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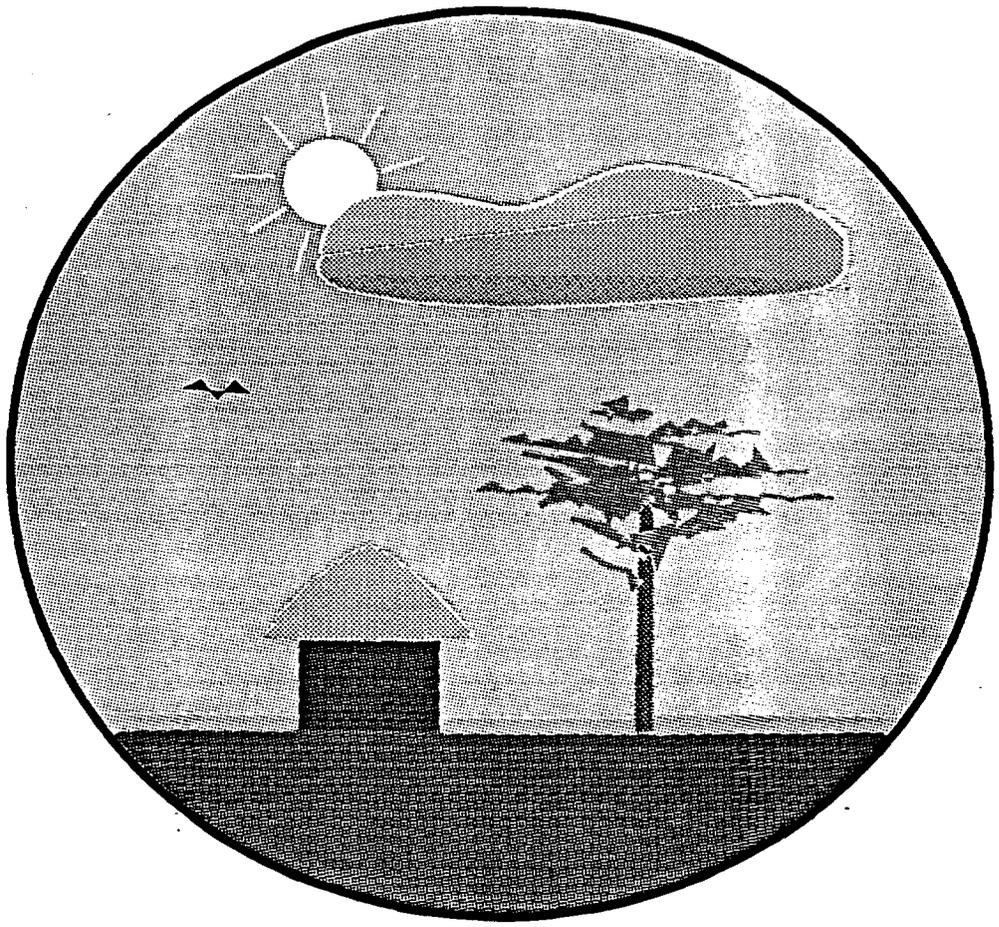
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**THE KENYA NATIONAL ENVIRONMENT
ACTION PLAN (NEAP)**

SUMMARY



THE KENYA NATIONAL ENVIRONMENT ACTION PLAN (NEAP)

**MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES
P.O. BOX 30126, NAIROBI, KENYA
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June 1994

FOREWORD

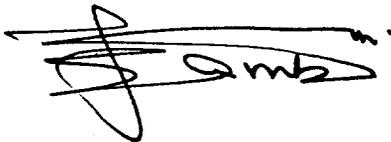
In Kenya, and elsewhere in the world, there is a growing public concern that many forms of economic development activities damage the natural resources upon which the economies are based. A major environmental and developmental challenge today is how to maintain the equilibrium between population, ecosystems and development.

Current development efforts emphasise production with little regard for environmental conservation, while conventional environmental conservation advocates resource protection without human use. Environmental damage, which is evidently widespread, undermines future development efforts. It is now time to meet human needs in ways that do not destroy the environment.

Kenya has physical and biological resources that are of considerable domestic and international economic and intrinsic value. The country possesses an estimated total of 35,000 known species of animals, plants and micro-organisms. This wealth is fundamental to Kenya's economic prosperity in many ways, including as a source of income for subsistence, source of employment and source of foreign exchange earnings. Life, and the economy, are based on natural resources such as water, air, rocks, minerals and soils. These resources are increasingly under pressure from unsustainable use, resulting in pollution, soil erosion, and depletion. Biological resources which are sources of food, fuel, medicine, wood, shelter and income, are only renewable if they are used sustainably.

The challenges presented by the conflicting demands of economic growth, sustainability and quality of life are formidable, both in their rate and geographical extent.

The Government of Kenya, being very concerned with the impact of these conflicts, has decided to put in motion this dynamic National Environmental Action Plan which provides coherent instruments for integrating environmental considerations into economic planning and programmes for sustainable development.

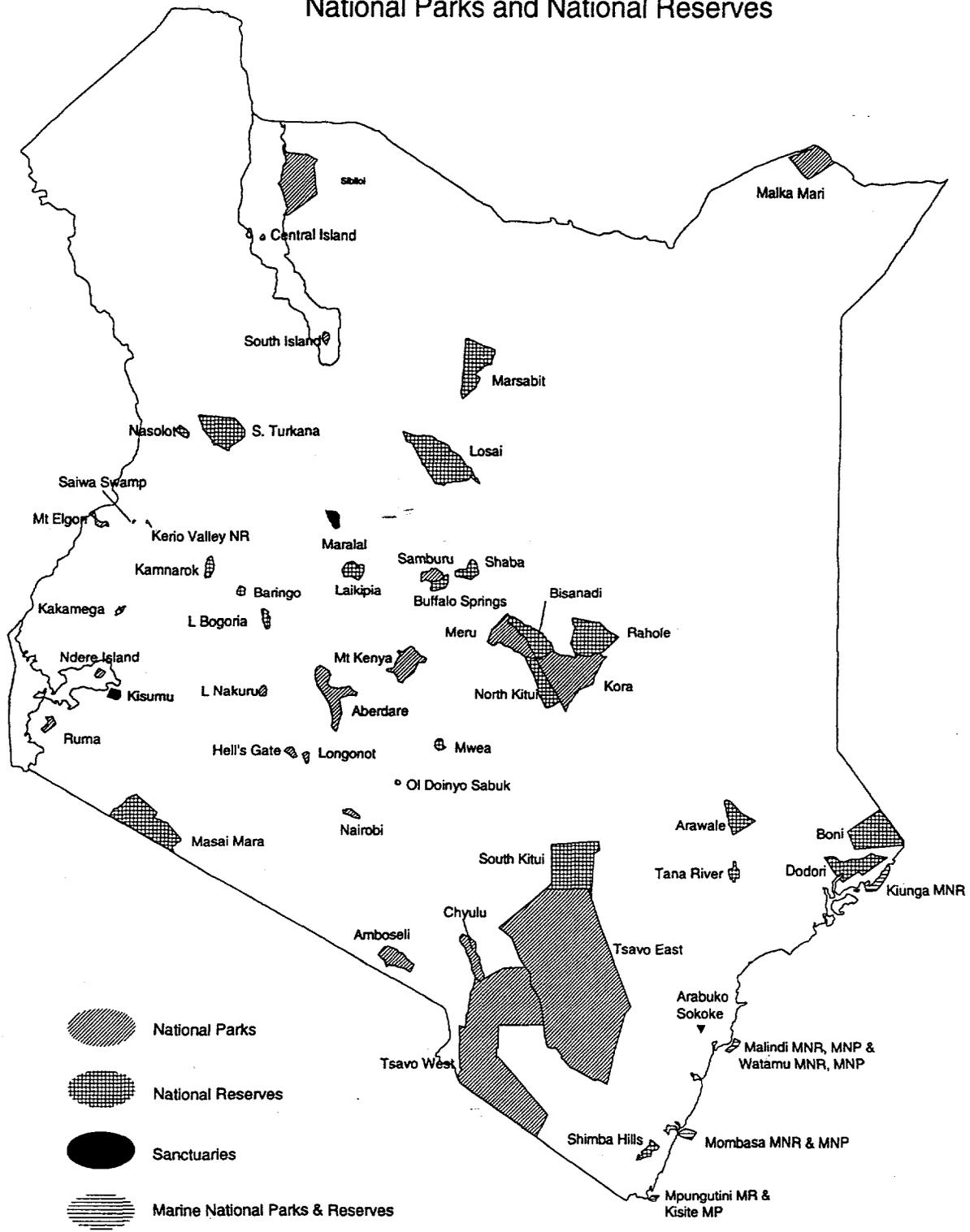


Hon. J. K. Sambu, EGH, MP
Minister for Environment and Natural Resources

TABLE OF CONTENTS

FOREWORD	(i)
PART ONE: ENVIRONMENTAL POLICY	1
1.1 CHALLENGES OF CHANGE	1
1.2 POLICY OBJECTIVES	1
1.3 MAJOR STRATEGIES TO REALISE OBJECTIVES	1
PART TWO: SECTOR ISSUES	3
2.1 ECONOMIC CHALLENGES	3
2.2 PHYSICAL ENVIRONMENT	4
2.3 WATER RESOURCES	5
2.4 BIODIVERSITY	6
2.5 AGRICULTURE AND FOOD SECURITY	8
2.6 DESERTIFICATION AND DROUGHT	10
2.7 POLLUTION CONTROL AND WASTE MANAGEMENT	15
2.8 HUMAN SETTLEMENTS AND URBANISATION	16
2.9 PUBLIC PARTICIPATION AND ENVIRONMENTAL EDUCATION	18
2.10 ENVIRONMENTAL INFORMATION SYSTEM (EIS)	19
2.11 INSTITUTIONAL AND LEGAL FRAMEWORK	20
ANNEX: PROPOSED INSTITUTIONAL FRAMEWORK	22

National Parks and National Reserves



Source: Compiled by KIFCON from KWS Planning Unit maps

PART ONE: ENVIRONMENT POLICY

1.1 CHALLENGES OF CHANGE

Kenya is in the midst of rapid changes: changes in the size of the population and their quality of life; changes in traditions, literacy levels, family structures; and changes in the foundations of its economy.

Kenya is largely a rural society. Its people have been surviving on a subsistence economy, and its cash economy has been small and dependent on the export of a small number of crops. However, over the last three decades, Kenya's population has tripled, commercial and industrial activity have grown tremendously, tourism is the single largest source of foreign exchange, while horticulture has rapidly become a major export earner.

The population increase together with economic and industrial development have had considerable impact on the country's environment and natural resource base.

1.2 POLICY OBJECTIVES

The Government's commitment to conservation and sustainable use of resources has been stated in all national development plans since independence. Sessional papers and presidential directives have frequently emphasised proper management of the national resource base. The 1994-96 National Development Plan details Government commitment to integrate environmental considerations in development programmes and projects. The plan calls for increased efforts towards management and conservation of the environment.

A national environmental policy will provide guidance for actions in all sectors. Some of the broad objectives of Kenya's environmental policy include:

a) Facilitating optimal use of the national land base and water resources in

improving the quality of the human environment.

- b) Promoting sustainable use of natural resources to meet the needs of present generations while preserving their ability to meet the needs of future generations.
- c) Treating environmental conservation and economic development as integral aspects of the same process of sustainable development.
- d) Generating income and meeting national goals and international obligations by conserving biodiversity, reversing desertification, mitigating effects of disasters, and maintaining the ecological balance of the earth.

1.3 MAJOR STRATEGIES TO REALISE OBJECTIVES

- 1.3.1 Enhance the harmonisation, implementation and enforcement of laws for the management, sustainable use and protection of the environment.
- 1.3.2 Provide economic incentives and penalties to encourage sustainable use of natural resources and to minimise pollution.
- 1.3.3 Assess and evaluate in economic terms the value of standing, unexploited natural resources and ecological functions. For example, a standing tree should be worth more than a cut one.
- 1.3.4 Institutionalise the process of environment impact assessment and monitoring for public and private projects and programmes.
- 1.3.5 Provide strong and effective environmental co-ordination and monitoring, by creating a single autonomous organisation.
- 1.3.6 Enhance the involvement of local communities in the management of

natural resources and their living environment. In addition, promote the participation of all parties - local communities, district committees, business, industry and NGOs - in projects and programmes for conservation and development.

- 1.3.7 Enhance environment management capacities by training professionals and raising awareness at all levels.
- 1.3.8 Conduct research in a wide range of disciplines, including biodiversity, biotechnology, indigenous knowledge, waste management, gaseous emissions, disaster management, human settlements development and alternative forms of energy.
- 1.3.9 Maintain the system of protected areas and create others to conserve biodiversity, generate income and

provide recreation.

- 1.3.10 Address underlying causes of desertification, including socio-economic factors, and establish mechanisms to mitigate the effects of drought.
- 1.3.11 Formulate a comprehensive land use and settlements policy to regulate human activities in order to minimise their negative impacts on the environment.
- 1.3.12 Improve decision-making processes by developing an efficient national environment education and information system within easy reach of users in all parts of the country.
- 1.3.13 Enhance co-operation with regional and international environment programmes, and treaties and agreements.

PART TWO: SECTOR ISSUES

2.1. ECONOMIC CHALLENGES

Economically, Kenyans have been going through a trying period recently. Drought in many areas of the country led to a decline in agricultural output; since many industries are agro-based, industrial output also declined. A world recession further weakened our economic performance. Prices of Kenya's agricultural produce fell drastically, fewer tourists travelled, and foreign exchange earnings were not sufficient to sustain imports required for industrial and agricultural development.

Kenya faces a major challenge in planning for sustainable resource management in the face of limited natural resources, rapid population growth, poverty, and limited finance capital. All these are compounded by degradation of the environment on which development depends.

For sustainable development, the planning and decision-making process must carefully consider alternative strategies.

2.1.1 Actions Which Can Be Taken Immediately

- a) Use markets, prices, and government fiscal and other economic instruments, including tax-based incentives and sanctions to protect the environment and influence attitudes and behaviour towards sustainability. Initiate the proposed incentives package in co-operation with the private sector.
- b) Re-orient the national budget to prioritise sustainable projects.
- c) Use pricing policy to reflect actual cost of natural resources, taking into account their long term scarcity.
- d) Include environmental performance as a criterion in tender evaluation in the Government tendering system.

- e) Create an enabling environment, including an information bank for use by environmental managers.
- f) Share benefits accruing from proper use of natural resources with local communities.
- g) Provide social and economic incentives to the private sector to decentralise and relocate in economically and environmentally depressed regions.
- h) Initiate incentives for business and industry to promote cost effective and environmentally friendly technologies.
- i) Review and update fines and penalties for environmental crimes, in order to make them a real deterrent to environmental abuse.
- j) Increase government expenditure on environmental management.
- k) Make use of international agreements to promote sharing of benefits from Kenya's genetic resources and transfer of technology from industrialised nations to the country.

2.1.2 Some Selected Priority Activities Requiring Funding

- a) Analyse the effects of structural adjustment programmes (SAPs) on the environment, and ways in which the world can contribute to maintain healthy tropical ecosystems.
- b) Treat biological resources as capital resources and invest accordingly to prevent their depletion.
- c) Introduce environmental awards which carry financial benefits.
- d) Provide basic infrastructure and soft credit lines to targeted sectors.
- e) Continue to build capacity within the public and private sectors for integrating

environmental concerns, and calculations of benefits and costs, into project design, implementation, evaluation and monitoring.

2.1.3 Some Long-Term Priorities

- a) Change the behaviour of people and institutions so that they become conservers of biological resources and not overusers.
- b) Recognise and affirm the role of culture as part of conservation.

2.2 PHYSICAL ENVIRONMENT

2.2.1 Geology, Soils, Minerals and Mining

Kenya has a wide variety of landscapes, from tropical coral reefs to snow capped Mount Kenya. The geology ranges from some of the world's oldest rocks to recent volcanic ash and lava flows. There are many different types of soils, including very fertile volcanic soils. Soil erosion is a problem, causing loss of nutrients, siltation of lakes and hydroelectric dams and pollution of marine ecosystems. Government ministries, research institutes and many non-governmental organisations (NGOs) and local communities are involved in soil conservation programmes and projects. A number of useful minerals occur in Kenya, including fluorspar and soda ash.

There are precious minerals such as gemstones and gold. Limestone deposits are mined to make cement, and sand is collected for the building industry. The process of extracting minerals can cause severe environmental damage. Some of the chemicals used in the mining process often contaminate ground and surface water. Harvesting of "free" sand causes soil erosion, lowers the water table, damages biodiversity and may cause some rivers to change course; in some cases sand miners have drowned or been buried in landslides.

2.2.2 Climate

The equator bisects Kenya, but unlike most

other equatorial countries, Kenya has a mostly dry climate. Nearly 80% of the country is arid and semi-arid lands (ASAL). The Government is concerned about the global increase in carbon dioxide emissions and other "greenhouse gases" that form a layer in the atmosphere, trapping heat around the earth. The rainy seasons in the last few years have been erratic. Climate change brought on by global warming would have disastrous effects on the country, which is dependent on its biological resources for food and industry.

2.2.3 Actions Which Can Be Taken Immediately

- a) Enhance and co-ordinate soil conservation programmes.
- b) Enact legislation and/or enhance enforcement of regulations governing mining and sand harvesting, and involve local people in monitoring and valuation of local resources.
- c) Co-operate with international initiatives to assess and monitor causes and effects of global warming and climate change.

2.2.4 Some Selected Priority Activities Requiring Funding

- a) Assess and monitor the effects of small-scale gold mining on the environment.
- b) Require mine owners to rehabilitate mines and quarries, supported by a system of incentives and penalties.
- c) Assess available information on impacts of climate change on ecosystems and human development.

2.2.5 Some Long-Term Priorities

- a) Formulate response strategies and options to mitigate or adapt to climate change.
- b) Assess the status and quality of Kenya's mineral deposits.

2.3 WATER RESOURCES

Water, or the lack of it, is crucial to Kenya's development. Agriculture, industry, human settlements, waste management, tourism and natural ecosystems all depend on water. Although Kenya's total water resources potential exceeds the present total annual demand, it is limited in space, time and quality. In many areas of Kenya, water has become scarce or polluted, leading to conflicts. The ultimate constraint on Kenya's industrial development is likely to be unavailability of water.

2.3.1 Inland Waters

Kenya's fresh water resources include rivers, lakes, wetlands and underground water. The waters of the Tana River, for example, supply hydroelectric power. The Lake Victoria basin sustains nearly half of the country's population. Alkaline lakes such as Lake Nakuru are major tourist attractions. Wetlands provide groundwater recharge and discharge, water purification, pollutant removal, water storage, shoreline stabilisation, breeding grounds for fish and birds, dry season grazing grounds for livestock and wildlife, and a variety of wetlands products.

Demand for Kenya's water resources is high, and has caused a number of conflicts. Using water to dilute and carry industrial, domestic and agro-chemical wastes has polluted several water bodies, some to alarming levels. Water stored in dams or diverted for irrigation reduces the flow for downstream users, including seasonal flooding on which systems of agriculture are based. Inter-basin water transfer for urban or agricultural use may deplete water resources in one basin while causing disposal problems in the other. Demand for agricultural or settlement land has caused encroachment on water catchments and wetlands, thus reducing the flow of springs and streams and lessening the land's ability to adjust to floods and droughts.

2.3.2 Coastal And Marine

Coastal and marine areas include harbours, deltas and creeks; forests, beaches, mangroves and coral reefs; inshore and

offshore fishing grounds and the exclusive economic zone. These resources bring much revenue to the country by sustaining trade, tourism and food production. However, natural resources at the coast are under increasing pressure. There is recurrent shortage of fresh water. Coral reefs are threatened by pollution from factories, towns, hotels, and siltation. The fisheries are being exploited unsustainably, sometimes by vessels outside national control.

2.3.3 Actions Which Can Be Taken Immediately

- a) Stop further encroachment on water catchment areas, including wetlands and mountain forests, while developing strategies to manage these areas for multiple use.
- b) Prioritise water allocation in quantity according to the needs of rural and urban settlements; industry; downstream users; agriculture; waste dilution; and maintenance of ecological systems.
- c) Introduce a tariff for water abstraction.
- d) Formulate a comprehensive national water policy.
- e) Develop a national plan on sewerage management.
- f) Promote regional co-operation in the management of all shared water resources, particularly Lake Victoria.

2.3.4 Some Selected Priority Activities Requiring Funding

- a) Survey water quality and quantity throughout the country. This could be done on a basin by basin basis.
- b) Survey and inventory the nation's wetlands and its coastal and marine resources.
- c) Rehabilitate and/or develop fresh water resources monitoring systems.
- d) Enhance the national capacity to monitor offshore waters.

- e) Formulate an integrated water resources development plan for each basin, to include fisheries, water quality, domestic supply and sanitation, industrial and agricultural needs, pollution, biodiversity, land use, etc.
- f) Develop an integrated coastal management plan to address fresh water resources, fisheries, tourism, pollution, biodiversity, human settlements and industry.
- g) Develop an integrated management plan for wetlands (water use and storage, fisheries, biodiversity, agriculture, livestock, land use, human settlement, etc.), including community participation.
- h) Implement the Water Master Plan.

2.3.5 Some Long-Term Priorities

- a) Develop and implement methods to harvest rainfall and runoff.
- b) Strengthen and promote the role of women and youth to fully participate in water resources and environmental management.

2.4 BIODIVERSITY

Kenya's biodiversity is all of its plants, animals, and micro-organisms, the genes they contain and the ecosystems of which they are part. Kenya has biological resources that are of considerable economic and intrinsic value. The country possesses an estimated total of 35,000 known species of animals, plants and micro-organisms. These are fundamental to human well being. For example, agriculture, livestock, fisheries and forests account for most economic output, including subsistence survival, employment and export earnings; and tourism is a key foreign exchange earner which is largely based on the presence of wildlife and seashores.

2.4.1 Genes, Species And Ecosystems

At present our use of most natural resources

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 plants and animals are over-harvested, and a few have actually become extinct. Conservation is therefore vital to sustainable growth. Conservation does not preclude human use. The present task is to measure the true value of biological resources; widen the use of indigenous species; establish sustainable harvest levels; develop microbial resources; protect threatened ecosystems; and integrate the conservation of biodiversity with other resource use.

2.4.2 Forestry

Forests cover less than 3% of Kenya's land area, yet these forests contain 50% of the nation's tree species, 40% of the mammals and 25% of the birds. Forests provide wood and wood products such as wood fuel, used by over 80% of all households. Forests, and especially indigenous forests, protect water catchments, supply non-wood products such as honey and medicinal plants, and have important cultural, ceremonial and recreational uses. However, gazetted indigenous forests are losing 5,000 ha. every year, and industrial tree plantations have declined from 170,000 to 133,000 ha in the last few decades. Sustainable wood and wood fuel production from forests is estimated to be only about one quarter of national requirements. To meet needs for wood and wood fuel, trees will have to be grown on-farm.

One area that deserves immediate attention is the coastal forests. Coast Province forests constitute less than 10% of the nation's forests, but they contain nearly half of the country's rare trees. There are animals and plants found in remnant coastal forests that occur nowhere else. Kaya forests are sacred places to the local communities, and other sites have cultural or ceremonial importance. Many forest areas have been destroyed for development, mining, agriculture or wood fuel.

2.4.3 Wildlife And Fisheries

Kenya has an impressive system of protected areas, covering 8% of the land area, and earning much foreign exchange. Conflicts occur, however, when wild animals destroy crops and even kill people. In addition, a number of important habitats are not yet protected. A

tourism master plan that will address some of these issues is under preparation.

Fisheries provide the nation with protein, employment and foreign exchange. Unfortunately, overfishing in some areas, pollution of inland and coastal waters, and the introduction of alien species of fish and plants, threaten the variety and productivity of the nation's fisheries.

2.4.4 Biotechnology

Biotechnology is the use of molecular genetics, biochemistry, microbiology, and of processes using micro-organisms or the cells and tissues of living things, to produce goods and services. Advances in biotechnology have revolutionised developments in agriculture, human health, forestry, medicine and industry. Although Kenya is rich in genetic resources, biotechnology is undeveloped. This is due to insufficient finances, lack of enough trained scientists and technicians, lack of well equipped facilities and poor linkages between research organisations and end users. Kenya's people and environment also need protection against some technology imported from abroad, which may be hazardous.

2.4.5 Indigenous Knowledge

Indigenous knowledge in biodiversity conservation is immense. Different cultures have lived with, sustained themselves from, and conserved and managed biodiversity, with respect for nature. Understanding cultures and indigenous knowledge may therefore offer the needed options for future biodiversity conservation and development. Yet too often local communities have not been consulted or involved in development or conservation projects and programmes.

2.4.6 Actions Which Can Be Taken Immediately

- a) Develop a biodiversity strategy to maintain, use and preserve Kenya's remarkable biological diversity.
- b) Place critical and fragile unprotected forests, including coastal forests, under some form of protection, and formulate plans for sustainable use by neighbouring communities. Coastal

sites in need of immediate protection include some Kaya forests, Mwangea Hill and Kilibasi Hill. Protection to be extended to include sites with unique plants, especially the rock outcrops of Chasimba, Mwarakaya, Pangani and Kambe Rocks, and the gorges of Rare, Njora, Ndzovuni, Lwandani and Kombeni rivers.

- c) Formulate scientific criteria for the safe use of genetically modified organisms (GMOs); and make Prior Informed Consent a pre-requisite for all field testing of GMOs.

2.4.7 Some Selected Priority Activities Requiring Funding

- a) Survey and document the composition, distribution, structure, functions, and the use and value of biodiversity.
- b) Expand *ex situ* conservation efforts such as gene banks, botanical gardens, and commercial farming in support of conservation.
- c) Implement the recommendations of the Forestry Master Plan.
- d) Examine the most suitable methods of establishing forest plantations.
- e) Involve local communities in wildlife conservation and ensure that wildlife contributes to their welfare.
- f) Train more scientists and technicians in biotechnology.
- g) Create a Biotechnology Enhancement Fund to provide venture capital for biotechnology research and innovation.
- h) Protect sacred places and areas of cultural importance under present legislation or new types of protected areas.

2.4.8 Some Long-Term Priorities

- a) Establish realistic harvest levels of wild species, supported by effective regulatory mechanisms.

- b) Promote the development, diversification, conservation and management of the nation's fisheries resources.
- c) Develop fish ladders or other means to enable fish to move up and down rivers with hydroelectric dams.
- d) Enhance research and development and monitoring in biotechnology and biosafety.
- e) Document traditional knowledge of the use and management of natural resources, and incorporate it into conservation programmes.

2.5 AGRICULTURE AND FOOD SECURITY

In thirty years Kenya's population has tripled, and, remarkably, food production has just about managed to keep up with it. In addition, Kenya produces a variety of cash crops, including tea, coffee, pyrethrum, flowers and others. Today, however, there is very little unused arable land which can be brought into production. Inappropriate use of agrochemicals have polluted some water sources, destroyed some natural pest predators and compacted some soils. Certain high potential areas are producing less because of unsustainable land use. The only way to increase production is by promoting efficient use of available land.

There is need for efficient and appropriate use of fertiliser, pesticides, tillage methods, crops and cropping patterns to avoid environmental degradation. In the long run, greater use of animal and compost manures need to be promoted as a supplement to mineral fertilisers. Integrated pest management strategy should be given high priority. To reduce pollutants reaching water bodies, the run-off water should be filtered through the soil as an integral part of soil conservation structures. Greater attention needs to be given to drought-resistant indigenous food plants.

2.5.1 Food Security

Producing the nation's current food needs

should not compromise the environment or the land's ability to meet future national foods needs. Food security can be ensured by a sustainable production of desirable amounts as well as the ability of all Kenyans to access the food in sufficient amounts and at all times.

Sustainable production depends on the use of certified seeds, research, effective outreach (extension) programmes, and use of appropriate agronomic practices to achieve high yields. Current trends of sub-dividing land into smaller and smaller units is a practice which can be counter-productive in the long term. It is therefore important to retain some large farms for research, certified seeds production, and quarantine purposes.

2.5.2 Soil Conservation

Erosion is a major cause of soil degradation in Kenya. In high and medium potential areas, soil conservation programmes should continue to be implemented on catchment basis. In the ASALs, conservation efforts need to be intensified, especially in the most fragile areas. Water harvesting for domestic, livestock and crop use needs to be integrated into conservation efforts in ASALs, alongside woodland and range management, which should emphasise natural tree regeneration rather than tree planting.

2.5.3 Irrigation And Drainage

Irrigation is one option for bringing more land into production. With Kenya's vast drylands and some fairly large lakes and swamps, it seems an obvious solution. Any irrigation project needs careful assessment. Possible negative impacts resulting from poorly designed and implemented irrigation projects include: salination due to poor drainage; pollution by agro-chemicals and other wastes if drainage water is emptied directly into receiving water bodies; inadequate water for downstream activities and ecosystems due to reduced outflow; and increase in water-borne diseases such as malaria and bilharzia leading to high health care costs.

In Kenya, many irrigation projects have failed due to socio-economic problems. Some of these projects failed because of poor planning, incomplete implementation, failure to involve local communities, and inadequate funding. Small scale projects with full community participation, and intensive commercial

ventures, seem to have been the most successful.

Drainage of wetlands also requires careful assessments of viability, costs and benefits. Draining a wetland may cause reduced water flow in dry years and more destructive floods. Some drained wetland soils become compacted and completely unproductive. Even in a successful project, the increase in food production may not offset the costs (loss of wetlands products, biodiversity and ceremonial sites).

2.5.4 Animal Husbandry

In the high and medium potential areas, dairy farming is one of the main activities. Continued sub-division of land necessitates the keeping of small stock like rabbits (for meat), dairy goats, and poultry, and the use of zero-grazing. The small stock are expected to have less negative impacts on the environment.

In the ASALs, beef cattle, sheep, camel and goat rearing are the major activities. Improvements of range production, water supply and marketing will need to incorporate environmental friendly techniques.

2.5.5 Actions Which Can Be Taken Immediately

- a) Intensify crop yields and reduce dependence on imports by encouraging integrated pest management, multiple cropping, agroforestry and organic compost and manures in agriculture. At the same time, train extension workers in these techniques.
- b) Train users of pesticides and other agro-chemicals, including extension staff and the general public, on safety and dangers of using pesticides and agro-chemicals.
- c) Encourage optimal livestock production, including high yielding breeds and zero-grazing in some areas and drought and disease resistant breeds in other areas.

2.5.6 Some Selected Priority Activities Requiring Funding

- a) Increase and diversify agricultural production by promoting the use of and improving the productivity of indigenous plant species and animal breeds. Provide incentives for farmers to maintain local crop varieties and animal breeds.
- b) Optimise production on existing land by promoting research into and adoption of appropriate land use systems and technologies.
- c) Improve fish farming through research, extension and marketing.
- d) Conduct studies on wildlife-livestock disease relationships and multiple land use systems such as wildlife/livestock ranching.
- e) Investigate lesser known plant products, including plant based chemicals, oils, insecticides, fragrances and flavourings, with full community participation.
- f) Assess the viability, rehabilitation needs, environmental impacts and economic costs and benefits of existing and proposed irrigation and drainage schemes.
- g) Avail adequate budgetary resources for adaptive research, training, and extension.

2.5.7 Some Long-Term Priorities

- a) Collect and provide information on optimal land uses in various agro-ecological zones.
- b) Integrate environmental considerations and sustainable resource management into all aspects of agricultural development.
- c) Support programmes in which women have traditionally had economic control, including production, marketing and processing. Improve

infrastructure facilities to support marketing.

- d) Keep some large farms intact to produce quality seeds, quarantine animals and for research.

2.6 DESERTIFICATION & DROUGHT

2.6.1 Desertification

Kenya's arid and semi-arid lands are suffering an increased rate of desertification. The major issues related to desertification and drought include the assessment and mapping of desertification; drought monitoring and early warning systems; land tenure and property regimes; rangeland resources management; socio-economic characteristics and population dynamics; community participation; and research, development and institutional arrangements.

2.6.2 Drought Monitoring

Droughts are part of the history of this region, a cyclical occurrence whose regularity is not clear. Droughts cannot be prevented, but can be predicted and mitigating measures put in place. Continued use of remote sensing techniques, district level monitoring, and local knowledge make it possible to predict the onset of drought about a year in advance.

2.6.3 Socio-Economic Dynamics

The arid and semi-arid districts of Kenya are characterised by a limited natural resource base and a low carrying capacity. Owing to the low carrying capacity of the ASALs, a relatively small increase in population may result in the over-exploitation of resources. The population growth rate is heavily influenced by migration, mainly from the high potential areas, in search of land and employment opportunities. Owing to insecurity in many ASAL areas, there tends to be concentrations of people and livestock, leading to land degradation.

There are other factors which affect population dynamics in the ASALs. These include temporary emigration of pastoralists in search of water, education and health;

displacement of pastoralists to allow for agricultural expansion or urbanisation; and the influx of refugees from neighbouring countries. Immigrants from high potential areas bring with them land use practices which are inappropriate and lead to land degradation. The immigrants also disrupt the indigenous management systems which are based on appropriate and locally adapted technologies.

2.6.4 Rangeland Resource Management

The quest for more land has led to a shift from the predominantly communal land ownership in the ASALs to privatisation. Group ranches are being subdivided. In some areas, increased fencing or privatised land has blocked the natural migration corridors for wildlife and livestock.

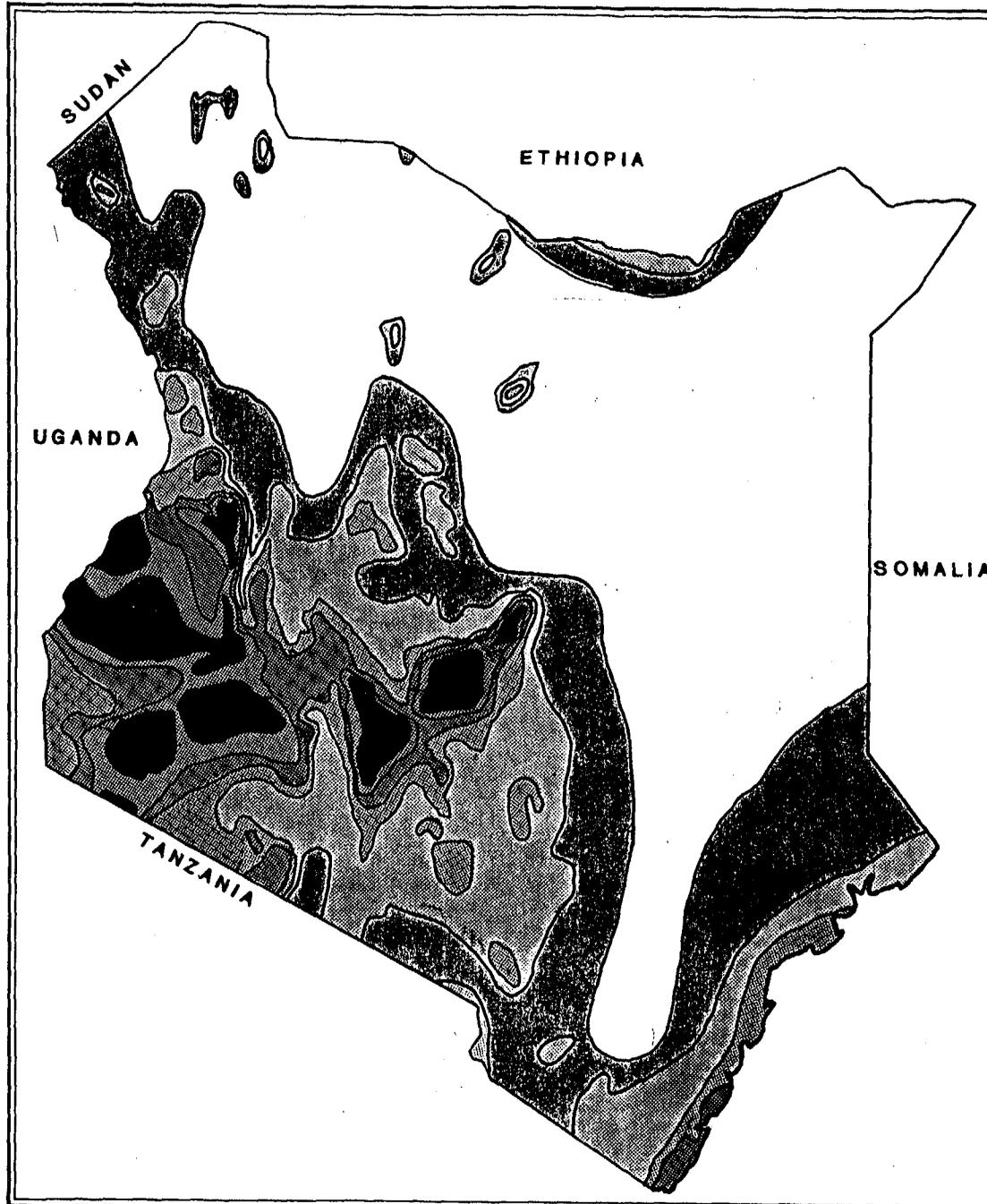
2.6.5 Actions Which Can Be Taken Immediately

- a) Study, and assess indigenous knowledge of local communities and use those which contribute to sustainable use of natural resources.
- b) Improve security in the ASALs so as to reduce local land pressure.
- c) Support multiple land use systems in rangeland.

2.6.6 Some Selected Priority Activities Requiring Funding

- a) Use remote sensing techniques, mapping and socio-economic data to assess the process of desertification.
- b) Promote alternative means of livelihood to reduce human impact on land.
- c) Improve marketing and transport of livestock, honey, and other ASAL products.
- d) Strengthen current drought preparedness and recovery programmes and introduce them in areas where they do not exist.
- e) Avail research results on ASALs and increase their use in order to improve land use systems, including adoption of suitable technologies.

AGRO -CLIMATIC ZONE MAP OF KENYA



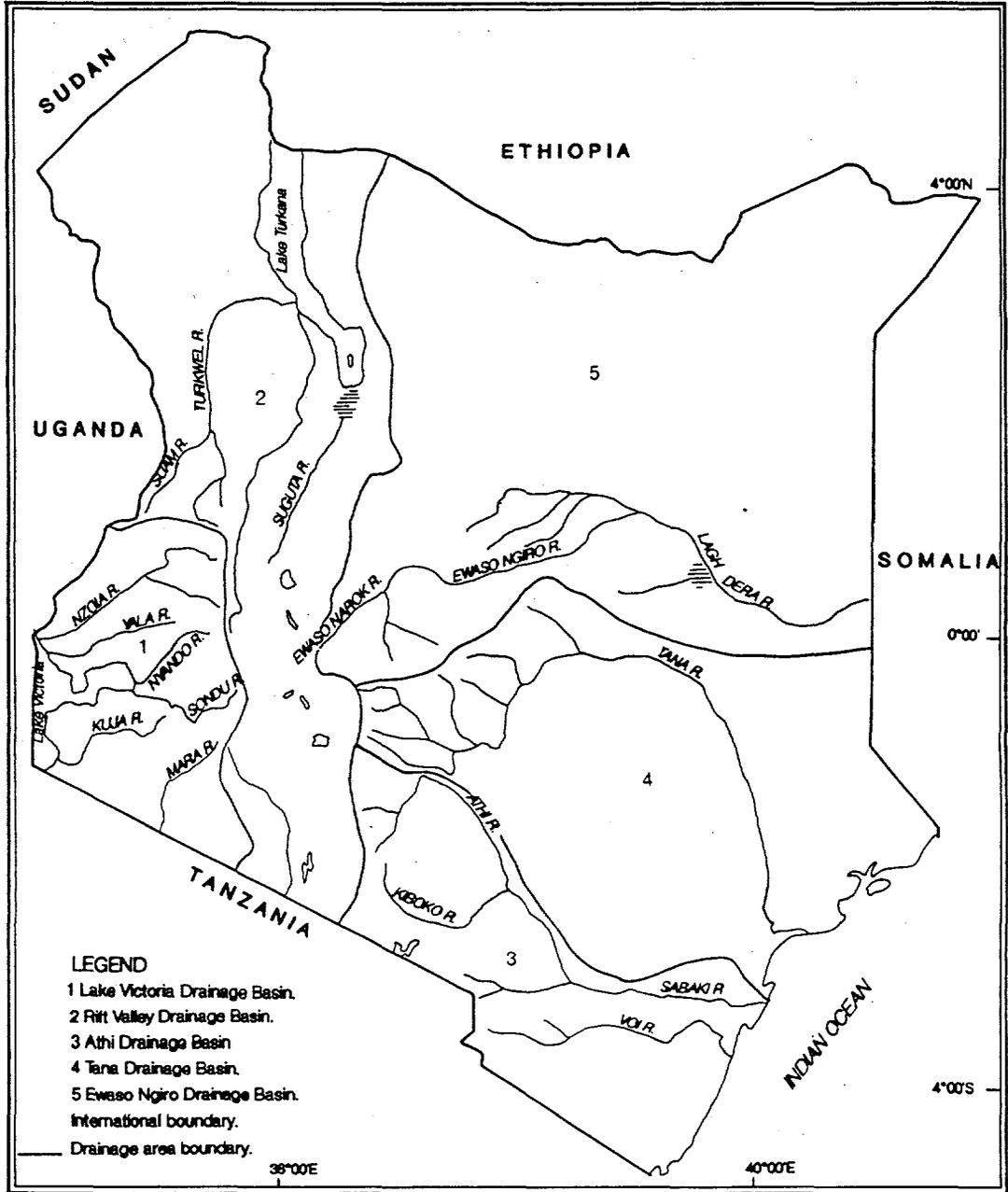
KEY Zone	Climatic designation	Agricultural potential
1	humid	high
2	sub-humid	high
3	semi-humid	high
4	semi-humid to semi-arid	medium
5	semi-arid	medium
6	arid	low
7	very arid	very low

LEGEND EXPLANATION

Zone	r/Eo ratio	r/Eo ratio in %	Climatic designation
1	>0.8	>80	humid
2	0.65 - 0.80	65 - 80	sub-humid
3	0.50 - 0.65	50 - 65	semi-humid
4	0.40 - 0.50	40 - 50	semi-humid to semi-arid
5	0.25 - 0.40	25 - 40	semi-arid
6	0.15 - 0.25	15 - 25	arid
7	< 0.15	< 15	very arid

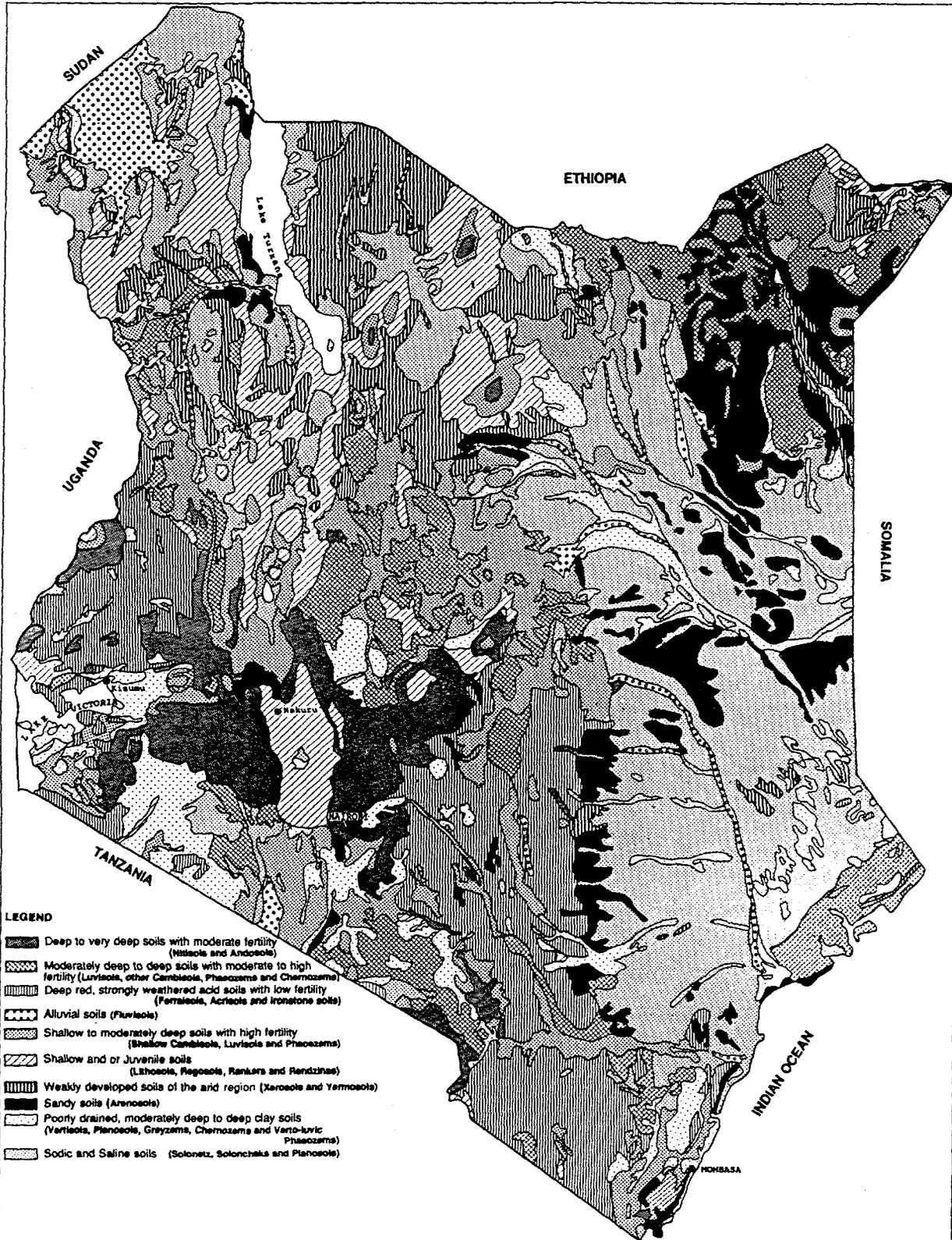
source : KARI

THE MAIN DRAINAGE BASINS OF KENYA



source : National Water Master Plan (1982)

GENERALISED EXPLORATORY SOIL MAP OF KENYA



Source: Okoth and Maingi, 1993. (generalised from Exploratory Soil Map of Kenya, Sombroek, 1982)

- f) Enhance national climatological, meteorological and hydrological capabilities to provide drought early warning data and use them.

2.6.7 Some Long-Term Priorities

- a) Allow adequate flow downstream in basins where damming of the rivers has taken place.
- b) Take environmental costs into consideration in the management of refugee settlements.

2.7 POLLUTION CONTROL AND WASTE MANAGEMENT

2.7.1 Gaseous Emissions

Gaseous emissions from industry, transportation, domestic and natural sources are changing the quality of the air. Some of these gases, the "greenhouse gases," are increasing global warming. Ozone depleting substances, particulate matter and toxic gases cause serious health problems, while some pollutants destroy property.

2.7.2 Liquid And Solid Wastes

As Kenya becomes more urbanised and industrialised, it produces more waste which has to be disposed of. The sewerage systems and waste collection ability of most urban areas cannot keep up with the waste produced by a rapidly growing population. Industrial and agricultural wastes are often discharged untreated into water bodies, making the water unfit for other uses.

2.7.3 Chemicals And Hazardous Wastes

Dangerous chemicals are used in industry, sometimes without sufficient safety measures; and industrialised nations try to dump their hazardous wastes in other countries.

2.7.4. Noise Pollution

Noise pollution is a growing problem in the urban and industrial environment.

2.7.5 Actions Which Can Be Taken Immediately

- a) Update water quality standards and develop national air quality standards.
- b) Involve business and industry in reducing pollution and managing waste including discharge and storage.
- c) Upgrade the ranking of the cleansing section within local authorities, making it possible to employ professionals.
- d) Devise procedures for proper management of chemicals at all levels, including manufacture, transport, handling, packing, labelling, use and disposal.
- e) Support international agreements to control trans-boundary shipments of hazardous wastes.
- f) Review and enforce legislation to deter pollution and encourage recycling, for example, institute polluter charges to discourage polluters.
- g) Keep the public informed of the dangers of fumes from cooking fires, toxic chemicals, climate change and other effects of pollution on environment.
- h) Enact and/or enforce legislation on the management of chemicals e.g, enact the Chemical Controls Bill of 1994.

2.7.6 Some Selected Priority Activities Requiring Funding

- a) Inventory sources and characteristics of gaseous emissions.
- b) Formulate a policy on control and management of gaseous emissions, enact supporting legislation and train personnel.
- c) Rehabilitate waste water treatment facilities, and provide funds for sustainable maintenance and operation of sewage treatment facilities.
- d) Promote and support cleaner production technologies with

economic incentives.

- e) Provide adequate storage facilities for solid wastes, determine collection frequencies, review location of disposal sites and develop acceptable procedures for their management.
- f) Train personnel and provide facilities (e.g laboratory equipment) to manage chemicals.
- g) Educate the public on the dangers of noise pollution and their rights within the law, and educate workers and managers to participate in control of noise pollution.

2.7.7 Some Long-Term Priorities

- a) Facilitate and encourage research, and commercialisation of research results, on all aspects of minimising, avoiding, recycling, treating and disposing of waste.
- b) Collaborate with neighbouring countries in the control of disposal of liquid wastes into common water bodies.
- c) Encourage technology to produce alternatives to plastics.

2.8 HUMAN SETTLEMENTS AND URBANISATION

2.8.1 Land Tenure And Property Regimes

Land is a crucial national resource that is basic to the livelihood and well being of Kenyans; however, there is not enough land for everyone to own a viable unit. Thus, land ownership is one of the most emotive issues in Kenya. Land tenure may or may not include rights in other properties such as trees, water, pasture, minerals and buildings. The cultural, social and economic basis of land tenure and property rights in different resources, and the distinct proprietary attitudes that affect the productivity of these resources, should be studied and understood.

Land disputes have intensified in the last two decades, leading to poor management. In some cases, they have affected agricultural production through loss of land and diversion of resources to cover the cost of litigation.

2.8.2 Land Use Planning

There are many demands on the available land which create tremendous pressures and conflicts such as:

agricultural vs infrastructure development; environment protection vs settlement and agriculture; tourism vs demand for access to land by local people; introduction of arable agriculture in marginal areas; and land allocation and change of user without environmental considerations.

Other problems related to land use planning in human settlements include:

fragmentation/sub-division and inefficient utilisation of the resultant land parcels; destruction of water catchments and wetlands; weaknesses in land allocation procedures leading to incompatible land uses; limited physical planning personnel; weak legal enforcement of development control measures; and limited community participation in the planning, implementation, monitoring and evaluation of land use plans.

Land use planning policies are well articulated and are backed by various legislation. These provisions are scattered in numerous statutes, and weaknesses in implementation arise owing to inadequate co-ordination and enforcement.

Sustainable land use planning involves the management of available land resources in such a way that it brings optimal benefit to the user while having minimal impacts on the environment. This includes planning and management of human settlements to satisfy the physical, social and other needs of the inhabitants on a sustainable basis by maintaining the balance of the ecosystems of which the settlements are an integral part.

2.8.3 Urbanisation

The high population growth rate together with the low economic growth rate and poverty have adversely affected sustainable use of available natural resources, infrastructures and overall living standards.

Rural housing has received minimal attention in development, yet 80% of the country's population live in them. This encourages rural-urban migration. The increasing urbanisation has placed tremendous pressure on existing housing, infrastructure and services. Housing, water supply, sewerage, solid waste management and urban transport are inadequate. Slums and squatter settlements have mushroomed, and consequently, there is an increase in urban poverty, unemployment, underemployment, crime, drug abuse and street children. There is need to improve management capabilities in order to improve the quality of the urban environment.

2.8.4 Shelter, Infrastructure And Services

Shelter development is hampered by poverty; unsustainable use of building materials; minimal participation of communities, community-based organisations or non-government organisations; weak institutional capacities and management; and the use of outdated building by-laws and planning regulations. The mobilisation of monetary, technological and human resources from all players should be intensified with a view to promoting sustainable human settlement development. These factors will further be enhanced by the on-going preparations for HABITAT II under the themes: "Sustainable Human Settlements in an Urbanising World" and "Adequate Shelter for All".

Infrastructure includes water supply, sanitation, solid waste management, environmental health services, energy, and transport. The low level of access to clean water supply, health and sanitation facilities, and poorly ventilated structures especially in rural areas and informal settlements in urban centres, impair human health.

2.8.5 Energy

Energy is an important input in all forms of human activities including domestic, commercial and transportation. Wood fuel

demand has been steadily growing. Unsustainable use of various forms of energy cause in-door and out-door air pollution; depletion of vegetation; and water pollution. Promoting energy conservation in the industrial and transport sectors can make significant reductions in energy demand.

2.8.6 Disasters

Disasters cause loss of life, damage to property and the environment, etc. There is need for a comprehensive national policy and law to provide for disaster preparedness and response.

2.8.7 Actions Which Can Be Taken Immediately

- a) Formulate a comprehensive national settlements policy and incorporate traditional and societal cultural values in planning human settlements.
- b) Enhance the involvement of local authorities in the planning and management processes.
- c) Involve local communities and require an environmental impact assessment for most cases of land allocation and change of user approvals.
- d) Redirect urban expansion and housing away from high potential agricultural land, and improve physical planning for low potential areas.
- e) Implement revised building by-laws and planning regulations.
- f) Encourage the construction industry to adopt new efficient, energy-saving, low polluting, and material conserving technologies, particularly in the wood processing industry.

2.8.8 Some Selected Priority Activities Requiring Funding

- a) Upgrade or develop infrastructure, in particular water and sanitation systems.
- b) Promote the use of alternative, clean and renewable sources of energy, including mini hydro power stations, solar power, biogas and wind energy. Encourage more efficient use of energy;

and promote research, development and commercialisation of alternative energy sources.

- c) Expand current research and development and training programmes to develop, promote and commercialise appropriate and environmentally friendly housing, building materials, construction and infrastructural technologies, in co-operation with communities and the private sector.
- d) Intensify poverty alleviation programmes.
- e) Carry out research on recycling of waste motor oil, use of leaded petrol and fuel economy, and other means of mitigating the effects of internal combustion engines on the human and natural environment.
- f) Formulate a policy on disaster management and establish a national fund for disasters to be administered by a national agency on disasters.
- g) Promote the use of non-motorized transport and expand road transport, related infrastructure and marketing systems especially in ASAL areas.

2.8.9 Some Long-Term Priorities

- a) Improve access to land and educate Kenyans to understand that part of the population will remain landless.
- b) Educate Kenyans to value other security e.g professionalism and business rather than only land as security.
- c) Strengthen programmes aimed at improving rural-urban linkages as a way of reducing to sustainable levels migrations into urban settlements.

2.9 PUBLIC PARTICIPATION AND ENVIRONMENTAL EDUCATION

2.9.1 Community Involvement

Community participation in development

activities is a well-established principle in Kenya. It has long been in place as *harambee* and self-help groups. The District Focus Strategy for Rural Development has decentralised decision-making and increased staffing and funding at district level. District Environment Officers (DEOs) reporting to Office of the President and District Environment Protection Officers (DEPOs) from the National Environment Secretariat, have been posted to the districts. Several other ministries encourage public participation in resource management.

Decisions taken at the local level, however, sometimes are not effectively carried through to the district level. The participation of local communities may be hindered by conflicting cultural practices, inappropriate technologies, lack of incentives and undeveloped leadership skills.

In many cases, the local communities who are the beneficiaries of environmental and development projects and programmes are not effectively consulted or involved. This often leads to failures. Donor agencies may be deficient in knowledge of local environmental conditions and cultural values. Flexibility in time and fund allocation, incorporation of traditional values as well as socio-economic, political and environmental realities, and greater co-operation among public and private sectors, would lead to greater success.

2.9.2 Environmental Education And Public Awareness

The school curriculum has incorporated essential aspects of environmental education, but not all institutions have the capacity to teach it effectively. Major constraints include shortage of funding, basic facilities such as laboratories, and teachers trained in environmental education.

In non-formal education, major drawbacks include unco-ordinated planning for environmental activities; inadequate community involvement in deciding where and what programmes should be undertaken and their priorities; limited use of indigenous knowledge and local expertise; and limited use of local languages.

The mass media does not always have access to factual information for publicity, and most journalists have not been trained to report on

environmental issues. Sometimes, although the public may be aware, the needs to survive today and to conserve for tomorrow are conflicting.

2.9.3 Actions Which Can Be Taken Immediately

- a) Involve communities in all the stages of environmental planning and management.
- b) Recognise and promote the use of indigenous knowledge and skills whenever appropriate in environmental management.
- c) Encourage international organisations to honour the priorities locally identified; to utilise local expertise and resources as much as possible; and to co-ordinate their activities with those of local communities.
- d) Strive for gender balance in community representation.
- e) Support efforts by the NGO council to develop a code of conduct and ethics for its members, as a self-regulatory mechanism.

2.9.4 Some Selected Priority Activities Requiring Funding

- a) Enhance community capacity to participate through training and incentives; and increase funds for community development initiatives in environmental planning and management.
- b) Train development agents in participatory methodologies.
- c) Integrate income-generating activities into environmental projects and programmes to achieve sustainability.
- d) Incorporate environmental education in the formal syllabi as an examinable subject at all levels of education, or revise the syllabi to strengthen the environmental component in examinable subjects. Support this with in-service environmental education for trainers and supervisors/evaluators.

e) Extend environmental training and awareness to leaders and decision makers in government, NGOs, the private sector and donor agencies.

f) Develop environmental programmes for the mass media; write environmental education training manuals; and prepare information packages in local languages for local communities.

g) Formulate a national environmental education strategy

2.9.5 Some Long-Term Priorities

a) Improve access to environmental information by individuals, the media and communities.

b) Review and strengthen the activities of district committees and decentralise some of their functions to divisional and locational levels.

c) Collect, study, store, analyse and disseminate indigenous knowledge; and recognise and respect moral and socio-cultural traditions and interests of target groups.

2.10 ENVIRONMENT INFORMATION SYSTEM (EIS)

2.10.1 Role Of Information

Information is a fundamental resource upon which organisations, countries and individuals depend in managing their affairs. A decision is generally no better than the information used to make the decision. Environmental information in Kenya is collected by many agencies in the public and private sector.

2.10.2 Constraints

A lot of data is collected but up to 70 per cent of some collected data remain unanalysed for long periods and therefore uninterpreted

because of financial, technical and planning constraints. Other constraints that affect access to information are as follows:

Fragmentation of the information in various institutions and organisations; undefined confidentiality; differing storage media; lack of a central environmental reference system; limited trained human capacity to collect, analyse, retrieve, and disseminate the information; limited funds for developing an information system; lack of awareness on what is available, where available and in what format; absence of co-ordination and linkages between information producers and users; and absence of an information management structure and infrastructure.

2.10.3 Actions Which Can Be Taken Immediately

- a) Enact legislation to establish a national environment information system (NEIS) to harmonise collection, analysis, storage, retrieval, and dissemination of environmental information. (see Annex)
- b) Review policies and legislation on information with a view to developing appropriate ones to respond to dynamic changes in software, hardware, exchange systems, linkages, copyright rules and patent rights.

2.10.4 Some Selected Activities Which Require Funding

- a) Establish NEIS as an autonomous, statutory institution.
- b) Strengthen human resource capacity in information management, Geographical Information System (GIS), remote sensing, and related disciplines.
- c) Prepare and implement programmes, for example, publishing directories and inventories.

2.10.5 Long-Term Priorities

- a) Monitor implementation of EIS strategies and programmes, especially as they respond to planning needs at the project, district, and national levels.

2.11 INSTITUTIONAL AND LEGAL FRAMEWORK

2.11.1 Legislation

Environmental legislation is found in various sectoral statutes under the different line ministries. Such laws are found under the ministries dealing with agriculture, health, water, forestry, mining, fisheries, livestock, wildlife, among many others. These statutes face fundamental constraints in enforcement. Constraints include penalties which are not deterrent enough, and provisions which are outdated.

2.11.2 Institutions

The Government has, over the years, set up primary institutions on environmental matters, notably the National Environment Secretariat established in 1974, the Inter-Ministerial Committee on Environment (1981), and the Permanent Presidential Commission on Soil Conservation and Afforestation (1981). In recent years, new institutional forms and programmes which are capable of cutting across administrative jurisdiction were established. These include the District Focus Strategy for Rural Development, and regional authorities such as the Tana and Athi Rivers Development Authority (TARDA).

There is need for a single institution with the legal authority to co-ordinate the management of environmental resources, which are currently managed by various sectoral statutes under the different line ministries.

2.11.3 Environmental Impact Assessment (EIA)

Environmental Impact Assessment is a method used to identify a project's probable impacts on the environment. As a national policy instrument, EIA is carried out early in the project cycle at the pre-feasibility stage for proposed activities, policies, programmes and development projects which are shown by preliminary screening as likely to have significant adverse environmental, social or economic impacts.

ried out during and after including those projects IA.

Which Can Be Taken ly .

ation to establish a new framework to co-ordinate, where necessary enforce, vital policy and legislation. Institution will also co-ordinate enable the continuation of an environmental action plan and its investment; and initiate the content of the national environmental information system, Environment Tribunal. It will also oversee environmental and evaluation, including environmental impact assessment.

provisions of law relating to environment in various statutes, to harmonising, updating and amending the statutes.

an independent environmental impact assessment and for all new development and programmes (with or certain cases).

cedures for enforcement of Environmental Impact Assessment

amine laws relevant to order to: incorporate performance, remove provisions, enhance ensure effective

implementation of provisions, provide incentives, and repeal sections that directly promote environmental destruction.

- f) Provide a legal framework for the National Oil Spill Response Committee in order to enhance its ability to marshal resources to contain and clean up oil spills.

2.11.5 Some Selected Activities Requiring Funding

- a) Establish a national environment agency, including a national environment information system and an Environment Tribunal. (see Annex)
- b) Provide human and financial resources to support the environment and development co-ordinating agency and EIA institution.

- c) Develop human resources in environmental law, evaluation and enforcement.

2.11.6 Some Long-Term Priorities

- a) Monitor and review laws to respond to the dynamism in environment management.
- b) Involve a broad cross-section of community groups, NGOs, private sector and other interested parties in the EIA process.
- c) Study and monitor the institutional framework with a view to recommending improvements or better management system(s).

ANNEX: PROPOSED INSTITUTIONAL FRAMEWORK

A: CO-ORDINATING INSTITUTION

A new institution to co-ordinate, enable, and where necessary, enforce environmental policy, legislation and activities is proposed.

1. Functions

- a) Co-ordinating and enforcing environmental policy and legislation.
- b) Co-ordinating and enabling the continuation of the National Environment Action Plan process and its investment programme.
- c) Facilitating the establishment of the national environment information system (NEIS).
- d) Initiating, monitoring and enforcing environmental monitoring and evaluation, including environmental impact assessment (EIA).
- e) Initiating and facilitating the establishment of an Environmental Tribunal to settle environmental disputes.
- f) Facilitating transparency, accountability and access to information by regularly publishing State of the Environment reports.
- g) Initiating the establishment of specialist committees with a wide professional representation to provide:
 - Advice on management of biotechnology and biosafety.
 - Studies and recommendations on management of pollution, chemicals and hazardous wastes.
 - Advice on land use planning.
 - Advice on the management of water resources.
 - Monitoring of the status of

biodiversity and recommending protection *in situ* or *ex situ* where necessary.

- Advice on human settlements.
- Studies and advice on management systems for areas of environmental and cultural importance, including gazetted areas such as game reserves, forest reserves and national monuments, and presently ungazetted areas such as recreational parks, ungazetted forests, water catchments, and sacred sites. Management systems can include parastatals operating as economically viable entities, community-run sites, and areas where the local people are the managers of their environment.
- Advice on environmental research.
- Studies on the impacts of commerce, industry and services, including tourism, on the environment.
- Advice on management of environment at the district level, supported by enhanced district infrastructure, safety enforcement and co-operation with district planning units.

2. Establishment

The proposed institution will be established by an Act of Parliament. In order to carry out its duties effectively, the institution requires independence and authority. It is therefore proposed that it be established as an independent constitutional office, and headed by a chief executive and governing council with security of tenure. Alternatively, the institution may be placed in the Cabinet Office, Office of the President, or the ministry in charge of environment, and the chief executive appointed by the President.

3. Structure

- a) It is important that the proposed institution be well represented at the district level. It is therefore

proposed that the structure of the institution at the national level will be reflected at the district level. The Government may consider the harmonisation of the duties, responsibilities and reporting mechanisms of DEOs and DEPOs.

- b) Four versions of the proposed institutional structure are appended. (Charts 1, 2, 3 and 4).
- c) In establishing and staffing the institution, present environmental institutions and committees should be considered in order to minimise costs and enhance co-operation.

4. Name

The following names for the institution have been proposed:

- Kenya Environment Agency
- Kenya Environment Protection Authority
- Environment and Development Authority
- National Environment Agency

B: ENVIRONMENT TRIBUNAL

1. Establishment

Having noted the increased concerns on the management of the environment, and particularly the widespread serious conflicts that have arisen over the past years, it is recommended that an Environmental Tribunal be established.

2. Authority

The Tribunal should be headed by a Judge. Interest or background in environmental law would be an advantage. Members of the Tribunal should also enjoy security of tenure of office. The decisions of the Tribunal should have the power of law.

3. Operations

Since the conflicts occur countrywide and involve all levels of society, it is

recommended that the Tribunal ease the burden of members of the public by conducting business in various parts of the country. The Tribunal will settle disputes raised by individuals, organisations, government, industries, etc. including disputes regarding EIA.

C: NATIONAL ENVIRONMENT INFORMATION SERVICE (NEIS)

1. Establishment

Having realised that there is enormous data and information in Kenya cutting across all sectors, it is recommended that a national environment information service (NEIS) be established to network, co-ordinate and document the various sources and forms of information in the country. The service will be operated on a sound economic basis. Its long term objectives include the establishment and maintenance of a reliable and up-to-date and yet responsive information service on natural resources.

2. Management

A multi-sectoral environment information steering committee will manage NEIS. The committee will be drawn from the government, non-governmental organisations, and individuals devoted to the environment. The system will be sustainably managed through appropriate costing, marketing, and pricing of information.

NEIS will promote compatible technology used in storage, analysis, retrieval, dissemination, and networking of information.

D: ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Development projects in the private and public sector will be subject to EIA.

1. National Projects

Investors of projects and programmes of a national nature will submit their proposals through the Investment Promotion Centre (IPC). The institution charged with overseeing the EIA process will review the investment in accordance with procedures established, which shall include public consultation.

A decision can include any of the following:

- a) Exemption from full EIA, but subject to monitoring of the conditions of approval.
- b) Acceptance of the proposal.
- c) Advice for revisions.
- d) Rejection.

In the case of projects recommended for revision, the review may result in a decision to allow the proposal to proceed or alternatively may reject the proposal.

All projects allowed to proceed will be subject to monitoring.

The expansion of existing industries and major agricultural projects will also be subjected to EIA before they are approved. Existing and new industries will be subjected to regular environmental accounting and auditing.

2. District Projects

District projects will be subjected to a similar process by the District Environmental Committees (DECs). Procedures for district projects will be established and strictly adhered to under the supervision of the institution charged with overseeing the EIA process in consultation with DDCs and DECs.

Detailed procedures on EIA are available from the NEAP Secretariat.

CHART 1

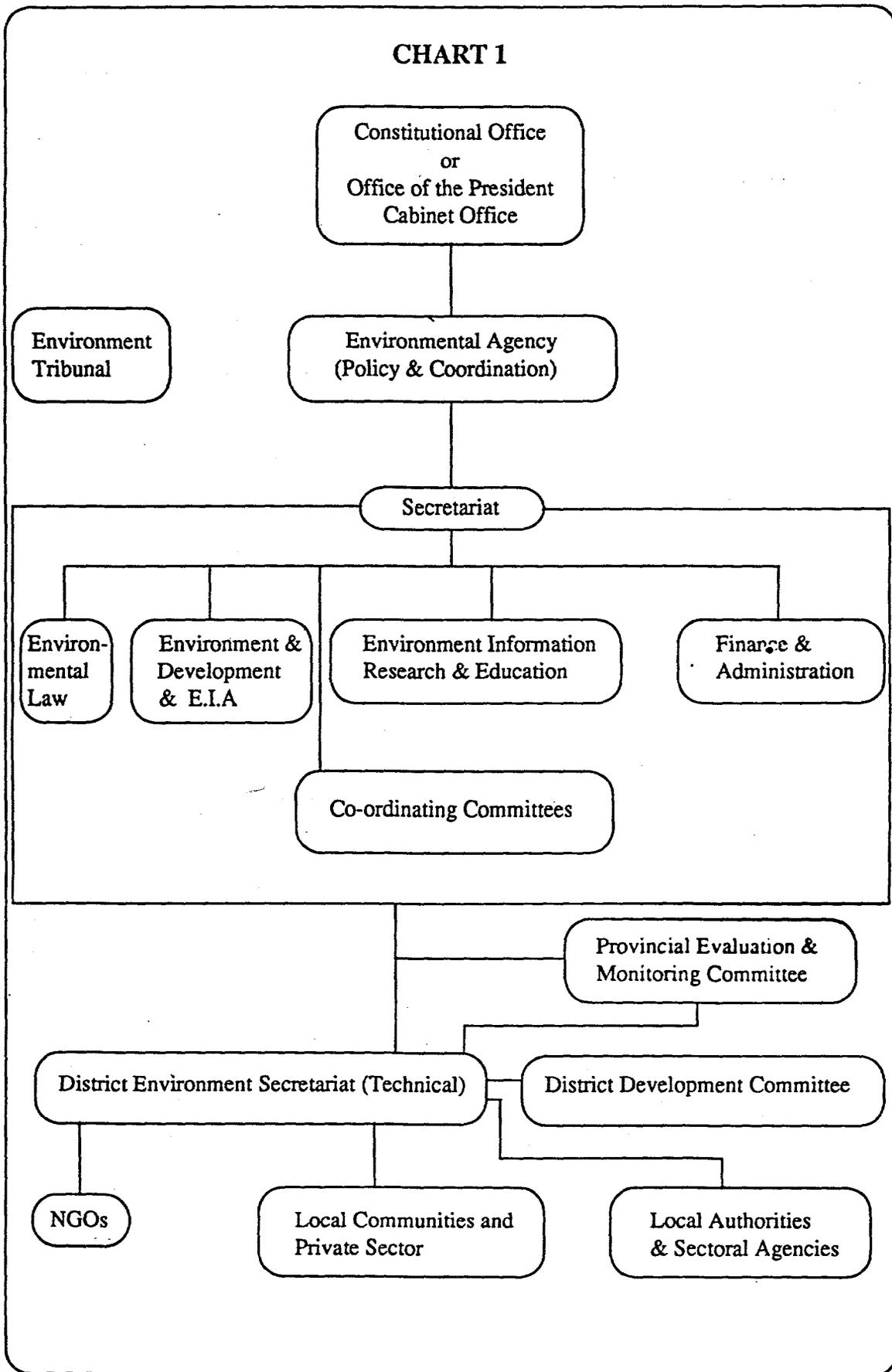


CHART 2

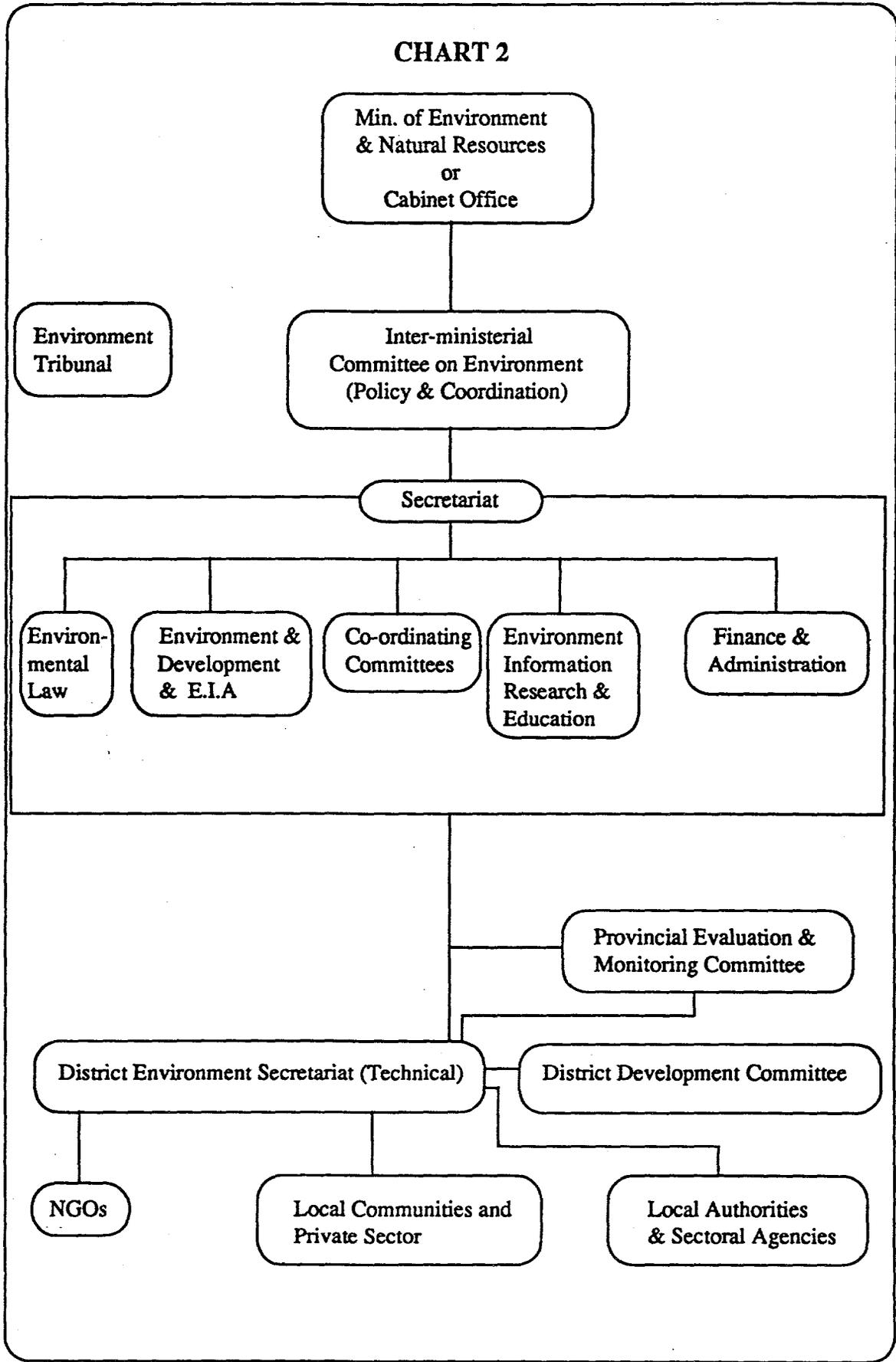


CHART 3

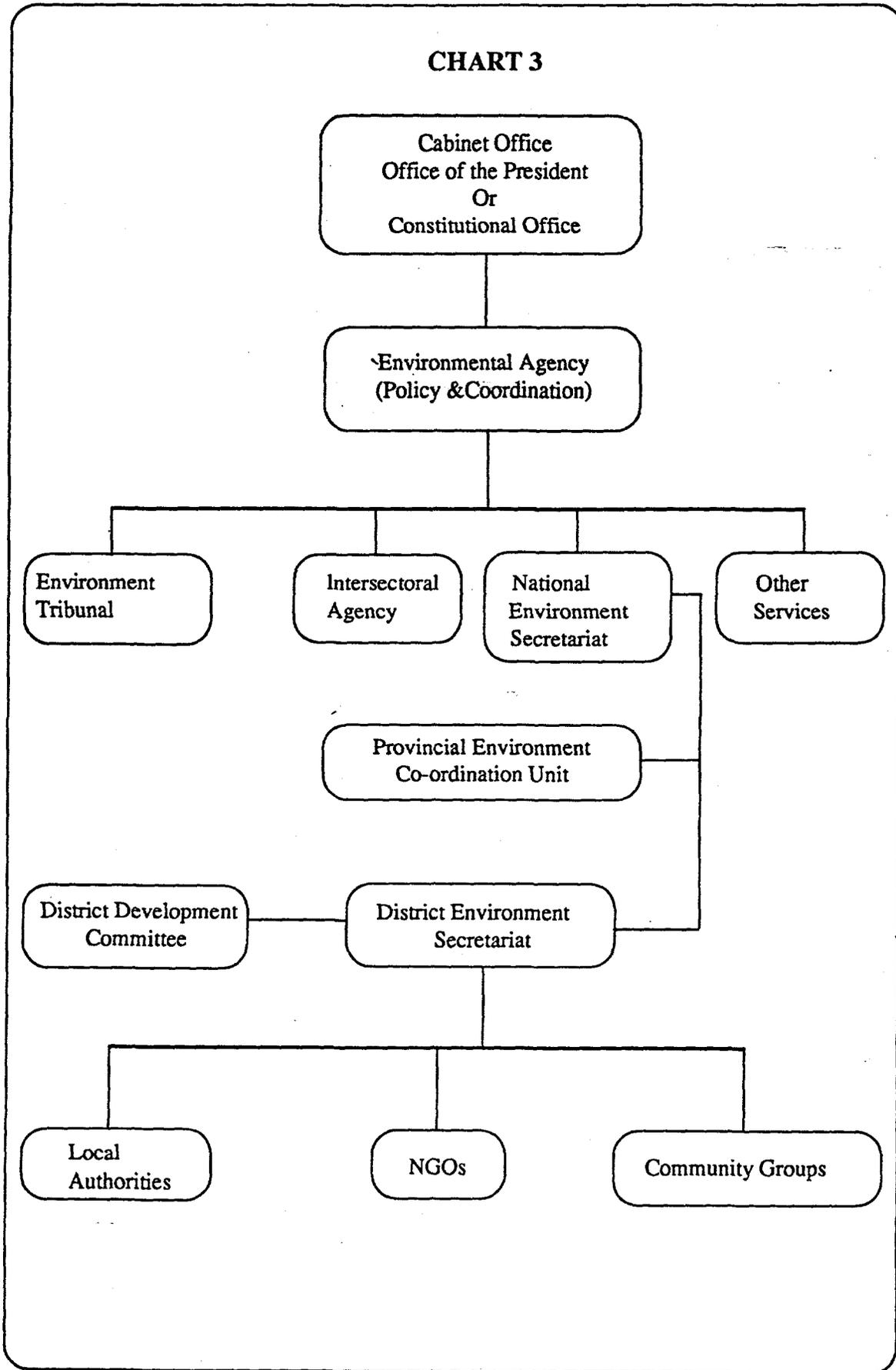


CHART 4

