functions:

- establish appropriate legal and institutional arrangements to manage the environment and natural resources, and
- improve the legal and administrative cooperation of the diverse sectoral functions to improve the national capacity for the management of the environment and natural resources.

The sector-specific statutes require review in order to improve their efficacy by eliminating some current deficiencies. Such deficiencies include:

- conflicting legal and institutional mandates;
 - lack of current scientific support for their provisions;
 - inadequate punitive sanctions;
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- absence of economic incentives for environmental management;
- non-reflection of new ideas, knowledge, and principles for environmental management, especially those of conventions, treaties or covenants;
- lack of established judicial and administrative arrangements for redress in the field of environmental management;
- absence of legal provisions for certain aspects of environmental management such as environmental offences; and
- absence of legal backing for basic tools of environmental management, including environmental impact assessment.

The Government will endeavour to:

a) *Formulate and present to Parliament a framework statute on the environment that will:*

- *provide broad-based policy formulation mechanisms;*
 - *incorporate fundamental principles of sustainable development and environmental conservation;*
 - *formalize legal mechanisms for environmental impact assessment, and environmental auditing, monitoring, and accounting;*
 - *implement international legal instruments in the field of environment;*
 - *provide judicial and administrative mechanisms for redress,*
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including giving locus standi to the general citizenry, establishment of an environmental tribunal and an environmental protection court, etc.;

- *establish an effective institutional scheme for environmental management;*
 - *formalize environmental planning;*
 - *mobilize resources and establish funds for environmental management;*
 - *promulgate environmental offences and commensurate penal sanctions;*
 - *provide mechanisms for the establishment of national environmental standards;*
 - *protect environmental resources; and*
 - *increase administrative coordination through statutory consultative fora.*
- (b) *Review the sector-specific statutes in order to increase their efficacy in the field of environmental management and to harmonize their provisions with the spirit and letter of the framework statute on the environment.*

5.5. ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Environmental impact assessment (EIA) is a methodology used to identify the actual and probable impacts of projects and programmes on the environment and to recommend alternatives and mitigating

measures. Monitoring is carried out at all stages of the project, with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector ventures. Assessment requirements will be set out in the EIA guidelines and will include social and cultural values.

EIAs will be undertaken by the developer as an integral part of project preparation. However, EIA evaluation by the government agency will be carried out independent of the project proponent. Periodic environmental audits will be conducted in order to determine if the developer is fully mitigating the impacts identified in the assessment. There will be mechanisms for appeal.

Currently, environment and development have not yet been effectively integrated at the planning and management levels. The absence of legislation and an implementing agency regarding EIA have meant that current policy intentions have not been implemented to any significant extent.

The Government will endeavour to:

- a) *Formulate comprehensive EIA guidelines, procedures, and legislation;*
- b) *Strengthen and develop environmental standards;*
- c) *Establish a system for EIA audits, monitoring, evaluation, and appeal;*
- d) *Subject new and existing projects and programmes to environmental monitoring and auditing;*

- e) *Strengthen capacities in institutions and local communities with regard to EIA; and*
- f) *Incorporate social and cultural values in EIA.*

5.6. ENVIRONMENT AND LAND-USE PRACTICES

Land use is influenced by several factors which include climate, labour, cultural attitudes, technology, and markets. Rapid population increase and the need for more food and cash crops have exerted immense demand on land in the high and medium potential areas. Uneconomic land parcels, degradation, reduced water flow, migration, and falling productivity are some of the consequences.

Land adjudication and settlement processes in ASALs have led to privatization. This has brought about a shift from pastoralism to ranching and arable agriculture. Some of the new practices are inappropriate and have contributed to environmental degradation. Inappropriate land use practices are often introduced by immigrants without due consideration of their impact on the environment. In addition, land use practices that promote soil conservation have often been delayed or hampered by a lack of security of tenure. Current concerns are access to and right of use of different land resources, land ownership, tenure, and productivity, changing property rights, land disputes and legal procedures, and land tenure and gender issues.

Currently there is no comprehensive legislation on land use. However, there are legal provisions for the protection and proper use of land. These provisions, which are scattered in numerous statutes, do not cater for the challenges created by changing ownership, production

practices, and economic environment.

In order to achieve sustainable management of land resources, land use policy should provide a system of laws, regulations, standards, and practices that govern the rights and obligations of land owners together with appropriate guidelines on optimal utilization taking into consideration environmental concerns.

The Government will endeavour to:

- a) *Develop a land use policy;*
- b) *Review existing land use and land tenure laws;*
- c) *Establish a land use commission;*
- d) *Develop guidelines relating to land use consonant with the various agro-ecological zones and urban areas, taking into consideration property rights, traditional resource use, land allocation, compensation guidelines, institutional aspects, arbitration and ownership of environmentally fragile areas including wetlands;*
- e) *Strengthen research capacity to determine the potential or actual productivity of various agro-ecological zones; and*
- f) *Develop and maintain inventories on land use.*

5.7. ENVIRONMENT, INDUSTRY AND ECONOMIC DEVELOPMENT

The next stage of Kenya's development is rapid industrialization. To do this without undue damage, the integration of environmental considerations at all levels of development planning and decision making is a prerequisite. In most past cases, development projects and programmes have ignored principles of proper environmental management. Yet industries which have installed energy-saving or recycling technologies have often recorded economic as well as environmental gains.

Industrial development will benefit from adherence to standards of environmental protection and sustainable resource use, particularly with regard to energy and water conservation, waste and discharge recycling and disposal, and conditions in the workplace. Industry needs to become more energy and resource efficient, and promote waste minimization and proper waste management. In the past, health and environmental damage caused by industry have been largely transferred to the public sector or to future generations.

The application of "polluter pays principle" will shift the responsibility back to industry. Other incentives and dis-incentives to promote wise use of resources include the introduction of effluent or emission charges, tax concessions for industries using environmentally friendly technologies, and the establishment of a fund to provide low interest loans to alleviate additional capital costs required to introduce environmental protection equipment.

The application of market based principles in development tends to exclude environmental considerations as well as expose the poor to

higher levels of risks in their existence. The government will endeavour to reduce poverty, improve health and environmental quality through capacity building and the incorporation of environmental and social concerns into the development planning process, especially in the District Focus for Rural Development Strategy.

Environmental economics and accounting are tools for incorporating environmental change into the economic decision making process. This enables the environment to be valued appropriately to reflect its full contribution to human welfare. As a result, adjusting and harmonizing prices through markets, fiscal and other economic policies will reflect the costs (and benefits) of using the environment.

The Government will endeavour to:

- a) *Incorporate environmental concerns into the national planning process;*
- b) *Involving industry in finding solutions to challenging environmental problems*
- c) *Adopt a system of incentives and disincentives to encourage sustainable use of resources;*
- d) *Promote the use of environmentally friendly technologies;*
- e) *Formulate a comprehensive industrial policy incorporating environmental concerns;*
- f) *Devise a system to measure the worth of standing, unexploited*

natural resources, taking into consideration their effect on the biosphere and their scarcity;

g) Develop and maintain inventories of natural resources;

h) Identify mechanisms for establishing the links between international trade, debt, and environment, and develop an appropriate policy on the same; and

i) Promote waste minimization and recycling of waste materials.

5.8. ENVIRONMENT, RESEARCH AND TECHNOLOGY

Research and scientific knowledge are important in understanding the interdependence of environmental parameters and life support systems. Data collection, storage, processing, and retrieval are vital activities in scientific, technological, and socio-economic research, including planning of environmental programmes and projects. Research data are also important in providing the necessary environmental information required to initiate, formulate, and implement environmental policy and guidelines for sustainable development. Considering the challenges of development, technological research is crucial for generating new environmentally friendly technologies for all sectors of the economy.

The choice of technology in the production and processing of goods and services has a direct influence on the future of the environment in terms of resources consumed and wastes generated. Technological advancement, which is necessary for economic development, has also raised environmental concerns such as global warming, biodiversity loss, ozone layer depletion, climate change, and pollution.

There are weaknesses in the existing policy instruments and there are no guidelines on technology transfer, adaptation, and development. Consequently, not all the research findings developed in academic and research institutions have been fully utilized by the end users. The absence of effective laws to regulate the conditions and terms of royalty and licensing have characteristically tended to reinforce dependence on external technologies. This situation is not conducive to the development or even modification of technologies for local use.

In order to diversify and expand the resource base, Kenya will have to boost its research potential in biotechnology, including microbiology and genetic engineering. Biotechnology promises to make significant contributions to national development, particularly in crop and animal production, health, pollution control, forestry, and the development of new varieties with high rates of survival in localized harsh conditions. Research and technology transfer, including training and information gathering, are the key areas in which the government will invest to enable the country to benefit from technological developments.

The Government will endeavour to:

a) Develop a comprehensive research and technology policy that takes into consideration environmental concerns;

b) Set guidelines for technology acquisition, transfer, adaptation, and development;

c) Encourage the private sector to finance research and development by providing appropriate incentives;

- d) *Review the Science and Technology Act with a view to strengthening institutional capacities and the capabilities of national research institutions;*
- e) *Develop and support mechanisms for dissemination of research findings to the end users;*
- f) *Formulate biosafety policies and regulations;*
- g) *Encourage and promote the application of indigenous technologies;*
- h) *Build scientific capacity and harmonize technological innovations with cultural and national aspirations; and*
- i) *Encourage regional and international exchange of research findings and the transfer of environmentally friendly technologies.*

5.9. COORDINATION AND PARTICIPATION

The development and implementation of environmental policies and activities should be participatory, with the ministry responsible for environment providing leadership. In general, the Government, NGOs, private sector, and local communities will act as partners in promoting environmental planning, utilization, conservation, and protection. The government will encourage and create an enabling environment for all to this end.

5.10. REGIONAL AND INTERNATIONAL COOPERATION

Kenya is honoured to host two of the leading United Nations agencies responsible for environment and human settlement matters, namely, the United Nations Environment Programme (UNEP) and United Nations Centre for Human Settlement (UNCHS). Kenya also hosts other international organizations whose activities promote proper environmental management. Kenya will continue to participate in the process of formulating and implementing regional and international treaties, conventions, agreements, and protocols relevant to the environment.

5.11. ENVIRONMENTAL MANAGEMENT AUTHORITY

The public institutions presently engaged in environmental management are mostly sector-based. A few of these institutions coordinate diverse sectoral initiatives. These institutions include ministries, departments, national regional development authorities established by statutes, parastatals, local authorities, and other public institutions. A key institution in the field of environmental management is the National Environment Secretariat (NES) which is a department of the Ministry of Environmental Conservation. NES has been coordinating environmental matters, in co-operation with other agencies, since its inception in 1974. It, however, lacks the necessary enabling legislation for its operations. A host of private institutions, non-governmental organizations, community-based organizations and private voluntary organizations are also active in the field of environmental management.

Various studies, seminars, workshops and discussions, at both public and private levels, have recommended that a national environmental

management authority be established by way of statute to play advisory, coordinative, consultative, facilitative, and executive roles in matters of environmental management.

The Government will endeavour to:

- a) *Establish, by way of statute, a national environmental management authority to operate under the guidance of the ministry responsible for matters of environment. It will have legal mandate to formulate, review, harmonize, and coordinate environmental policy and to monitor and enforce implementation. In addition, the authority will provide advice to the Government and other agencies on matters pertaining to the protection and management of the environment.*
 - *The environmental authority will have specialised consultative committees at the national, provincial and district levels empowered to formulate environmental standards and oversee their enforcement, facilitate national environmental planning, and receive and investigate public complaints relating to matters of environmental management.*
 - *The specialized consultative committees of the authority will have representation from the government, and the sectors dealing with industry, commerce, finance, transport, energy, information, food and catering, agriculture, health, as well as NGOs, consumer organizations, civic bodies, professional societies, and community-based organizations.*
 - *The authority will endeavour to deliver its services in a timely, efficient, and transparent manner. In this connection, it will decentralize its services to the provinces and districts and*

delegate its powers to these levels as appropriate.

- *The EIA guidelines will provide clear and open mechanisms for appealing the decisions of the authority.*
 - *An environmental tribunal will be established to entertain appeals concerning administrative acts under the framework legislation.*
 - *The national environmental management authority will be enabled to establish such funds as may be appropriate for the effective discharge of its functions.*
 - *The national environmental management authority will be generally charged with the responsibility of implementing the framework legislation.*
 - *The national environmental management authority will be headed by a Director-General whose office will be established through the Constitution. The functions of the Director-General will be described in the statute.*
- b) *Set aside, by way of annual appropriations, adequate financial resources for the implementation of the framework legislation.*
 - c) *Establish an Environment Protection Court to handle and create harmony on matters relating to environment and development, along the lines of the Industrial Court.*