

REPUBLIC OF KENYA



THE STUDY ON THE NATIONAL TOURISM MASTER PLAN IN THE REPUBLIC OF KENYA

Kenya

(Volume 3)

ENVIRONMENTAL CONSERVATION
AND MANAGEMENT PLAN

OCTOBER 1995

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MINISTRY OF TOURISM AND WILDLIFE
THE GOVERNMENT OF THE REPUBLIC OF KENYA

**THE STUDY
ON
THE NATIONAL TOURISM MASTER PLAN
IN
THE REPUBLIC OF KENYA**

Environmental Conservation and Management Plan

Final Report (Volume 3)

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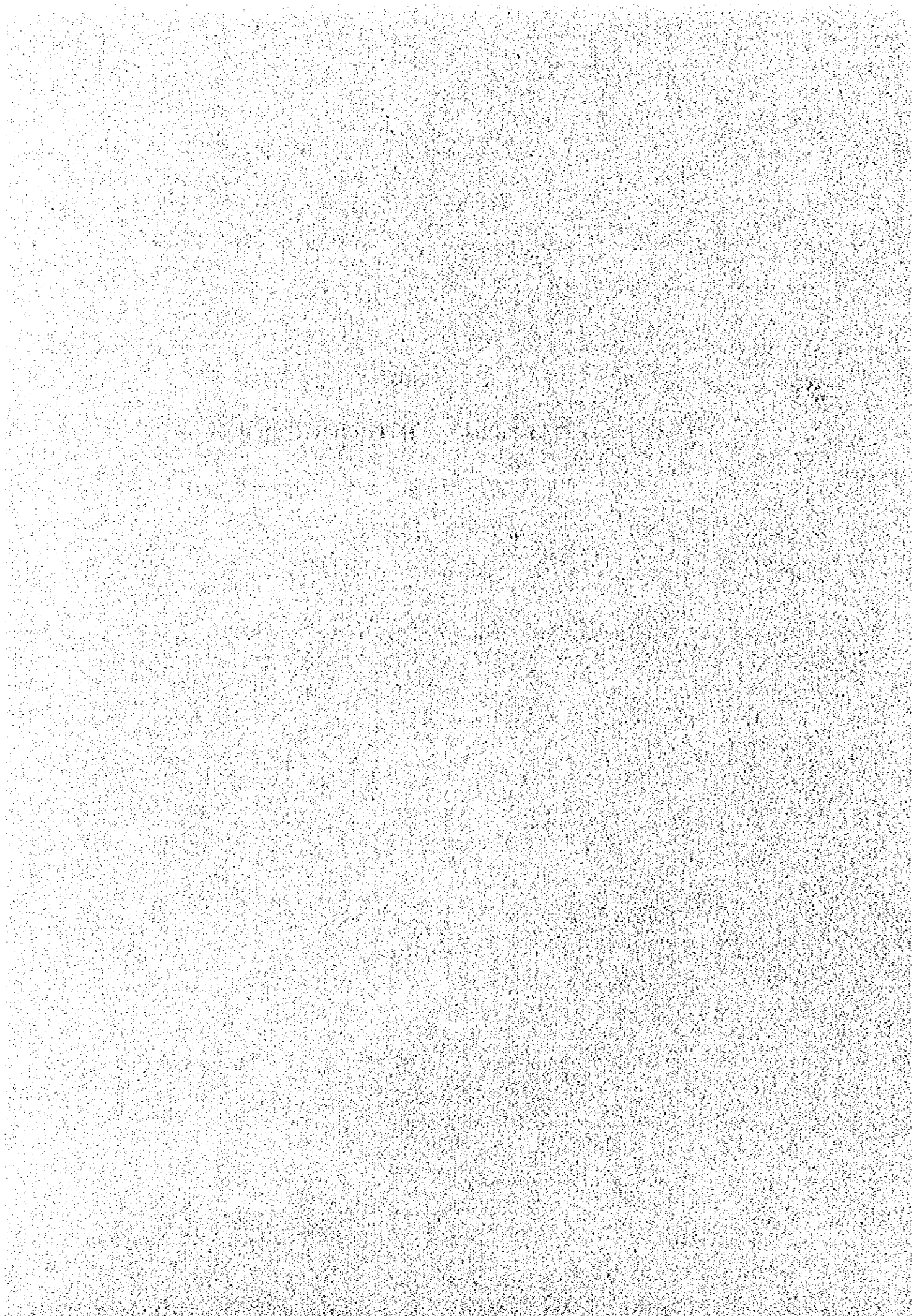
Abbreviations

ASAL	Arid and Semi-Arid Land
AT & H	African Tours and Hotels
B/C	Benefit Cost Ratio
BOD	Biochemical Oxygen Demand
CC	County Council
CITES	Convention on International Trade in Endangered Species (Fauna and Flora)
COBRA	Conservation of Biodiverse Resource Areas
COD	Chemical Oxygen Demand
COR	Capital Output Ratio
DDC	District Development Committee
DRSRS	Department of Resource Surveys and Remote Sensing
EANHIS	East Africa Natural History Society
EC	European Community
EIA	Environment Impact Assessment
EPZ	Export Processing Zone
FAO	Food and Agriculture Organisation of the United Nations
FD	Forest Department
FR	Forest Reserve
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFCF	Gross Fixed Capital Formation
GOK	Government of Kenya
ICOR	Incremental Capital Output Ratio
IDA	International Development Association
IEE	Initial Environment Examination
IPCC	Intergovernmental Panel on Climate Change
IUCN	World Conservation Union
JICA	Japan International Cooperation Agency
KATA	Kenya Association of Travel Agents
KATO	Kenya Association of Tour Operators
KIFCON	Kenya Indigenous Forest Conservation Project
KNM	Kenya National Museums
KPLC	Kenya Power and Lighting Company
KPTC	Kenya Posts and Telecommunication Corporation
KR	Kenya Railway Corporation
KREMU	Same as DRSRS
KSS	Kenya Soil Survey
KTDC	Kenya Tourist Development Corporation
KWS	Kenya Wildlife Service

LG	Local Government
LS	Local Sanctuary
MENR	Ministry of Environment and Natural Resources
MNP	Marine National Park
MNR	Marine National Reserve
MOALDM	Ministry of Agriculture, Livestock Development and Marketing
MOED	Ministry of Education
MOE	Ministry of Energy
MOENR	Ministry of Environment and Natural Resources
MOP	Ministry of Finance
MOFIC	Ministry of Foreign Affairs and International Cooperation
MOH	Ministry of Health
MOHANH	Ministry of Home Affairs and National Heritage
MOLRRWD	Ministry of Land Reclamation, Regional and Water Development
MOLS	Ministry of Land and Settlement
MOPWH	Ministry of Public Works and Housing
MOTC	Ministry of Transport and Communication
MOTW	Ministry of Tourism and Wildlife
MRST	Ministry of Research, Science and Technical Training
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organisation
NP	National Park
NPV	Net Present Value
NR	National Reserve
NS	National Sanctuary
NWCPC	National Water Conservation and Pipeline Corporation
NWMP	National Water Master Plan
OCC	Opportunity Cost of Capital
ODA	Overseas Development Administration
OP	Office of President
OVP&MPND	Office of Vice President & Ministry of Planning and National Development
PAC	Problem Animal Control
PAWS	Protected Area and Wildlife Service
PIP	Public Investment Programme
PTDA	Priority Tourism Development Area
SME	Small and Medium-sized Enterprise
SSC	Species Survival Commission
TPZ	Tourism Promotion Zone
TRAFFIC	Trade Records Analysis of Flora and Fauna in Commerce
TRH	Trade, Restaurant and Hotel
TZ	Tourism Zone

UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Education and Scientific Organisation
USAID	United States Agency for International Development
VAT	Value Added Tax
WCI	Wildlife Conservation International
WWF	World Wide Fund for Nature

CHAPTER 1 INTRODUCTION



Chapter 1 Introduction

1. Background of the Study

The natural environment has deteriorated remarkably all over the world for recent decades and its conservation is an urgent and global task for the 21st century. Kenya's natural environment is considered a precious world heritage, because of her high level in biodiversity and large Savannah animals. Conservation of Kenya's natural environment will therefore contribute not only to Kenya herself, but also to the conservation of the world's natural environment and thus, support of such efforts is an international obligation.

Kenya's tourism sector is since 1987 one of the most important economic sectors in terms of foreign exchange earnings. Kenya's tourism depends largely on her natural resources, such as wildlife and magnificent landscapes. Although tourism products will have to be diversified by using various resources in the future, it is expected that the natural resources will remain a basic and most important tourism resource. Natural resources depend on the soundness of the natural ecosystem. It is, therefore, obvious that Kenya cannot develop herself without careful consideration of her natural environment.

The natural ecosystem in Kenya is characterised by high biodiversity and migration of large mammals in the Savannah, deriving from its location, topography and climatic conditions. The characteristic of high biodiversity is remarkable even when compared with other African countries. In addition to nature, culture and society in Kenya are also highly diverse, because of her many ethnic groups. "High diversity" is therefore considered a key word for tourism development in Kenya. In other words, the crucial point for further tourism development will be how to keep her high diversity and how to use the natural resources in a sustainable manner.

In spite of its importance, Kenya's natural environment has deteriorated caused by rapid population growth. The population size is currently some 25 million people with an average annual growth rate of 3.6% and her population is projected to be around 37 million by the year 2010. The deterioration of the natural environment, such as degradation of wildlife habitat and decrease of wildlife population and biodiversity, is a critical issue for Kenya. This is so not only from an environmental point of view, but also from a national development point of view, because it means, among other things, degradation of a most valuable tourism resource.

On the other hand, tourism has had impacts on the natural environment through its facilities and activities. Since it is expected that tourism facilities and activities will increase in view of further tourism development, the impact on the natural environment may become more serious. Uncontrolled negative impacts may lead to the collapse of the tourism base, particularly in National Parks and Reserves.

Therefore, as for promoting tourism development, it is indispensable to examine and carry out conservation measures for the natural environment and resources, which includes its protection and sustainable use. However, Kenya's policies, administration and legislation on environmental conservation are not yet consolidated sufficiently. Thus, there is urgent need for an effective and realistic environmental conservation and management plan from a long term viewpoint and to implement such a plan.

2. Objectives of this Volume

The objective of this volume is to present the outline of an environmental conservation and management plan for Kenya, which is interrelated with the Tourism Development Master Plan.

Firstly, the existing conditions of the natural environment and the socio-economic features, including land use, are analysed and major problems and constraints are identified. After that existing policies and the prevailing implementation of environmental conservation measures are studied. Finally, policies, plans and programmes for environmental conservation and management are proposed from the following four aspects :

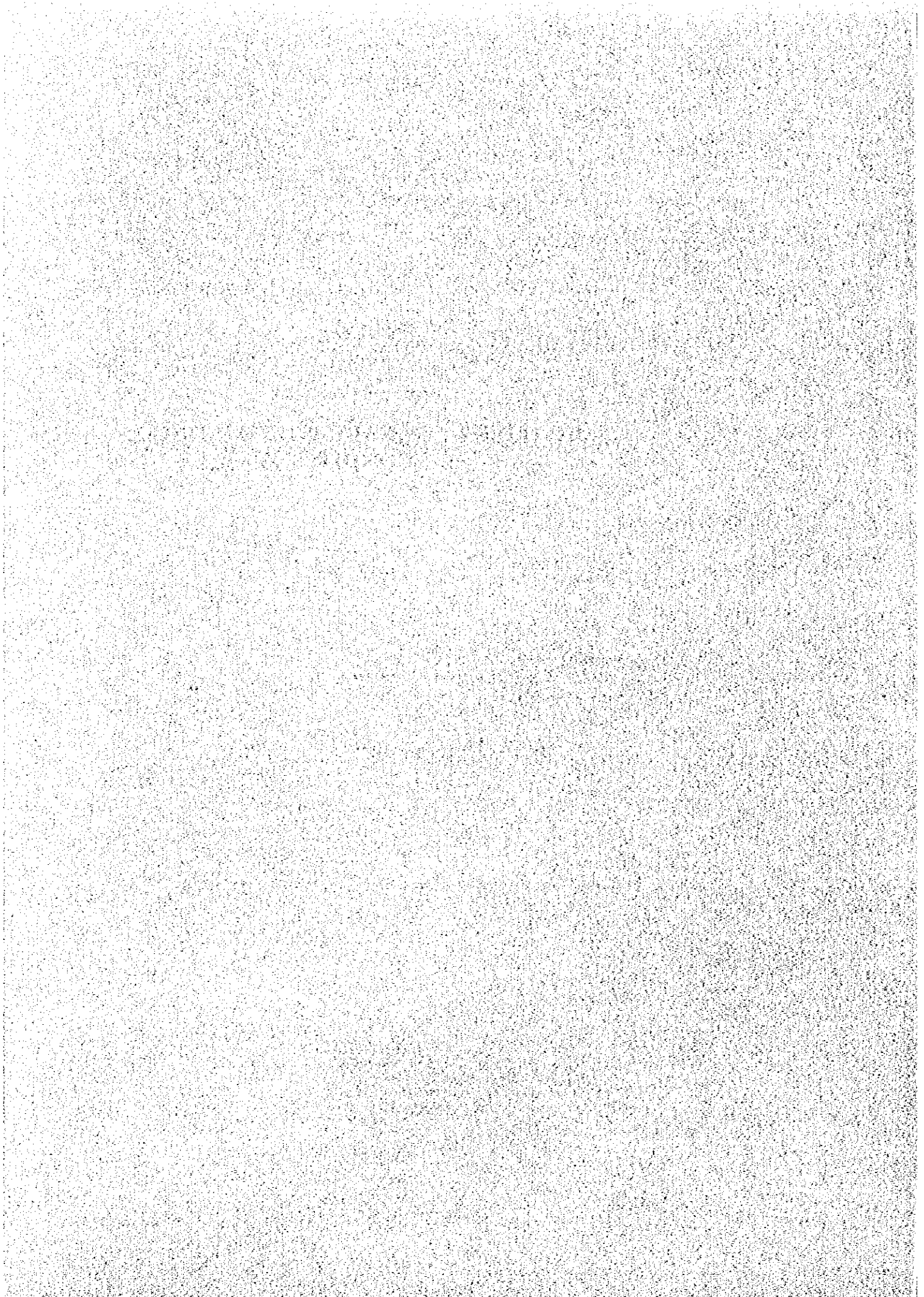
- Natural environment conservation aspect,
- Land use aspect,
- Environmental impact control aspect, and
- Environmental conservation/tourism development aspect.

3. Scope of this Volume

Principal factors affecting the natural environment can be divided into two groups. One is natural environment itself, such as climate change and natural disaster. The other is human activities, such as agriculture, pastoralism and infrastructure development. Tourism development is, of course, a kind of human activity, which has an impact on the natural environment, but the degree of impact is obviously less than that of other human activities with larger scale development.

Therefore, although natural resources regarding tourism development are paid special emphasis, the whole natural environment, which is subjectively or directly concerned in Kenya and its surrounding regions, is also considered in this volume.

CHAPTER 2 ANALYSIS OF EXISTING CONDITIONS



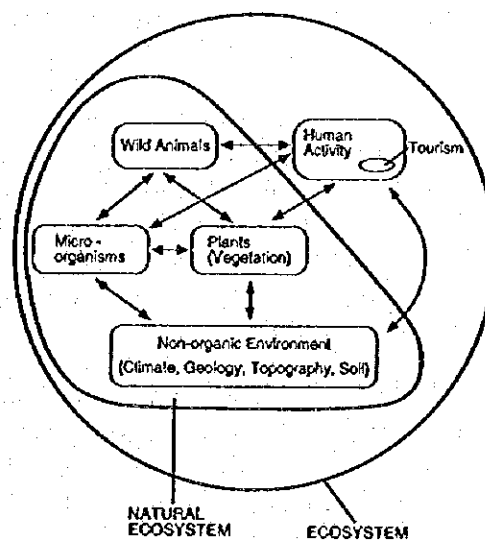
Chapter 2 Analysis of Existing Conditions

1. General Recognition of Kenya's Ecosystem

An ecosystem consists of the close interrelationship of elements in the natural ecosystem including human activity in a well-balanced dynamics (Figure 2.1 refers).

A natural ecosystem includes the non-organic environment (climate, geology, topography, soil and so on), plants (vegetation), wild animals and micro-organisms. The non-organic environment is an indispensable factor in a natural ecosystem, as it provides the basic requirements for forming a biosphere. Plants, which are producers in a natural ecosystem, are dependent on the non-organic environment. Wild animals, which are consumers, are dependent on plants, either directly or through a food chain, in which carnivores eat herbivores. Also, micro-organisms play partly a role as decomposers to connect between the non-organic environment and a biosphere.

Figure 2.1 Concept of Ecosystem



Source: JICA Study Team

Human activity is based on the natural ecosystem. Tourism is one of the human activities and Kenya's tourism, particularly wildlife safari, is related closely to the natural ecosystem. Considering tourism in Kenya means considering her natural ecosystem. Conservation of the natural ecosystem, therefore is, most important aspect of Kenya's tourism development, as well as sustainable use of her natural resources.

2. Natural Environment

2.1 Environmental Characteristics

2.1.1 Non-organic Environment

(1) Climate

Kenya is located as tride the Equator and has many topographical conditions (from Mt. Kenya with an altitude of 5,199m to the Indian Ocean). These factors influence temperature, rainfall and evapotranspiration and make the climate condition vary from region to region (Appendix 1.1-1.5). According to agro-climatic zones, however, about 88% of the whole country is classified as arid/semi-arid land (Appendix 1.6).

The mean annual temperature ranges from 14°C to 28°C. Generally speaking, the temperature is low in the Western highland and high in the lowland, including the coastal area. High temperature zones (higher than 20°C) occupy about 80% of the whole country.

Kenya has two main seasons, a rainy season from April to June and November to December and a dry season during the rest of a year. The average annual rainfall ranges from about 150 mm to 2,000 mm or more. Only the highland and the coastal area have a lot of rainfall (more than 1,000 mm), while the other areas have little rainfall. The distribution of evapotranspiration is determined by the relationship of temperature and rainfall.

Kenya's typical land, arid/semi-arid land, is hot and dry and the evapotranspiration rate is more than twice the available rainfall. The typical picture of rainfall is from 250 to 1,000 mm per year, and evapotranspiration ranges from 1,500 to 2,500 mm per year. Besides the high evapotranspiration rate, the rainfall is highly variable both, in space and time, and its distribution over any season is very uncertain, but most of the rainfall concentrates over a short period. In addition, the rainfall has high intensities, which result in less infiltration and more run-off.

(2) Geology and Topography

The geology of Kenya is based on Precambrian metamorphic rocks. The geological formation varies from West (inland) to East (coast), such as Precambrian metamorphics, Palaeozoic sediments, Mesozoic sediments, Tertiary and Quaternary sediments. Tertiary and Quaternary volcanics occur in the Western part and form the Rift Valley (Appendix 1.7).

The topography is based on the geology and divided into 8 physiographic regions (Appendix 1.8-1.9). On the Western and Central parts, which are covered with volcanics, there are the highlands and mountains (Mt. Kenya, Mt. Elgon, Aberdare Mountains and so on). The altitude decreases from West to East. On the Northern and Eastern parts, which are covered with sediments, there is the vast plain land.

There are many lakes in the Rift Valley, such as Lake Turkana, Baringo, Bogoria, Nakuru, Elmenteita, Naivasha and Magadi. Lake Victoria is not part of the Rift Valley system, but it too has originated from the geological movements.

The whole land is divided into five drainage basins, which follow the topography (Appendix 1.10). There are some big rivers, such as the Tana, Sabaki and Ewaso Nyiro Rivers, which come from the central highland and mountains. The Aberdare Mountains and Mt. Kenya are main water catchment areas in Kenya.

(3) Soil

The soil is based on the conditions of topography, geology and climate. The main soils of Kenya are poor soils, such as solonetz, solonchaks, arenosols and xerosols (Appendix 1.11). About 50% of Kenya's soils are not very suitable for agricultural purposes (Table 2.1).

These poor soils, which are distributed in the arid/semi-arid land, are low in organic matter, due to the low density of plant life and fast microbial activities. They have low fertility and are inherently shallow, permitting only a limited capacity for water storage. Also in other areas, agriculture is limited by the salinity and sodicity of soils, sometimes so severe as to render the land agriculturally useless. These soils have another disadvantage of high erodability, due to the poor structure, together with the low vegetation cover at the beginning of the rainy seasons and the intensive rainfall, which lead to increasing susceptibility to land degradation.

Fertile soils, such as nitosols, and osols and cambisols are distributed in small and limited relatively wet areas. These areas are located on the highland, the coast and the lowland along riversides with stable rainfall, being based on the volcanic rocks/ashes and sediments.

Table 2.1 Extent of "Problem Soils" in Kenya and Their Associated Problems

Type of Soil (FAO/UNESCO Classification)	Extent as % of Total Land Area	Associated Problems
Planosols	4.7	Poor drainage, occurrence of hard pans, low fertility
Solonchaks	3.9	High salinity, sometimes high exchangeable Na on adsorbing complex
Solonetz	13.7	High exchangeable Na on adsorbing complex, poor structure stability, sometimes high salinity
Ferralsols	5.3	Low fertility
Acrisols	3.2	Low fertility, soil erosion
Luviosols	10.5	Soil erosion
Arenosols	3.7	Low fertility, low water holding capacity
Histosols	0.3	Poor drainage, low fertility
Gleysols	1.4	Poor drainage
Vertisols	3.1	Poor drainage, poor workability
Total	49.8	

Source: Muchena, F.N., (1985)

2.1.2. Wildlife (Plants & Wild Animals)

(1) Plants (Vegetation)

The vegetation is based on the conditions of soil and climate, in Kenya particularly rainfall, and it varies from Afro-alpine moor land in mountains to mangrove forest in the coast. The Savannah type vegetation is dominant in most part of the country, while forests occupy only about 3.5% of the whole country like small islands, such in the highland, mountains and the coast (Appendix 1.12). In addition to these, wetlands, both inland and marine, are found in swamps, around lakes and along the coastal shore (Appendix 1.13). The schematic cross-section of Kenya is shown in Figure 2.2.

Figure 2.2(1) Schematic Cross-section of Kenya (A-A')

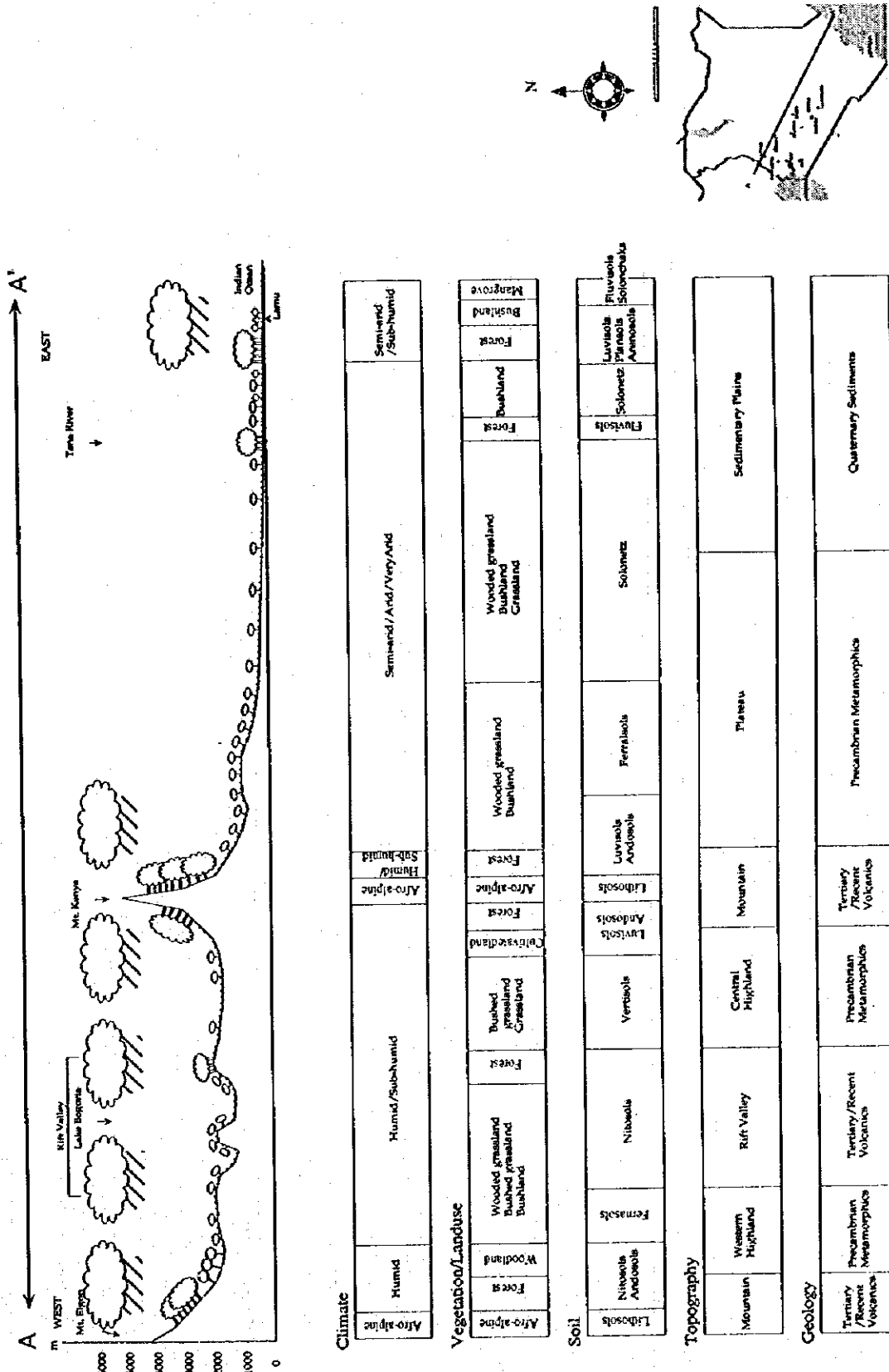
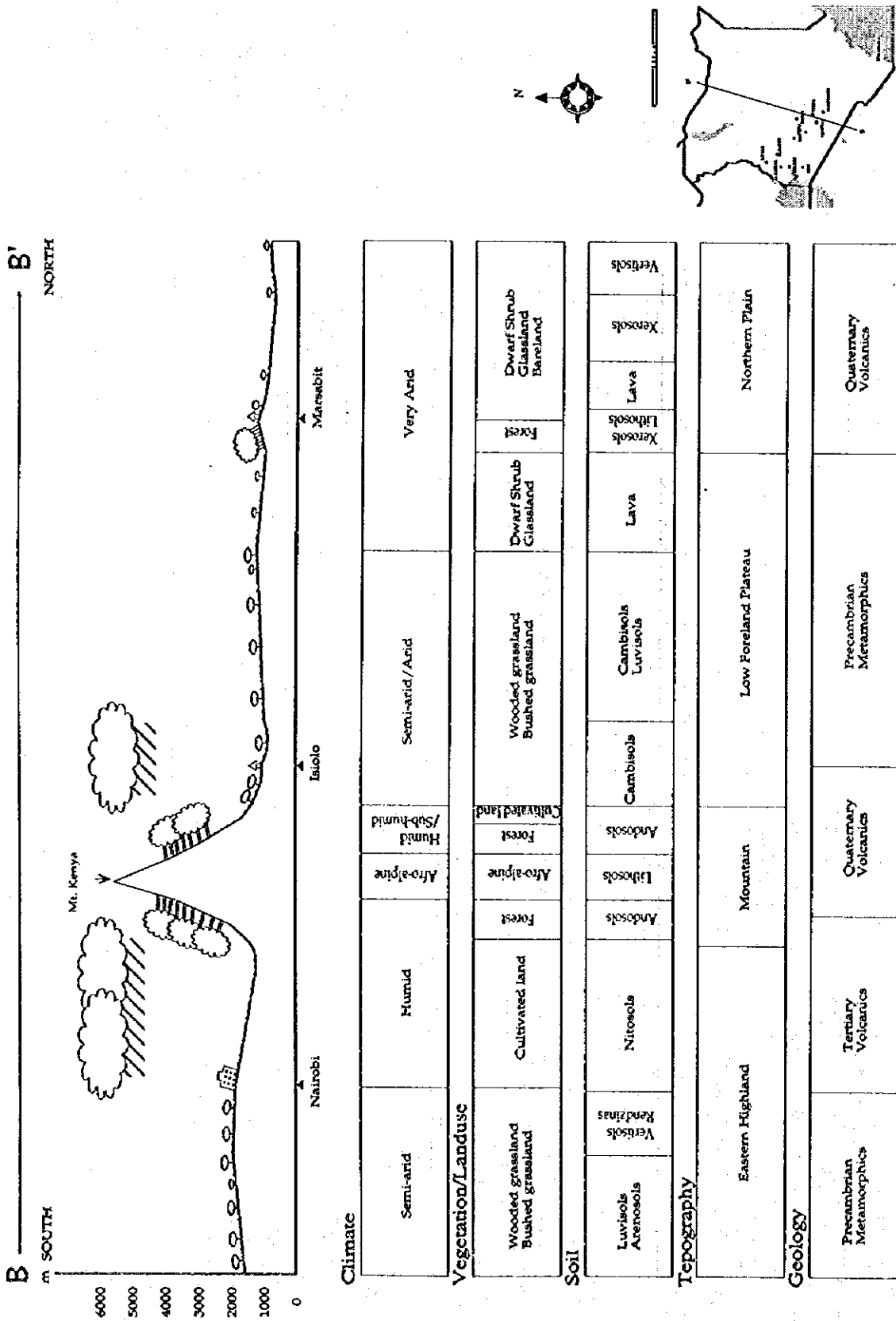


Figure 2.2 (2) Schematic Cross-section of Kenya (B-B')



Source : JICA Study Team

As regards the vegetation's variety, the flora of Kenya has a high level of diversity with about 6,500 plant taxa, including about 500 taxa of ferns and fern allies. Kenya is ranked at fifth place for her floral diversity among African countries, which have also rich flora (Figure 2.3 refers). Among these taxa, 144 taxa are evaluated to be threatened and more than 265 species are endemic. For example, *Acacia* spp. of Kenya occupies about one-third of the total species in Africa (Table 2.2 refers).

Table 2.2 Distribution of African Acacia Species

Regions	No. of species	% of species
Pan-African	18	14.0
North Africa	9	7.0
East Africa*	53	41.1
East-central Africa	13	10.1
Southern Africa	30	23.3
South-west Africa	4	3.1
Disjunctive distribution**	2	1.6
Total	129	100.2
Kenya	43	30.0

Note: * includes Ethiopia, Kenya, Somalia, Sudan, Tanzania, Uganda

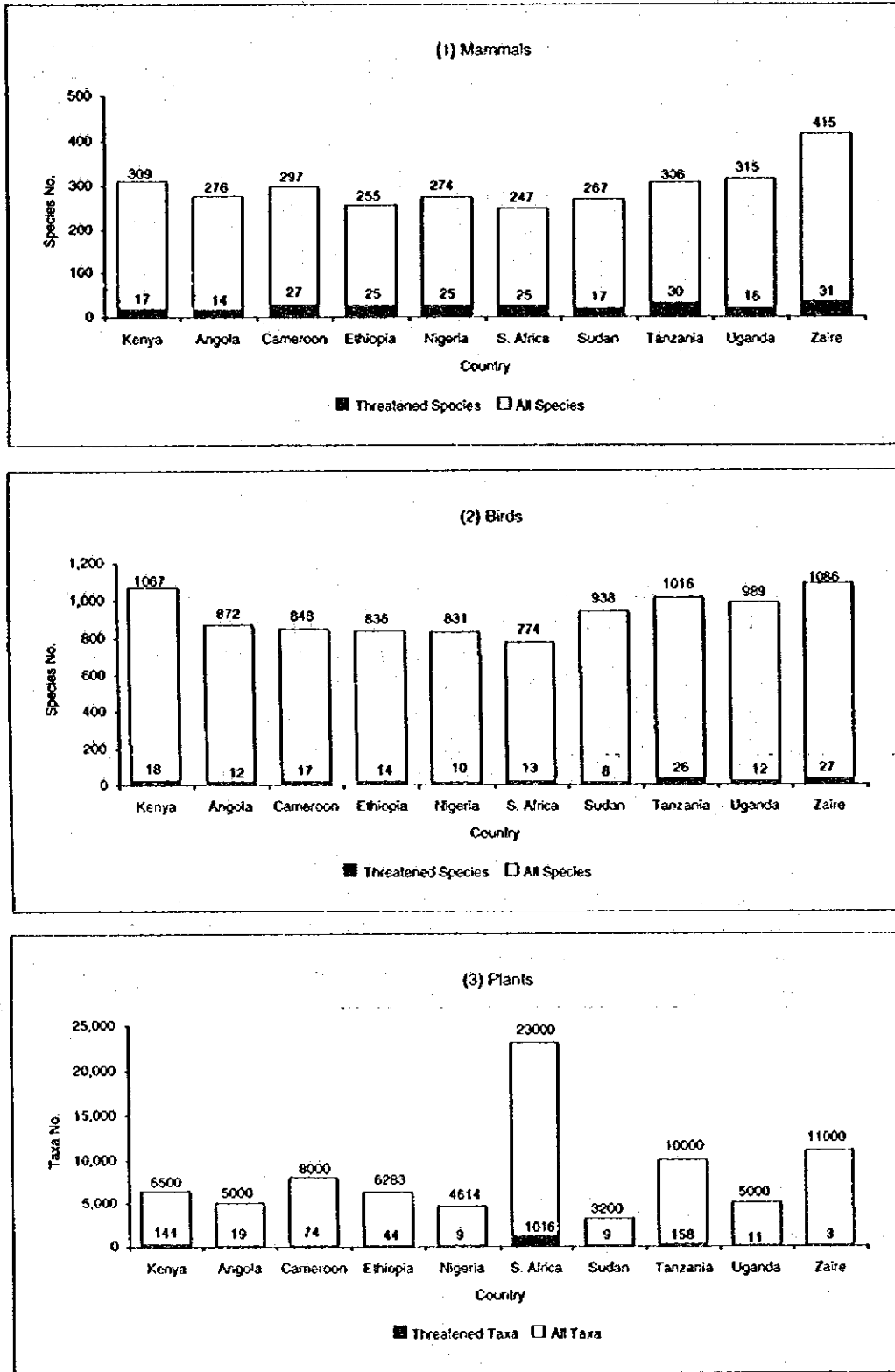
** includes Somalia to South-west Africa

Source: After Coe and Coe (1987)

The Northern plain land to the Southern plateau, which are arid/semi-arid land, are covered with Savannah type vegetation, such as *Acacia/Commiphora* bush land with many ephemerals and succulents, grassland, wooded grassland, bushed grassland and dwarf-shrub grassland. Evergreen forest is rare in this area, but some occur along the Tana River and on Mt. Marsabit. The area from Lake Turkana and the Tana River to the Ethiopian/Somalian border is especially rich in regional endemics.

In the coast, coastal bush land, grassland and wooded grassland are dominant and small patches of evergreen/semi-deciduous forests still remain with remarkably high biodiversity. Mangrove forest spreads over the coastal shore, particularly to the North of Lamu Island, and forms an important part of marine wetland (Appendix 1.15).

Figure 2.3 Diversity of Animal Species and Plant Taxa in African Countries with Rich Fauna/Flora



Source : UNEP (1993)

The highland and mountains, which are humid/sub-humid land, are covered with evergreen/semi-deciduous forests, woodland and a forest/grassland mosaic. These areas have clear altitudinal zonation on the vegetation, ranging from forest through bamboo/heath thickets to tufted grass moor land above 3,500m. While the mountain areas do not have notable biological richness, there is an Eastern patch of the Guinea-Congolian rain forest in the Western highland, which has distinctive West African affinities.

The agricultural areas, such as fields of maize, wheat, saisal and ranches, concentrate mainly in the forest zone with more than 1,000 mm rainfall per year and covering about 6.6% of the whole land. The forest area, however, is decreasing through deforestation caused by cultivation, human settlements and fuel-wood collection. The annual average rate of deforestation over the period 1981 to 1990 was 0.5% of the total forest area according to the World Resources Institute (1994).

(2) Wild Animals

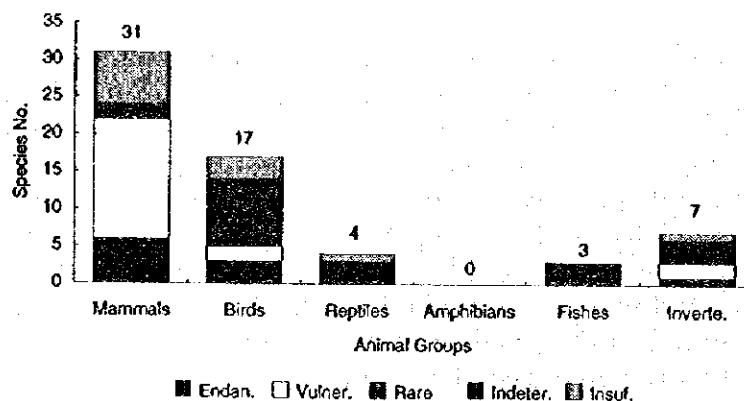
The fauna of Kenya has a very high level of species' diversity with a total of 1,651 species for mammals, birds, reptiles and amphibians (Figure 2.3 refers). There are also about 750 species of fishes reported. This high faunal diversity reflects the variety of habitat types, the combination of topography and vegetation and the location of the country, which is a crossing area of Western, Northern, Southern Africa and the Indian Ocean and also a transit area of migratory birds. Compared to other African countries having also a rich fauna, the species' diversity of mammals and birds in Kenya are both ranked among the top three.

Main characteristics of Kenya's wild animals are the abundance in population and species' diversity of large ungulates and carnivores with their migration in arid/semi-arid land. Particularly the species diversity of antelopes, ranging from forest to arid Savannah species, should specially be mentioned. There are also many endemic species, especially of forest-dependent animals, such as primates, rodents, insectivores and birds as well as fresh-water fishes in Lake Victoria. Waterfowls are abundant in the Rift Valley lakes. As for marine animals, diversified coral fishes/invertebrates, dugong and sea turtles are found in the coastal ocean.

Threatened and endemic animals species are listed in Appendix 1.16. The number of threatened species, including subspecies, is 62 by IUCN categories (1994) (Figure 2.4 refers). There are many kinds of threats for the survival of wild animals, but commercial poaching and habitat destruction are regarded as two major threats. Elephant and black rhinoceros are two of the best examples for the rapid population decreases caused by commercial poaching. Over the last 20 years, the population size of elephants decreased by about 88% and that of black rhinoceros by about 98% (Figure 2.5 refers).

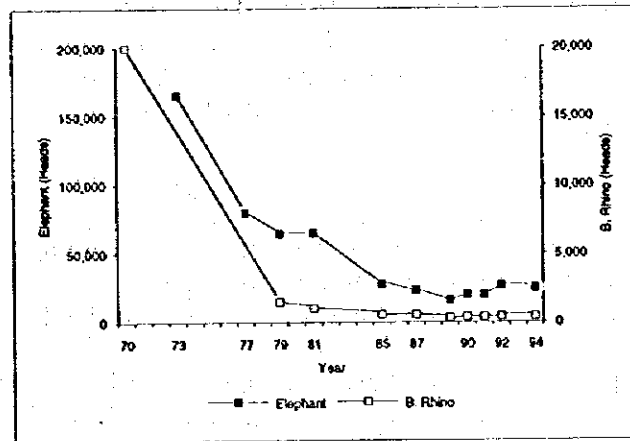
However, most of wild animals are threatened rather by habitat destruction caused by various human activities, such as agriculture and pastoralism. The population trends of large ungulates and livestock are shown in Figure 2.6. As for dominant large ungulates, the total population decreased about 41% from 1977 to 1987 and recovered only about 15% in 1993. The livestock population, on the contrary, most of which are cattle, sheep and goats, increased 2.4 times from 1977 to 1987 and became stable after that. In addition, among the large ungulates, the population of sedentary species (impala, kudu, gerenuk and so on) have not recovered yet in comparison with that of migratory species (wildebeest, Thomson's gazelle, Burchell's zebra and so on). These tendencies may indicate that some ungulate species have been driven away from their habitats as a result of grazing competition with livestock and that the sedentary ungulate species have been faced with more serious threat by habitat destruction.

Figure 2.4 Number of Threatened Animal Species in Kenya by IUCN Categories (1994)



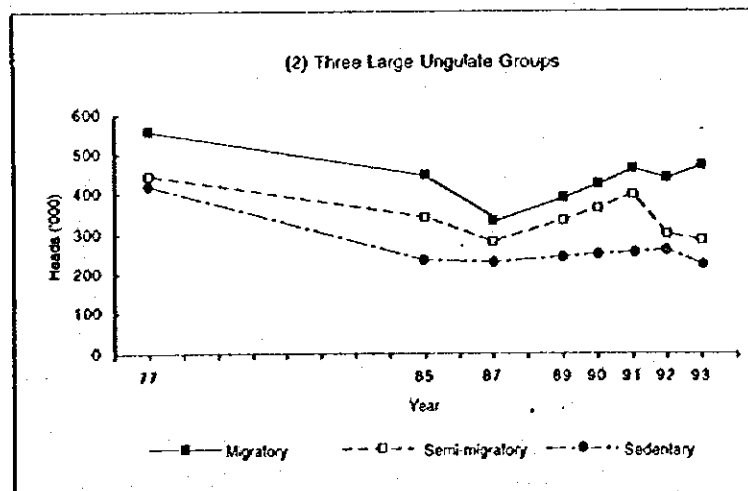
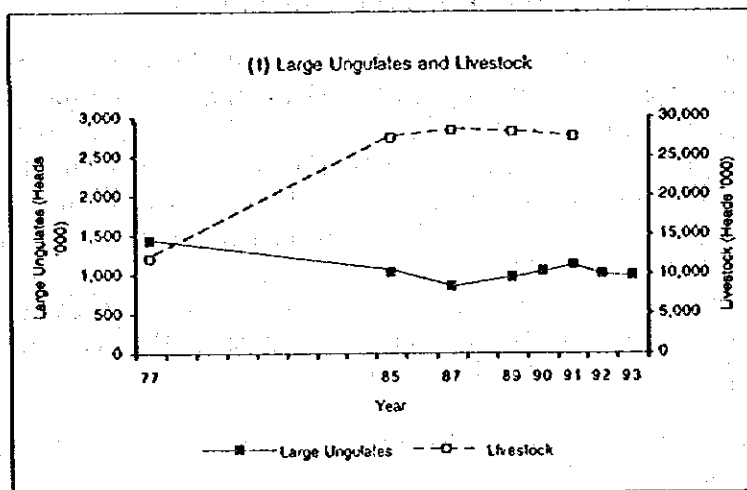
Source: IUCN (1993)

Figure 2.5 Population Trend of African Elephant and Black Rhinoceros



Source: African Rhino Specialist Group (1987), KWS (1990/91) and so on

Figure 2.6 Population Trend of Large Ungulates and Livestock



Source: DRSRS(1989), UNEP(1987), Kenya Economic Survey (1991/94) and so on

Consequently, the distribution of wild animals tends to be reduced from the former ranges and the distribution of the threatened species has mostly been limited and fragmented into small patches, especially in forest areas, as shown in Figure 2.7 and Appendix 1.21. For reference, the distribution of livestock is also shown in Appendix 1.22.

2.1.3. Natural Ecosystem

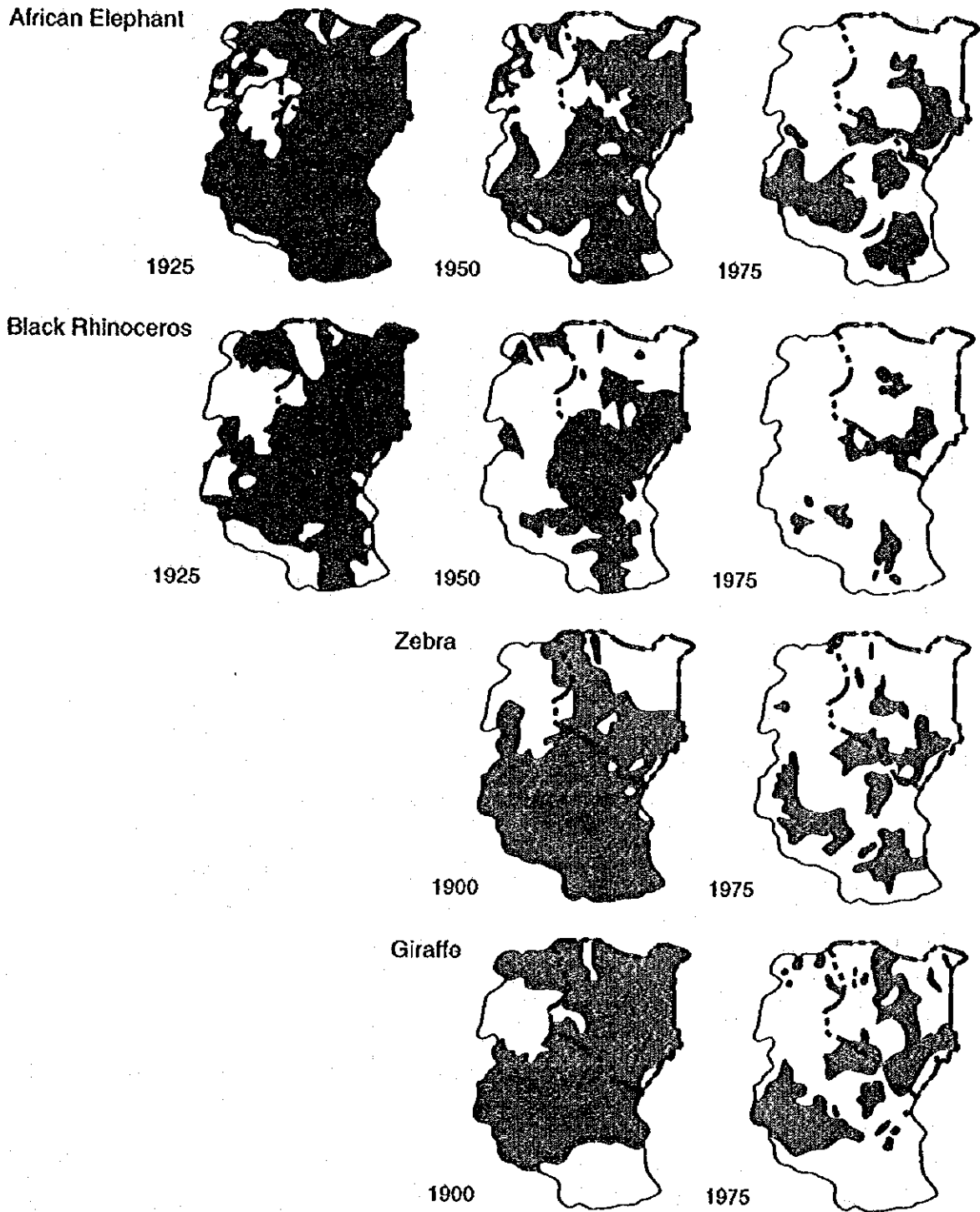
The characteristics of Kenya's natural ecosystem with respect to the components of non-organic environment, plants (vegetation) and wild animals, are shown in Figure 2.8 and summarised as follows :

- There is a variety of eco-zones, ranging from Afro-alpine to coastal ocean and a vast area of arid/semi-arid land,
- There is a high level of biodiversity of flora and fauna, especially in forest and wetland, and
- There is an abundance in population of large ungulates/carnivores and their migration in arid/semi-arid land.

The ecological zones, which represent the regional types of natural ecosystem, are determined based on the agro-climatic zones with the distribution of vegetation and wild animals. The ecological zones are classified into four zones that is I to IV. The zones II and III are the bush land/grassland zones and they are mainly distributed in arid/semi-arid land in the Northern plain land and the Southern to Eastern plateau/lowland, which occupies about 88% of the whole land. The zones I and IV are the forest zone. They are distributed in humid/sub-humid land in the central to Western highland and the coast, including the Indian Ocean.

The characteristics and simplified distribution of the ecological zones are shown in Figure 2.9.

Figure 2.7 **Habitat Change of Large Four Mammals in East Africa in the 20th Century**



Source : J. Kingdon(1979)

Figure 2.8 Characteristics of Kenya's Natural Ecosystem

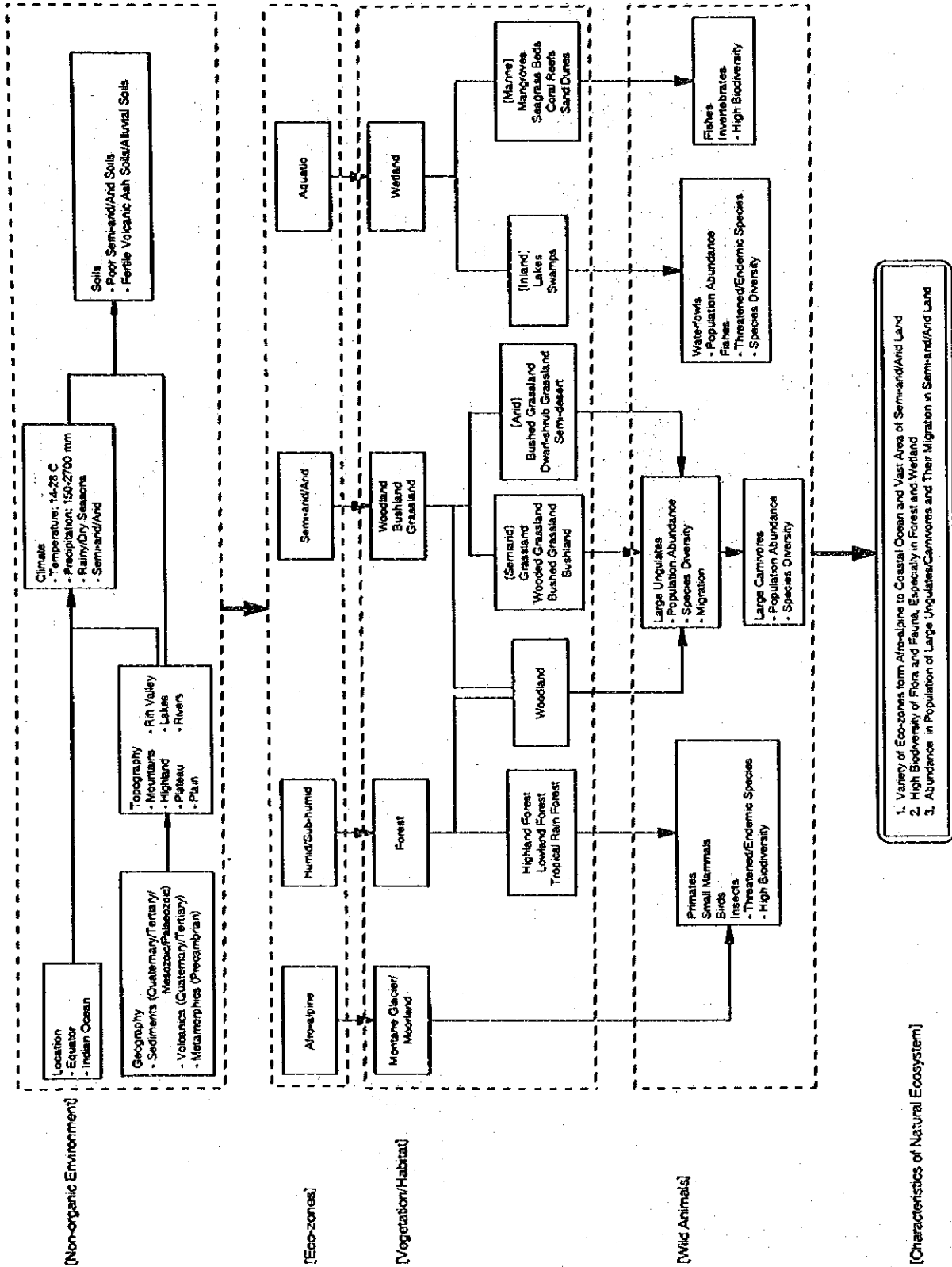
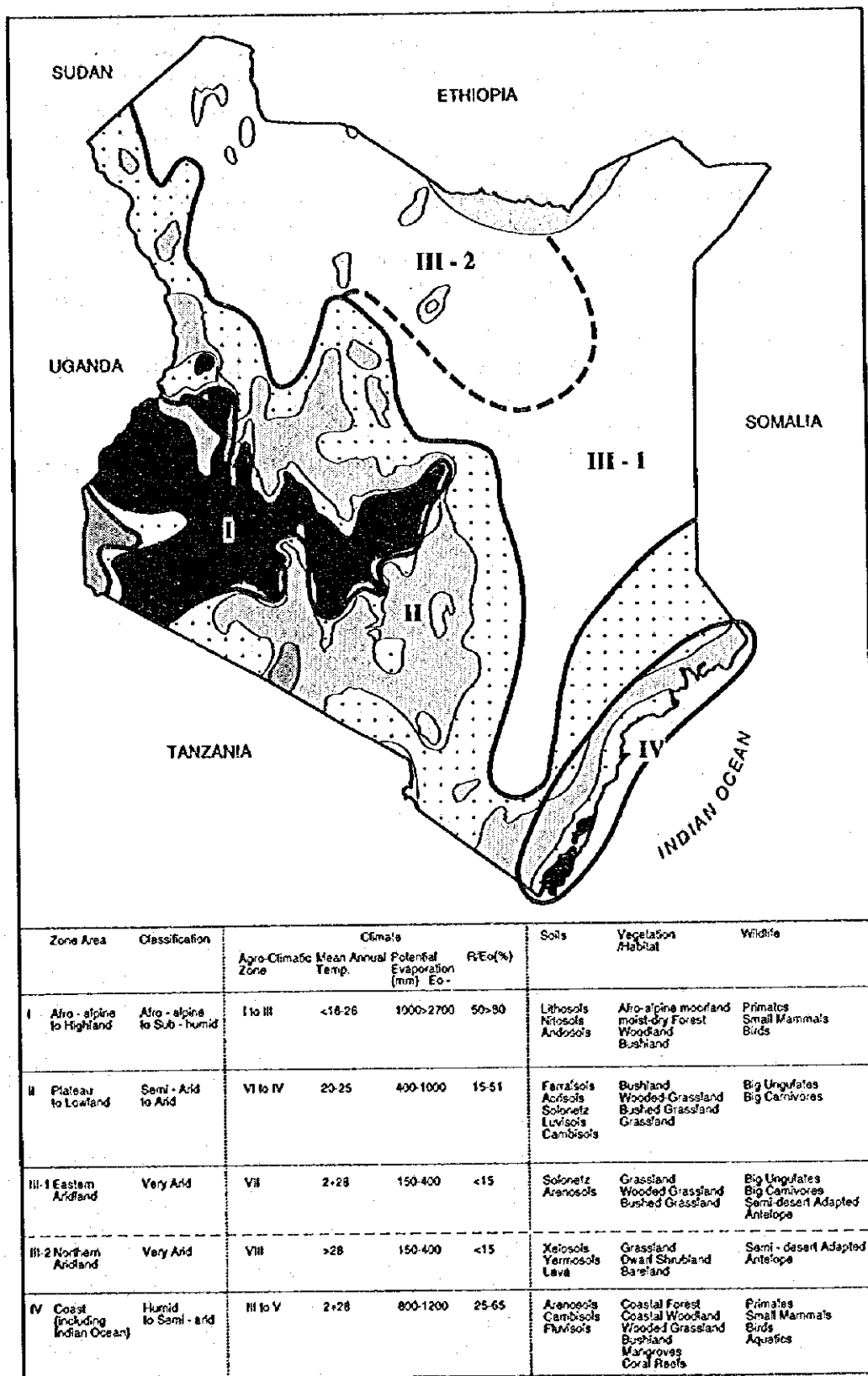


Figure 2.9 Ecological Zones in Kenya

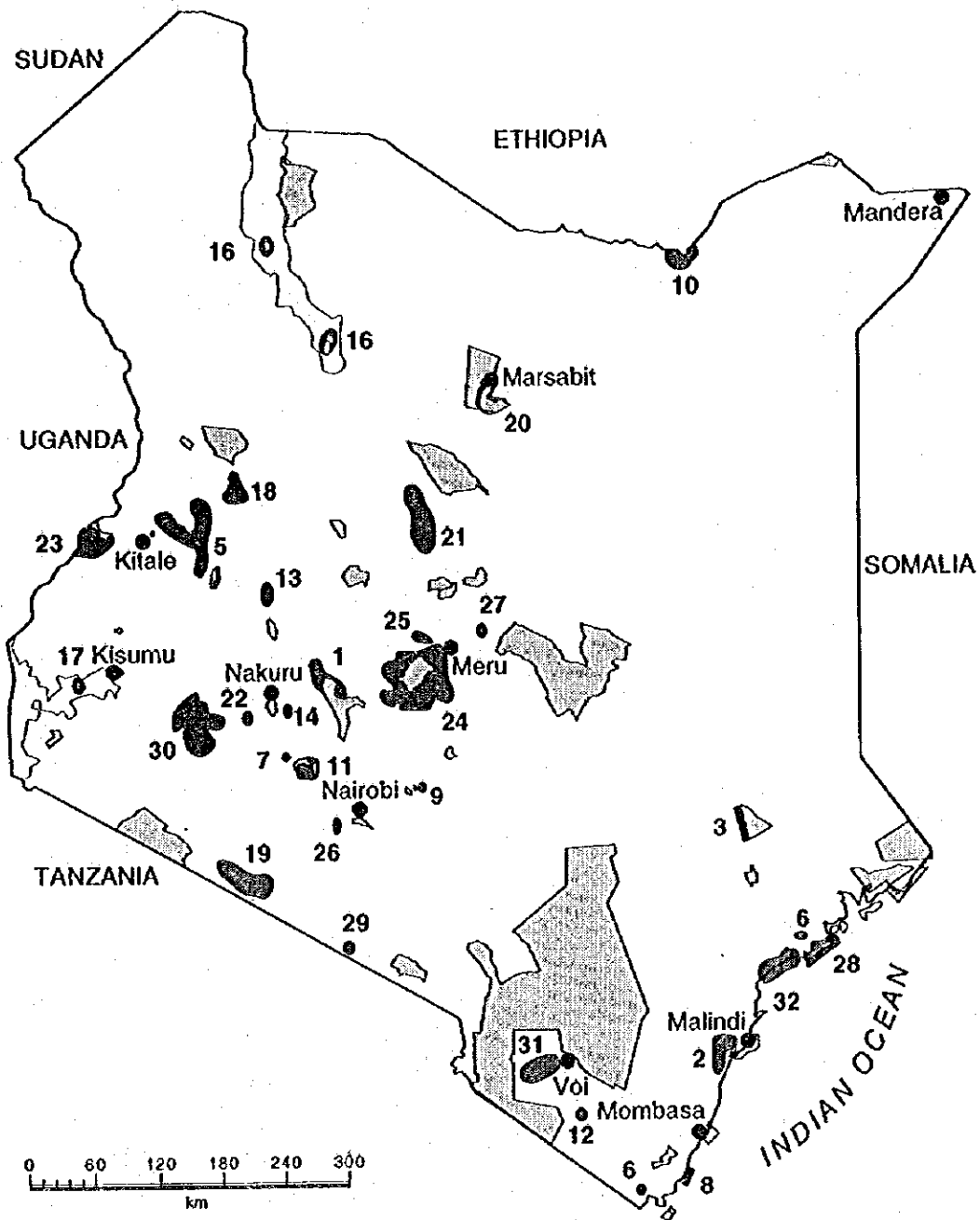


2.2. Ecologically Important Areas

Gazetted protected areas for environmental conservation, such as National Parks, Reserves, Sanctuary and Local Sanctuary, represent ecologically important areas in Kenya. Their details are mentioned in the later section. However, there are many other ecologically important areas, ranging from Afro-alpine moor land in the highland to coral reefs in the coast, which are not legally protected. These areas include high endemism/biodiversity areas, important wildlife habitat areas for greater protection, ecologically sensitive areas and also private wildlife sanctuaries. The locations and a list of these areas are shown in Figure 2.10-2.11 and Table 2.3, respectively.

There are 18 sites for the high faunal endemism/diversity areas and 45 sites for the high floral endemism/diversity areas, 32 sites for important wildlife habitat areas, 160 sites for ecologically sensitive areas and 9 private wildlife sanctuaries. Most of these areas are natural forest and wetland and many of them are overlapping with each other.

Figure 2.10 Location of Important Wildlife Habitat Areas

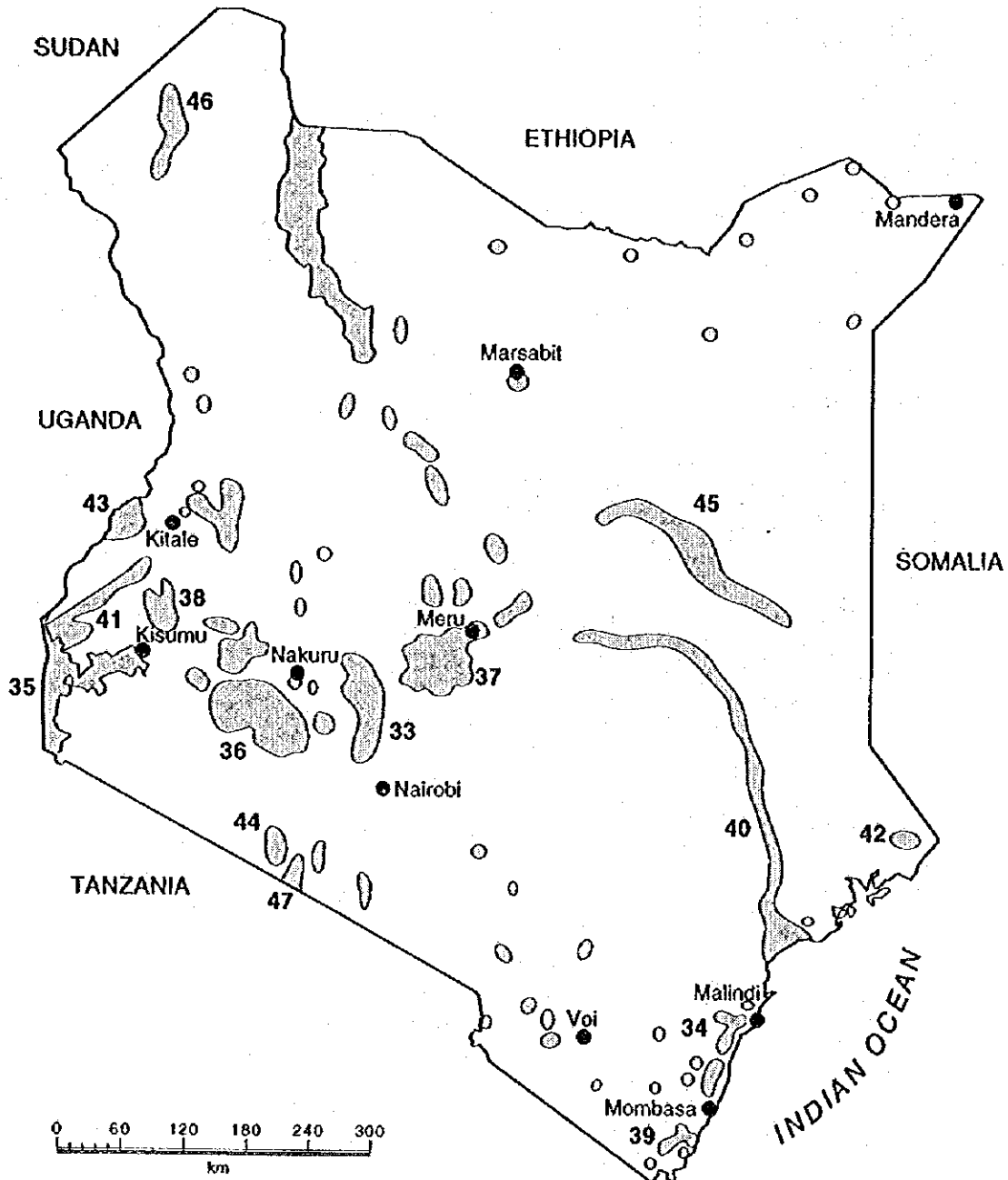


Legend :

- Important wildlife habitat areas for greater protection
- National Parks / Reserves / Sanctuary and Local Sanctuary

Note : The numbers on the map correspond to those in Table 3
 Source : KWS (1990, 1995 information)

Figure 2.11 Location of Unprotected Ecologically Important Areas



Legend :

- High species diversity / endemism areas, Major ecologically Sensitive areas

Note : The numbers on the map correspond to those in Table 3
 Source : The National Biodiversity Unit (1992),
 The World Bank (1993)

Table 2.3 List of Unprotected Ecologically Important Areas

No. Important Wildlife Habitat Areas * (32 sites)**	No. High Species Diversity/ * Endemism Areas	No. Ecologically Sensitive Areas * (160 sites)****	Private Wildlife Sanctuaries (9 sites)
1 Aberdare NP extension	[Fauna] (18 sites)	Arabuko Sokoke Forest	Sofia Rhino Sanctuary
2 Arabuko Sokoke Forest#	33 Aberdare Mountains	Boni Forest	Olpejeta Rhino Sanctuary
3 Arawale NR/Tana River extension	34 Arabuko Sokoke Forest	Cha Shimba Rocks	Lewa Downs Rhino Sanctuary
(4) Bonjoge#	Ewaso Nyiro Swamp	Esspich Hill	Lakipia Rhino Sanctuary
5 Cherangani Mountains	Kakamega Forest	Gakuyu Forest	Oljogi Rhino Sanctuary
6 Coastal forests (Jonbo Forest, Witu Forest, etc.)	Kasigau Mountains	Gembe Forest	Taita Hill Game Sanctuary
7 Crater Lake (Naivasha)	35 Lake Victoria	Kachagalau-Lorusuk Hill	Mt. Kenya Game Sanctuary
8 Diani/Chale#	Lititiri Swamp	Kamatira Forest	Bamburi Game Sanctuary
9 Fourteen Falls#	36 Mau Forest	Kiangombe Forest	Giraffe Centre
10 Gurar	37 Mt. Kenya (including Nyambeni Hills)	Kianjiru Forest	
11 Hell's Gate/Longonot NPs extension	38 North/South Nandi Forests	Kurwitu Forest	
12 Kasigau Mountains	Nzoia River basin	Lake Chala	
13 Lake Baringo	Rift Valley lakes	Lake Victoria	
14 Lake Elmentaita	Sacred Kaya forests	Lambwe Forest	
(15) Lake Simbi#	Saiwa Swamp	45 Lorian Swamp	
16 Lake Turkana (Central/South Island NPs extension)	39 Shimba Hills	46 Lotikipi Plain	
17 Lake Victoria (Ndale Island NP extension)	Taita Hills	Rift Valley lakes	
18 Lokis	40 Tana Delta/riverine forest	Mai Forest	
19 Loita Hills/Nguruman Range	41 Yala Swamp	Mangea Hill	
20 Marsabit NR extension#	[Flora] (45 sites)***	Mt. Kulal	
21 Mathews Range	Arabuko Sokoke Forest	Muhaka Forest	
22 Mau Summit#	42 Boni Forest	Mumoni Forest	
23 Mt. Elgon NP extension	Chyulu Hills	Mwarakaya Area	
24 Mt. Kenya NP extension	Kakamega Forest	Ndhoani Forest	
25 Ngare Ndare Forest	Loita Hills/Mt. Suswa	Nguruman Hills	
26 Ngong Hills	Mathews Range	Njukini Forest	
27 Nyambeni Forest	Mau Forest	Nyiru Area	
28 Ras Tenewi#	43 Mt. Elgon	Sacred Kaya forests	
29 Ol-doinyo Orok	Mt. Kulal	Shimoni Forest	
30 South-western Mau	Mt. Marsabit	47 Shombole Swamp	
31 Taita Hills	Muri Hills	Tana riverine forest	
32 Tana Delta	Ndoto Range		
	44 Nguruman Hills		
	Ol-doinyo Nyiru		
	Ol-doinyo Sabuk		
	Sacred Kaya forests		
	Shimba Hills/Makandara		
	Maitungani Forests		
	Witu Forest		

Note: * The numbers correspond to those in Figure 2.10 and 2.11.

** These areas have been proposed or processed (#) to be gazetted as the protected areas (NP/NR) by KWS.

*** Only 19 sites more than 10 sq.km are shown in this table as an example.

**** Only 31 major sites are shown in this table as an example.

Source: KWS (1990, 1995 information), The National Biodiversity Unit (1992), The World Bank (1993)

3. Human Activities and the Environment

Peoples' life is influenced by characteristics of the natural environment, though people's activities also strongly affect the natural environment. It is easily understandable that rapid expansion of human activities affects the natural environment. In this sense, the section discusses the present situation regarding socio-economic activities and the pollution, which has been caused by these socio-economic activities. The negative impacts on the wildlife are discussed finally in the following section.

3.1. Overview on Socio-economic Growth of Kenya

3.1.1. Population and GDP Growth

The growth performance of Kenya's economy since independence has been quite satisfactory when compared to that of other East African economies. However, in spite of this favourable economic growth performance, Gross Domestic Product (GDP) per capita has not grown at desirable levels, because of the rapid population increase (Table 2.4 refers). For example, over the period 1984 to 1990, GDP (in 1982 constant prices) increased an average of 5% per annum. However, since the population increased at an average rate of 3.6% over the same period, the growth rate of GDP per capita was an average rate of 1.4% per annum only. The rapid population increase affects not only the GDP per capita growth, but also the urban unemployment rate, because of rural-urban migration. Likewise, it effects the balance between food demand and supply and creates land use pressure spilling over from cultivated land with high and medium agricultural potential to arid and semi-arid land, which has a sensitive to very sensitive environment.

Table 2.4 Economic Growth and Population Growth

		1984	1986	1988	1990	Growth Rate
Population	(million)	19.4	20.9	22.4	24.0	3.58%
GDP	(KHS million)	63,057	69,964	77,173	84,668	5.03%
GDP per Capita	(KHS)	3247.6	3352.4	3446.8	3530.2	1.40%

Source: Statistical Abstract 1991

3.1.2. Composition of GDP

Kenya's economic growth is still mainly based on the primary sector. Although the relative position of the primary sector in GDP has declined gradually, it still accounted for some 30 % of GDP in 1990. The relative position of the secondary sector has also declined, while the share of the tertiary sector has increased considerably (Table 2.5 refers). In terms of productivity, the tertiary sector has the highest labour productivity among the major GDP sectors, while the primary sector recorded the lowest. Over the period 1985 to 1990, labour productivity in the tertiary sector grew fastest, while the manufacturing sector showed the lowest growth.

Table 2.5 Sector Share

	1980*	1985**	1990**
Non-Monetary Economy	5.1	6.1	5.4
Primary	33.50	30.60	29.50
Secondary	18.70	17.20	17.80
Tertiary	42.70	46.10	47.30
Total	100.00	100.00	100.00

Note: * Based on constant 1976 prices

** Based on constant 1982 prices

Source: Economic Survey of several years

3.2. Population Distribution

The distribution of Kenya's population is mainly dependent, on distribution of rainfall and soil fertility. The Central and Western tourism regions, which have higher agricultural potentials, have large populations. The Turkana, Northern and Eastern tourism regions, which belong to the arid and semi-arid land type, have only 34% of the total population as against 88% of Kenya's total land. Population density in these regions accounts for only approximately 14.4 person/km² or one-twentieth (1/20) of the population density of the Central Province (Table 2.6 refers). In terms of urbanisation, there are several large towns, such as Nairobi, Mombasa, Nakuru, Eldoret and Kisumu.

Table 2.6 Population Distribution

Province	Population in Numbers (thousands)						Pop. Density in 1989 (Person/Sq.Km)
	1979	(Share)	1985	(Share)	1989	(Share)	
Nairobi	828	(5.40%)	1,162	(5.71%)	1,325	(6.18%)	1,937
Central	2,344	(15.29%)	3,041	(14.94%)	3,117	(14.54%)	237
Coast	1,342	(8.76%)	1,756	(8.63%)	1,829	(8.53%)	22
Eastern	2,719	(17.74%)	3,565	(17.51%)	3,769	(17.58%)	24
Northeastern	374	(2.44%)	509	(2.50%)	371	(1.73%)	3
Nyanza	2,645	(17.26%)	3,633	(17.85%)	3,507	(16.35%)	217
Rift Valley	3,242	(21.15%)	4,314	(21.19%)	4,982	(23.23%)	29
Western	1,833	(11.96%)	2,355	(11.57%)	2,544	(11.86%)	304
Total	15,327		20,355		21,444		37

Source: Development Plan 1994-1996, Population Census 1989

3.3. Agricultural Potential and Utilisation

The agricultural sector, the leading sector in Kenya's economy, is based on about 82,400 km² of cultivated land. This is equivalent to about 14.0 % of Kenya's total land area. As illustrated in Figure 2.12, this agricultural land is spread over the highland and coastal areas along with the fertile soils. Using the limited cultivated land, various kinds of cereals, cash crops, livestock and dairy products are produced in reflection of the characteristics of the natural conditions. In the arid and semi-arid lands, the land is extensively utilised for livestock and pastoralism. About 76 % of the total labour force is engaged in this sector in Kenya.

The present situation of the agricultural sector described above is supposed to be the result of peoples' effort on land. Table 2.7 shows the proportion of already utilised areas in the total agricultural potential area. Approximately 99,420 km² of agricultural potential area is identified as high and medium potential agricultural land. Out of this total, approximately 82,400 Km² or 83 % are already utilised as agricultural area. In particular, potential agricultural land in the Central, Western and Eastern tourism regions are almost fully utilised.

Table 2.7 Utilisation of Agricultural Potential Area

	Agricultural Potential			Area	Utilisation
	High	Medium	Low		
Central	19,180	11,060	60,200	27,066	90%
Masailand	9,300	0	24,640	4,074	44%
Western	34,810	1,180	12,080	30,358	84%
Turkana	120	0	59,370	0	0%
Northern	40	0	153,420	0	0%
Tana Basin	730	580	77,860	42	3%
Coastal	2,580	7,280	16,800	5,341	54%
Eastern	1,090	11,470	16,680	10,633	85%
Total	67,850	31,570	421,050	82,420	83%

Note: Agricultural potential is based on Statistical Abstract. Agricultural Area is computed from Remote Sensing Image by the JICA Study Team.

Source: JICA Study Team

3.4. Distribution of Manufacturing and Service Sectors

While agriculture is the single most important sector in terms of absolute size as described above, manufacturing and in particular the service sector have gradually expanded. As shown in the above Table 2.5, the combined share of the secondary and tertiary sectors together accounted for about 65.1 % of GDP in 1990. These sectors are mostly located in certain cities. According to Table 2.8, Nairobi accounts for 35.4% of the total factories. Mombasa, Thika, Eldoret, Nakuru, Kisumu are followed. These cities formulate an industrial corridor along route A-104 and A-109.

Table 2.8 Wage Employment by Major Towns

	1985		1990	
	Persons	(%)	Persons	(%)
Nairobi	63,394	38.68	66,373	35.36
Central	10,737	6.55	11,857	6.32
Coast	21,637	13.20	25,234	13.45
Eastern	4,504	2.75	5,439	2.90
Nyanza	4,256	2.60	5,635	3.00
Rift Valley	17,535	10.70	19,661	10.58
Western	1,660	1.01	1,742	0.93
Major Town Total	123,723	75.49	136,141	72.54
National Total	163,903	100.00	187,683	100.00

Source: Statistical Abstract, 1991

3.5. Land Use

3.5.1. Land Use Pattern

The land use pattern reflects the results of human activities. People have made optimal utilisation of the land in consonance with the natural environment as described in the preceding section. In this sense, out of the approximately 583,000 Km² of total land area, approximately 15.6 % is utilised as agricultural land and plantation land, while bush land, bare land and grassland, which are extensively utilised as ranches and for grazing, account for about 68%. About 7.7 % of land are used as national parks and reserves with a conservation purpose.

Table 2.9 Land Use of Kenya, 1987

	Water Body	Swamp	Woodland	Forest	Bushland	Agriculture	Barreland	Grassland	Plantation	Town	Unknown	Total
(sq Km)												
(Area)												
Central	184	880	3,590	6,437	44,318	26,977	6,965	2,582	11,439	640	1	104,011
Masailand	142	1,335	1,417	2,386	26,313	4,047	294	1,402	2,248	12	24	39,618
Western	3,936	762	1,075	3,547	15,753	28,138	1,949	34	1,732	18	58	56,991
Turukana	2,278	2,338	757	41,751	0	0	16,615	102	0	0	207	64,041
Northern	4,126	792	793	203	100,265	0	49,854	4,691	0	29	297	161,058
Tana Basin	0	175	5,973	92	73,232	41	0	2,871	213	0	29	82,621
Coastal	547	12	5,058	815	15,177	5,396	0	175	430	28	296	27,931
Eastern	16	114	2,549	163	32,812	10,281	142	81	112	0	95	46,361
Total	11,229	6,407	21,211	55,395	307,870	74,880	75,818	11,938	16,173	727	1,004	582,651
(Percent)												
Central	0.18%	0.85%	3.45%	8.19%	42.61%	25.94%	6.70%	2.48%	11.00%	0.62%	0.00%	100.00%
Masailand	0.36%	3.37%	3.58%	6.02%	66.41%	10.21%	0.74%	3.54%	5.67%	0.03%	0.06%	100.00%
Western	6.91%	1.34%	1.89%	6.22%	27.64%	49.37%	3.42%	0.06%	3.04%	0.03%	0.10%	100.00%
Turukana	3.55%	3.65%	1.18%	65.19%	0.00%	0.00%	25.94%	0.16%	0.00%	0.00%	0.32%	100.00%
Northern	2.56%	0.49%	0.49%	0.13%	62.26%	0.00%	30.96%	2.91%	0.00%	0.02%	0.18%	100.00%
Tana Basin	0.00%	0.21%	7.23%	0.11%	88.63%	0.06%	0.00%	3.47%	0.26%	0.00%	0.04%	100.00%
Coastal	1.96%	0.04%	18.10%	2.92%	54.33%	19.32%	0.00%	0.63%	1.54%	0.10%	1.06%	100.00%
Eastern	0.03%	0.25%	5.50%	0.35%	70.77%	22.18%	0.31%	0.17%	0.24%	0.00%	0.21%	100.00%
Total	1.93%	1.10%	3.64%	9.51%	52.84%	12.85%	13.01%	2.05%	2.78%	0.12%	0.17%	100.00%

Note: Area is measured based on Land Use map which is developed based on Remote Sensing Image by JICA Study Team.

Source: JICA Study Team

Figure 2.12 illustrates the spatial distribution of natural vegetation. Agricultural land is principally spread over the central and western tourism region, while bush land, bare land, grassland are dominant in the other tourism regions.

3.5.2 Land Ownership

In terms of land ownership, the classification system is divided into three classes, namely government land, freehold land and trust land. Out of 583 thousands km² of the total land area, the government land and the trust land account for a share of 20% and 78.5%, respectively, while freehold land accounts for only 1.5% of the total (Table 2.10 refers).

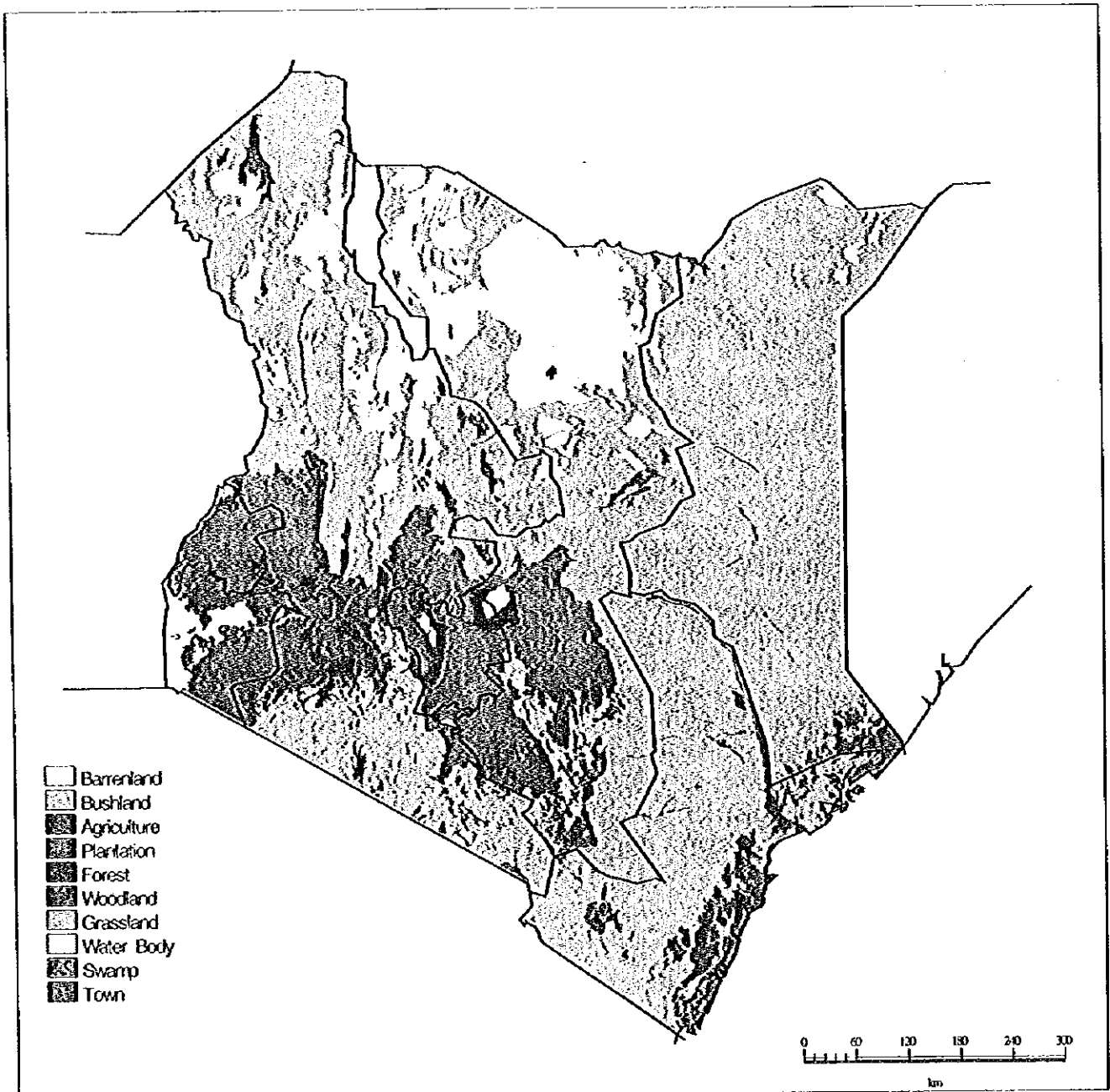
Table 2.10 Area by Land Classification

	Government Land (Sq.Km)	Freehold Land (Sq.Km)	Trust Land (Sq.Km)	Total (Sq.Km)
Nairobi	549 (80.26%)	135 (19.74%)	0 (0.00%)	684 (100.00%)
Central	5,268 (40.13%)	3,365 (25.54%)	4,523 (31.33%)	13,176 (100.00%)
Coast	53,123 (63.54%)	1,178 (1.41%)	29,302 (35.05%)	83,603 (100.00%)
Eastern	25,365 (15.88%)	605 (0.38%)	133,709 (83.74%)	159,679 (100.00%)
Northeastern	0 (0.00%)	0 (0.00%)	126,902 (100.00%)	126,902 (100.00%)
Nyanza	3,796 (23.50%)	551 (3.41%)	11,807 (73.09%)	16,154 (100.00%)
Rift Valley	27,375 (15.74%)	2,044 (1.18%)	144,449 (83.06%)	173,868 (100.00%)
Western	758 (9.07%)	853 (10.20%)	6,749 (80.73%)	8,360 (100.00%)
Total	116,254 (19.96%)	8,731 (1.50%)	457,441 (78.54%)	582,426 (100.00%)

Source: Statistical Abstract 1991

The land ownership system is complicated because nomads and pastoralists and sedentarised populations co-exist in the nation, land tenure must be established to meet their nature of activities. Accordingly, land use and customary land tenure, so that several types of the land classification of property regimes have been developed such as trust land, group ranches, freehold land and government land. Since such land tenure was established under different acts, it is difficult to operate a land use policy. (In the table, the group ranches are included in the trust land.) Figure 2.10 and Table 2. 11 explain briefly distribution of natural vegetation (1970) and land travel systems in Kenya respectively.

Figure 2.12 Land Use



Source: Land Use map is developed based on Remote Sensing Image by JICA Study Team.

Table 2.11 Characteristics of Land Ownership

	Background	Characteristics	Authority
Trust Land	Pastoral societies practice communal land ownership in order to secure seasonal migration, rights of grazing and use of wells in a proper manner.	County Council holds the land in trust for the benefit of the residents. Once the land is adjudicated, consolidated and registered, it ceases to be trust land.	Native Lands Trust Ordinance (1938) The Trust Land Act (Cap.28)
Group Ranch	Trust land was sub-divided into groups to facilitate individualisation of title while keeping a corporate use of land.	Group representative is registered trust land holder. Each member has exclusive use of the all ranch resources.	Group Representative Act (Cap 287)
Freehold Land	Freehold land is alienated land for settlement purposes by the government.	The government grants the land. The land holding is no different from the absolute proprietorship.	Registration of Titles Act
Government Land	Government land is owned by the State as a private owner.		Government Lands Act (Cap.280)
Individual Holdings	As a modernized land tenure system, individualization of title is introduced to secure attractive land rights for the settler community.	Absolute proprietorship of individual land holders.	Registered Land Act (Cap.300)

Source: JICA Study Team "N.S.A 10-mile Coastal Strip is termed as "Mazui Land" Under Mazui Land Act.

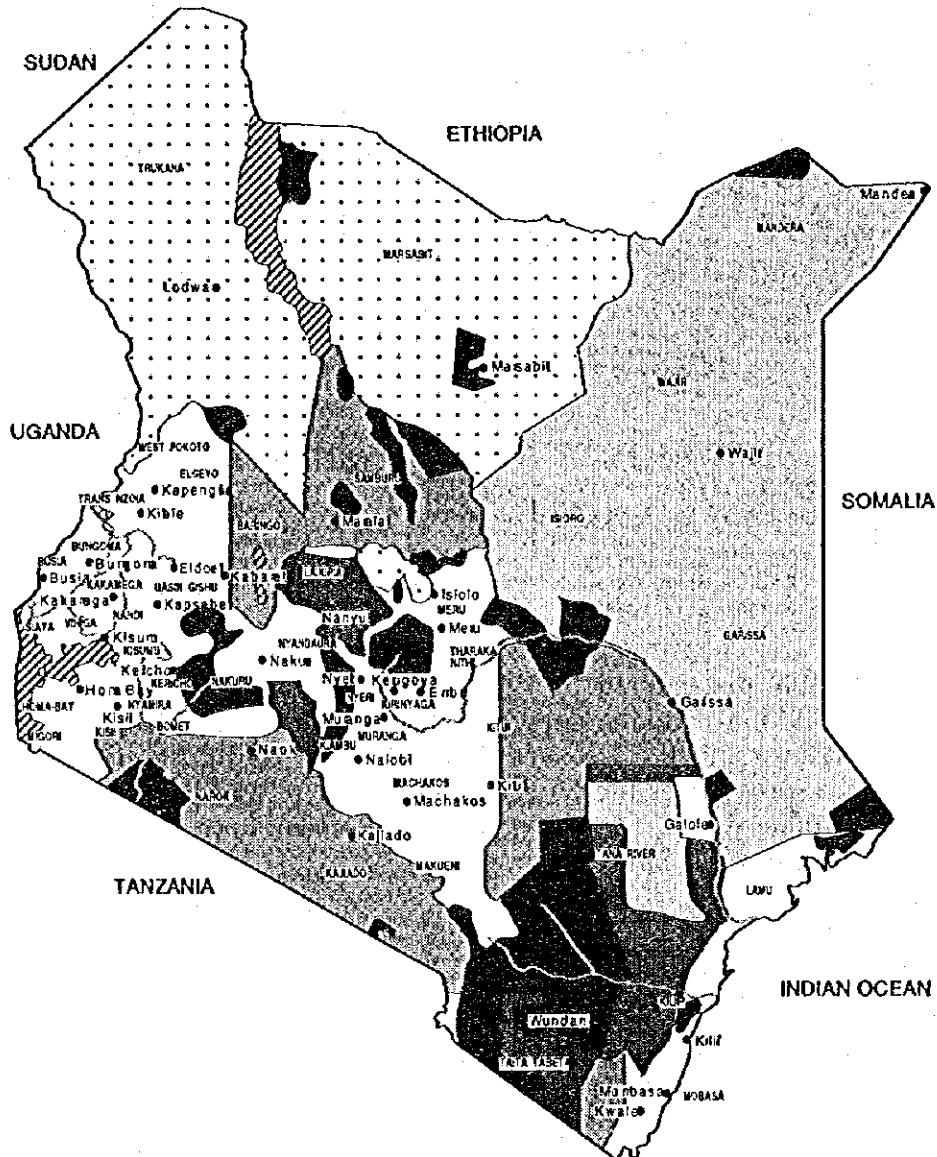
Spatial distribution of land ownership is illustrated in Figure 2.13. Individual land holders are spread mainly over the Coast, Central, Nyanza and Western Provinces, while trust land and group ranches are spread over the Eastern, North-eastern and Rift Valley Provinces. In other words, trust land and group ranches are dominant in the arid and semi-arid land.

4. Environmental Problems

4.1. Mechanism of Occurrence of Environmental Problems

Problems in the environment are caused by an imbalance in the elements of an ecosystem (Figure 2.14 refers). The imbalance in the ecosystem is usually caused by human activities and nature-originated changes such as drought, flood, earthquake and bush fire. On the other hand, the environmental capacity of the natural ecosystem is determined by its characteristics, such as climate, soil potential and vegetation types. The extent of influence of human activities on a natural ecosystem depends on both, the feature and scale of human activities and the environmental capacity of the natural ecosystem.

Figure 2.13 Land Ownership

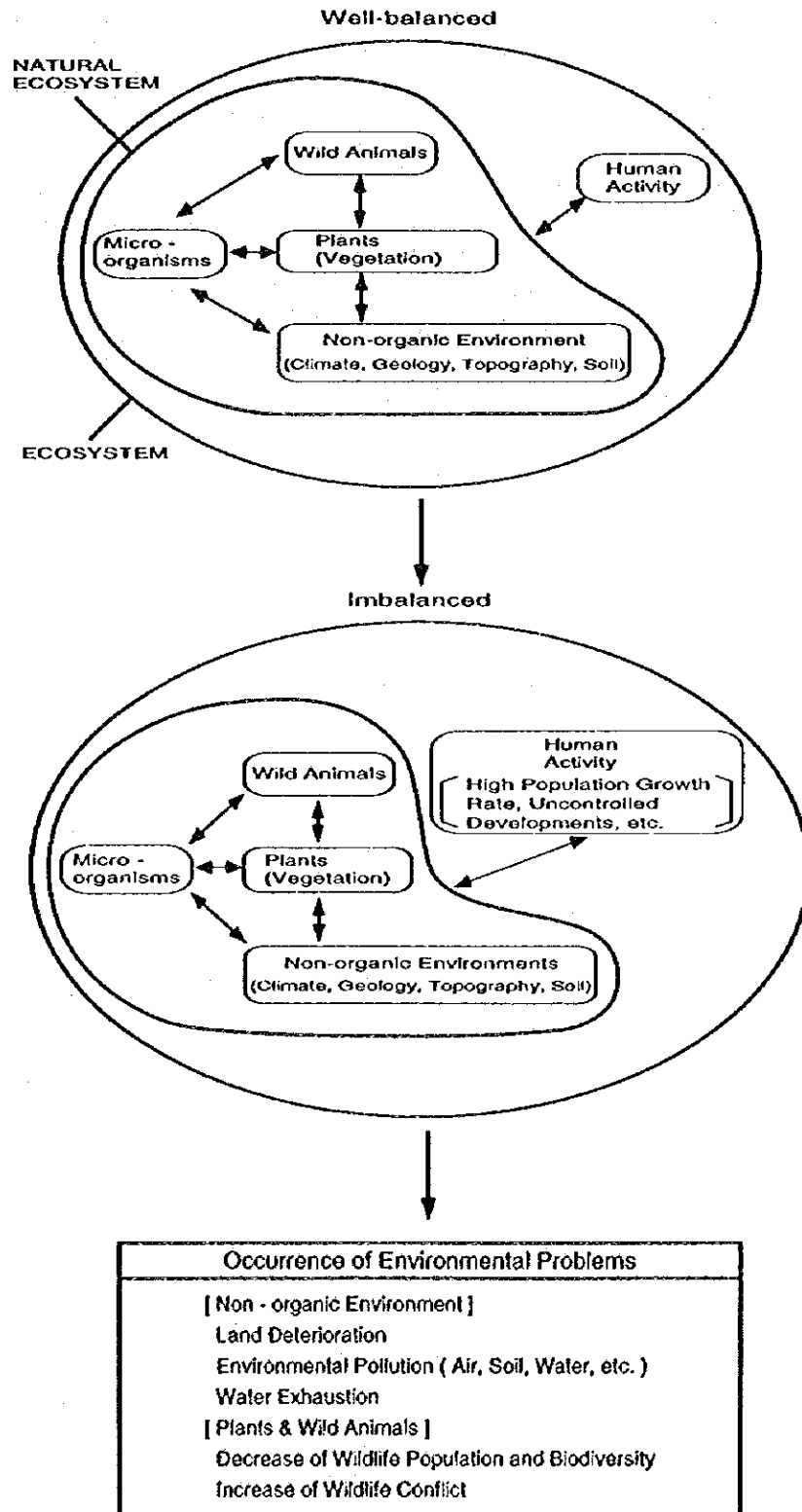


LEGEND :

- MAJOR TOWNS
- ~ MAJOR RIVER
- ▭ LAKE
- ▭ INDIVIDUAL HOLDING
- ▭ TRUST LAND (PASTORALISM)
- ▭ TRUST LAND (GRAZING)
- ▭ GROUP RANCH
- ▭ COMMERCIAL RANCH
- ▭ NATIONAL PARK / RESERVE, FOREST RESERVE

Source: KWS

Figure 2.14 Simplified Mechanism of Occurrence of Environmental Problems due to Human Activities

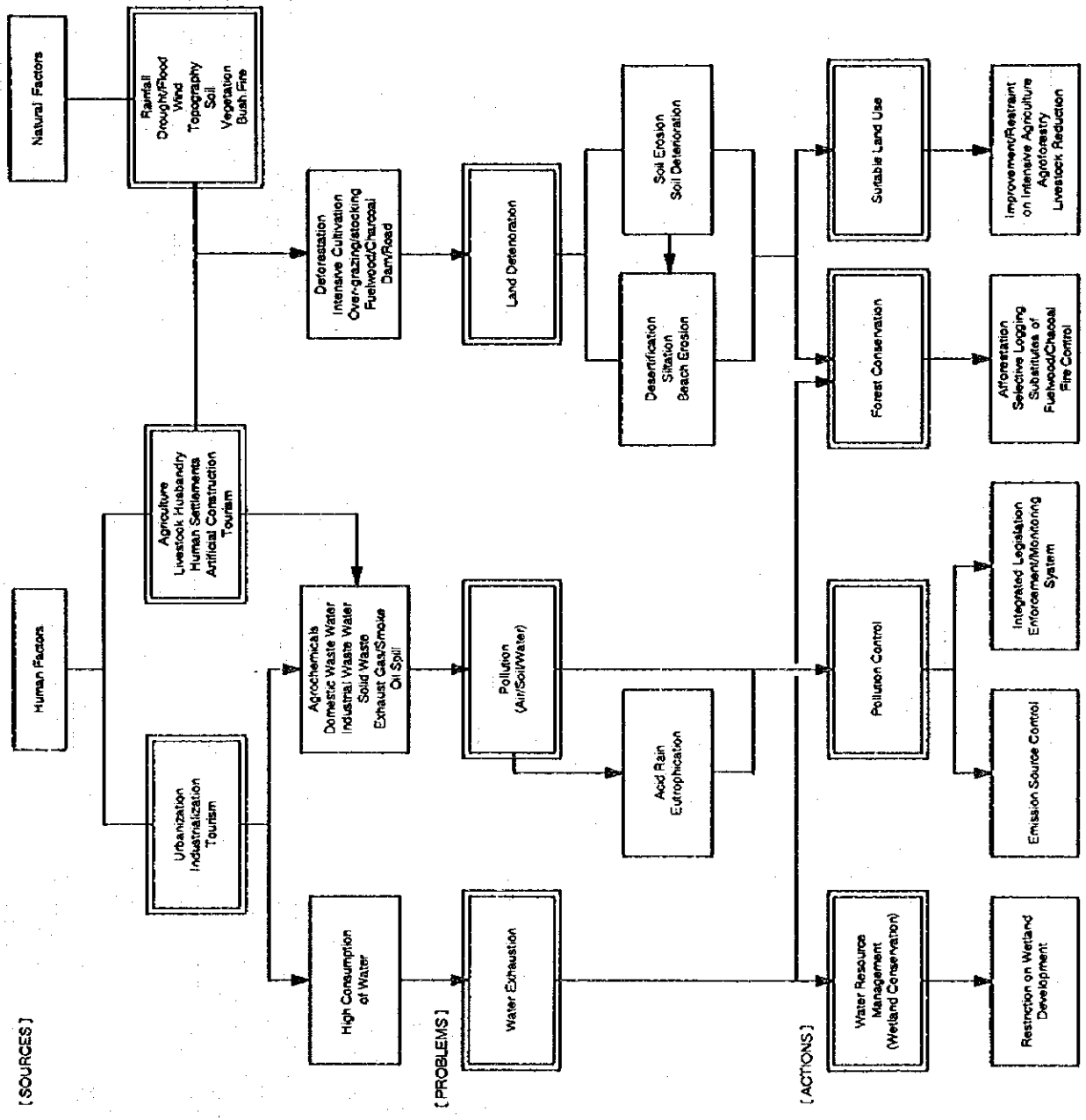


Source: JICA Study Team

About 88% of the whole land is classified by arid/semi-arid land. This type of land is generally weak and fragile for human activities, since its vegetation cover and plant productivity are low, due to low rainfall and poor soil condition. Furthermore, human activities have become larger and larger following a rather high rate of population growth (3.6%); Kenya's population has doubled from about 11 million to 22 million over the last two decades (1969-1989).

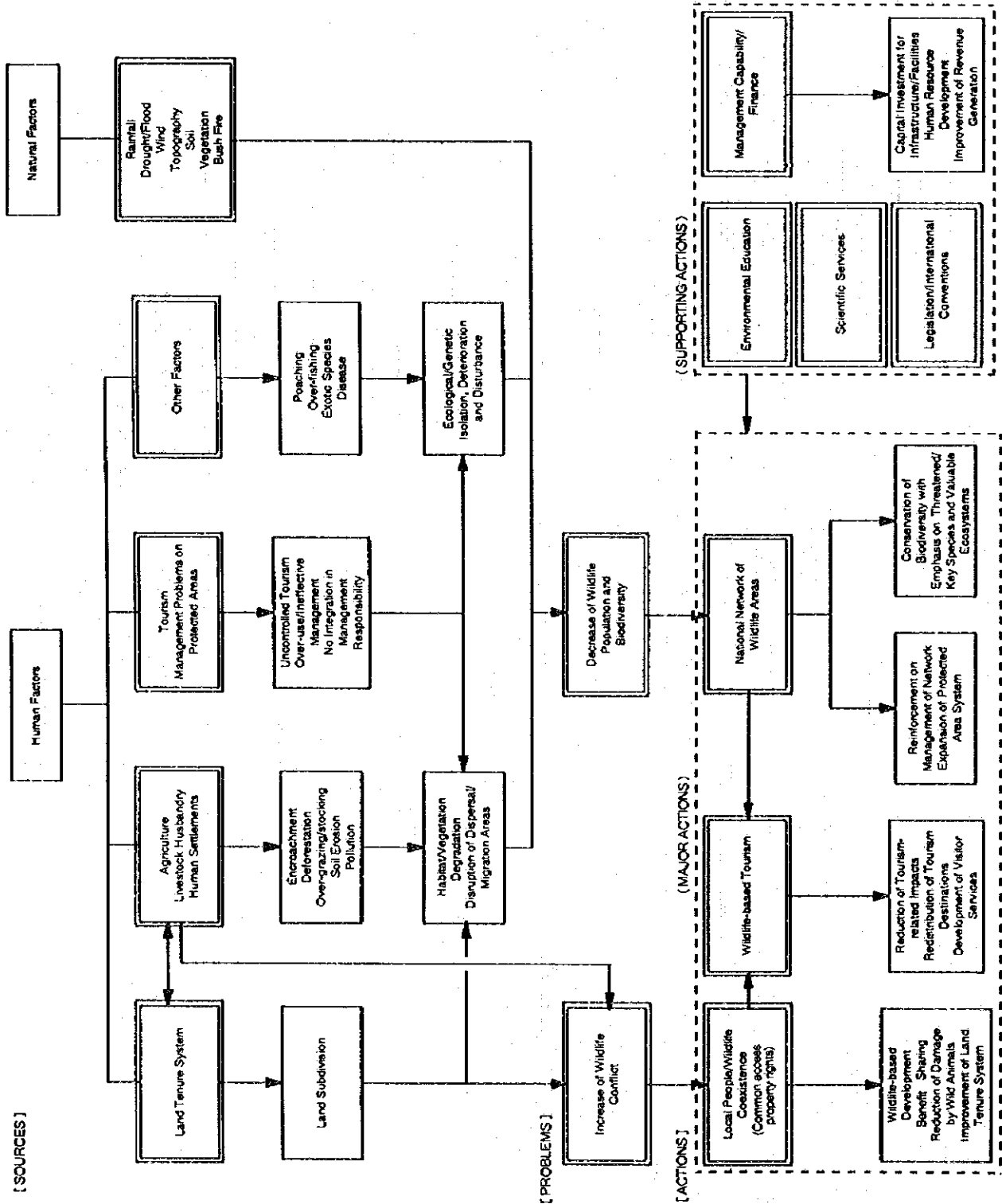
A mixture of these factors causes various environmental problems, which are closely interrelated to each other. Environmental problems are roughly divided into three main categories, that is environmental pollution, land deterioration and influence on wildlife survival. The flow charts illustrating these problem categories are shown in Figure 2.15 for the non-organic environment and Figure 2.16 for the wildlife. They are described in detail below.

Figure 2.15 Present Problems and Suggested Actions for Non-organic Environmental Conservation/Management



Source: JICA Study Team

Figure 2.16 Present Problems and Suggested Actions for Wildlife Conservation/Management



Source: JICA Study Team

4.2. Impacts of Human Activities on the Natural Environment

4.2.1. Environmental Pollution

(1) Air Pollution

Kenya's air quality at this moment is, in general, still quite suitable. However, air quality in certain areas, especially urban and industrial areas, is becoming polluted gradually. In urban areas, air pollution is caused mainly by exhaust gases from vehicles. It is reported in the case of Nairobi City, that 90% of air pollution is estimated to be caused from exhaust gases. On the other hand, in industrial areas, air pollution is caused by the factories' facilities, which are not well maintained as shown in Table 2.12. Some pollutants may cause acid rain, which is presently identified in the world as an environmental issue of global dimensions. According to the survey conducted by UNEP in 1987 as shown in Table 2.13, Nairobi records the highest acidity of pH 5.5, but at the other survey points the values were over pH 5.6. It can be said therefore that acid rain fall in Kenya is not yet a common phenomenon.

Table 2.12 Air Pollution in Nairobi City

Air Pollutant	Urban Area	Industrial Area
SO ₂ (µg/m ³)	36	57
SPM (µg/m ³)	51	80

Source: Kenyan National State of the Environment Report 1987, UNEP

Table 2.13 Acidity of Rain Water

Station	pH
Nairobi	5.5
Kericho	6.1
Meru	6.3
Garissa	7.1

Source: Same as Table 2.12

(2) Water Pollution

Water pollution is one of the big problems in Kenya. In general, although the surface water condition is fair, water pollution is observed in some lakes, rivers, the ocean, wetland and ground water. The pollution is caused from the following sources :

- Domestic and industrial sewage and garbage,
- Pollutants from agricultural activities, such as biocides, sediment and fertilisers,

- Agricultural processing, such as breweries, canning, coffee, tea, sisal, tanneries, paper and pulp,
- Industrial manufacturing, such as heavy metals, acids, dyes and oils,
- Sedimentation caused by soil erosion and mine tailings, and
- Leachate from dumping.

(3) Solid Waste Disposal

Solid waste disposal in urban areas is becoming a big problem in Kenya. Solid waste is categorised into domestic and commercial waste. Domestic waste consists of garbage of refused foods. Commercial waste is categorised into non-toxic and toxic waste. Non-toxic waste is generated from hotels, food industries and so on. Toxic waste consist of heavy metals, flammable waste and so on.

4.2.2. Land Deterioration

Land deterioration is caused by various human activities, following expansion of agriculture, increase of livestock and infrastructure development, which are accompanied by over-use or mismanagement of land. Land deterioration is often enhanced by effects of the natural environment, such as drought and flood in the lowland.

(1) Soil Erosion and Deterioration

Desertification in the arid/semi-arid land is one of the most serious environmental problems in Kenya. It is estimated that more than 80 % of the whole land is threatened by desertification on a continuous basis. The main cause of desertification is soil erosion, which is most severe in the arid/semi-arid land and next serious in the high agricultural potential areas. The causes of soil erosion are mainly over-grazing by livestock, expansion of agricultural land into marginal land, unsuitable agricultural methods and illegal tree felling, mostly for domestic use. Bush fires, often caused by charcoal burning and honey collection, contribute to this process.

All of these factors destroy the vegetation cover and prevent plant reproduction. The resulting deforestation weakens the function of mountains and hills as water catchment areas. There are reports estimating that 71 % of the original forests (especially 70 % of mangroves) have already been lost and only 1 to 2 % of the whole country will be covered with forests around 2015 (IUCN, 1983). Additionally, it has been estimated that about 7 % of wetlands are lost annually to agricultural land use(WWF, 1991).

The eroded soils are washed into rivers leading to siltation in lakes and swamps (e.g. Lakes Baringo and Victoria) and the coastal ocean (e.g. the mouths of the Tana and Sabaki Rivers). It has been estimated that the silt load of the Athi-Sabaki Rivers has increased about 130 times from the 1950's to the 1970's (Giesen and Van der Kerhof, 1984). Beach erosion may follow the siltation, which coral reefs and seagrass beds. Other related problems are soil deterioration, including soil loss, soil infertility, salinisation and soil contamination.

(2) Water Exhaustion

Lack of water resources is another big and common problem in most of the country, particularly in arid/semi-arid land. It becomes more severe during a drought year and sometimes has total damage on human activities as well as wild animals' survival. Following urbanisation and industrialisation, water exhaustion has become a serious problem, especially along the coast (e.g. Mombasa, Lamu), due to high consumption of water resource such as groundwater.

4.3. Influence on Wildlife Survival

There are mainly two aspects of influence on wildlife survival. First one is decrease of the wildlife population and biodiversity with extinction of floral/faunal species and, second one is increase of wildlife conflict with local people concerning land use. The principal cause is expansion of human activities due to population increase.

4.3.1. Decrease of Wildlife Population and Biodiversity

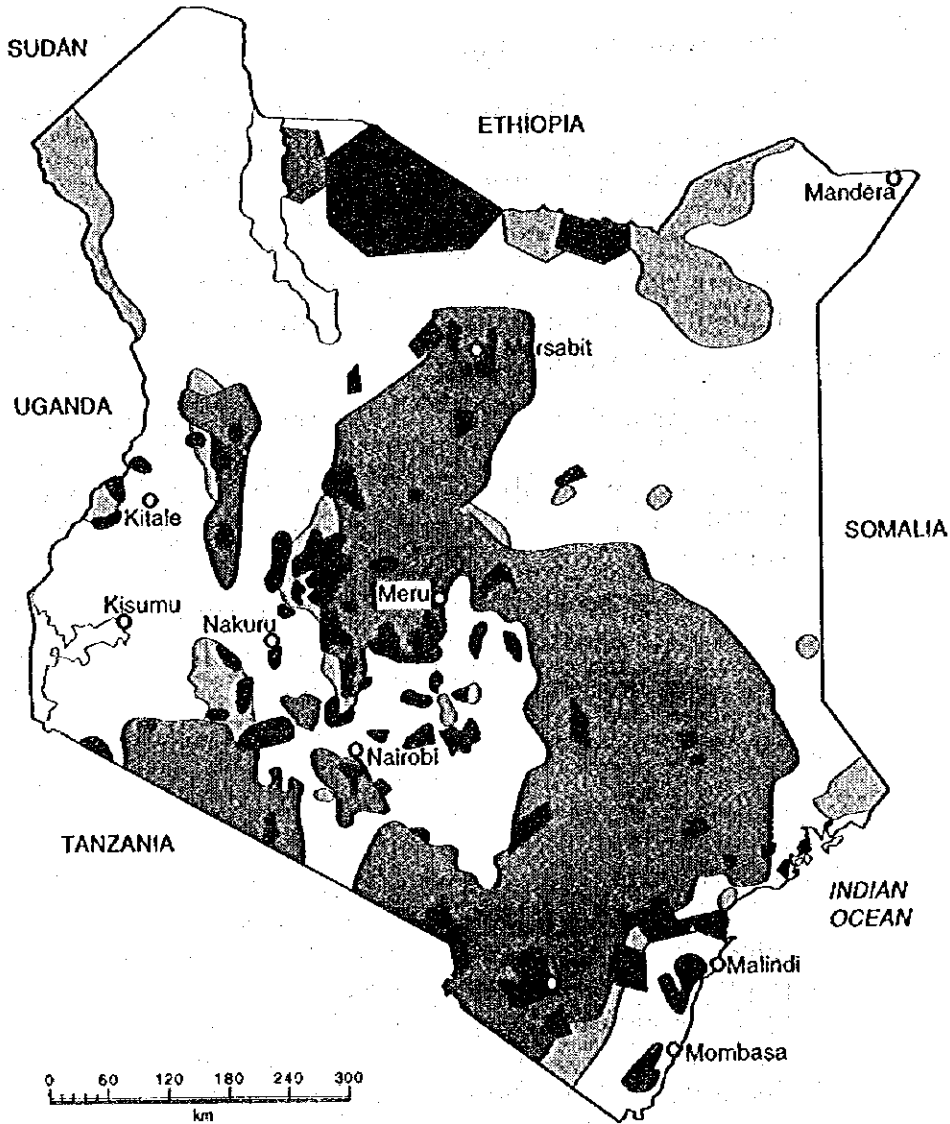
Decrease in the wildlife population and biodiversity is enhanced by two types of influence, that is direct influence and indirect influence.

The direct influence is represented by illegal hunting, especially commercial poaching, and illegal/over-fishing, such as mixed/dynamite fishing and trawling. All of these activities can result in excessive exploitation of wildlife resources. The drastic decrease of elephants and black rhinoceros is the best example for the direct influence by commercial poaching (refer to Figure 2.5). Wild animals infected by livestock sometimes results in serious damage to their population (e.g. Tsavo West NP, Masai Mara NR). The increase of livestock with the expansion of their ranges increases the opportunity for infecting wild animals. Other causes include ecological disturbance, predation of indigenous species by exotic species introduced or competition between them (e.g. Lake Victoria).

The indirect influence is represented by degradation of wildlife habitats, caused by various human activities, especially agriculture in the case of a terrestrial ecosystem. It has been estimated that nearly half of the Kenya's wildlife habitats (48%) have been lost so far (IUCN/UNEP, 1986). This leads to, for example, ecological isolation of wildlife habitats with possible genetic deterioration of wildlife species

(e.g. Aberdare NP, Saiwa Swamp NP, Ruma NP, Shimba Hills NR) and disruption of their dispersal/migration areas (e.g. Masai Mara NR, Amboseli NP, Nairobi NP). Wild animals used to migrate in the past from the North to the South along the Rift Valley, but most of this grand migration routes have disappeared. The present major wildlife dispersal areas are shown in Figure 2.17.

Figure 2.17 Location of Wildlife Conflicts/Dispersal Areas



Legend :

- Major wildlife conflict areas
- Major wildlife dispersal areas
- Other elephant distribution areas

Source: KWS (1990)

4.3.2. Increase of Wildlife Conflict with Local People

The problems mentioned above cause and/or are caused by land use conflicts between local people and wild animals. Main problems from the people's point of view are crop/livestock damage, human injury or death and grazing/watering competition. The areas and opportunities for local people to get into contact with wild animals have been increasing mainly because of the expansion of human settlements and agricultural land. On the other hand, since wildlife has been gradually recognised as an important natural resource and a kind of world heritage, wildlife conservation has become an urgent issue from both, the national and international points of view. As a result, land use conflicts have appeared over recent decades as a serious problem. These conflicts are found mainly around National Parks and Reserves, particularly in the central highland and the coastal lowland, as shown in the previous Figure 2.17.

These problems and their solutions are also affected by land use policies, land tenure systems, international market trends and environmental education. "Sub-division" of land is a serious threat to wildlife and tourism, excluding wild animals from their dispersal areas.

4.4. Tourism Problems

Tourism developments are assumed to generate a smaller negative impact on the environment in comparison with natural disasters and other human activities. However, if carried out without proper management, regulations and directions, tourism development can also easily have or enhance influence on both, the natural ecosystem and human activity at local or regional levels.

At present, tourism-related problems caused to the environment are conspicuous in popular National Parks/Reserves and parts of the coastal area, where over-use by tourism is sometimes observed. The problems derive mainly from two factors. One is the construction and operation of tourism facilities, such as hotels and roads, and the other is tourism activities and traffic increase.

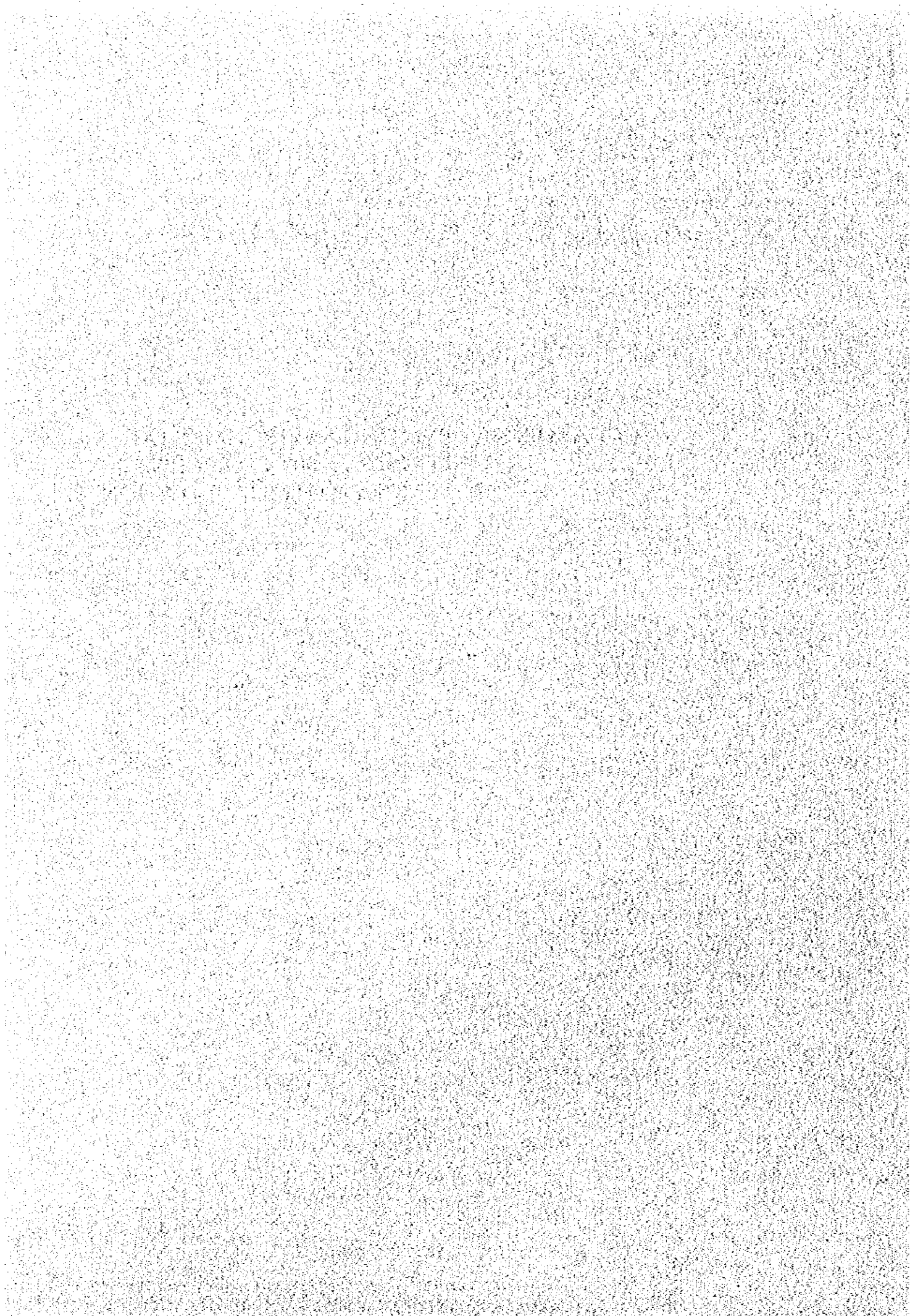
Major problems and their causes are as follows :

- Water/air pollution by sewage from tourism facilities and traffic waste such as exhaust gas and oil spill,
- Spoilage of scenic beauty by litter and tourism facilities constructed,

- Water exhaustion, due to high water consumption by tourism facilities,
- Degradation of vegetation/habitat with soil erosion, caused by the construction of tourism facilities and off-road driving, including balloon safari,
- Disturbance of wild animals by tourism activities, leading to influence their breeding/feeding behaviour. Eating garbage by wild animals, feeding of the animals tourists, and animal harassment through close enavelement frightening by vehicles, balloons or tourists,
- Destruction of coral reefs by boat operation/anchorage, snorkelling and illegal collection of marine creatures by tourists,
- Traffic accident with wild animals by road expansion and over-speed driving.

Details of the tourism related problems caused for the environment are described in Chapter 9 of this volume.

**CHAPTER 3 EXISTING ENVIRONMENTAL
CONSERVATION POLICIES,
PLANS AND IMPLEMENTATION**



Chapter 3 Existing Environmental Conservation Policies, Plans and Implementation

The preceding chapter presents problems on Kenya's natural environment. The Kenyan government has identified those environmental problems and formulated several policies and plans, in order to solve such problems. This chapter reviews the past policies and plans for and implementation of environmental conservation in Kenya.

1. General Policies

The theme of the 7th National Development Plan is "Resource Mobilisation for Sustainable Development". In the Plan, the term sustainable development means, among other things, a development process, which conserves and protects the environment. The important matters to be emphasised are establishing procedures for the Environmental Impact Assessment (EIA) of development projects, reinforcing the efficiency of environmental laws and regulations, and correcting pricing distortions of resources. The involved authorities have prepared a "Sessional Paper on Sustainable Development" and a "National Environmental Action Plan (NEAP)".

The Government of Kenya will enhance national development by assessing and avoiding adverse impacts in at least three key areas : -

- Prior assessment of the possible environmental impact of major economic and sectoral policies, plans, programmes and projects,
- Prior assessment of the possible economic impact of environmental measures, and
- Prior assessment of the possible equity impact of both.

All three approaches are needed to support and achieve a development that is economically, ecologically and socially sustainable.

2. Management Authorities

There are several authorities concerned with environmental conservation and management in Kenya. They are: -

- The Ministry of Environment and Natural Resources,
- The Ministry of Tourism and Wildlife (including the Kenya Wildlife Service),
- The Ministry of Land Reclamation, Regional and Water Development,
- The Ministry of Health,
- The Ministry of Culture and Social Services,
- The Ministry of Planning and National Development, and
- The Office of the President.

Among these authorities, the following three authorities have the main responsibility for the conservation and management of the natural environment and resources, including tourism resources.

2.1. The Ministry of Environment and Natural Resources

This Ministry has three departments, namely the National Environmental Secretariat, the Mines and Geology Department and the Forest Department.

The National Environmental Secretariat is responsible for providing general policies on environmental management and co-ordination with national and international organisations. The Mines and Geology Department is responsible for administration of mining activities. The Forest Department is responsible for the administration of government forest land and provision of the National Forest Policy. In this policy issued in 1968, the importance of gazetted forests as a source of forest products for all inhabitants is emphasised. The policy has ten basic principles, such as reservation, protection, management, industry, finance, employment, research/training and forest categories.

2.2. The Ministry of Tourism and Wildlife

This Ministry has three departments, namely the Tourism Department, the Administration Department and the Fisheries Department. This Ministry is also responsible for the administration of several parastatals, including, to some extent, the Kenya Wildlife Service. The major functions of this Ministry are to plan and promote tourism development and to conserve and manage wildlife and fisheries resources.

2.3. The Kenya Wildlife Service

The Kenya Wildlife Service (KWS) was established in 1989 under the Wildlife Conservation and Management (Amendment) Act, 1989, after abolishment of the former authority, the Wildlife Conservation and Management Department. The KWS is a state parastatal with the financial autonomy under indirect supervision by the President or the Ministry of Tourism and Wildlife. The KWS is the legal authority for wildlife conservation and management in the whole country, being responsible for management of all National Parks, Sanctuaries and several Reserves under agreements with County Councils.

KWS formulated its policy and programmes for wildlife conservation and management in "A Policy Framework and Development Programme 1991-96". Following this framework, KWS has carried out various projects and made several agreements with other organisations such as County Councils and the Forest Department.

The goals of KWS are as follows :

- Conservation of the natural environment of Kenya and its fauna and flora for the benefit of present and future generations and as a world heritage,
- Sustainable utilisation of Kenya's wildlife resources for the economic development of the nation and for the benefit of people living in wildlife areas, and
- Protection of people and property from injury or damage caused by wild animals.

3. Environmental Laws, Regulations and Conventions

3.1. Generals

There is not yet a general and integrated environmental law in Kenya, but it is presently under establishment by the government. Also, the Ministry of Environment and Natural Resources has prepared a "National Environmental Action Plan".

The Government of Kenya has 77 individual statutes related to the environment. However, the environmental related are somewhat incomplete and not well enforced, the main reasons for which are as follows :

- Lack of sufficient political will,
- Ineffective co-ordination among the different authorities sharing responsibility on the same resource,

- Shortage of manpower,
- Inadequate penalties and incentives, which do not provide for situations that damage the environment, or enhance conservation measures respectively,
- Little enforcement of the laws, and
- Inadequate education or sensitization of people on environmental issues.

3.2. Outlines of Laws, Regulations and Conventions

3.2.1. Laws and Regulations for Air Pollution

The important laws and regulations for air pollution control are as follows: -

- The Penal Code Cap. 63 (1970),
- The Traffic Act Cap. 403 1962 (1988),
- The Public Health Act Cap. 242 1972 (1986), and
- The Factories Act Cap. 242 1972 (1986).

The Penal Code provides for the decrease of air and noise pollution, which would affect public health. The Traffic Act also provides for air pollution control, such as rules concerning the construction of buildings, maintenance of vehicles and the emission of exhaust gases. The Public Health Act provides for protecting the public health from air pollution. The Factories Act provides for emission standards concerning pollutants and industrial wastes.

However, these laws and regulations are not completely and systematically connected with each other. Therefore, it is necessary that a new law like the Environmental Standards Act, including air pollution standards, ambient environmental quality standards and emission standards, be enacted by an unified authority, such as the Ministry of Environment and Natural Resources.

3.2.2. Laws and Regulations for Water Pollution

The following laws and regulations exist for water pollution control purposes: -

- The Water Act Cap. 372 1972,
- The Merchant Shipping Act Cap. 389, and
- The Public Health Act Cap. 242 1972 (1986).

(1) The Water Act

The Water Act provides for the management of water resources and its use under the responsibility of the Water Apportionment Board. The Board has divided the whole country into six water catchment areas (or drainage basins).

This Act also provides for protecting the water source against pollution caused by dumping waste and sewage under the responsibility of the Water Quality and Pollution Control Section in the Ministry of Land Reclamation, Regional and Water Development. However, this Act is not well enforced, because of the following reasons :

- Lack of budget,
- Inadequate enforcement of water supply and affluent treatment quality standards,
- Increase of development activities, and
- Lack of land use control.

(2) The Merchant Shipping Act

The Merchant Shipping Act provides for water pollution control of the sea, as for oil spills from ships, but it is not complete for the protection of marine water pollution.

(3) The Public Health Act

The Public Health Act provides for protecting the water supply to the public from water pollution, but it is also inefficient, because of the following reasons :

- Inadequate enforcement of water supply quality and effluent discharge standards, and,
- Lack of a monitoring system for the quality of water resources.

3.2.3. Laws and Regulations for Waste Disposal

There are five main acts for waste disposal : -

- The Food, Drugs and Chemical Substances Act Cap. 254 1967(1970),
- The Public Health Act Cap. 242 1972 (1986),
- The Pest Control Products Act Cap. 346 1967 (1985),
- The Water Act Cap. 372 1972, and
- The Local Government Act Cap. 265 1986.

The Food, Drugs and Chemical Substances Act provides for the manufacture, use, export or import of chemical substances. The Public Health Act provides for chemical substance removal or abolition for the manufacture, sale, export or import. The Pest Control Products Act provides for the use of agrochemicals to protect public health, plants, animals or the environment. The Water Act provides for preventing water pollution by dumping waste and sewage. The Local Government Act provides for the establishment and maintenance of the sewerage and drainage systems.

In addition to these Acts, there are many laws and regulations legislated for water pollution control as above mentioned.

3.2.4. Laws and Regulations for Natural Resources

The Acts for natural resources are as follows : -

- The Forest Act Cap. 385 1942 (1982),
- The Wildlife Conservation and Management Act Cap. 376 (1976, 1989),
- The Government Fisheries Protection Act Cap. 379 (1962),
- The Fish Industry Act 378 (1970, 1983), and,
- The Agriculture Act Cap. 318 (1967).

(1) The Forest Act

As a basic legal framework for the conservation of forests, including the unique flora and fauna, the Forest Act provides for the establishment, control and regulation of three categories of forests, namely the central forests, the other forests/forest areas in the Nairobi area and those in the unalienated government land. The Act states that the Minister may gazette or de-gazette forest areas and Nature Reserves or alter the boundaries.

However, there are some difficulties to enforcement of the Act, especially due to the high population growth and the increase of fuel-wood demand. This Act is not complete on the following points: -

- Existence of uncontrolled forests without gazettement as Forest Reserves,
- Illegal settlement and cultivation in forests, and
- Lack of buffer zones around forests.

The National Forest Policy was issued in 1968 and it is not suitable nowadays, because of the changed social and economic conditions. A renewal of the policy is required to be issued.

(2) The Wildlife Conservation and Management Act

The Wildlife Conservation and Management Act was enacted in 1976 and amended in 1989. The Act provides for the protection and control of wildlife and their habitats. Under the Act, the hunting and dealing in wildlife products has been prohibited since 1977. KWS was established in 1989 as the new legal authority for wildlife conservation and management. This Act allows to gazette or de-gazette National Parks, National Reserves, Local Sanctuaries and other Protection Areas or amend the boundaries with declaration by the Minister. All National Parks and two Reserves are controlled by the central government (represented by KWS) and the rest of National Reserves by the local governments (County Councils).

Human activities except tourism are prohibited in National Parks, while various activities are allowed in National Reserves. Since human pressure is increasing as a result of population increase, there is a tendency that wild animals are pushed into small National Parks or Reserves or driven away to unsuitable areas. The Act is still incomplete for effective wildlife conservation and it needs to be further amended, to encompass wildlife conservation in the disposal areas which about 70 to the wildlife population in the country. Land owner rights for local communities in group ranches should also be included in revised Act.

(3) The Government Fisheries Protection Act & the Fish Industry Act

The Government Fisheries' Protection Act provides for control on gathering of particular species, such as pearls, pearl shells, shellfish, oysters, cowries, crustaceans, corals and bivalves.

The Fish Industry Act provides for research on the fisheries development and regulations, which prescribe fishermen licenses, fishing vessels/equipment and fishing methods for each water body. However, this act does not include regulations on the fishing seasons. It is therefore required to define the closed season, at least in the breeding season.

(4) The Agriculture Act

As for soil conservation, land use policy is very important. The Agriculture Act provides not only for the development of agriculture, but also the preservation of soil and its fertility.

3.2.5. Laws and Regulations for Social Environment

There are two main Acts as regards the social environment : -

- The Land Planning Act Cap. 303, and
- The Town Planning Act Cap. 134.

Land use planning plays an important role for environmental conservation and management. These Acts establish land use plans for urban areas with infrastructure development, and they require some development in accordance with the plans. The problem with the Acts is that they do not cover other than urban areas, so that the conservation of natural resources is restricted substantially.

3.2.6. Environmental Impact Assessment (EIA) System

The Environmental Impact Assessment (EIA) will be implemented in Kenya in accordance with the EIA form provided by the Ministry of Environment and Natural Resources. However, there are no specific laws and regulations on EIA, so that the evaluation of EIA cannot be completed. Therefore, the EIA System should be provided as part of a general environmental law, which is currently under consideration by the government.

3.2.7. International Conventions for Environmental Conservation

In the field of environment and natural resource conservation, Kenya participates, has ratified or signed a number of international conventions. They are as follows :

- African Convention on the Conservation of Nature and Natural Resources (1968) : ratification,
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat (1971) : ratification,
- Convention concerning the Protection of the World Cultural and Natural Heritage (1972) : ratification,
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1983) : ratification,
- International Undertaking on Plant Genetic Resources (1983) : ratification,
- Convention on Biological Diversity (1992) : signature,
- Vienna Convention for the Protection of the Ozone Layer (1985) : ratification,
- United Nations Framework Convention on Climate Change (1992) : signature,
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972) : ratification,
- United Nations Convention on the Law of the Sea (1982) : ratification,
- International Convention for the Regulation of Whaling (1946) : ratification, and
- Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (1985): ratification.

4. Gazetted and Registered Areas for Environmental Conservation

There are many gazetted and registered areas for environmental conservation in Kenya, namely National Parks, Reserves, Sanctuary, Local Sanctuary, Forest Reserves, Nature Reserves and several internationally designated conservation areas. The total area of these conservation areas is approximately 76,800 sq.km, that is about 13.2% of the whole country. The outlines of each conservation area are summarised as follows.

4.1. National Parks/Reserves/Sanctuary and Local Sanctuary

National Parks, Reserves, Sanctuary and Local Sanctuary (hereinafter referred to as NP, NR, NS and LS) are regarded as "protected areas" by KWS. As one form of National Parks and Reserves, there are Marine National Parks and Reserves (hereinafter referred to as MNP and MNR). National Parks and Reserves are established for wildlife conservation by the Act of Parliament and the local governments, respectively. National Parks are given the total protection and preservation of wildlife, while National Reserves are occasionally allowed to be used for other domestic purposes, such as livestock grazing, watering, fuel-wood collection and traditional fishing by local people. National/Local Sanctuaries are established to give special protection to a specific wildlife species and population, which is either threatened or endemic, although the vegetation is not usually protected. All National Parks, Sanctuaries and several Reserves are administrated by KWS and the rest of National Reserves by County Councils under the Wildlife Conservation and Management Act

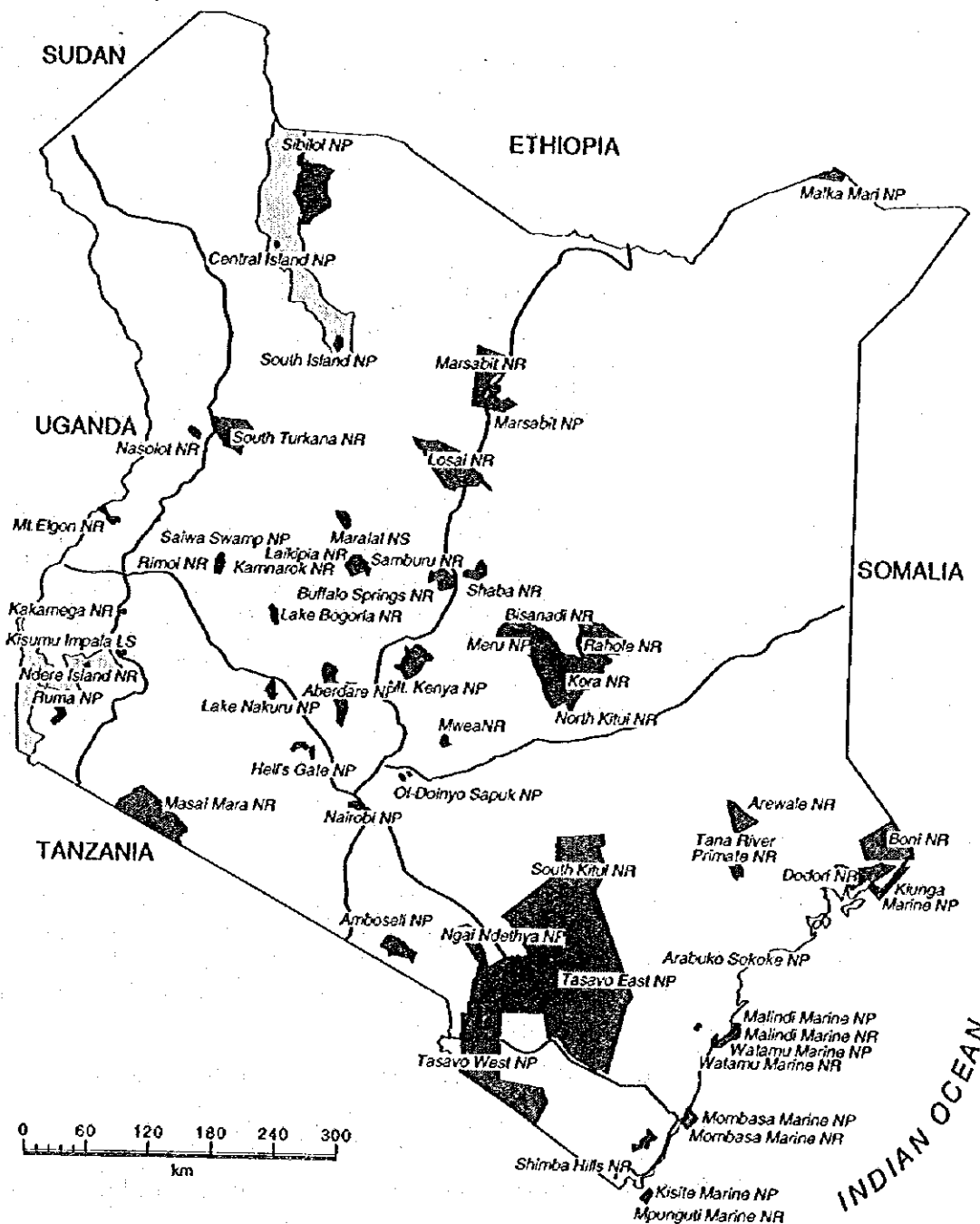
The locations and environmental characteristics of the protected areas are shown in Figure 3.1 and Table 3.1 respectively. The total number of these areas is 56 (NP: 22, NR: 23, MNP: 4, MNR: 5, NS: 1, LS: 1) and the total area is about 45,100 sq.km, which occupies 7.7% of the total land area (NP: 5.0%, NR: 2.7%). Compared to other African countries, however, this percentage is not so large, being ranked at the 15th place.

4.1.1. Characteristics

Major characteristics of these areas are summarised as follows :

- Ecologically important areas located mostly in arid/semi-arid land and partly in mountains and at the coastal ocean,
- Representation of Kenya's bio-communities, particularly well for arid thorn bush land/woodland (about a half of NP/NRs) and grassland (about a quarter of NP/NRs) (Table 3.2 refers),
- Mostly small and isolated areas, by fencing in some cases, with no buffer zones : all except Tsavo East/West NPs are smaller than 2,000 sq.km and about 80% of NP/NRs are smaller than 1,000 sq.km,
- Core or refuge areas with water sources for large mammals, particularly migratory species during the dry season, in main NP/NRs, and
- Relatively well-maintained facilities in main NP/NRs, compared to other African countries.

Figure 3.1 Location of National Parks, Reserves, Sanctuary and Local Sanctuary



Source: KWS

Table 3.1 Eco-zones/Bio-Communities

Eco-zones	Bio-communities	Corresponding NP/NR No. (%)	
Afro-alpine	Afro-alpine Glacier and Moorland	3	(5.8)
Humid and Sub-humid (Forest)	Highland Moist Forest	3	(5.8)
	Guineo-Congolean Rain Forest	1	(1.9)
	Highland Dry Forest	3	(5.8)
	Coastal Forest and Woodland	2	(3.8)
	Ground Water and Riverine Forest	6	(11.5)
	Coastal Palm Stands	0	(0.0)
Arid and Semi-arid (Woodland/Bushland/Grassland)	Evergreen and Semi-Evergreen Bushland	4	(7.7)
	Grassland	13	(25.0)
	(Highland, Fire-Induced, Alkaline/Volcanic Ash, Seasonal Floodplain/Delta)		
	Semi-arid Wooded and Bushed Grassland	3	(5.8)
	Arid Thorn Bushland and Woodland	25	(48.1)
	Semi-desert	5	(9.6)
	Coastal Evergreen Bushland	1	(1.9)
Aquatic (Wetland)	Mangroves	3	(5.8)
	Permanent Swamps	2	(3.8)
	Freshwater Lakes	1	(1.9)
	Alkaline Lakes	2	(3.8)
	Marine Beaches and Dunes	0	(0.0)
	Coral Reefs and Islands	9	(17.3)

Source: Wildlife Planning Unit of MOTW (1987), KWS (1990), The National Biodiversity Unit (1992)
 Note: Among all 56 protected areas, 52 NP/NR are taken as objects for this table. Since each of them includes 1 to 4 bio-communities, the total number of the corresponding NP/NR is 86.
 The percentage (%) is a ratio of the number of the corresponding NP/NR to that of the object NP/NR (52).

4.1.2. Problems

Various types of problems occur in these areas, deriving from their characteristics and the administration. The environmental problems are partly common to the general and tourism problems above mentioned. The problems, both of the environment and management, are summarised as follows :

(1) Mostly Small and Isolated Areas with No Buffer Zones

- Disruption of wild animal's dispersal/migration areas,
- Ecological/genetic isolation and deterioration in wildlife,
- Confinement and the following over-population of wild animals,
- Degradation of vegetation/wildlife habitats, and
- Increase of wildlife conflict with local people.

(2) Over-use of Some Major NP/NRs by Tourism

- Degradation of vegetation/wildlife habitats,
- Disturbance to wild animals by tourism activities,
- Pollution of water, soil and air, and
- Decrease of tourist's satisfaction and possibly tourist's numbers, too, in the future.

(3) Little-use of Other Minor NP/NRs

- Little tourism revenue,
- Little management and conservation measures to be taken , and
- Increase of illegal activities, such as human encroachment and poaching.

(4) Controversial Management Measures and Problems

- Trans-location of indigenous species, invasion of exotic species, fire invasion, illegal hunting/grazing/tree felling,
- Ecological/genetic disturbance and deterioration in wildlife , and
- Degradation of vegetation/wildlife habitats.

(5) Under-representation of Several Kenya's Bio-communities

- No management and conservation measures to be taken,
- Degradation or possible disappearance of some bio-communities, that is for example highland grassland, coastal palm stands, marine beaches/dunes (as referred to Table 3.2).

(6) Little Transparency in Flow of Tourism Revenue for Some NRs

- Dissatisfaction with the administration by local people , and
- Increase of wildlife conflict with local people.

4.2. Forest Reserves and Nature Reserves

Forest Reserves (hereinafter referred to as FR) are established for the conservation of forest resources, timber and other forest products, and water catchment being managed either as production forests or protection forests. Nature Reserves are established inside Forest Reserves for the conservation of unique flora/fauna or physical features. In general, both types of reserves are administrated by the Forest Department under the Forest Act.

The locations of Forest Reserves and a list of main Forest Reserves larger than 200 sq.km and Nature Reserves are shown in Figure 3.2 and Table 3.3, respectively. The total number of Forest Reserves is 203 and that of Nature Reserves is 11. The total area of Forest Reserves, including ungazetted ones, is about 22,000 sq.km (3.8% of the whole land). However, the actual cover of indigenous forests is estimated only less than 13,000 sq.km (2.2% of the whole land) (KIFCON, 1994). The total area of Nature Reserves is about 540 sq.km.

4.3. Internationally Designated Conservation Areas

Internationally designated conservation areas in Kenya are Biosphere Reserves, Ramsar Sites and World Heritage Sites. The first areas are approved in a part of UNESCO's "Man and the Biosphere Programme". The later two areas follow each of the relative international conventions mentioned above. The purposes for the establishment are : conservation of biodiversity with ecologically sustainable development for local people, conservation of world heritage and conservation of wetlands, especially as waterfowl habitats.

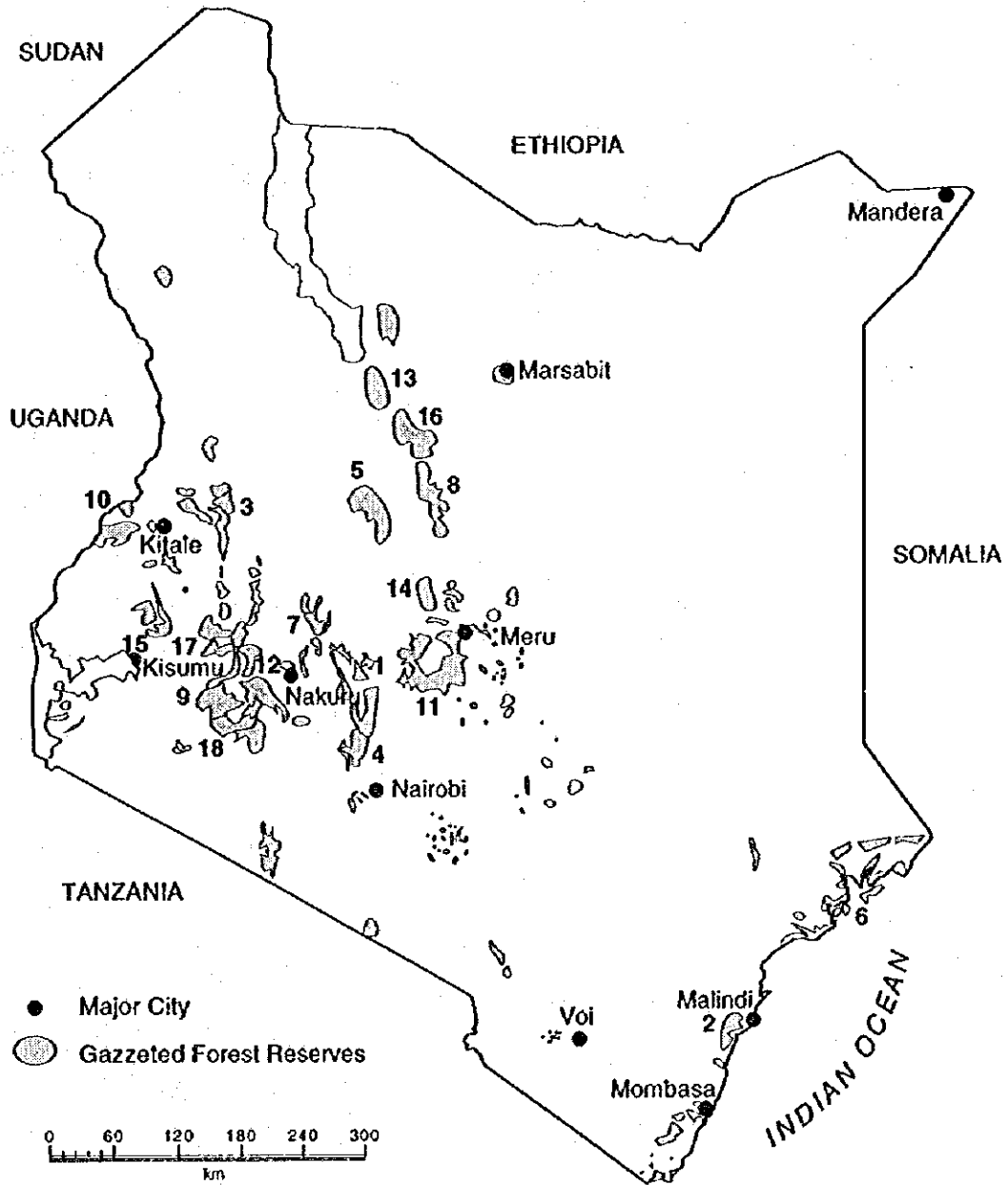
Internationally designated conservation areas are shown in Figure 3.3 and listed also in Table 3.3. There are 5 Biosphere Reserves, 1 Ramsar Site and 1 World Heritage Site. The total area of these areas is about 13,000 sq.km (2.0% of the whole land).

5. Implementation of Environmental Conservation and Management

5.1. Present Measures

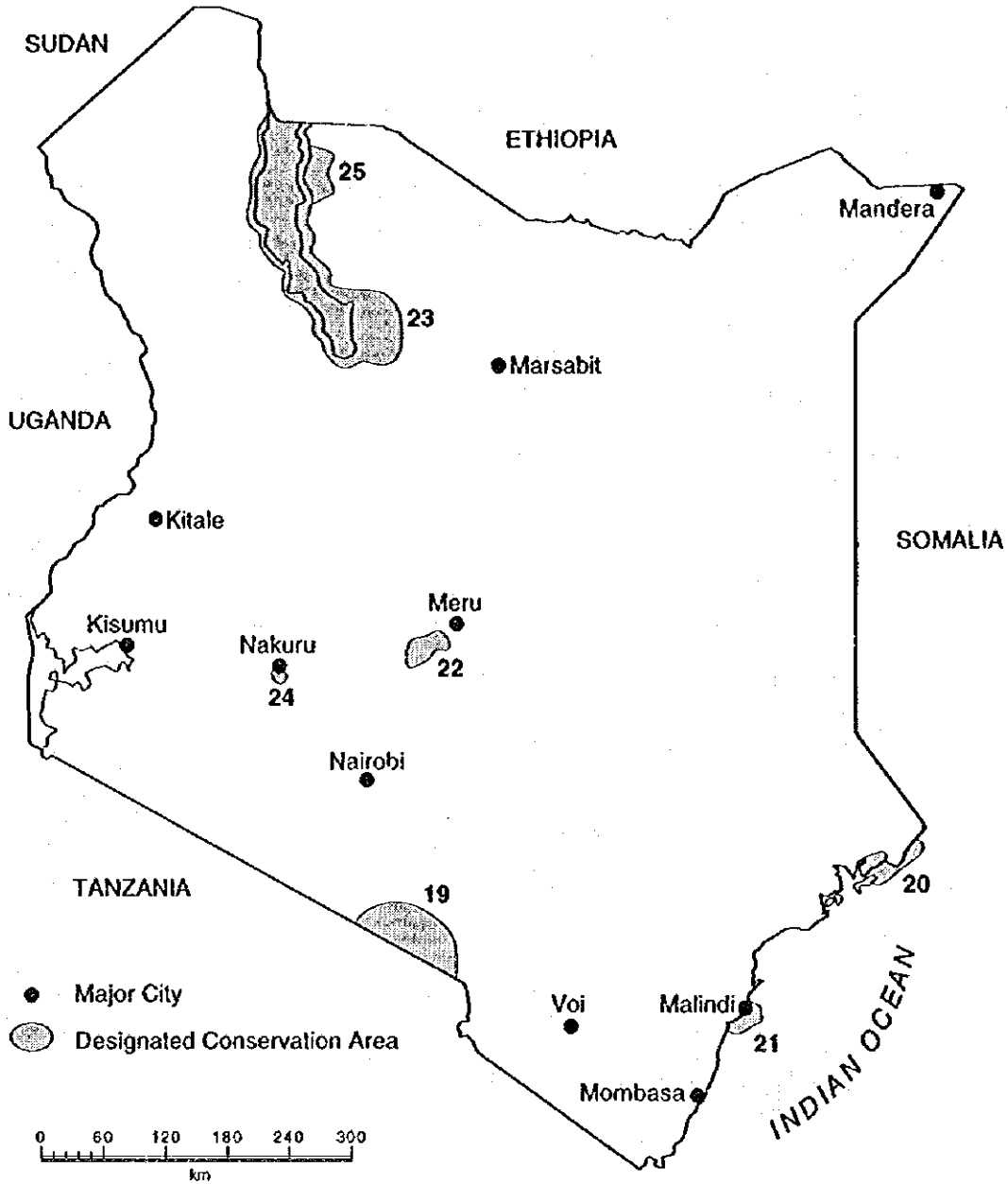
KWS has manifested its policy and programmes for wildlife conservation and management in "A Policy Framework and Development Programme 1991-96". KWS has started the "Protected Areas and Wildlife Service Project" (PAWS) in 1992 as a ten-year project with loan funding from the International Development Association (IDA) and grant by some donor countries half and half respectively. Following the framework the project and KWS's annual work plans for each fiscal year, KWS has concluded several agreements and memoranda of understanding, and carried out various projects and programmes for wildlife conservation and management.

Figure 3.2 Location of Gazetted Forest Reserves



Note: The number on the map correspond to those in Table 3.3.
kifc6n

Figure 3.3 Location of Internationally Designated Conservation Areas



Note: The number on the map correspond to those in Table 3.3.
 Source: The World Bank (1993), KWS (1995 information)

Table 3.2 List of Gazetted/Registered Conservation Areas besides Protected Areas

No.*	Name	Year Notified	Area (sq.km)
[Forest Reserves] 203 sites**			
1	Aberdare (3)	1943	1,030
2	Arabuko Sokoke	1943	418
3	Embobut	1954	219
4	Kikuyu Escarpment	1943	383
5	Leroghi	1936	919
6	Mangrove Swamp	1932	451
7	Marmaret	1932	233
8	Mathews Range	1956	938
9	Maus (4)	1932/41	1,674
10	Mt. Elgon	1932	737
11	Mt. Kenya	1943	2,009
12	Mt. Londiani	1932	297
13	Mt. Nyiru	1956	459
14	Mukogodo	1937	302
15	Nandis (2)	1936	300
16	Ndotos Range	1956	972
17	Tinderets (2)	1932	540
18	Transmara	1941	353
[Nature Reserves] 11 sites***			
	Arabuko Sokoke	1979	43
	Cheptugen-Kapchemutwa	-	>1
	Kaimosi Forest	-	>1
	Kaptagat Forest	-	-
	Karura	-	1
	Katimok Kabarnet	-	>1
	Langata	-	>1
	Mbololo	-	-
	Nandi North	1978	34
	South-western Mau	1961	430
	Uaso Narok	1981	16
[Biosphere Reserves] 5 sites			
19	Amboseli	1991	2,792
20	Kiunga Marine	1980	600
21	Malindi-Watamu	1979	196
22	Mt. Kenya	1978	718
23	Mt. Kulal	1978	7,000
[Ramsar Sites] 1 site			
24	Lake Nakuru NP	1990	188
[World Heritage Sites] 1 site			
25	Sibiloi NP	1994?	1,571

Note: * The numbers correspond to those in Figure 3.2 and 3.3.

** Only 22 sites larger than 200 sq.km are shown in this table as an example.

*** There may be 3 other Nature Reserves: Kakamega, Kisere and Yala River.

Source: The World Bank (1993), KWS (1995 information)

5.1.1. Five Year Management Plans for Protected Areas (after 1990) :

- 12 NP/NRs : Amboseli NP, Aberdare NP, Mt. Kenya NP, Hell's Gate/Longonot NPs, Laikipia NR, Kakamega NR, Nasolot NR, South Turkana NR, Shimba Hills NR, Tana River Primate NR, Nairobi NP, Lake Nakuru NP (the later two in progress at the end of 1994).

5.1.2. Agreements for NR Management between KWS and County Councils :

- 4 County Councils: West Pokot C.C. (Nasolot NR), Turkana C.C. (South Turkana NR), Elgeyo Marakwet C.C. (Rimoi NR), Laikipia C.C. (Laikipia NR).

5.1.3. Memoranda of Understanding for the Joint Management of Selected Forests between KWS and the Forest Department :

- 25 sites of forest areas, equal to 31 FRs (about 80% of all the forests) : Aberdares, Mt. Kenya, Namanga Hill, Nguruman Escarpment, Ngong Hills, Mau, Mathews Range, Mt. Nyiro, Kakamega, Arabuko Sokoke, Shimba Hills, Mangrove forests, Mt. Elgon, Mt. Kulal, Marsabit, Bonjoge, Chyulu Hills, Ngare Ndare, Nyambeni Hills, Ngaya, Mukogodo, Cherangani Hills, Tinderet, Leroghi Range, Lembus.

5.1.4. NP/NR Management and Wildlife Conservation

- Anti-poaching and security operations by field patrol and information gathering,
- Fencing programme : Nairobi NP, Lake Nakuru NP, Aberdare NP, Saiwa Swamp NP, Ruma NP, Marsabit NR, Shimba Hills NR,
- Population control and trans-location of wild animals : e.g. Nairobi NP, Lake Nakuru NP, Aberdare NP, Ruma NP, Ndele Island NP,
- Elephant and rhino programmes (principally funded by EC) : e.g. Nairobi NP, Aberdare NP, Shimba Hills NR, Laikipia District,
- Scientific research, such as population census for wild animals, vegetation survey, sea turtles/dugong survey : e.g. Nairobi NP, Lake Nakuru NP, Shimba Hills NR, the coastal ocean,
- Environmental monitoring of water quality in Lake Nakuru and MNP/MNRs,
- Pilot project of the voluntary fee collection system as the marine conservation fee with hotels at Mombasa MNP (in progress on reinstatement),

- Integrated Coastal Zone Management Plans for Mombasa/ Malindi/Watamu MNP/MNRs,
- Tana River Primate Reserve project (GEF : administered by IDA), and
- Environmental education through participation of youth in local conservation activities and invitation of youth to Education/ Field Study Centres in several NPs.

5.1.5. Community Wildlife Programme

- Establishment and registration of local community groups for wildlife-based development : e.g. Association of Mt. Kenya Operators, Mombasa Boat Owners Association, Association of Private Rhino Sanctuaries,
- Revenue sharing programme in the form of public investment, such as construction or improvement of infrastructure/facilities (schools, clinics, water holes, etc.) : about 10% of the park entry fees went to local communities in 12 areas in 1993/94 fiscal year,
- Fencing and problem animal control programmes to minimise people and property damage by wild animals,
- Establishment of the Wildlife Fund for Development to support wildlife-based projects in wildlife areas through loans and grants,
- Pilot projects for operation of the wildlife use rights, such as game culling and farming with establishment of the Wildlife Management Forums : Laikipia, Machakos, Nakuru, Narok, Taita, Loitokitok Districts,
- Eco-tourism in community-based sanctuaries : e.g. Laikipia, Kwale Districts,
- Afforestation by local communities through the Community Afforestation Programme : e.g. Mt. Kenya FR, some Mangrove FRs,
- Participation in NR management and domestic use of NRs by local communities under administration of County Councils : e.g. Baringo District,
- COBRA project (USAID) : Laikipia/Meru, Samburu, Narok Districts, and
- Rural Services Design project (IDA) : Ruma NP, Amboseli NP, Kora NP, Sibiloi NP.

5.1.6. Other Environmental Conservation Programmes

- Specific soil conservation programme in more than 36 Districts by the Presidential Commission for Soil Conservation and Afforestation,
- Valuable information service for protection from desertification in arid/semi-arid land by the Integrated Project on Arid Lands and the Arid Land Research Centre,
- Afforestation programme by the Rural Afforestation Extension Service and the Forest Plantation Development in the Forest Department : establishment of tree nurseries, raising and distribution of seedlings, emphasis on agro-forestry in private farms and hill tops and so on,
- FR management by the Forest Department : establishment of forest guard posts, clearance of fire-breaks, clearing of access roads and so on,
- Sustainable fisheries management by the Department of Fisheries : fishermen loans, fisheries surveys, fish farming extension, rehabilitation of fishing gear/boats and so on, and
- KIFCON project (ODA) : 3 pilot projects in Kakamega Forest, Arabuko Sokoke Forest, South-west Mau/Transmara Forests.

5.2. Financial Conditions

As for the Forest Department (Ministry of Environment and Natural Resources) and the Department of Fisheries (Ministry of Tourism and Wildlife) and other governmental bodies, their budgets are distributed by the Treasury and are thus strongly constrained by the financial condition and national development policies of the government. Therefore, even though financial support is provided to these governmental bodies by donor countries and agencies, they usually suffer from lack of funds to implement conservation and management measures.

Meanwhile, the financial condition of KWS is somewhat much better than these governmental bodies, since KWS is a parastatal body and hence its financial autonomy is guaranteed to some extent. The financial condition of KWS for the recent years is shown in Table 3.4.

There are two kinds of income, internally and externally generated income, and more than half of them are from internally generated income. Main source of internally generated income is the park entry fees and that of externally generated income is the grants from donor agencies, which has increased over recent years. Park entry fees

occupy about 85-90% of the internally generated income and account for about half of total income. Grants from donor agencies, including amortisation and reimbursement, occupy about 60-80% of externally generated income and account for about one-third of total income. Grants from the government occupy 20-40% of externally generated income, but account for only less than 10% of total income.

Expenditures are divided into two categories, that is recurrent and development expenditures. The ratio of development expenditure has been increasing to more than half of total expenditures for recent years. According to the 1994/95 Annual Work Plan, 73% of the recurrent expenditure is funded out of expected revenues and 27% from donor agencies. Almost all of the development expenditure, 98%, is funded as grants and loans by donor agencies.

Table 3.4 Financial Condition of KWS

Account Items	1991/92		1992/93		1993/94*	
	KShs ('000)	(%)	KShs ('000)	(%)	KShs ('000)	(%)
[INCOME]						
(Internal Generated Income)						
Park entry fees	246,145	46.8	297,533	47.3	597,480	56.9
Other operating/miscellaneous income	37,127	7.1	31,317	5.0	54,700	5.2
Sub-Total	283,272	53.8	328,850	52.2	652,180	62.1
(External Generated Income)						
Grants from donor agencies**	148,907	28.3	249,229	39.6	323,940	30.8
Grants from Government of Kenya	94,100	17.9	51,354	8.2	74,440	7.1
Sub-Total	243,007	46.2	300,583	47.8	398,380	37.9
TOTAL	526,279	100.0	629,433	100.0	1,050,560	100.0
[EXPENDITURE]						
Recurrent***	195,543	58.9	287,060	49.9		
Development	136,329	41.1	288,616	50.1		
TOTAL	331,872	100.0	575,676	100.0		

Notes: * Latest estimate

** Includes Operation & maintenance expenses reimbursement, Amortization of capital grants, and Donations

*** Includes Salaries, Allowances, Benefits, Depreciation Charges, Community Services, and Finance Charges

Sources: (1991/92, 1992/93) KWS Annual Progress Report 1992-93.
(1993/94) KWS Annual Work Plan 1994-95, Volume 1 (Draft)

The main constraint on the recurrent budget is the park entry fees and donor support, which is insufficient fund allocation by the Treasury. The main constraint on the development budget ceiling determined by the Ministry of Finance is much smaller than the estimate requested by KWS, and mismatches on proposed expenditure to the individual line items allowed by donors. In some cases, grant and credit agreements have not been finalised yet between the government and the donors.

5.3. Obstacles for Implementation of Measures

There are many obstacles for the implementation of environmental conservation and management measures. The basic causes of all obstacles are due to political issues and financial constraint : -

- Indefinite financial conditions by constraint on the donor support with insufficient fund allocation by the Treasury, lack of the printed estimate by the Treasury and no final contract on grant and credit agreements between the government and the donors
- Inadequate political will old support,
- Poor security condition, especially in the North-eastern to Eastern areas, the Northern part of the coastal area and the areas adjacent to the border,
- Lack of understanding and support for environmental conservation by Kenyans, particularly local people,
- Land use conflict between environmental conservation and large-scale development for public purposes, such as hydro /geo-thermal electric plants, water supply/drainage plants and reclamation /irrigation schemes,
- No or little progress and implementation of the Five Year Management Plans and the Annual Work Plans, especially for low development priority NP/NRs, by lack of funds,
- No Agreement for NR management between KWS and several County Councils,
- Deficiency or lack of infrastructure and facilities : roads, airstrips, transport, plant, equipment, offices, accommodation, water supply facilities,
- Lack of trained staff, especially for research and education works, and
- Illegal or encroachment from human settlements, particularly in NRs, and privatisation with land sub-division.