

# KARURA FOREST

## Strategic Management Plan



**2010-2014**

**APPROVAL PAGE**

This management plan is approved for implementation and will be amended as need arises.

.....  
**David K. Mbugua**  
**Director**  
**KENYA FOREST SERVICE**

Date .....

## **DEDICATION**

This management plan is dedicated to Professor Wangari Maathai, Nobel Peace Prize laureate and founder of the Green Belt Movement. Professor Maathai is internationally recognized for her persistent struggle for democracy, human rights and environmental conservation. In the 1990s, Professor Maathai challenged a planned settlement in Karura Forest Reserve, risking jail and bodily harm to preserve the forest for generations to come. If not for Professor Maathai's vindication and bravery, the trees and their ecosystem would not be there.

*"I have invested 20 years of my life in this campaign for the environment and I'm still only scratching the surface. I am confident of winning. Nobody will build anything [in the forest] as long as we live. We cannot dignify theft."*

Prof. Wangari Maathai, rededicating herself to the fight to save Karura Forest, Nairobi, 2001.

**By Local Planning Team**

## **FOREWORD**

Karura Forest Reserve is situated in the outskirts of Kenya's capital city, Nairobi. This remarkable geographical location gives the forest a unique role in Nairobi and Kenya. The dense population surrounding the forest, including two slums and several more affluent areas, has led to high demands on forest resources. These demands include; fuel wood, water, bee keeping, ecotourism, recreation and grazing pasture. There is also a history of violent crime associated with the forest, making it unsafe for people to visit. This depletion of forest resources and connection with crime is unsustainable. The development of this plan is therefore timely, as it comes in a period when the demands on the forest are great and the opportunities for direct and indirect benefit are sizeable.

The Forests Act 2005 and the draft Forest policy have ushered in a new era in forest management in Kenya, with a dispensation that allows the involvement of forest adjacent communities in their management. This follows a similar shift in legislative change in other East African countries, such as, Tanzania and Uganda. Contrary to past practice where management was centralised, many countries around the world have embraced a participatory approach to the management of forests, and the practice is now widely regarded as the acceptable way of managing natural resources.

A key requirement of the new dispensation is that all forests will henceforth be managed in accordance with a management plan. In the Participatory Forest Management context, stakeholders are expected to prepare a Participatory Forest Management Plan to guide the process of managing the resources of the forest. This is a process that involves a planning team drawn from all key stakeholders. Kenya Forest Service (KFS), Karura Community Forest Association (Karura CFA), Friends of Karura Forest (FKF) and the Nairobi Conservancy Forest Conservation Committee (NCFCC) have collaborated in order to prepare this management plan.

It is hoped that by its adoption, sustainable management of the Karura Forest Reserve will be realized.

**David K. Mbugua**  
**Director**  
**KENYA FOREST SERVICE**

## **ACKNOWLEDGEMENTS**

The development of this Participatory Forest Management Plan has been a combined effort of different stakeholders that included the community, Friends of Karura Forest CFA (FKF), the Nairobi Forest Conservation Committee (FCC) and Kenya Forest Service (KFS).

In particular we appreciate the contribution of Mr. John K. Macharia, Management Plans Section, KFS, who spent many hours in organizing and improving the initial draft by the Local Planning Team (LPT), the wise comments of Mr. Benjamin G. Wamugunda Chair of FCC, Mrs. Charity Munyasya, Head of the Nairobi Conservancy, and Mr. John Orwa, Forester Karura, who spent invaluable time perusing and contributing to the document. Mr. Christian Lambrechts, Mrs. Alice Macaire, Mrs. Lucy Fernie, Mrs. Cristina Boelcke, Mr. Harvey Croze and Mr. John Chege from FKF have also put up invaluable time and effort to make the production of this plan a success.

While it would be difficult to mention each and every stakeholder who in one way or the other took part in this noble work, all their efforts are highly appreciated and acknowledged.

## EXECUTIVE SUMMARY

This is the management plan for Karura Forest covering an area of 1041.3ha and is comprised of two blocks namely Karura and Sigiria. It will be implemented over a period of five years. This is an urban forest and caters for a wide clientele whose demands range from subsistence needs to recreation and aesthetics, for the poor and affluent respectively,

The vision of the plan is to make Karura Forest safe and secure, and a world class example of sustainable forest management and conservation.

The goal of the plan is to achieve and sustain a well conserved Karura Forest through stakeholder's participation for provision of goods and services for the city residents.

The plan is justified in that it will be the framework to moderate the participation of stakeholders, besides ensuring that the implementation leads to sustainable management of the forest. In order to achieve these, the forest has been divided into four zones namely; natural forest, wetlands, plantations and developed areas, each of which is put under a different management regime.

The threats and constraints to the conservation of the forest include:

- a) The forest is adjacent to slum areas. Some residents of the slums over exploit the resources of the forest. This leads to unsustainable deforestation, affecting the water table and the balance of flora and fauna;
- b) Some criminals use the forest as a place of refuge and commit opportunistic attacks on visitors;
- c) The lack of safety reduces the number of visitors to the forest. This, in turn, reduces interest in its preservation and conservation;
- d) Due to the prime location of Karura Forest, there has been, and continues to be pressure from developers to claim forest land for building;
- e) The threat posed by greedy potential developers claiming 477 Ha of the forest;
- f) The forest is susceptible to forest fires during dry periods; and,
- g) *Lantana camara* and other invasive weeds grow too vigorously, endangering indigenous plants and trees.

The overall objective of the plan is to have Karura Forest managed and sustainably conserved for provision of goods and services to Nairobi residents. The specific management objectives that will guide the implementation of the plan are:

- 1) To rehabilitate and manage Karura Forest to a healthy and productive closed canopy forest;
- 2) To protect the forest from any high impact development other than forestry activities and ensure ecotourism proposals are in the best interest of the forest;
- 3) To provide a world class example of sustainable participatory forest management and conservation;
- 4) To make the forest safe and secure for the enjoyment of all;

- 5) To support the needs of local communities;
- 6) To promote environmental education, ecotourism and research in forestry;
- 7) To have in place the necessary infrastructure, vehicles, machinery and equipment to sustain the management of the forest; and,
- 8) To ensure plans are in place that provide the necessary human resources to implement and sustain the management plan.

The plan further provides for monitoring and evaluation of the planned activities, and its revision.

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## ACRONYMS

AIDS	Acquired immune deficiency syndrome
BP	British Petroleum
CAP	Chapter
CFA	Community Forest Association
CID	Criminal Investigation Department
CITES	Convention on International of Endangered Species in Fauna and Flora
CO	Company
CO <sub>2</sub>	Carbon Dioxide
CREEL	Centre for Resources, Energy and Environmental Law
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
FAN	Forest Action Network
FCC	Forest Conservation Committee
FKF	Friends of Karura Forest – Community Forest Association
GBM	Greenbelt Movement
Ha	Hectare
HIV	Human immunodeficiency virus
HOC	Head of Conservancy
ICRAF	World Forestry Centre
KCB	Kenya Commercial Bank
KEFRI	Kenya Forestry Research Institute
KFMC	Karura Forest Management Committee
KFWG	Kenya Forests Working Group
KFS	Kenya Forest Service
KPLC	Kenya Power & Lighting Company
KWS	Kenya Wildlife Service
LN	Legal Notice
LPT	Local Planning Team
MEMR	Ministry of Environment and Mineral Resources
MOFW	Ministry of Forestry and Wildlife
NEMA	National Environment Management Authority
NSIS	National Security and Intelligence Service
PELIS	Plantation Establishment and Livelihood Improvement Scheme
POSER	Project, Objectives, Strategy, Evaluation and Review
PROC	Proclamation
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VHF	Very High Frequency
WWF	World Wildlife Fund for Nature

# Table of Contents

<b>CHAPTER I - INTRODUCTION.....</b>	<b>1</b>
1.1 VISION .....	1
1.2 GOAL .....	1
1.3 PURPOSE .....	1
1.4 JUSTIFICATION OF THE PLAN.....	1
1.5 IMPLEMENTATION OF THE PLAN.....	2
1.6 PLAN PERIOD.....	2
1.7 AMENDMENTS AND REVISION OF THE PLAN.....	3
1.8 FUNDING FOR THE PLAN.....	3
<b>CHAPTER II - DESCRIPTION OF THE FOREST .....</b>	<b>4</b>
2.1 TITLE OF THE PLAN .....	4
2.2 LEGAL STATUS.....	4
2.2.1 <i>Excisions and allocation</i> .....	4
2.3 GEOGRAPHIC LOCATION.....	5
2.4 BIOPHYSICAL DESCRIPTION .....	7
2.4.1 <i>Topography</i> .....	7
2.4.2 <i>Climate</i> .....	7
2.4.3 <i>Geology</i> .....	7
2.4.4 <i>Soils</i> .....	7
2.4.5 <i>Hydrology and drainage</i> .....	8
2.4.6 <i>Flora</i> .....	9
2.4.7 <i>Fauna</i> .....	10
2.4.8 <i>Avifauna</i> .....	10
2.4.9 <i>Special interest areas and sites</i> .....	10
2.5 FOREST MANAGEMENT UNITS.....	12
2.6 HISTORY OF THE KARURA FOREST .....	14
2.6.1 <i>Pre-gazettement</i> .....	14
2.6.2 <i>Post-gazettement</i> .....	14
2.7 SOCIO ECONOMIC STATUS AND ASSESSMENT OF THE FOREST COMMUNITY .....	15
2.7.1 <i>Forest adjacent communities</i> .....	15
2.7.2 <i>Range of Stakeholders:</i> .....	15
2.7.3 <i>Roles and Responsibilities</i> .....	16
2.8 MAIN THREATS FACING THE FOREST.....	17
<b>CHAPTER III - PLANNING CONSIDERATIONS .....</b>	<b>19</b>
3.1 RELEVANT POLICIES AND LEGAL FRAMEWORKS.....	19
3.1.1 <i>Forest Policy and Forest Act 2005</i> .....	19
3.1.2 <i>The Wildlife (Conservation and Management) Amendment Act 1989 and Policy</i> .....	21
3.1.3 <i>Environmental Management and Coordination Act (1999)</i> .....	22
3.1.4 <i>Water Policy and Water Act (2002)</i> .....	22
3.1.5 <i>River Authorities Act (Cap. 443)</i> .....	23
3.1.6 <i>The Agricultural Act (Cap. 318)</i> .....	23
3.1.7 <i>The Timber Act (Cap. 386) of 1972</i> .....	23
3.1.9 <i>Science and Technology Act (Cap. 250) and State Corporation Act (Cap 446)</i> .....	23
3.1.10 <i>National Energy Policy (2004)</i> .....	24
3.2 STRATEGIES .....	24
3.2.1 <i>Millennium Development Goals (MDGs)</i> .....	24
3.2.2 <i>Vision 2030</i> .....	24
3.2.3 <i>Multi/bilateral and private sector funding</i> .....	24
3.3 INTERNATIONAL AND REGIONAL AGREEMENTS AND TREATIES .....	24
3.3.1 <i>Convention on biological diversity</i> .....	24
3.3.2 <i>Forest Principles</i> .....	25
3.4 THE IMPORTANCE OF KARURA FOREST.....	26
3.4.1 <i>Importance for the general public</i> .....	26

3.4.2 Importance for employment.....	26
3.4.3 Watershed .....	27
3.4.4 Biodiversity reservoir .....	27
3.4.5 Historical and Cultural importance.....	27
3.4.6 Source of Forest Products .....	28
3.4.7 Tourism and recreation opportunities for Kenyans .....	29
3.4.8 Research and Education Centres .....	31
3.4.9 Environmental services (including carbon sinks, soil conservation) .....	31
3.5 CONSERVATION CHALLENGES.....	31
3.6 FOREST ZONATION .....	32
3.6.1 Current situation.....	32
3.6.2 Objective.....	32
3.6.3 Forest zones and their management.....	32
<b>CHAPTER IV - MANAGEMENT PROGRAMMES .....</b>	<b>36</b>
4.1 REHABILITATION AND MANAGEMENT PROGRAMME.....	36
4.2 PARTICIPATORY FOREST MANAGEMENT AND CONSERVATION PROGRAMME .....	40
4.3 FOREST SAFETY AND SECURITY PROGRAMME .....	41
4.4 LOCAL COMMUNITIES' LIVELIHOODS PROGRAMME .....	42
4.5 ENVIRONMENTAL EDUCATION, ECOTOURISM AND RESEARCH PROGRAMME.....	43
4.6 INFRASTRUCTURE, VEHICLES, MACHINERY AND EQUIPMENTS PROGRAMME.....	44
4.7 HUMAN RESOURCES PROGRAMME .....	46
<b>CHAPTER V - PLAN IMPLEMENTATION AND FINANCIAL MANAGEMENT .....</b>	<b>49</b>
5.1 PLAN IMPLEMENTATION AND SUSTAINABILITY .....	49
5.2 FINANCIAL MANAGEMENT .....	49
5.3 RESOURCE MOBILIZATION.....	49
5.4 REVENUE PROJECTIONS .....	50
5.5 FUNDRAISING STRATEGIES.....	51
5.6 GUIDING PRINCIPLES FOR THE IMPLEMENTATION OF THE PLAN.....	51
<b>CHAPTER VI - ENVIRONMENTAL IMPACT ASSESSMENT .....</b>	<b>52</b>
<b>CHAPTER VII - PLAN MONITORING AND EVALUATION .....</b>	<b>53</b>
7.1 MONITORING .....	53
<b>APPENDIX I</b>	
<b>INSTITUTIONAL ARRANGEMENTS FOR PLAN IMPLEMENTATION.....</b>	<b>55</b>
<b>APPENDIX II</b>	
<b>DETAILS OF THE PLANTATIONS WITHIN KARURA. ....</b>	<b>56</b>
<b>APPENDIX III</b>	
<b>STAKEHOLDER ROLES AND RESPONSIBILITIES .....</b>	<b>57</b>
<b>APPENDIX IV</b>	
<b>COMPOSITION OF FCC.....</b>	<b>59</b>
<b>APPENDIX V</b>	
<b>MANDATE OF THE KARURA FOREST MANAGEMENT COMMITTEE .....</b>	<b>60</b>
<b>REFERENCES .....</b>	<b>62</b>

## List of Figures

Figure 1: Karura Forest geographic location .....	6
Figure 2: Karura Forest road network .....	6
Figure 3: Karura Forest drainage .....	9
Figure 4: Ecotourism sites in Karura Forest .....	11
Figure 5: Establishment in Karura Forest .....	13
Figure 6: Current (2010) zonation / forest cover types of Karura Forest .....	34
Figure 7: Planned (2015) zonation / forest cover types of Karura Forest.....	35

## List of Plates

Plate 1: A stream in the forest .....	8
Plate 2: A cave in the forest .....	27
Plate 3: A mature plantation in the forest .....	28
Plate 4: A water fall in the forest .....	29
Plate 5: Signage on the family trail.....	30
Plate 6: One of the trails in the forest.....	30
Plate 7: A rehabilitation activity in the forest. ....	37
Plate 8: Karura Forest Tree Nursery .....	38
Plate 9: Bamboo planting on the banks of the.....	39

## List of Tables

Table 1: History of alteration of boundaries of Karura Forest Reserve .....	4
Table 2: Distribution of the area of Karura Forest .....	12
Table 3: Karura Forest Area Statement based on the Rapid Proportional Survey, 2010	12
Table 4: Zonation criteria .....	32
Table 5: Staff Strength in Karura .....	47
Table 6: Karura revenue collection for the period 2005 to 2009.....	50

## CHAPTER I - INTRODUCTION

This is the management plan for Karura Forest covering an area of 1,041.3 Ha. The forest comprises two blocks, namely Karura and Sigiria and houses the Kenya Forest Service Headquarters. The forest comprises both natural forest and plantations and is an urban forest in the capital city of Nairobi.

### 1.1 Vision

The vision of the plan is to make Karura Forest Reserve safe and secure, and a world class example of sustainable forest management and conservation.

### 1.2 Goal

The goal of the plan is to achieve and sustain a well conserved Karura Forest through stakeholder's participation for provision of goods and services for the city residents.

### 1.3 Purpose

Forests provide essential services to Kenya and the world, including soil and water conservation and the production of wood. In many countries, the management of forest land is guided by management plans that are created in collaboration with local communities and relevant stakeholders. This has added value to forest services, enhanced cooperation in the local communities and lead to better conservation of important natural resources. In the most part, the management of forests in various parts of the world has been guided by management plans drawn for specific time periods, by these stakeholders. In Kenya, the introduction of the 'Forest Act 2005' has made it mandatory for each state forest to be managed in collaboration with stakeholders who have an interest in the forest. Management plans are intended to outline the activities to be carried out in compliance with key regulatory and policy documents, such as the Forest Act, Sessional Paper 9, 2005. In addition, management plans should be in line with, and contribute to the Kenya Forest Service's five year Strategic Plan (2009-2014).

### 1.4 Justification of the plan

For a number of years, Karura Forest Reserve has been managed on an *ad hoc* basis without the guidance of a management plan. Under this type of management, Forest Department, the precursor of KFS, was responsible for all management actions and was not obliged to consult with other stakeholders. It is during this period (in the 90s) that attempts were made to excise vast areas of the forest. This indicated that the management of the forest was not driven towards achievement of a defined long-term

vision for the forest. This state of management is a threat to the forest, as decisions may be made that are based on current considerations, or influenced by factors other than sustainability of the resource.

According to the Forest Act section 35, all forests must be managed in accordance with a management plan. It is therefore illegal for any forest to fail to comply with that requirement. Karura Forest Reserve is no exception and therefore has to move with haste in order to be within the law.

Karura Forest Reserve is situated in the Northern part of the Nairobi Municipality. It is an urban upland forest covering approx. 1,041.3 hectares. It is rich in biological diversity with many species of plants, birds, insects and mammals to within its boundaries. It was established as a forest reserve in 1932 largely as a way of supplying the railways with timber products and fuel. It fell into disuse after the advent of diesel engines. It has since suffered from neglect and been under various threats of encroachment and land grabbing due to its proximity to the city. The security situation is a major concern inside the forest. However it is an invaluable asset and its location within Nairobi is one of its main assets, as it acts as a “green lung” for the heavily polluted city, a water catchment for several rivers. It also offers a rich recreational area for Nairobi dwellers who wish to enjoy and stay in touch with their natural heritage in a nearby location.

The current approach in preparation of such plans identifies all the stakeholders, their roles and responsibilities. To date, a wide number of stakeholders have shown an interest in working with the KFS in the forest. They include Friends of Karura Community Forest Association, local communities, Greenbelt Movement, Oshwal Education and Relief Board, Community Development Foundation, UNEP, Shell Kenya Ltd, East Africa Breweries Ltd, Safaricom and Barclays Bank. These stakeholders have committed themselves to the goals and vision outlined in this management plan. By creating a management plan that is agreed upon and developed in an on-going process, an efficient and cohesive management of the forest can be achieved. This approach also ensures the sustainability of the forest, as activities are geared towards the achievement of defined objectives in the short-term and the planned future vision.

## **1.5 Implementation of the plan**

The plan will be implemented by KFS in collaboration with the stakeholders. The main vehicle for this collaboration is the Friends of Karura Community Forest Association. Working in partnership, annual work-plans and budgets will be prepared. All works in the forest will clearly identify those responsible for the different actions and the source of funding.

## **1.6 Plan period**

This plan covers a five year period starting from 2009/2010 – 2014/2015.

## **1.7 Amendments and revision of the plan**

A consultation process was undertaken in the development of the management plan, with key stakeholders contributing to its final form. As the first draft of the plan, it will be reviewed at the mid-point of its five year tenure. However, it is anticipated that once completed there will be few amendments in the early years, but changes may be more numerous in the later stages due to new developments. Any changes will be tabled publicly by the KFS to the stakeholders and once endorsed incorporated in the plan.

## **1.8 Funding for the plan**

Kenya Forest service will have a leading role as an investor in the development and management of Karura Forest Reserve. However, many of the objectives of the management plan will also require funding from external donors, or from revenue generated through utilising the forest's attributes.

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## CHAPTER II - DESCRIPTION OF THE FOREST

### 2.1 Title of the plan

The title of the plan is: Karura Forest Strategic Management Plan.

### 2.2 Legal status

Karura Forest Reserve was originally gazetted in 1932 through Proclamation No. 44. The Forest became a Central Government Forest Reserve in 1964, through Legal Notice 174.

Karura Forest Reserve is managed by the Kenya Forest Service under the Forest Act of 2005.

#### 2.2.1 Excisions and allocation

Since its establishment in 1932, the forest has been affected by 5 excisions totalling approx. 114 Ha (see Table 1)

**Table 1: History of alteration of boundaries of Karura Forest Reserve**

Year	Proclamation / Legal Notice	Action	Area affected	Total area
1932	Proc. 44/1932	Establishment of Karura Forest Reserve	1062.7 Ha	1062.7 Ha
1951	Proc. 15/1951	Excision	- 1.6 Ha	1061.1 Ha
1954	Proc. 30/1954	Addition	+1.6 Ha	1062.7 Ha
1956	L.N. 289/1956	Excision	-18.6 Ha	1044.1 Ha
1964	L.N. 174/1964	Declaration as central forest		1044.1 Ha
1986	L.N. 310/5.12.1986	Excision	- 2.78 Ha	1041.3 Ha
1993	L.N. 301/24.9.1993	Excision.>Exchange Addition>	- 5.86 Ha + 5.63 Ha	1041.1 Ha
1997*	L.N. 97/13.6.1996	Excision	- 85.00 Ha	956.2 Ha

*(Source – As per KFS survey records)*

\*It must be noted that the Legal Notice 97 by which 85 hectares of the forest were de-gazetted is affected by a number of irregularities including:

- The process leading to the excisions did not give a 28 days notice prior to the de-gazettement as required by the former Forest Act Cap. 385;
- The legal notice refers to Boundary Plan No 175/363 which is an alteration of boundaries in Eastern Mau Forest Reserve;
- No boundary plan showing the alteration of boundaries is available.

In addition, it was reported by the Minister for Lands that 1,176 acres (476 Ha) of the forest were allocated to 67 companies between 1992 and 1996.

Over the years, gazetted forestland in Karura has been allocated to national and international public institutions. They include:

- Criminal Investigation Department (CID) headquarters (9.0 Ha);
- National Security and Intelligence Service (NSIS) headquarters (5.8 Ha); and,
- World Agroforestry Centre (ICRAF) headquarters (3.0 Ha).

Forestland has also been leased to corporate entities:

- Muthaiga Golf Club (21.8 Ha); and,
- BP Shell Sports Club (6.0 Ha).

The Karura Forest is the host to the headquarters of the Kenya Forest Service and KFS residential area.

## **2.3 Geographic location**

Karura Forest Reserve is situated in the northern part of Nairobi Municipality. It forms part of the Nairobi river basin.

The Forest comprises three sections separated by the Limuru Road and the Kiambu Road.

The southern boundary of the forest lies mainly along the Getathuru River (although the western section of the three parts includes an area below this river).

The Western Section (previously known as Sigiria) is delineated by a cut and beacons line along its boundary with the residential area of New Muthaiga to the West, the residential areas of Gigiri/Rosslyn to the North (along the Thigiru River – a tributary of the Getathuru River), Limuru Road to the East and the Getathuru River to the South.

The Middle Section is bounded by a cut and beacons line along Limuru Road, the residential area of Muthaiga North and Runda to the west, Rui Ruaka River, Huruma village, a road, and farmland to the north, Kiambu Road to the east and Getathuru River<sup>1</sup> to the south.

The Eastern Section is bounded by the Kiambu Road to its west, Thika Road to the east, and Muthaiga Golf Club to the south (to which it yields an extension).

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<sup>1</sup> The Muthaiga – Karura Forest Reserve boundary is in dispute due to allegations by neighbours that the Getathuru River shifted into their properties. A re-survey is required to resolve the dispute.

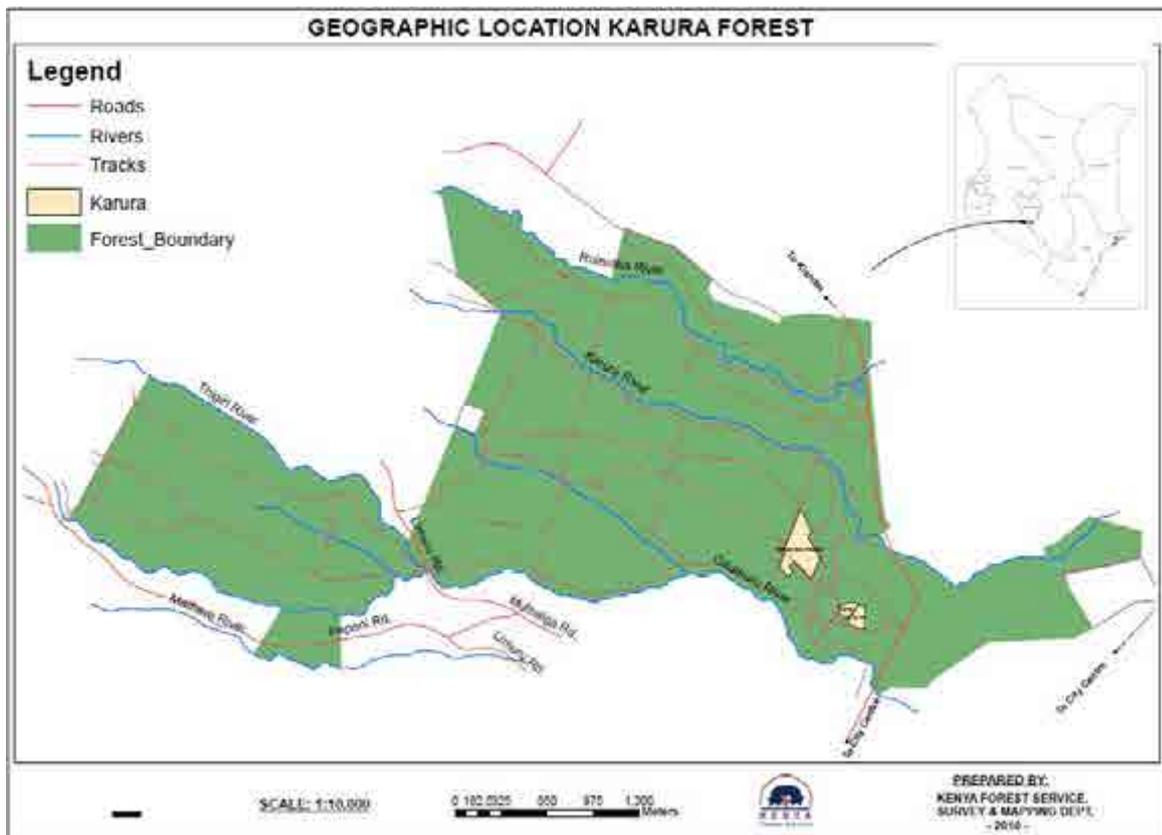


Figure 1: Karura Forest geographic location

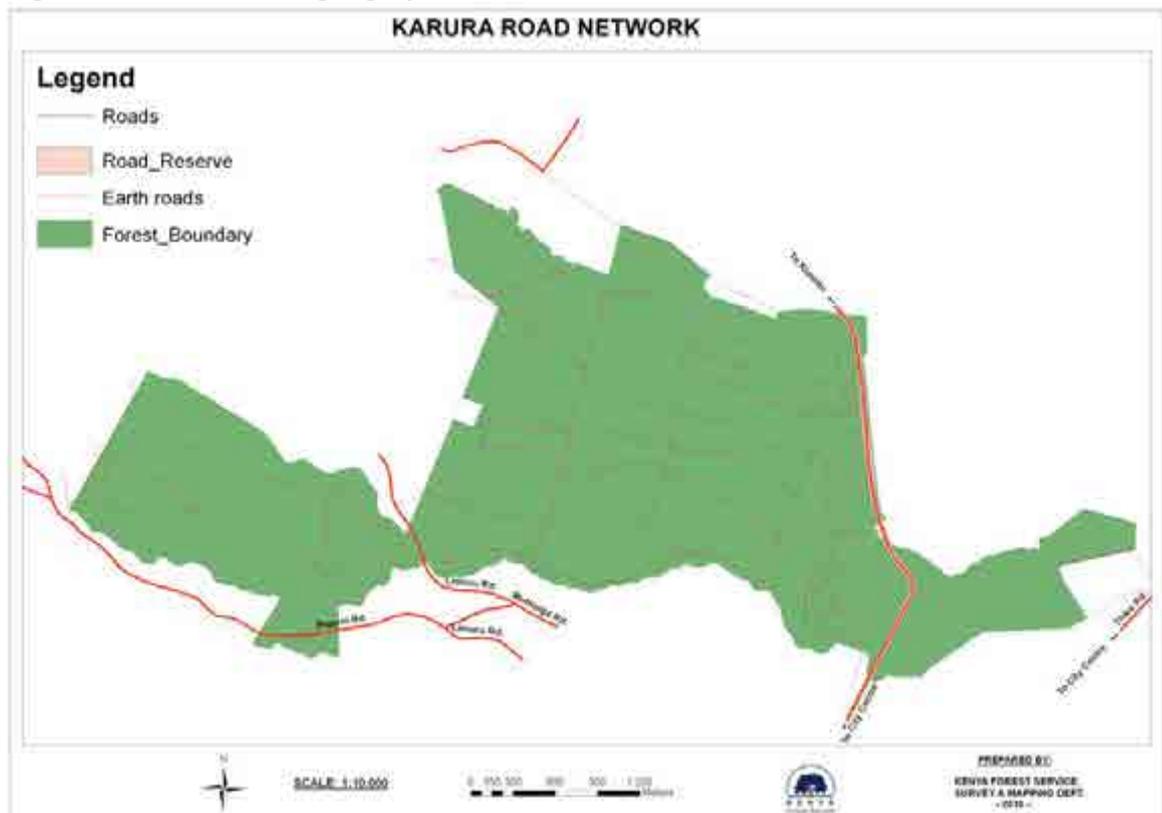


Figure 2: Karura Forest road network

## **2.4 Biophysical Description**

### **2.4.1 Topography**

The topography of Karura is gently rolling, occasioned by shallow valleys. Drainage is generally in the southerly and eastern direction. Sometimes insusceptible depressions in the Western Section of Karura (previously called Sigiria forest) hold small local swamps which are threatened by eucalyptus trees.

### **2.4.2 Climate**

The climate of Karura Forest is characterised by two wet seasons: April-June and October-December. July to August is a cold, cloudy but dry period. From August to October is a sunny and dry period. January, February and early March are hot, dry months.

The average annual rainfall at Karura Forest Station was recorded over the past 10 years as 928.34 mm with a maximum of 1,239.90 mm and a minimum of 345.00 mm.

Temperatures remain constant throughout the year and vary roughly with the times of cloud and sunshine.

### **2.4.3 Geology**

The Karura Forest lies over tertiary volcanic rocks. Volcanic tuffs with intercalated flows of basaltic lava are the common forms. Both types are occasionally exposed in the deeper river valleys, and the tuffs yield the common grey building stone of the Nairobi district. Occasionally "Chimneys" of lava are found exposed on the tops and sides of ridges as in the both the Western section and Middle section of Karura.

### **2.4.4 Soils**

The area has suffered very little tectonic or other disturbances since tertiary times, and thus the parent rocks have been weathered to great depths and giving very even soil profiles. Under natural forest the resulting soil is very deep; reddish brown clayey loam with slow but free profile drainage. Such soils become very sticky when wet but dry very quickly and tend to shrink and crack. The upper few inches of soil are usually stained dark brown with incorporated humus, but no deep litter layer develops.

Under grassland in freely drained areas, the soil is very similar to that under forest stands, but in the low lying areas a different soil is found. These low lying areas are intermittently water logged, and the water table fluctuates greatly, and a small amount of fine soil material is usually carried in from neighbouring higher ground. Under such conditions, the soil is usually very heavy, dark grey clay, often stained black with undecomposed humus "Black Cotton Soils". At varying depths below this clay layer, from 2" to 3ft. below the surface, red brown laterite is found. It is a recementation product, rich in iron compounds, associated with swampy areas having a shifting water table.

Laterite, locally known as ‘murram’ is a useful gravel for road maintenance. Another form of ‘murram’ is partially decomposed parent rock, and may be found at the foot of nearly all soil profiles where the rock is sufficiently near the surface for it to be excavated. This form of ‘murram’ is also popular for road surfacing, but is less satisfactory than laterite.

Generally speaking, Karura Forest soils are eminently suited to tree growth, with assisted drainage in the case of swampy sites.

#### **2.4.5 Hydrology and drainage**

Four tributaries of Nairobi River pass through Karura Forest Reserve. These are:

- 1) The Ruaka River which separates Karura River and the Runda Residential area;
- 2) The Karura River with traverses through the forest;
- 3) The Getathuru River which borders the Forest along its Southern edge with Muthaiga Residential area; and,
- 4) The Thigiria River (a tributary of Getathuru River) which traversed through the western section of Karura Forest.



**Plate 1: A stream in the forest**

The details of the rivers and their distribution are indicated in Figure 3 below.

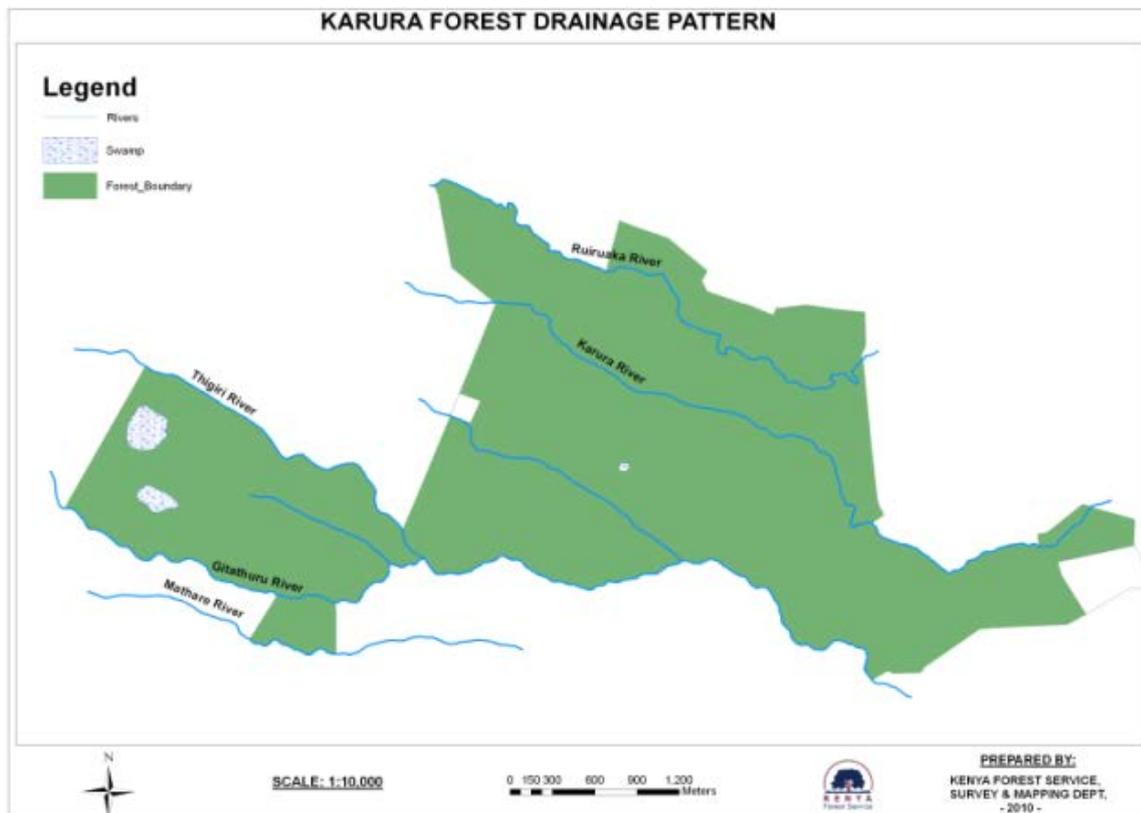


Figure 3: Karura Forest drainage

#### 2.4.6 Flora

**Forest plantations** cover 632 Ha and are comprised species such as *Araucaria cunninghamii*, *Eucalyptus saligna*, *E. globula*, *Brachylaena huillensis*, *Grevillea robusta*, *Cupressus torulosa* and *Cupressus lusitanica*. The area under plantations was more extensive in the past but decreased a big portion of it was targeted for excision in year 2004 leading to premature harvesting. As consequence this area was invaded by *Lantana camara* and has been the main focus of rehabilitation effort in the forest mainly with indigenous species.

Almost all the plantations in the forest have passed their economic rotation age. The *Eucalyptus sp.* range from 38-83 years, *Araucaria cunninghamii* (44-46 years), *Cupressus torulosa* (34-46 years). Most of these plantations will therefore start succumbing to age related drying in the near future.

**Indigenous trees** cover 260 Ha and is comprised of species such as *Olea europaeae var. africana*, *Croton megalocarpus*, *Warburgia ugandensis* (Muthiga), *Brachyleana huillensis* (Muhugu), *Uvaridendron anisatum*, *Markhamia lutea*, *Teclea nobilis*, *Juniperus procera* (Cedar), *Craebean brownii*, *Newtonia buchananii*, *Salvadora persica*, *Ficus thonningii*, *Trichilia emetica*, *Calondendrum capense* and *Dombeya goetzenii*.

Additionally a number of shrubs are also found which have wide local medicinal use and include *Strychnos henningsii* (Muteta), *Erythrococca bongensis* (Muharangware), *Vangueria madagascariensis* (Mubiro), *Rhamnus prinoides* (Mukarakinga), *Caesalpinia*

*volkensis* (Mubuthi), *Solanum spp.* (Mutongu), *Elaeodendron buchananii* (Mutanga), *Rhus natalensis* (Muthigio).

The riparian belts along rivers Gitathuro and Ruaka are covered by *Arudinaria alpina*, the Kenya native bamboo species. The exotic giant bamboo *Dendrocalamus giganteus* is mainly found growing within the area of the tree nursery along Karura River where it may have been introduced in the past. Additionally there are three wetlands which occupy 10.5 Ha. These serve as important habitats for birds and therefore are ideal areas for bird watchers.

#### **2.4.7 Fauna**

No detailed inventory of the fauna has been carried out for the Karura Forest. The forest is however known to host a variety of animals. These include duikers, bush bucks, bushpigs, genets, civets, bushbabies, porcupines, sykes monkeys, squirrels, hares, epauletted-bat.

Reptiles include cobras, pythons, green snakes and monitor lizards.

#### **2.4.8 Avifauna**

Some 113 bird species have been observed in Karura Forest. They include Ayres Hawk-eagle, crows, owls, sparrows, doves, weavers, vultures, Hartlaub's Turaco and Narina Trogon. A detailed inventory is to be carried out under this Management Plan.

#### **2.4.9 Special interest areas and sites**

The forest includes a 50 feet waterfall, caves that are considered sacred by many and have historic value because of their use during the days of the Mau Mau, marshlands which attracts birdlife and a wide diversity of indigenous trees. Karura Forest is also the place where Professor Wangari Maathai (Nobel Peace Prize winner) was attacked for standing up to the developers hoping to grab the area of land to the north of the central section of the forest. Some of the sites with ecotourism potential are shown in Figure 4 below.

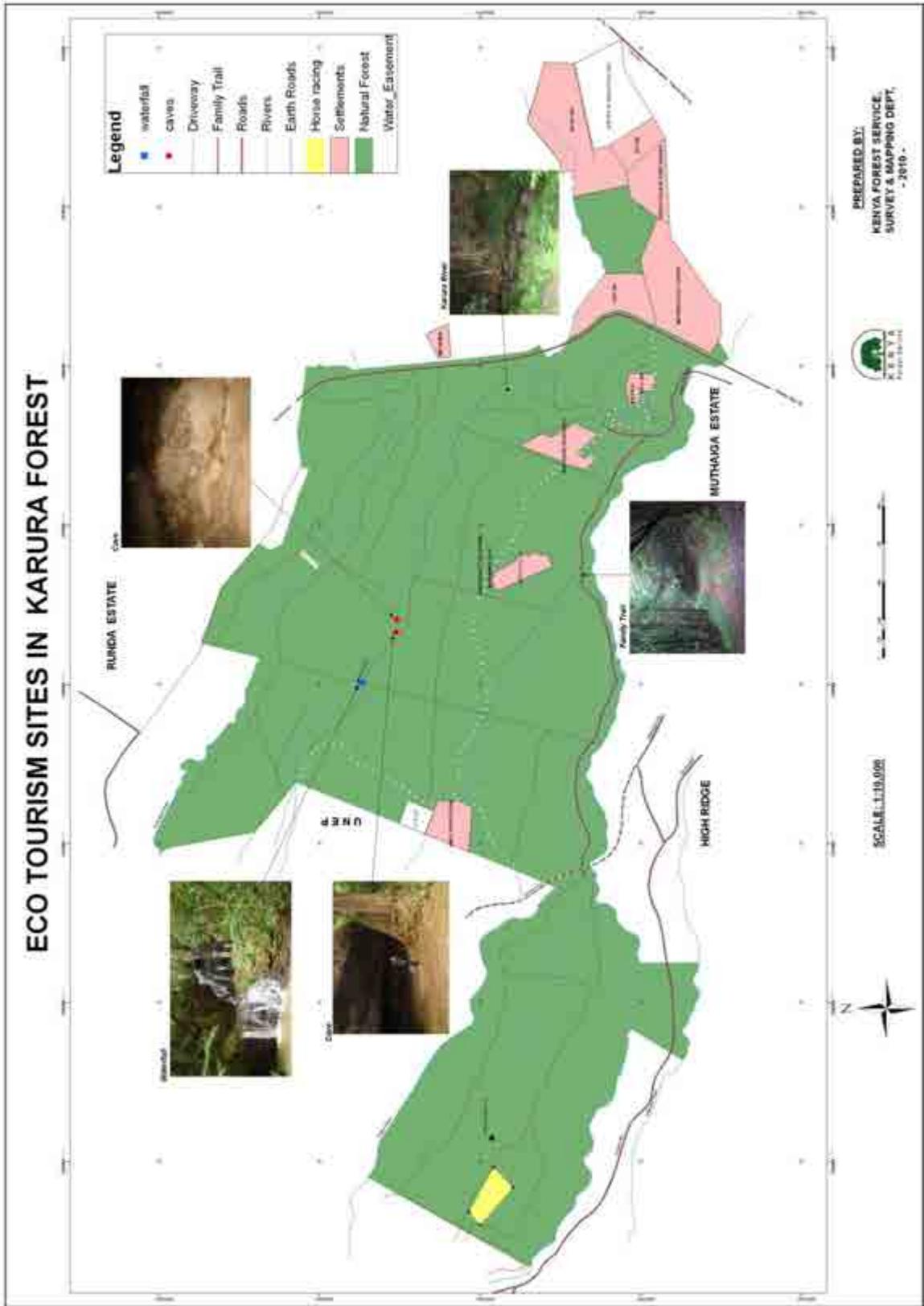


Figure 4: Ecotourism sites in Karura Forest

## 2.5 Forest management units

The forest is divided into two blocks with one outpost, all managed centrally from Karura Forest Station. There had always been three outposts but two were abandoned, namely the one in Sigiria due to old age while the other next to BP Shell Club due to insecurity.

**Table 2: Distribution of the area of Karura Forest**

Block	Area (Ha)	Remarks
Karura & Eastern Salient	765.9	This is the largest block and houses KFS Hq., CID Hq., Muthaiga Golf Course, Utalii staff quarters, NSIS offices, KEFRI and the KFS residential quarters.
Sigiria	275.4	This block has a large marshland which is a site that is ideal for a camp site. This block is well protected by the adjacent high class residential areas.
<b>Total</b>	<b>1,041.3</b>	

The area of the forest is further subdivided as shown in Table 3 below. The “Other” category also covers all the area occupied by buildings, tree nurseries and other facilities.

**Table 3: Karura Forest Area Statement based on the Rapid Proportional Survey, 2010**

Block	Indigenous Forest (*) (**) (Ha)	Exotic Plantation Areas (*) (Ha)	Deforested areas (Ha)	Other (Ha)	Total (Ha)
<b>Karura</b>	213	411	32	37	693
<b>Eastern Salient</b>	25	0	0	80	105
<b>Sigiria</b>	22	222	0	0	244
<b>Total</b>	260	633	32	117	1042
	25%	61%	3%	11%	100%

(\*) These areas include patches of *Lantana camara*.

(\*\*) Indigenous Forest does not include the 95 Ha re-planted in the northern portion of the forest, nor does it include ca. 20 Ha of edaphic grassland glades and wetlands.

The existing establishments within Karura Forest are shown in Figure 5 below. Some of the establishments are under KFS and KEFRI while others are either leased out or allocated to other institutions.

# KARURA & ESTABLISHMENTS

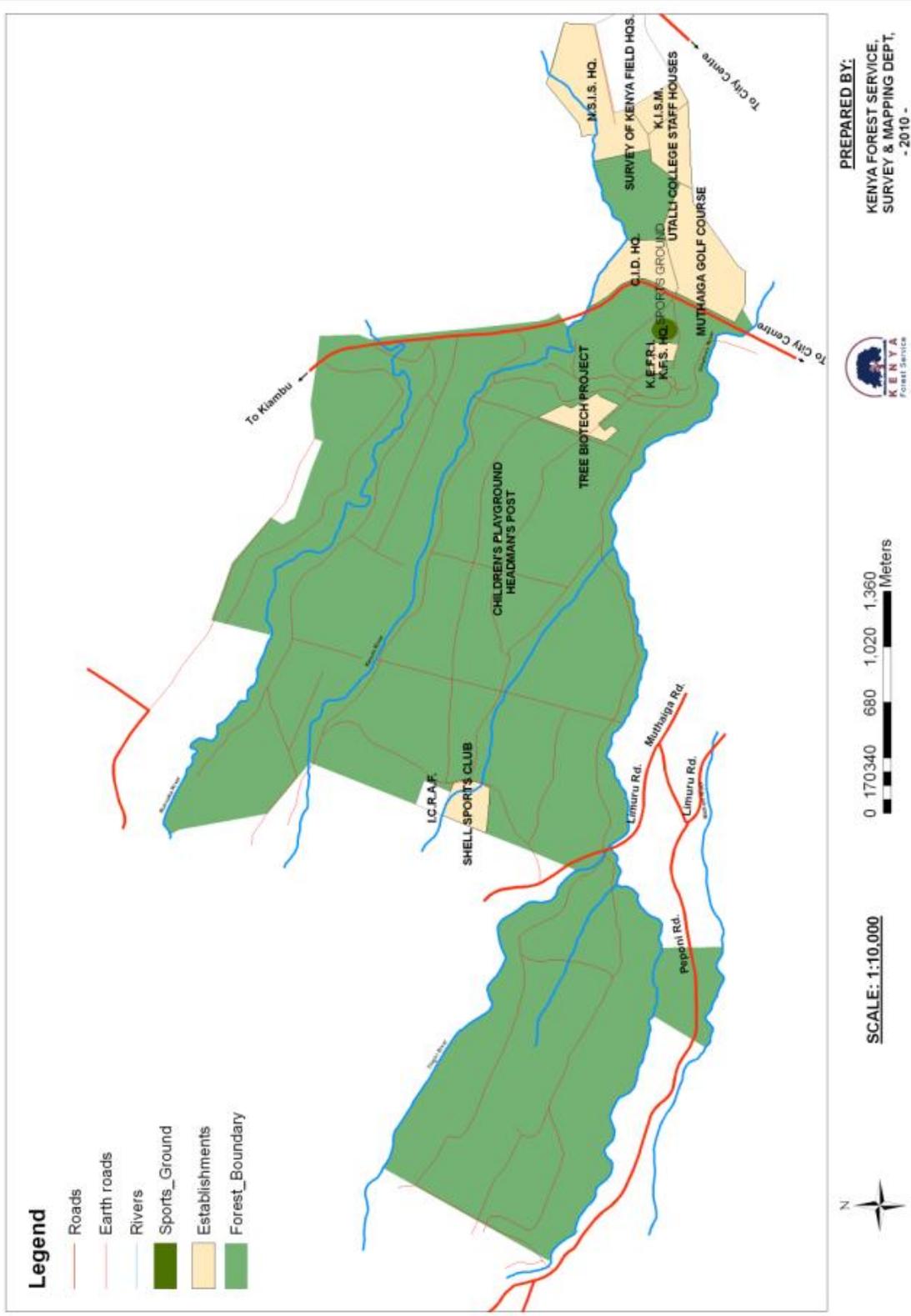


Figure 5: Establishment in Karura Forest

## 2.6 History of the Karura Forest

### 2.6.1 Pre-gazettement

During the pre- colonial period, Karura Forest was owned by the Kihara family. The family surrendered the forest to the British Government at the time of colonization on condition that it remained forest land. The agreement further stated that if at any point the land use was changed, it should return to its original owners.

### 2.6.2 Post-gazettement

Karura Forest was gazetted in 1932 and was one of the earliest to be recognised as such.

The first experimental plantations in Karura were made in 1906. At that time various species of Eucalyptus and some Cypress were tried. In the initial stages, the Forest was comprised principally of a natural forest of *Brachylaena huillensis* (Muhugu), *Croton megalocarpus*, and *Warburgia ugandensis* (Muthiga). Up to 1935 it was fashionable to plant a certain proportion of indigenous species, either pure or in mixture with Eucalyptus. However, when Eucalyptus was found to grow at extremely fast rates, the natural forest was reduced over the years and re-planted with this species (Eucalyptus provided a fuel- wood at a rotation age of twelve (12) years whilst it was estimated that the natural forest would require seventy years to reach an equivalent girth and volume). This wood was used to provide fuel wood for the railways, poles to carry electrical wires, and for the construction industry.

With time and on the basis of the ever pressing demands for fuel from the adjacent, and fast growing metropolis of Nairobi, Eucalyptus became the principle species planted almost to the exclusion of all others. Another species *Araucaria cunninghamii* establishment made good progress and proved a possible alternative to Eucalyptus for planting in Karura, but its fuel-wood rotation of fifty (50) years seemed too long in comparison.

Demand for fuel and construction material in Nairobi from 1950 – 1970 increased with a growing African and Asian population despite the existence of other forms for fuel such as electricity and paraffin.

The plantations in Karura were established through the ‘shamba’ system. Kenya’s ‘shamba’ or Taungya system has been generally defined as a form of agroforestry, where farmers are encouraged to cultivate primary crops (maize, cabbages, potatoes, beans and carrots) on previously clear cut public forest land on the condition that they replant trees. Since the mid 19th century, Kenya adopted this system to establish tree plantations by means of cheap or free labour, in order to meet the demand for timber.

## **2.7 Socio economic status and assessment of the forest community**

### **2.7.1 Forest adjacent communities**

Karura Forest is surrounded by the communities of very different extremes

Affluent communities include:

- a) Muthaiga residential area (one of the wealthiest residential areas in Nairobi);
- b) New Muthaiga residential area;
- c) Gigiri residential area;
- d) Ridgeways residential area; and,
- e) Runda residential area.

The above residential areas have Residents Associations that have expressed interest to be involved in the participatory management of the forest.

Less affluent communities include:

- a) Deep Sea slum in the Westland area. This slum dwellers currently use the Western section (Sigiria) of the forest as a source of timber;
- b) Huruma slum, to the North the forest. This slum has about a dozen of registered groups which benefit from the Karura Forest. The community help plant trees in return for being allowed to collect dead wood. Members of this slum have also been allowed to keep bee hives in the forest. They benefit from use of a water outlet in the forest as their own water supply is not enough to meet their needs;
- c) Mathare slum, to the East of the forest. This is one of Nairobi's largest slums. Many of the slum's inhabitants depend on Karura Forest for fuel wood. To date, the collection of fuel wood is not regulated. However, as the inhabitants do not live directly adjacent to the forest, and have to cross roads and estates to reach the forest, control of their entry should be more easily managed; and,
- d) Githogoro slum to the north west of the forest. The slum currently uses the forest by illegally removing forest materials, including poles and firewood.

### **2.7.2 Range of Stakeholders:**

Karura Forest Reserve stakeholders are numerous and broad ranged. They include:

- a) Kenya Forest Service;
- b) Private Sector – many wealthy residents are living around Karura Forest Reserve;
- c) Business Sector – a number of large businesses (such as Village Market, and Mobil) lie close to Karura;
- d) Communities – see detailed list in section 2.7.1;
- e) Diplomatic Community – many embassies are situated near the forest. A

number of them have already made donations in support of the conservation of Karura Forest Reserve;

- f) Donors – donations have been received from organisations and individuals with an independent interest in preserving the forest;
- g) Non-governmental organisations - such as The Green Belt Movement;
- h) Government bodies – Nairobi City Council, Ministry for Nairobi Metropolitan Development; and,
- i) United Nations and international bodies, such as UNEP, UN-Habitat and ICRAF.

### **2.7.3 Roles and Responsibilities**

The roles and responsibilities of the different stakeholders are detailed in Appendix III.

During the five years of this management plan, KFS aims to encourage current stakeholders to be involved further in the execution of the management plan and to seek additional stakeholders.

To date there are no collaborative management strategies in place for Karura Forest Reserve. However, there are opportunities for partnerships or collaborative management arrangements to be established:

- a) A 'Friends of Karura Community Forest Association' (FKF) has been registered according to the Forest Act 2005. The intention of the FKF is to provide a platform that facilitates the collaboration of key stakeholders. Its aim is to work with the KFS to sustainably manage the Karura Forest for the benefit of local and wider communities and ensure Karura Forest is protected for future generations. Currently, it includes representation from local communities (both affluent and impoverished), UNEP, Greenbelt Movement and the Community Development Foundation.
- b) There are other government and non-government, international and UN institutions with which closer collaboration and partnership could be sought:
  - i. The Ministry of Environment and Mineral Resources (MEMR). The mandate of the Ministry is to develop, conserve, protect and sustainably manage the environment, and mineral resources for national development;
  - ii. Forest Action Network (FAN). FAN is a regional non-governmental organisation with its headquarters in Nairobi. FAN's mission is to facilitate stakeholders in the Eastern African region to participate in the sustainable management of their natural resources and to influence policy especially where it relates to forests and watersheds;
  - iii. World Wildlife Fund for Nature (WWF). Headquartered in Gland, Switzerland, WWF has a global network active in over 90 countries. WWF's mission is to stop the degradation of the planet's natural

environment and to build a future in which humans live in harmony with nature;

- iv. The Centre for Environmental Legal Research and Education (CREEL). CREEL is a not-for-profit expert membership organisation. CREEL's mission is to promote and ensure sustainable environmental management. To realise this goal, CREEL aims to promote the development of high quality internationally recognised research in environmental policy and law, training in environmental policy and law and for advocacy and networking in the field of environmental policy and law;
- v. Kenya Forests Working Group (KFWG). KFWG is a forum of individuals, organizations and institutions, and grass root community organizations working together to promote sound forest management and conservation practices in Kenya;
- vi. Greenbelt Movement (GBM). GBM is a women's civil society organization aiming at empowering communities to protect the environment and promote good governance;
- vii. United Nations Environment Programme (UNEP). UNEP provides leadership and encourages partnership in caring for the environment by inspiring, informing and enabling people to improve their quality of life without compromising that of future generations;
- viii. World Agroforestry Centre (ICRAF). ICRAF is to generate science-based knowledge about the diverse roles that trees play in agricultural landscapes and to use its research to advance policies and practices that benefit the poor and the environment;
- ix. Nairobi City Council; and,
- x. Ministry of Nairobi Metropolitan Development.

## **2.8 Main threats facing the forest**

The threats and constraints to the conservation of the forest include:

- a) The forest is adjacent to slum areas. Some residents of the slums over exploit the resources of the forest. This leads to unsustainable deforestation, affecting the water table and the balance of flora and fauna;
- b) Some criminals use the forest as a place of refuge and commit opportunistic attacks on visitors;
- c) The lack of safety reduces the number of visitors to the forest. This, in turn, reduces interest in its preservation and conservation;
- d) Due to the prime location of Karura Forest, there has been, and continues to be pressure from developers to claim forest land for building;
- e) The threat posed by greedy potential developers claiming 477 Ha of the forest;

- f) The forest is susceptible to forest fires during dry periods; and,
- g) *Lantana camara* and other invasive weeds grow too vigorously, endangering indigenous plants and trees.

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## **CHAPTER III - PLANNING CONSIDERATIONS**

### **3.1 Relevant Policies and Legal Frameworks**

Forest conservation in Kenya has faced many challenges over the last three decades that have been linked to weakness in policy and market failures. Conservation policies in the past have failed to incorporate stakeholder priorities and changing values of forest resources. Similarly, market distortions have culminated in the under-valuation of forest resources. As a result, forest development, conservation and management in Kenya has not been responsive enough to stakeholder needs and priorities, thus further increasing the poor attitude towards forest conservation. Kenya's forest legislation has in the past focused on a "command and control" approach that has made it difficult to achieve environmental sustainability through public participation and cooperation. The problem has further been compounded by institutional weakness and poor coordination. More recent legislation has sought to address these issues and provide for a more sustainable forest management approach.

The broad objective of forest legislation (Forest Act 2005 and Forest Policy 2007) is to provide continuous guidance to all Kenyans on the sustainable management of forests. This involves taking cognizance of other existing policies relating to land and land use, tenure, agriculture, energy, environment, mining, wildlife and water. The need for greater cooperation and linkage among resource owners, users, and resource planners, is recognized and recent policy incorporates forest-related values of the people of Kenya, as well as international concerns. Indigenous forest management, farm forestry, industrial forest development, dryland forestry, forest health and protection, private sector involvement and PFM are all seen as key components of forest management. Policy recognizes that there are benefits arising from the involvement of local communities and other stakeholders in forest management. Poverty reduction is identified as a goal with the forestry sector in the mainstream of economic recovery strategies. Most importantly, policy emphasizes the importance of forests for water and biodiversity conservation, and addresses cost and benefit sharing.

#### **3.1.1 Forest Policy and Forest Act 2005**

The Forest Act 2005 identifies critical areas to be addressed if the forest sector is to be revamped and provides the appropriate legal and institutional framework for sustainable forest management in Kenya. The goal of the policy is to enhance the contribution of the forest sector in provision of economic, social and environmental goods and services while some of the specific objectives relevant to Karura Forest are:

- a) To contribute to poverty reduction, employment creation and improvement of livelihoods through sustainable use, conservation and management of forests and trees;

- b) To contribute to sustainable land use through soil, water and biodiversity conservation, and tree planting through the sustainable management of forests and trees;
- c) To promote the participation of the private sector, communities and other stakeholders in forest Management to conserve water catchment areas, create employment, reduce poverty and ensure the sustainability of the forest sector; and,
- d) To promote forest research, training and education to ensure a vibrant forest sector.

In respect to these objectives, the degraded areas of the forest will be rehabilitated; partnership for conservation and development of the forest will be promoted while research training and education will be supported.

**In response to Section 13 of the Act - a Forest Conservation Committee** has been established for the Nairobi Conservancy, the functions of which are:

- a) To gather the ideas and opinions of the local community within and surrounding forest conservation areas and report these to the KFS. With specific reference to conservation and utilisation of the forest;
- b) To monitor the implementation of the forest act and other forest regulations within the stated area;
- c) To review and recommend to the KFS Management Board applications for licenses and renewals thereof;
- d) To regulate the management of Karura Forest Reserve, including the setting of charges and retention of charges and income;
- e) In consultation with the KFS Management Board, to assist local communities to benefit from income derived from flora and fauna traditionally used or newly discovered by the communities; and,
- f) To perform such other functions as the KFS Management Board may require or delegate to it.

**In response to Section 41 of the Act – Karura Forest** shall be managed on a sustainable basis for the purposes of:

- a) Conservation of water, soil and biodiversity;
- b) River line protection;
- c) Cultural use and heritage;
- d) Recreation and eco-tourism;
- e) Sustainable production of wood and non-wood products;
- f) Carbon sequestration and other environmental services;
- g) Education and research purposes; and,
- h) Habitat for wildlife.

The above can be achieved by:

- a) Promoting involvement of the private sector, communities and other stakeholders in forest management and conservation to create employment, reduce poverty and ensure the sustainability of the forest;
- b) Contributing to sustainable management of the forest through soil water and biodiversity conservation and tree planting; and,
- c) Promoting forest education and research to enable forest stakeholders to be made aware of benefits and ecosystem services offered by the forest.

**In response to the Forest Act 2005, section 45**, a Community Forest Association (CFA) has been established, namely Friends of Karura Community Forest Association. The functions of the CFA is to:

- a) Protect, conserve and co-manage such forest or part thereof pursuant to an approved management agreement entered into under this Act and the provisions of the management plan for the forest;
- b) Formulate and implement forest programmes consistent with the traditional forest user rights of the community concerned, in accordance with sustainable use criteria;
- c) Protect sacred groves and protected trees;
- d) Assist the Service in enforcing the provisions of this Act and any rules and regulations made pursuant thereto, in particular in relation to illegal harvesting of forest produce;
- e) With the approval of KFS Management Board, enter into partnerships with other persons for the purposes of ensuring the efficient and sustainable conservation and management of forest;
- f) Keep KFS informed of any developments, changes and occurrences within the forest which are critical for the conservation of biodiversity;
- g) Help in fire fighting; and,
- h) Do any other that is necessary for the efficient conservation and management of the forest.

**In response to the Forest Policy 2005** – A Karura Forest Management Committee has been established to support the sustainable management of the forest (see Appendix V).

### **3.1.2 The Wildlife (Conservation and Management) Amendment Act 1989 and Policy**

Kenya's wildlife policy is embodied in the Sessional Paper No. 3 of 1975 entitled "A Statement on Future Wildlife Management Policy in Kenya". This policy was a radical departure from the previous approach to wildlife conservation, which emphasized protected areas. The key elements of this Policy may be summarized as follows:

- a) It identified the primary goal of wildlife conservation as the optimization of returns from wildlife defined broadly to include aesthetic, cultural, scientific and economic gains, taking into account the income from other land uses;
- b) It pointed out the need to identify and implement compatible land uses and fair distribution of benefits derived from wildlife including from both non-consumptive and consumptive uses of wildlife;
- c) It underscored the need for an integrated approach to wildlife conservation and management in order to minimize human–wildlife conflicts; and,
- d) The Government assumed the responsibility of paying compensation for damages caused by wildlife.

The Wildlife (Conservation and Management) Act of 1976 subsequently established the legal provisions for the implementation of the Policy. This Act amalgamated the then Game Department and the Kenya National Parks to form a single agency, the Wildlife Conservation and Management Department (WCMD), to manage wildlife. Subsequently, through an Amendment to the Act in 1989, the Kenya Wildlife Service (KWS) was established to replace WCMD.

There are no large wildlife species in the Karura Forest Reserve and therefore there are no human-wildlife conflicts that are associated with the presence of large mammals such as elephants etc. There is, nevertheless, a large wildlife presence in Karura Forest Reserve, including an increasing monkey population.

The exact size and variation of the population is however unknown and there is need therefore to undertake a study detailing the wildlife in the forest.

### **3.1.3 Environmental Management and Coordination Act (1999)**

EMCA (1999) is an act of Parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment, and for matters connected to it. The environment constitutes the foundation of national economic, social, cultural and spiritual advancement. The requirement for environmental impact assessment and audits will be observed as necessary in conformity with the requirements of the Act.

### **3.1.4 Water Policy and Water Act (2002)**

The Water Act (2002) provides for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; provides for the regulation and management of water supply and sewerage services. The Act mandates the minister responsible for water resources to ensure that certain water catchment areas are protected. The Minister is also mandated to declare such areas as water catchment areas. A number of rivers dissect Karura Forest whose flow will be enhanced by its protection and rehabilitation.

### **3.1.5 River Authorities Act (Cap. 443)**

This Act empowers all existing river authorities to, *inter alia*, construct any works necessary for the protection and utilization of water and soils on areas along riverbanks. Fallow land acts as a reservoir of terrestrial carbon, while trees and vegetation growing along riverbanks sequester carbon dioxide. Efforts will be made to protect the riparian belt by planting of appropriate species like bamboo.

### **3.1.6 The Agricultural Act (Cap. 318)**

This Act promotes and maintains a stable agriculture, to provide for the conservation of the soil and its fertility and to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry. The Act gives the minister responsible for agriculture extensive powers to make rules for purpose of conservation of soil and good land management. Soil conservation measures emphasize tree planting and prohibit crop cultivation on land with steep gradients. These provisions contribute directly to mitigation of climate change since trees act as sinks for CO<sub>2</sub> and undisturbed soils are a reservoir for carbon.

### **3.1.7 The Timber Act (Cap. 386) of 1972**

This Act provides for control of the sale and export of timber by means of grading, inspection and marking, and provides for the control of timber in transit. Relevant sections of this Act will apply when harvesting of the mature plantations in the forest reserve commence.

### **3.1.8 Registered Land Act (Cap. 300) of 1985 (revised 1989)**

This Act provides for registration of title to land, including state land and trust land, and rights of land properties, which is important in protection of forests.

Currently some parts of the forest were irregularly allocated and title deeds issued. There is need to secure the forest by cancelling all such title deeds. Relevant sections of the Acts will apply when the revocation exercise commences.

### **3.1.9 Science and Technology Act (Cap. 250) and State Corporation Act (Cap 446)**

The Kenya Forestry Research Institute (KEFRI) was established in 1986 under the above two acts to undertake research and development activities in forestry and allied natural resources. KEFRI has over the years carried out research, build human capacity, developed infrastructure, conducted in-service training, and formed partnerships with many institutions and stakeholders. These efforts have contributed positively to forest development and further research is currently addressing four core programmes, namely: farm, natural, dry land and plantation forestry.

### **3.1.10 National Energy Policy (2004)**

The policy objective stated that it aims to ensure sufficient supplies to meet demand on a sustained basis while minimising the environmental impacts associated with biomass energy consumption. However, to do this, it includes promotion of fast maturing trees for energy production.

## **3.2 Strategies**

### **3.2.1 Millennium Development Goals (MDGs)**

These include (Goal 7) 'To ensure environmental sustainability by increasing the proportion of land area covered in forest, to protect land area to maintain biological diversity and reduce Carbon dioxide emissions (per capita)'. The rehabilitation of Karura Forest will be contributing to this goal.

### **3.2.2 Vision 2030**

This includes the suggestion that by 2030 the urban Areas may hold 60% of Kenya's future population. This population is suggested to be well over 40 million by then as opposed to fewer than thirty in 1999. This will increase the pressure on the forest land.

### **3.2.3 Multi/bilateral and private sector funding**

It is intended to seek for funding from the multi/bilateral partners and the private sector for:

- a) Fencing;
- b) Re-forestation; and,
- c) Recreation / education through the establishment of an education centre.

It is understood that good relationships with these partners are vital to the success of the management of the forest.

## **3.3 International and regional agreements and treaties**

### **3.3.1 Convention on biological diversity**

This Convention aims to conserve biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resource. Kenya ratified the convention on 26 July 1994.

Kenya has undertaken activities that are consistent with the goals of the Convention, and has developed a national strategy for the conservation of biological diversity and established a system for protecting endangered species both in the protected and dispersal areas.

The management plan will contribute to the implementation of a number of provisions of the Convention, in particular with regard to:

- a) Identification and monitoring (Art. 7);
- b) In-situ conservation (Art. 8);
- c) Sustainable use of components of biological diversity (Art. 10); and,
- d) Public education and awareness (Art. 13).

The management plan will also support the objective of a Collaborative Partnership for Forests, a voluntary arrangement among 14 international organizations and secretariats, including the Secretariat of the Convention on Biological Diversity. This arrangement aims to promote the management, conservation and sustainable development of all types of forest, and strengthen long-term political commitment to that end.

### **3.3.2 Forest Principles**

The Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all Types of Forests, also known as the “Forest Principles” were adopted in 1992. They contain 15 articles providing guiding principles for the management, conservation and sustainable development of forests.

The management plan will be in line with and further implement the Forest Principles, in particular with regard to:

- a) Sustainable forest management to meet the social, economic, ecological, cultural and spiritual needs of present and future generations;
- b) Promotion of opportunities for the participation of interested parties in the development , implementation and planning of forest policies;
- c) Positive and transparent action towards reforestation, afforestation and forest conservation;
- d) Support by international financial and technical cooperation, including through the private sector; and,
- e) Provision of alternative options to the urban poor who are economically and socially dependent on forest resources.

### **3.3.3 CITES**

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was established in response to concerns that many wildlife species were becoming endangered because of international trade. Kenya ratified the Convention on 13 December 1978.

The only recorded endangered tree species in Karura is the *Brachylaena huillensis* (Muhugu). This tree species is classified as Low Risk – near threatened globally, according to the IUCN Red List. The tree is used for wood carving sold to tourists. However, this species is not listed in any of the three CITES appendices.

During the period of the plan existing trees of this species will be clearly designated for extra protection and increased planting.

### **3.3.4 United Nations Framework Convention on Climate Change (UNFCCC)**

The ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) is the “*stabilization of the greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system [....]*”. Kenya ratified the convention on 30 August 1994.

The management plan will contribute to the implementation of the Convention by increasing carbon storage and sink, through the rehabilitation of degraded forest areas and the reestablishment of indigenous forest cover.

## **3.4 The importance of Karura Forest**

### **3.4.1 Importance for the general public**

Karura Forest receives a wide range of visitors on daily basis whose interest are variable, some of which include:

- a) To provide an opportunity to educate general public on the importance of forests;
- b) To contribute to mitigation on climate change;
- c) To provide fuel and timber;
- d) To serve as a venue for recreation;
- e) To provide seedlings; and
- f) To provide training in environmental and natural resource management.

### **3.4.2 Importance for employment**

At present 19 people are employed as forester (1); assistant forester (1); plant operator (1); senior clerical officer (1); subordinate staff (2); rangers (13), and five casuals. There is also a separate trust running a tree cloning project employing approx. 70 people.

It also provides an employment opportunity for the inhabitants of Huruma and Mathare slums who by working for couple of hours at a time in return are allowed to take firewood back home. With the advent of ecotourism, employment opportunities will increase through providing services like guides, horse attendants, community scouts(15)etc.

### **3.4.3 Watershed**

The forest contributes to recharging the rivers that run through it. It is proposed to boost this by planting bamboo and other water conservation vegetation along all the rivers

### **3.4.4 Biodiversity reservoir**

Karura Forest hosts a wide diversity of fauna and flora species. Further protection of these species will be provided once a full biodiversity inventory has been completed.

### **3.4.5 Historical and Cultural importance**

Pre-colonial times the Karura Forest was owned by the Kihara family. During colonial rule the family surrendered the forest to the British Government on the condition that it remained forest land. The agreement further stated that if at any point the land use was changed, it should return to its original owners.



**Plate 2: A cave in the forest**

There are three caves in Karura Forest which were used by the Mau Mau during the battles for independence. These caves have also in the past served as venues for spiritual nourishment for many people from different parts of the country.

There are four churches within the Forest.

Professor Wangari Maathai, Nobel Peace Prize laureate, gained further recognition because of her heroic efforts to stand up to would-be developers of the northern part of Karura Forest.

### **3.4.6 Source of Forest Products**

#### Timber products

The plantations will be zoned where necessary for conservation and production reasons. Those plantations on areas suitable for conservation will gradually be converted into indigenous forest. During the plan period, Eucalyptus plantations that are wrongly sited will be uprooted to leave space for the planting of the indigenous trees.



**Plate 3: A mature plantation in the forest**

*Brachylaena huillensis* (Muhugu) has been used historically for wood carving sold to tourists. This valuable indigenous tree species is now only found scattered within the forest. During the plan period, the remaining specimens will be clearly designated for extra protection. Muhugu seedlings will also be planted.

#### Non Timber Products

At present the Forest caters for the supply of small businesses such as beekeeping, gathering grass from the glades, collection of herbs and other medicinal plants.

### 3.4.7 Tourism and recreation opportunities for Kenyans



**Plate 4: A water fall in the forest**

Despite high potential for tourism/recreation, Karura Forest is yet to develop and harness resources in this sector.

During this plan period, the station will develop an inventory of forest scenic and attractive sites. It will then establish a number of walking/jogging/cycling/riding trails, a canopy walk, board walk, an education centre, a riding school, bird watching programme, monkey watching programme, a camp site (with shower block, toilets and small office) and organize a number of cultural activities/concerts. Each of these activities provides scope for an entrance fee, as already practiced in other forests. However, as Karura Forest is a small forest, surrounded by hotels, there will be no new tourism related permanent structures or footprints in the forest.

Recently the 'Family Trail' has been opened, and it is proposed that there will be a charge for using the facility. An 'Adventure Trail' to the waterfall, will also be commissioned.



Plate 5: Signage on the family trail



Plate 6: One of the trails in the forest

### **3.4.8 Research and Education Centres**

KEFRI has a forest product research centre located at Karura Forest Station whose research work has proved very useful in the diversification of forest products and services. For example, bamboo has been found to have multiple uses that can be promoted.

There is need to provide visitors to the forest with an opportunity to learn the importance of forests and the significant role they play in their every day lives.

Within the five year term of this Management Plan, a new Education Centre will be developed and opened within. The centre will provide opportunities for visitors to learn not only about Kenya's forests, but also about other forests around the World. The centre will draw from information and expertise from close neighbours, such as UNEP and ICRAF, but also from national/international universities and government agencies.

### **3.4.9 Environmental services (including carbon sinks, soil conservation)**

#### Carbon sink

One third of greenhouse gases build up in the atmosphere is estimated to result from changes in land use. Afforestation and conservation of forests can significantly contribute to mitigate on climate change. Nairobi once had a reputation as a healthy place to live and was known as 'The Green City in the Sun'. However the increasing carbon emissions in Nairobi are attributed to the ever growing and intense industrial activity and use of automobiles. Therefore Karura Forest has a vital role mitigating on negative impacts. Land Use Change and Forestry activities during the plan period will focus more on development of indigenous forest.

There is also scope for partnering in one of the carbon financing schemes.

#### Soil and Water Conservation

The forest is able to retain the amount of rainfall falling over it through infiltration, only gradually releasing it to the streams flowing through the forest. It is also useful in recharging underground water streams from which the current boreholes that are being drilled get recharged. This action contributes towards minimizing soil erosion.

## **3.5 Conservation Challenges**

In addition to the threats identified in section 2.8, the conservation of Karura Forest faces the following challenges:

- a) Inadequate funding;
- b) Inadequate water supply for irrigating trees;
- c) Inadequate work force;
- d) Undervaluation of forest resources for their services; and,
- e) Lack of management information, such as inventory of fauna, description of flora.

### 3.6 Forest zonation

#### 3.6.1 Current situation

The forest is divided into two blocks, one of which is mainly comprised of plantations. The other block has plantations of both exotic and indigenous species and an area under natural forest.

#### 3.6.2 Objective

The objective of the zonation is to help sustainable conservation and development of the forest.

#### 3.6.3 Forest zones and their management

The Forest Reserve has been zoned using the multiple - use classification criteria, which considers the application of the primary use along with secondary uses of the zoned areas. The main zones identified include:

- a) Nature Reserve;
- b) Indigenous forest area;
- c) Wetlands and riparian areas;
- d) Productive forest (exotic plantations); and,
- e) Developed areas.

**Table 4: Zonation criteria**

<b>Zone</b>	<b>Criteria</b>	<b>Management Objectives</b>	<b>Management Options</b>
Nature Reserve	High biodiversity natural forest	Total biodiversity conservation	- No extractive uses - No disturbance
Indigenous forest area	Water catchment Wildlife habitat Protection of biodiversity, rehabilitated are previous under plantations	- Conservation of biodiversity, wildlife habitat - Low disturbance	- Conservation area - Minimum impact ecotourism (walking, bird watching) - Enrichment planting of degraded areas
Wetlands	Swamps / marshlands / riparian areas	Total preservation of the wetlands	- Preservation of the area - Research and bird watching

Zone	Criteria	Management Objectives	Management Options
Productive forest (exotic plantations)	Area under plantation of exotics species	<ul style="list-style-type: none"> <li>- Generation of revenue</li> <li>- Adventure sports</li> </ul>	<ul style="list-style-type: none"> <li>- Harvesting of plantations to be converted into indigenous forest</li> <li>- Areas to be identified for plantation development mainly for Xmas trees and other wood products</li> </ul>
Developed areas	Areas under residential and non residential buildings, tree Nurseries etc	<ul style="list-style-type: none"> <li>- Area to continue serving the same purpose</li> <li>- Generation of revenue (rent)</li> </ul>	Status quo to remain

Figure 6 shows the current (2010) distribution of indigenous forest (dark green) and exotic plantation mixed with *Lantana camara* thickets (light green)<sup>2</sup>. The total indigenous forest cover is approximately 260 Ha, 25% of the total gazetted forest area. If some 20 Ha of edaphic grassland glades and wetlands (shown in stippled light green) are added, the total becomes 280 Ha (27% of total). Indigenous forest plots in the north that were clear-cut in the 1990s (totaling 32 ha, not included in the indigenous total) are shown as dark green stripes. Areas recently replanted during a programme of corporate-sponsored reforestation, nominally totally 95 Ha (J. Orwa, pers. comm.), are shown in yellow cross-hatching. Areas historically de-forested for various uses, such as building or recreation, are shown in light grey; such areas comprise nearly 120 Ha, some 11% of the total gazetted Karura. The main forest tracks are shown as red lines.

Figure 7 shows projected (2015) distribution of indigenous forest combining 2010 cover (dark green) and proposed reforested or reclaimed areas (dark green-light green stripes). The 2015 additions comprise all areas currently under *Araucaria* and *Cupressus* spp. exotic plantations (the latter invaded by *Lantana camara* thickets). The remaining areas, predominantly *Eucalyptus* spp. plantations and *Lantana* thickets are light green.

<sup>2</sup> The boundaries of the forest compartments were determined from two sources. The primary source was the 1:10.000 KFS map that designates forest and plantation plots established in Karura from 1975 to 1997 (range of plot dates on the map). The boundaries and type designations were then checked on the ground with a rapid proportional survey and adjusted as required in ArcGIS (a geographic information system).





Figure 7: Planned (2015) zonation / forest cover types of Karura Forest

## CHAPTER IV - MANAGEMENT PROGRAMMES

The overall objective of the plan is to have Karura Forest managed and sustainably conserved for provision of goods and services to Nairobi residents. The specific management objectives that will guide the implementation of the plan are:

- a) To rehabilitate and manage Karura Forest to a healthy and productive closed canopy forest;
- b) To protect the forest from any high impact development other than forestry activities and ensure ecotourism proposals are in the best interest of the forest;
- c) To provide a world class example of sustainable participatory forest management and conservation;
- d) To make the forest safe and secure for the enjoyment of all;
- e) To support the needs of local communities;
- f) To promote environmental education, ecotourism and research in forestry;
- g) To have in place the necessary infrastructure, vehicles, machinery and equipment to sustain the management of the forest; and,
- h) To ensure plans are in place that provide the necessary human resources to implement and sustain the management plan.

Implementation of the plan will be guided by the eight specific management objectives from which strategies and actions are proposed under the seven programmes named here under.

### 4.1 Rehabilitation and Management Programme

#### **Objective 1**

***To rehabilitate and manage Karura Forest Reserve to a healthy and productive closed canopy forest***

#### **Current status**

The total area of the forest is 1041.3 Ha out of which plantations occupy 632 Ha and natural forest 260 Ha. Out of the remaining area, 32 Ha are still deforested. The intention of this objective is to focus in rehabilitating this area and manage the rest of the forest in order to eliminate the backlog and re-establish a healthy thriving forest.

In the recent past many corporate Institutions have shown interest in teaming up with KFS in the rehabilitation through KFS stakeholder engagement policy.

### *Protection of critical water catchment*

The adjustment of different plantations where necessary; for conservation and production reasons, there are some plantations that are better suited to some areas than others.

### *Water resource availability*

The Karura Forest is well positioned for water availability as it has four rivers which flow throughout the year (not seasonally). Nairobi City Council also supplies water, for which a monthly charge is paid.

The main indigenous tree nursery uses water from the Karura River. The small tree nursery uses water from the Nairobi City Council water. The tree biotechnology nursery has its own borehole to ensure a pure water source.

### *Water utilization and demand*

The forward policy for tree planting is now to always plant during the rainy season and therefore more water than is available is not required. The tree nursery needs a good water supply.

The KFS headquarters and the staff (most of who live in the Forest) are affected by the Nairobi water shortages during the dry spells.



**Plate 7: A rehabilitation activity in the forest.**

### Challenges

Some of the challenges that have to be overcome in order to undertake successful rehabilitation include:

- a) Proper timing of planting operations;
- b) Removal of *Lantana camara*;
- c) Regular weeding;
- d) Occasional watering;
- e) Seedlings of right sizes and species;
- f) Insistence by some corporate partners to plant at the wrong time;
- g) Making concrete decisions on the future of the very old plantations that are past economic rotation age;
- h) Inadequate funding for supporting all operations;
- i) Lack of patrol vehicles; and,
- j) Inadequate number of Forest Rangers.



**Plate 8: Karura Forest Tree Nursery**

### Strategies

⇒ *Enter into partnerships with other stakeholders*

#### Actions:

- Identify all partners/partner institutions operating in Karura Forest and develop working modalities.

⇒ **Undertake rehabilitation of the forest**

**Actions:**

- Identify the sites requiring rehabilitation and survey and map them. These would include the approx. 35 Ha comprising four original indigenous plots in the upper portion of the forest north of the Ruaka River that have been largely deforested;
- Identify the tree species to match the degraded sites;
- Identify and zone out ecologically sensitive areas for protection;
- Identify and zone out habitats with endemic and endangered species;
- Procure the seeds of identified tree species;
- Protect and further plant *Brachlaena huillensis* (Muhugu);
- Provide other nursery inputs (logistics);
- Recruit labour force for planned activities;
- Raise enough seedlings as identified;
- Prepare degraded sites for planting;
- Remove *Lantana camara*, starting with the 95 Ha that have been recently replanted;
- Mobilize corporations and the communities to participate in planned activities (schools, churches, institutions);
- Promote enrichment planting in areas with open forest;
- Remove eucalyptus stumps and coppices in newly replanted (approx. 95 Ha)/ enriched indigenous forest areas;
- Select and plant multi-purpose species useful to the ecosystem and the surrounding communities;
- Protection and maintenance of planted trees and generally the forest from all other risks; and,
- Re-introduce native indigenous flora and fauna.

⇒ **Protect the wetland and riverine reserves within the forest**

**Actions:**

- Assess the wetlands' hydrology to guide on their conservation; and,
- Plant bamboo and other conservation vegetation along the rivers.



**Plate 9: Bamboo planting on the banks of the streams in the forest**

⇒ **Manage the plantations for providing forest products**

**Actions:**

- Survey the existing plantations;
- Prepare operational plans focusing on harvesting and replacement of the over mature plantations;
- Prepare/implement the requisite plans for the existing Araucaria and Cupressus plantations (approx. 110 Ha) that need to be gradually replaced with indigenous; and,
- Identify areas suitable for commercial plantations.

## 4.2 Participatory Forest Management and Conservation Programme

**Objective 2**

***Provide a world class example of sustainable participatory forest management and conservation***

**Current Status**

Currently KFS is working with the communities residing around the forest. A Community Forest Association, Friend of Karura Forest, has been established which encompasses the communities adjacent to the forest. The communities benefit by getting employment during tree planting, collection of firewood, fodder, water and also have beehives in the forest. The involvement of the community in major decision making in regard to the forest resource is inadequate. By involving them in development of this plan, it is expected that a good basis has been established for their enhanced participation.

**Challenges**

Karura Forest is a small forest (1,041.3 Ha) surrounded by high density residential areas. The communities living around Karura Forest are diverse with different needs.

**Strategy**

⇒ ***Joint implementation of the management plan by all the stakeholders and develop necessary consultative mechanisms***

**Actions:**

- Prepare and sign a forest management agreement between Kenya Forest Service and the Friend of Karura Forest CFA (FKF) for implementation by all stakeholders;
- Prepare a joint monitoring and evaluation plan;
- Hold regular meetings of the Karura Forest Management Committee;
- Collect information on 'Best Practice' in PFM from elsewhere in the country and the rest of the world;
- Establish a close collaboration between the Forest Conservation Committee and the FKF.
- Undertake capacity building of the FKF in governance, proposal writing, recruitment of more members, PFM, among others.

### 4.3 Forest Safety and Security Programme

#### **Objective 3**

***To make the forest safe and secure for the enjoyment of all.***

#### **Current status**

There is need to re-establish the boundary as some of the beacons are missing and need to be replaced. In view of the high demands placed on the forest by the surrounding communities whose population continues to rise steadily, there is need to control access by erecting a barrier with designated entry and exit points and also cater for its maintenance. The security situation throughout the forest is a source of serious concern.

#### **Challenges**

The main challenges include funding, the cancellation of the title deeds illegally issued in the forest and ensuring the security of visitors.

#### **Strategies**

⇒ ***Secure the forestland***

#### **Actions:**

- Identify the boundary by replacing missing beacons;
- Engage the Commissioner of Lands in order to stop any further collection of annual land rates for the illegally allocated parcels;
- Repossess encroached area along the Kiambu road;
- Revoke illegally issued titles; and,
- Acquire the title deed for Karura Forest.

⇒ ***Secure the forest from uncontrolled entry***

#### **Actions:**

- Erect the electric fence and other appropriate types of fencing along the forest boundary and provide for its maintenance with the FKF-CFA;
- Ensure all the entry/exit points are properly managed; and,
- Provide regular patrols throughout the forest by a sufficient number of forest rangers and scouts.

⇒ ***Promote forest health***

#### **Actions:**

- Ensure protection from fires, diseases and pests;
- Maintain the current fire breaks and create new one where necessary;
- Purchase fire fighting equipments;
- Establish a fire outbreaks surveillance system;
- Enhance patrols in all parts of the forest;
- Train Rangers and Community Scouts on fire fighting;

- Create public awareness on fire hazards and its economic and ecological implications; and,
- Establish network of informers for enhancing forest and visitor security.

#### 4.4 Local Communities' Livelihoods Programme

##### Objective 4

*To contribute to the needs of the local communities*

##### Current status

There are various user rights and livelihoods (water, medicinal herbs, honey, fuel wood, spiritual nourishment, among others) that accrue to communities living adjacent to Karura Forest. This is more so for the dwellers of the four named slum villages. It is the aim of this plan to continue meeting these requirements and to ensure their sustainable supply. However no deliberate socio-economic study has been undertaken to fully appreciate this relationship. It is therefore intended to undertake such a study during the implementation of the plan so as to adequately address the livelihood matters. Many activities ranging from afforestation, visitor guiding, maintenance of tracks and electric fence etc can be implemented jointly with the communities to provide them with opportunities of eking a livelihood.

##### Challenges

The expectation from the local communities are very high and are unlikely to be met in light of the small area of the forest and its location in the city.

##### Strategy

⇒ *Joint participatory planning and implementation by all stakeholders will be embraced for all the livelihood activities in the forest*

##### Actions:

- Undertake socio-economic study;
- Provision of goods- Firewood;
- Support eco-friendly micro-projects like bee-keeping, butterfly farming, fish farming;
- Provision of water to the Huruma community;
- Support community tree nurseries;
- Create employment opportunities through the development of recreational activities:
  - Horse riding guides
  - Eco-tourism guides
  - Cycling
  - Jogging
  - Nature trails
  - Walking
  - Bird watching guides

- Improved controlled access to forest products:
  - Wild fruits
  - Leaves
  - Medicinal herbs
  - Fodder cut
- Improved controlled access to religious / cultural sites:
  - Sacred trees/ grooves/ shrines
  - Caves
  - Religious retreat

## 4.5 Environmental Education, Ecotourism and Research Programme

### Objective 5

***To promote Environmental Education, Ecotourism and Research in forestry***

#### **Current Status**

Currently there is minimal research undertaken at the tree Biotechnology nursery on cloning and other aspects of propagation of the indigenous tree species. Other aspects of research that could be recommended for Karura Forest is as detailed below.

There is a great deal of wildlife in Karura Forest, none of it predatory. Historically it was the home of many species of primates.

Currently there is no monitoring programme of the changes affecting Karura Forest. There is no demonstration plots to show samples of tree species and forest composition.

#### **Challenges**

Most of the activities under this programme component are long-term. They will require sustained resources over the years.

#### **Strategies**

⇒ ***Undertake the necessary research in the forest to inform management decisions***

#### **Actions:**

- Inventory flora and fauna species;
- Delineate and protect the area for conservation as a nature reserve; and,
- Establish a system of monitoring changes in biodiversity.

⇒ ***Inform and educate visitors to Karura Forest on its biodiversity, aesthetic value and other benefits***

#### **Actions:**

- Establish an Education Centre;
- Develop the educational programme for the Centre that cuts across all levels and

ages;

- Organise guided visits and other events to the forest;
- Establish demonstration plots to show the forest composition; and,
- Create a botanic arboretum.

⇒ *Promote the development of ecotourism*

**Actions:**

- Inventory of tourism products and attraction in Karura Forest;
- Carry out a baseline visitors carrying capacity;
- Develop clear guidelines and codes of conduct to govern visitors and future visitor-related development in Karura Forest;
- Develop and publicize the special interest areas within the forest so as to attract visitors;
- Develop camps sites with showers / toilets / water points, as low impact non-permanent accommodation facilities for visitors;
- Promote Karura Forest as a recreation destination for the Nairobi dwellers (cycling, jogging; nature trails, walking, horse riding);
- Develop a bird watching circuit in Karura Forest;
- Develop the recreational activities within the Education Centre complex; and,
- Undertake a publicity/promotion and marketing campaign.

## **4.6 Infrastructure, Vehicles, Machinery and Equipments Programme**

**Objective 6**

***To have in place the necessary infrastructure, vehicles, machinery and equipments***

**Current Status**

*Roads and trails*

The movement of visitors in the forest require good well maintained network of roads and trails.

Karura is unique not only in its location (so close to the centre of Nairobi) but also for other reasons such as its beauty spots, examples of good tree management and Kilometres of attractive walks (there is also permission for a riding stable in the Western Section of the forest). There is huge untapped potential for producing revenue from visitors to the forest.

*KFS buildings (office and outposts)*

The forester's office and the office store is in deplorable condition. Housing is provided within Karura but is badly in need of renovation. In addition, more houses need to be provided. Proper housing of the rangers is a motivation for enhancing their performance. There is currently only one camp in the two blocks that comprise Karura Forest, There is need for housing for a total of 26 rangers.

### *Non-KFS Buildings*

Non-KF buildings include: churches; a school (originally constructed by the Forest Dept. but now run by the Nairobi City Council); the Tree Biotechnology Project office; the BP Shell Club; National Security Intelligence Service Headquarters; Criminal Investigation Department; a facility for the Central Bank of Kenya; the International Earthquake Sensor for the region; and KEFRI station and residential quarters

### *Vehicles, machinery and equipment*

There is one tractor, but no other vehicle specifically for use at Karura.

The only vehicle presently in great demand as it is used to cover security, moving of seedling, moving officers for meetings, emergency use (to include fire, and personal injuries). It is also the pickup truck which has been allocated to the Head of Conservancy (HOC). This is particularly difficult as the HOC is also responsible for Ngong Road Forest, Arboretum, Ngong Hills Forest, Thogoto Forest and Kiambu Forest.

There are other pieces of small machinery and equipment which are covered in a separate tool inventory (produced quarterly and available on request).

### *Communication equipment*

There is an inadequate communication system in place (the Sergeant in charge has one VHF to connect him to the Commandant's office).

In order to make urgent contact, rangers resort to using their own mobile phones. However, as few of them have credit, this is not a good system.

### **Challenges**

The main challenges include appropriate funding of KFS.

### **Strategies**

⇒ ***Provide for the necessary infrastructure in Karura***

#### **Actions:**

##### *Roads and trails*

- Maintain existing access roads for patrol and enhance visitor movements;
- Erect information sign boards in all strategic parts of the forest; and,
- Build four new bridges and rehabilitate the two existing ones.

##### *Buildings*

- Provide toilets, benches, bins for the Family Trail and Adventure Trail;
- Establish an education centre in the BP Shell Club;
- Construct entry gates with guardrooms and toilet facilities;
- Establish a campsite centre with showers, toilets and water points;
- Renovate/rebuild the two Forest Rangers camps and establish two ones at Ribshack and Duck Farm;

- Construct a guardroom with toilet facilities at the new Botanic Arboretum area;
- Construct a new forester's office block and store and renovate the forester's house; and,
- Construct horse riding stable in Western block (Sigiria).

⇒ ***Provide for means of transportation, machinery and equipments***

**Actions:**

*Means of transportation*

- Provide one 4 x 4 pick-up vehicle for the forester;
- Provide one 4 x 4 pick-up vehicle for enforcement;
- Provide four motorbikes for enforcement; and
- Provide six horses for enforcement.

*Equipments/Furniture*

- Provide for suitable furniture in Karura Forest office;
- Provide a digital camera for evidence collection;
- Provide for essential office equipment; and,
- Purchase 20 VHF handsets for the forest rangers / community scouts on duty.

*Monitoring stations*

- Build a radio control room; and,
- Build a tower/platform to be built in the centre of the forest as a look out for fire, for example.

## **4.7 Human Resources Programme**

**Objective 7**

***To provide for optimum human resource for implementing the management plan***

**Current Status**

At present, one forester, one assistant forest, one senior clerical officer, two support staff, 14 rangers and five casuals comprise the human capital of the station. There is also a separate trust running a tree cloning project employing approx. 70 people. It is expected that with implementation of this plan, more job opportunities for the local communities will be created and equally the strength of KFS staff will be raised to optimal level so as to meet the challenge.

*Staff strength and requirements*

In order to protect the forest from illegal logging and to keep visitors safe, the existing number of rangers is inadequate.

Given that the forest is fenced before the end of this plan period, the existing number could be enough; however their role will need to change accordingly.

There is also inadequate staff for the tree nurseries as the labour which requires engaging casuals.

### *Capacity Building*

The Rangers currently working in Karura are guards, first and foremost – during the five year span of the Management plan, it is intended that the role of Karura should change, and at the same time, the role of the rangers will change also. They will require adequate training to fit in with this.

It has been agreed that ‘Rangers on Horseback’ would provide a better means of protecting the forest, therefore during the necessary recruitment, the ability to ride and care for horses will have to be taken into consideration.

### *Staff welfare*

A health care package has recently been introduced by the Kenya Forest Service, this covers the employee, spouse and four children. The Rangers retirement fund is provided by the government at the age of 60. There is however need to revitalize the forest ranger operational standards and uplift their and other workers morale.

Most rangers and some of the residential staff send their children to the school in Karura.

**Table 5: Staff Strength in Karura**

<b>Staff cadre</b>	<b>Current strength</b>	<b>Desired strength</b>	<b>Variance</b>
Forester	1	1	0
Assistant Forester	1	1	0
Senior Clerical Officer	1	1	0
Clerical Officer	0	1	1
Copy Typist	0	1	1
Store Keeper	0	1	1
Forest Rangers	13	26	13
Artisan	0	1	1
Plant Operator	1	2	1
Drivers	0	1	1
Subordinate staff	2	4	2
Casuals	5	30	25
Community scouts	15	15	0
Fence Technicians	0	?	?
Horse stable aides	0	?	?

### **Strategy**

⇒ ***KFS to establish the requisite positions, employ as necessary and to enhance the capacity of the staff to undertake their mandates.***

#### **Actions:**

- Provide for the staffing requirements as per the variance shown on Table 6;

- Provide adequate training on guiding and hospitality to the Forest Rangers and community scouts;
- Provide adequate training on riding and caring for horses for both Forest Rangers and community scouts;
- Undertake refresher courses for the Rangers;
- Train staff and forest scouts in fire prevention and fire fighting;
- Revitalize the forest Rangers operational standards and uplift their and other workers morale;
- Undertake training needs assessment and implement the report;
- Recruit all the station staff into KFS as soon as possible; and,
- Provide staff with housing and other relevant welfare facilities.

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## **CHAPTER V - PLAN IMPLEMENTATION AND FINANCIAL MANAGEMENT**

### **5.1 Plan implementation and sustainability**

Through the Karura Forest Management Committee and the Friends of Karura Forest - CFA, KFS will work with the different stakeholders to ensure that the plan is implemented and sustainability is achieved in the long run. Institutional arrangements for the plan implementation are given in Appendix I.

### **5.2 Financial Management**

Karura Forest budgetary requirements are catered for under the KFS annual allocations. Various components face financial constraints affecting adequate implementation of programmes. For sound implementation of programmes there is need for a review of the budget to cater for the expanded activities that will ensure the integrity of the Karura Forest. The allocation should further include the participation of the forest adjacent communities in facilitating their involvement through development of nursery, awareness and training. Policy on retaining part of the revenue generated in the forest should be promoted and ploughed back for the forest management. Although such revenue is paltry, once the proposed programmes are implemented, the revenue base is set to expand.

### **5.3 Resource Mobilization**

Budgetary allocation to KFS is inadequate in meeting the challenges of resource conservation and management. This inadequacy results to insufficient office equipment, machinery, personnel, biodiversity monitoring, research, security, rehabilitation of degraded areas, and rehabilitation of infrastructure and capital development among others. These areas are key to the success of the management plan but may not be met through the annual budgetary allocation to KFS. The success of the proposed PFM requires collaborative approach to meet the management plan objectives. KFS and the FKF-CFA have already formalized their collaboration through the signing of one MoU. Through the MoU, FKF-CFA has already provided and is co-managing substantial funding for:

- a) Construction of a fence around the perimeter of the forest;
- b) A team of 10 scouts to guard the forest, including uniforms;
- c) A manager to oversee construction and security; and,
- d) A water plant for the local Huruma slum.

## 5.4 Revenue Projections

Revenue generation within Karura for the period 2005-2009 is shown in Table 6 below. Proposed programmes and activities are aimed at increasing the revenue base from the forest ecosystem. Such programmes include recreational and educational activities, commercial forest plantations, medicinal plants extraction, bee-keeping, fire-wood collection, picnic sites and camps. Revenue collection from these sources is only feasible through the successful implementation of the proposed programmes.

**Table 6: Karura revenue collection for the period 2005 to 2009**

Year	AIA	Timber	Fuel	Total
2005	33,438	-	-	<b>33,438</b>
2006	499,814	55,953	83,000	<b>63,8767</b>
2007	769,345	13,217	115,100	<b>89,7662</b>
2008	1,174,541	-	-	<b>1,174.541</b>
2009	2,180,015	-	-	<b>2,180,015</b>
<b>Total</b>	<b>4,657,153</b>	<b>69,170</b>	<b>198,100</b>	<b>4,924,423</b>

The table indicates an upward trend in revenue collection and is an indication of the potential existing within the forest. By implementing the improvements proposed in this plan, a continued increase in revenue collection is expected.

A brief list of the immediate foreseen cost centres and potential sources of revenue are listed here under:

### Forestry activities:

- a) Replanting 35 Ha of deforested areas with indigenous trees;
- b) Removal of 110 Ha of *Araucaria* and *cypress* species (which will raise funds);
- c) Replanting of 145 Ha of newly available area following the above tree removal, with appropriate species;
- d) Planting of bamboo along the rivers; and,
- e) Removal of *Lantana camara* throughout the forest.

### General security:

- a) Fencing;
- b) Guardrooms at entry gates with toilets;
- c) One 4 x 4 pickup vehicle; and,
- d) Look out platform.

### Educational and recreational activities:

- a) Education Centre;
- b) Campsite centre with toilets / showers / water points;
- c) Water points (at least one at the main gate and near educational/recreational facilities); and,
- d) All private nursery operators.

#### Karura Forest office:

- a) One 4 x 4 pick-up vehicle;
- b) New/renovated housing (approx. 6 extra houses);
- c) VHF equipment (approx. 20 units); and,
- d) Horses and stabling (for approx. 6).

At the present time it is not possible to provide exact figures for the above costs and revenues, however one of the goals of this plan is to get the costing of all the above within the next six month.

### **5.5 Fundraising Strategies**

Discussions with FKF-CFA and other experts are on-going to estimate costing for the above mentioned activities. Stakeholders/donors/local businesses will then be approached to secure funds.

The two trails that have recently opened will generate revenue in the near future.

There are other ideas under discussion. They include:

- a) Annual forest walk/marathon;
- b) Annual bicycling and or horse riding event;
- c) A 'Hog Charge' equivalent;
- d) For diplomatic missions and corporations: adopt a forest area (minimum 5 Ha) Each area would have a plaque attached giving reference to the sponsor; and,
- e) 'Concert for Karura'.

### **5.6 Guiding principles for the implementation of the plan**

KFS, the Karura Forest management Committee and the collaborating stakeholders are committed to adhere strictly to the following guiding principles for the duration of the 5 year plan:

- a) To operate and maintain an efficient running programme for the plan;
- b) To be accountable to the KFS, and other key stakeholders for decisions regarding the management of the forest;
- c) To practice a transparent process for all decision making and accountability; and,
- d) To always be available for communication and discussion, open to ideas, suggestions and advice from others.

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## CHAPTER VI - ENVIRONMENTAL IMPACT ASSESSMENT

Manipulation of an ecosystem results to negative impacts affecting the dynamics of the system and its ability to supply goods and services. Environmental impact assessment identifies these negative impacts and provides means of mitigation for the welfare of human and other species dependent on such ecosystems. It provides a mechanism on project planning, implementing and integrating environmental conservation, management and development. It takes cognizance of the social, physical and biological component of the environment to ensure minimal negative impacts as well as promoting environmental benefits. EIA should be carried out for all proposed development activities within the ecosystem to identify negative impacts and their mitigation measures. EMCA (1999) provides guidelines on successful environmental management in the country. Some of these are:

- a) Establishment and expansion of recreational sites;
- b) Timber harvesting in plantation forests;
- c) Waste disposal;
- d) Introduction of fauna or flora;
- e) Establishment of wilderness and modification of an ecosystem;
- f) Land use change; and,
- g) Infrastructure development.

The management plan has identified the following areas that would require EIA:

- a) Construction of office block;
- b) Construction of ranger/staff houses;
- c) Construction of camps and picnic sites;
- d) Fire breaks establishment and management;
- e) Development of roads and nature trails; and,
- f) Construction of buildings and associated structures.

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## CHAPTER VII - PLAN MONITORING AND EVALUATION

Monitoring and evaluation exercise serves as a tool assess project achievements, success, constraints and provides a feedback mechanism to improve proposed activities and make adjustments where necessary. The process also identifies problems, their sources to help come up with strategies in addressing them for a successful implementation and continuity of the proposed activities.

Monitoring and evaluation schedule will be based on the programmes being implemented, their duration and source of funding. However, for every programme, a mid and end term evaluations should be undertaken to assess their level of implementation, achievement, constraints and source of the problems. Analysis on progress made and constraints will provide information platform from which necessary adjustments can be carried out to ensure the programme meets its intended purpose. However, the mid and end term evaluation should be informed through continuous monitoring of project implementation by the concerned individuals, groups and departments.

### 7.1 Monitoring

Monitoring progress reports should be prepared and submitted on monthly, quarterly, half-yearly and annually. Project monitoring may be undertaken either internally or externally. Internal monitoring should be encouraged to involve the participation of the forest adjacent communities and other stakeholders, who may assist in assessing their progress on each of the programme's activity implementation. Once the community is trained, its members should avail monitoring data within the forest on project activities implementation levels, which can be used for project evaluation. External monitoring is preferred where technical requirements are needed and should be undertaken in consultation with the community, key stakeholders and other implementing agencies.

In order to implement the management plan efficiently, the following monitoring activities are intended to be implemented:

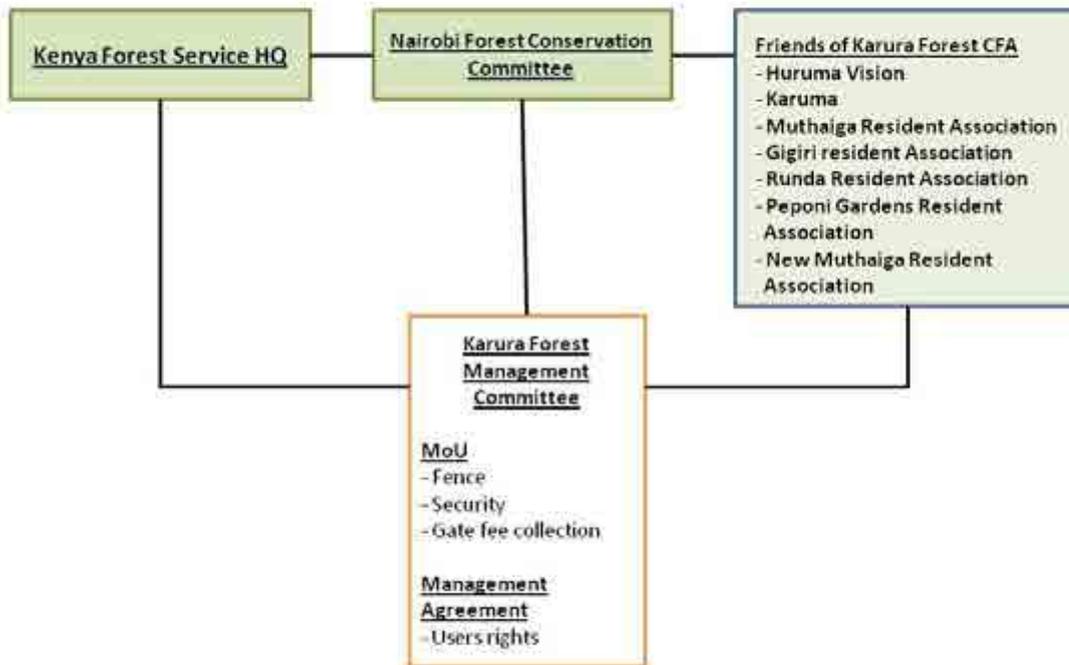
- a) Security will be provided by the KFS rangers and community scouts on a 24 hour basis, through daily patrolling of the fence and forest;
- b) Regular visits and spot checks will be organized for the security team;
- c) Periodic meetings (monthly) of the Karura Forest Management Committee will be convened;
- d) Periodic meetings (every three months) will be held (to which the Karura Forest stakeholders will be invited) to assess progress made towards the goals spelled out in the management plan. A site visit will be organized every three months;
- e) The Forest Conservation Committee (FCC) will continue to meet every three months;

- f) Quarterly and annual reports will be compiled and submitted to the KFS with a copy to key stakeholders; and,
- g) At the end of every financial year a Project, Objectives Strategy, Evaluation and Review (POSER) will be produced so as to allow for a review of achievements and to identify challenges.

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# APPENDIX I

## INSTITUTIONAL ARRANGEMENTS FOR PLAN IMPLEMENTATION



## APPENDIX II

### DETAILS OF THE PLANTATIONS WITHIN KARURA.

	SPECIES	SUB-COMP	AREA	AGE	DENSITY
KARURA	Cup. tororosa	17A	5.3 Ha	46 years	
"	Cup.lustanica	9C	2.0 Ha	34 years	
"	Araucaria cunninghamii	18A	10.5 Ha	46 years	
	Araucaria cunninghamii	18B	6.5 Ha	46 years	
	Araucaria cunninghamii	18C	3.7 Ha	49 years	
	Araucaria cunninghamii	13D	4.1 Ha	45 years	
	Araucaria cunninghamii	29A	1.2 Ha	43 years	
	Araucaria cunninghamii	34D	1.7 Ha	53 years	
	Araucaria cunninghamii	27A	7.7 Ha	44 years	
	Eucalyptus	Near HQs Offices	4.1 Ha	84 years	Coppice
	Eucalyptus	12C	3.2 Ha	81 years	Coppice
	Eucalyptus maculata	12B	1.8 Ha	41 years	Coppice
	Eucalyptus paniculata	12A	2.4 Ha	41 years	Coppice
	Eucalyptus saligna	14A	3.0 Ha	42 years	Coppice
	Eucalyptus paniculata & saligna	21A	4.5 Ha	50 years	Coppice
KARURA	Eucalyptus saligna	24C	4.1 Ha	53 years	Coppice
	Eucalyptus saligna	24D	8.9 Ha	38 years	Coppice
	Eucalyptus saligna & maculata	30A	8.9 Ha	53 years	Coppice
SIGIRIA	Cupressus torurosa	43A	2.3 Ha	44 years	
	Cupressus torurosa	49A	6.0 Ha	45 years	
SIGIRIA	Cupressus torurosa	42B	11.3 Ha	47 years	
SIGIRIA	Eucalyptus saligna	40A	8.9 Ha	52 years	Coppice
	Eucalyptus saligna	44A	6.1 Ha	74 years	Coppice
	Eucalyptus saligna	44C	1.2 Ha	70 years	Coppice
	Eucalyptus mix	45A	2.0 Ha	69 years	Coppice
	Eucalyptus saligna	45B	2.0 Ha	53 years	Coppice
	Eucalyptus saligna	46A	9.7 Ha	78 years	Coppice
	Eucalyptus saligna	46B	4.1 Ha	79 years	Coppice
	Eucalyptus saligna	48A	12.5 Ha	43 years	Coppice
	Eucalyptus mix	51A	8.5 Ha	47 years	Coppice

## APPENDIX III

### STAKEHOLDER ROLES AND RESPONSIBILITIES

<b>Category</b>	<b>Stakeholder</b>	<b>Roles/Responsibilities</b>
Government Institutions	MOF&W	Oversight responsibility over KFS
	KFS	Forest owners Provision of both Human and Financial resources
	Police (CID)	CID Hqs
	KEFRI	Research and wood workshop
	Tree Biotech Nursery	Biotech seedlings nursery and sales
	KWS	Wildlife in the forest
	Office of the President	Administration and general security
	Metropolitan Ministry	City Council oversight
	Infrasound Project	Research by UON and OP
Private Sector	KPLC	Power distribution lines maintenance and extension and Afforestation
	Small business owners	Cater for the needs for the Karura community
	Resident Associations	Partnering with KFS on Forestry
	American Embassy	Afforestation
	KCB	Afforestation
	UNEP	Guidance on international forestry policy and conventions.
	Naton Media	Afforestation
	I &M Bank	Afforestation
	DT Dobie	Afforestation
	Eagle Africa Insurance B	Afforestation
	City Bank	Afforestation
Faith Based Org.	Catholic church	Church
	Anglican Church	Church
	AIC	Church
	EA Pentecostal	Church
	Redeem Gospel	Church
Nairobi City Council	Karura Primary School	Primary school and staff houses
	Nairobi Water Co	Supply of water to Karura
NGOs	Green Belt Movement	Afforestation

CBOs	Friend of Karura Forest CFA	Joint management of the forest
	Huruma slum	Bee keeping, Tree planting and harvest firewood from the forest
	Mathare slum	depends on Karura Forest for fuel wood energy
	Githogoro slum	depends on Karura Forest for fuel wood energy
	Deep Sea slum	Fuel wood, depends on forest products

## **Appendix IV**

### **COMPOSITION OF FCC**

The Forest Conservation Committee (FCC) consists of:

- a) The Chairman;
- b) The Head of Nairobi Conservancy who is the Secretary of the committee;
- c) The Deputy Provincial Commissioner, representing the Provincial Administration;
- d) The forest officer in charge of Karura Forest Reserve, who is the secretary, and also in his role as responsible for Karura Forest Reserve shall, in consultation with the forest conservation committee, make inspection visits at least twice a year, and shall make a report thereon to the Director as to whether it is being managed in accordance with the provisions of this act;
- e) One member nominated jointly by members of the timber industry operating in Karura Forest Reserve;
- f) Four persons knowledgeable in forestry matters nominated by the conservancy area in consultation with the conservancy committees, including at least one female representative, one youth representative and one representative of Huruma Community;
- g) The Provincial Director of Agriculture who has been nominated by the Minister for Agriculture;
- h) The Provincial Director of Environment, who has been nominated by the Director General, National Environment Management Authority.

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## Appendix V

### **MANDATE OF THE KARURA FOREST MANAGEMENT COMMITTEE**

The mandate of the Karura Forest Management Committee is to:

- a) Promote the sustainable development of the forest for climate amelioration, soil, and water and biodiversity conservation;
- b) Carry out inventories and evaluation of forest resources and their potential utilization, in order to generate accurate information for decision making;
- c) Empower local communities to manage the forest through Community Forest Associations;
- d) Ensure that forest plantations are sustainably managed to realize their maximum potential;
- e) Support forest management which will embrace preservation of religious and cultural sites, traditional medical sources, water catchments, and habitats for endemic and threatened species of flora and fauna;
- f) Promote good governance in the forest sector;
- g) Ensure that Karura Forest Reserve, being largely indigenous, remains reserved;
- h) Determine and appropriate the status of the forest, and take restoration measures;
- i) Promote participatory forest management approaches to ensure the participation of communities and other stakeholders in the management of Karura Forest Reserve;
- j) Ensure that users benefiting from the forest contribute to the conservation and management through the user pay principle;
- k) Promote insect farming and other sustainable, non-harmful uses of forest are enabled;
- l) Ensure that forest plantations are efficiently managed and operated on a commercial basis;
- m) Ensure that degraded and over exploited areas are rehabilitated by community associations with government support;
- n) Develop recreation and ecotourism facilities;
- o) Liberalise seedlings production;
- p) Promote value added forest products;
- q) Application of forestry research findings;
- r) Support public awareness creation with regard to forest conservation management and utilization;

- s) Protect traditional interests of local communities customarily resident within or around a forest;
- t) Respect cultural practices that are compatible with sustainable forest management;
- u) Enhance more opportunities for women and youth in the forest through training and education; and,
- v) Promote HIV/AIDS awareness.

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## REFERENCES

1. Participatory Forest Management Guidelines (KFS-Dec 2007)
2. Manual on Preparation of Participatory Forest Management Plans (Dec 2007)
3. Forests Act 2005 (Government Press)
4. Draft Forest Policy (Sessional Paper No.9 of 2005)
5. Kenya Forest Service Strategic Plan 2009/10 - 2013/14
6. The Forests (Participation in Sustainable Forest Management) Rules, 2007 (Government Press)