KENYA WILDLIFE SERVICE

Mt Kenya Ecosystem
Management Plan, 2010-2020

Mt. Kenya Ecosystem
Management Plan, 2010-2020

Planning carried out by

MKE Managers
MKE Stakeholders

In accordance with the

PROTECTED AREAS PLANNING FRAMEWORK

Acknowledgements

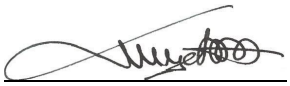
This General Management Plan has been developed through a participatory planning process involving a cross section of MKE stakeholders, under the coordination of a Core Planning Team comprising representatives from MKE managers (KWS and KFS), KWS and KFS HQ Planners, and NEMA and WRMA Regional Officers in Charge of the MKE.

KENYA WILDLIFE SERVICE	KWS, through the GOK/IFAD funded Mt. Kenya East Pilot Project, funded the planning process and provided planning technical assistance for the development of the plan
KENYA Forest Service	KFS co-funded the planning process and also provided technical assistance for the development of the plan.
WATER RESOURCES MANAGEMENT AUTHORITY	WRMA participated in the Core Planning Team and provided technical advice and information relevant for development of the Water Resource Management Programme.
KENYA FORESTRY RESEARCH INSTITUTE KEFRI	KEFRI participated in the Core Planning Team and provided technical advice and information for development of the Forest Resource Management Programme.
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY KENYA	NEMA participated in the Core Planning Team and ensured that the plan addressed key environmental management issues.

Approval Page

The management of Kenya Wildlife Service has approved the implementation of this management plan for the Mt. Kenya Ecosystem.

On behalf of the
KENYA WILDLIFE SERVICE



Julius Kipng'etich
Director

Date: 21.09.2010

Executive Summary

The Plan

This 10-year (2010-2020) management plan for Mt. Kenya Ecosystem (MKE) has been developed by MKE stakeholders through an elaborate and highly participatory planning process that benefited from a wealth of information and ideas provided by key MKE stakeholders. Plan implementation will similarly be quite participatory to ensure that management actions designed to address threats impacting on MKE's natural resources are effectively abated.

This plan is one in a series of protected area plans that have been developed in line with the KWS Protected Area Planning Framework (PAPF). These plans adopt an ecosystem approach to plan development and implementation with a view to addressing conservation issues holistically and actively involving local communities and other stakeholders in ecosystem conservation and management. PAPF-based plans are principally designed to be practical management tools to support day-to-day management of conservation areas. Unlike other types of plans where management actions are often stated but not expounded, management actions in PAPF-based plans are elaborated to improve understanding increasing prospects of implementation. They however, do not set out a detailed inventory of issues or problems impacting the MKE, that are not directly addressed through the plan's management objectives and actions and they do not provide detailed descriptions of the PAs management, administration, and national policies, unless they are relevant to the plan's management objectives and actions. Detailed inventories are usually provided in a separate document referred to as the Resource Base Inventory (RBI) Report.

Plan structure

The plan is divided into seven main sections. These include the Plan foundations; the MKE zonation scheme; the seven management programmes; and plan monitoring sections.

Plan Foundations. It gives a description of the key components of the MKE, sets out the MKE Exceptional Reserve Values, Purpose Statement and subsidiary purposes, which are the basis for which the MKE was established as a conservation area.

MKE Zonation Scheme. This section defines the zonation scheme developed for the MKE. The scheme divides the MKE into use zones and specifies allowed visitor activities and the type of visitor accommodation facilities that can be developed in each zone. In addition, the scheme describes KWS and KFS management sectors that the MKE is divided into to facilitate efficient and effective management of the area.

The seven management programmes. The main bulk of the plan is divided into seven management programmes:

1. Ecological Management Programme
2. Forest Resource Management Programme
3. Water Resource Management Programme
4. Tourism Development and Management Programme
5. Community Partnership and Education Management Programme
6. Security Management Programme
7. Protected Area Operations Programme

Each programme contains management objectives that set out the goals that MKE management aims to achieve, and a set of specific management actions to achieve these goals.

The **plan monitoring** framework provides guidance to enable the assessment of the potential impacts, positive, and where appropriate negative, resulting from the implementation of each of the five management programmes.

Participation in planning

The PAPF planning process has been designed to ensure a high degree of stakeholder participation in the development of a management plan. This is achieved through a multi-layered approach involving a variety of mechanisms designed to ensure that all stakeholders can meaningfully contribute to the plan's development. The three principal mechanisms used to enable this participation are: the Core Planning Team, Stakeholder Workshops, and Expert Working Groups. The MKE planning process adopted the aforementioned approaches to ensure that a broad spectrum of stakeholders was involved in the planning process.

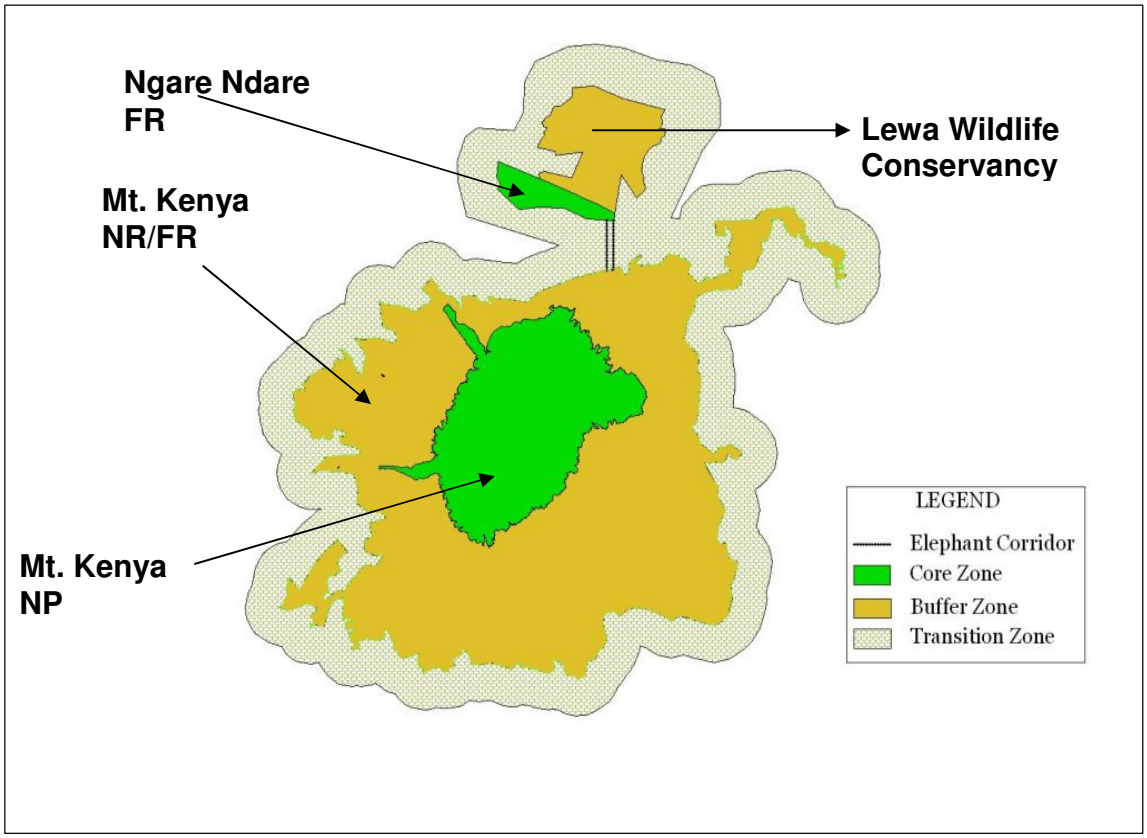
The Mt. Kenya Ecosystem

Mt. Kenya Ecosystem consists of Mt Kenya National Park, Mt Kenya Forest Reserve/ National Reserve, and adjacent environs including Ngare Ndare Forest and the Lewa Wildlife Conservancy. The Mount Kenya Forest Reserve was gazetted in 1932 and placed under the jurisdiction of the Forest Department (currently Kenya Forest Service) with the aim of forest conservation and development, which included establishing plantations in the place of harvested indigenous stands, regulating access to resources and sustaining a forest industry.

The Mt. Kenya National Park (58870 Ha) was demarcated within the Forest Reserve's upper zone above 3200m Above Sea Level in 1949 and placed under the management of the Game Department. It was the third National Park to be gazetted in Kenya after Nairobi (1946) and Tsavo National Park (1948). The Sirimon and Naro Moru extensions (12640 Ha) were later added in 1968, bringing the size of the National Park to 71,510 Ha.

In 2000, through a government notice, the entire Mt. Kenya Forest Reserve was gazetted as a National Reserve under the management of KWS but the earlier Forest Reserve status was not revoked. This implies that the Forest Reserve/National Reserve is legally managed jointly by KWS and KFS.

The MKE's Key components



MKE Purpose Statement

The MKE Purpose Statement summarises the importance of the MKE, clarifies the reasons for its existence, and provides the overall goal that MKE managers are striving to achieve. Both primary and supplementary purposes have been defined by MKE stakeholders.

The Purpose of the Mt. Kenya Ecosystem is:

To protect and conserve the water catchment and biodiversity, especially endemic, rare and threatened species, in the MKE for the present and future generations

Supplementary purposes of the MKE are:

- **To enhance forest production to generate economic benefits to the country**
- **To provide opportunities to local communities to benefit from the conservation of the forest resources**
- **To provide an opportunity for scientific research**
- **To preserve all sites of aesthetic, historical and cultural significance in the**
- **To exploit the tourism potential offered by the diversity of species, habitats, sceneries and a wide array of possible tourist attractions**

MKE Exceptional Resource Values

The exceptional resource values of MKE are those features, which justify its protected area status. The highest priority values of the MKE for the purpose of conservation are however, its biodiversity and water catchment values for which the MKE has been designated a protected area. The exceptional resource values are broadly classified into four categories: Biodiversity, Scenic, Social and Cultural.

MKE Exceptional Resource Values

Category	*Exceptional Resource Value*
Biodiversity	▸ Species of special concern
	▸ Important Bird Area
	▸ Afro-alpine ecosystem
	▸ Ecological diversity
Scenic	▸ Wilderness quality
	▸ The snow-capped peaks
	▸ Lakes, tarns and glacial features
Social	▸ Water catchment
	▸ Agricultural practices
	▸ Source of wood and non-wood forest products
	▸ Global Atmospheric Watch Station
	▸ Biosphere Reserve and World heritage site status
Cultural	▸ Historical sites
	▸ Religious importance

Threats to the MKE

Considerable resources and efforts have been invested in improving the management of the protected areas of Mt Kenya ecosystem in the past years. Although some successes have been achieved, tremendous threats and pressures on the ecosystem remain. The main source of this pressure arises from the depletion of resources and degradation within and near the populated areas of the ecosystem. The resource depletion and degradation are mainly due to unsustainable use levels and patterns as a result of poverty, rapid rural population growth, poor or inappropriate management skills and weak management institutions and systems. As resources become scarce on private and community lands, the population turns to the neighboring protected areas for livelihood resources. The key threats are manifested in form of wildlife Poaching and particularly bush meat poaching; Illegal Logging which is prevalent in the lower elevations of the forest; forest fires; invasive species; illegal water abstraction; visitor related impacts such as poor waste management; and human-Wildlife conflict.

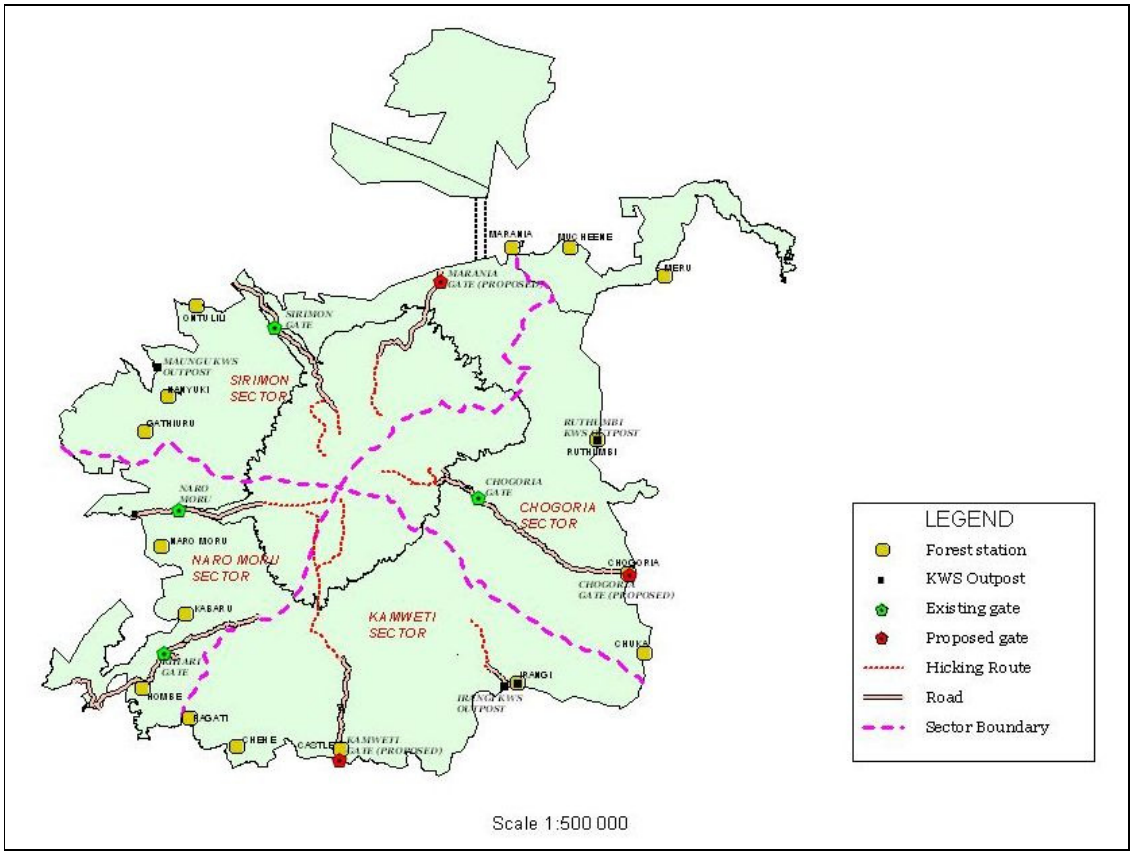
MKE Zonation Scheme

MKE management zoning is meant to reconcile the principal purpose of protecting the water catchment and other resource values with limited use of these resources by visitors and local communities. The zoning scheme is expected to guide MKE managers as they implement management and development prescriptions in the ecosystem, thereby achieving the MKE purpose.

Management Sectors

Due to the vastness of the MKE, the difficult terrain, and the distances between various outposts, KWS has divided the MKE into four management sectors to facilitate effective administration of the entire forest ecosystem. Similarly, KFS manages the MKE through 18 Forest Stations.

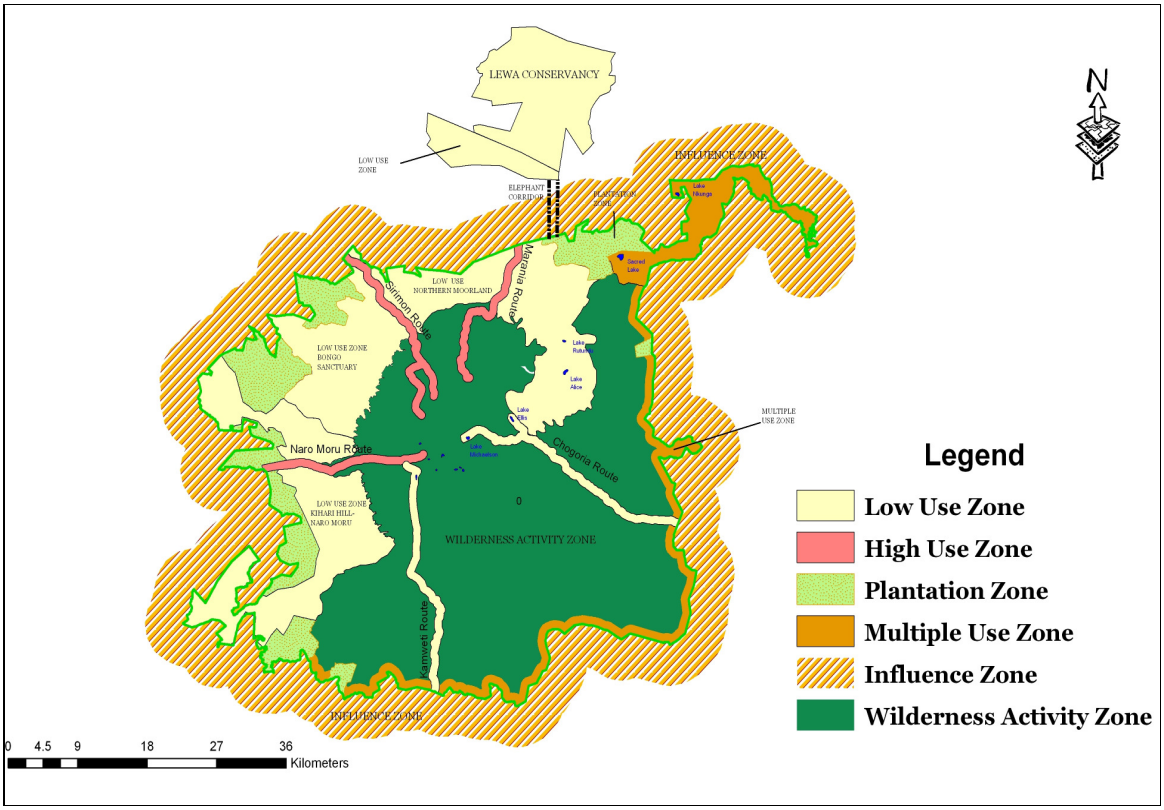
MKE Management Sectors and Administration Centres



Visitor Use Zones

The visitor use zoning divides the ecosystem into six distinct zones i.e. High Use Zone, Low Use Zone, Wilderness Activity Zone, Multiple Use Zone, Plantation Zone and Influence Zone.

MKE Visitor Use Zonation



Ecological Management Programme

The MKE ecology has been subjected to direct threats emanating from human activities. The Ecological Management programme therefore addresses threats to MKE biodiversity by focusing on biodiversity restoration and protection, linking ecosystems, and carrying out applied research to understand how the ecosystem functions. In implementing the MKE's Ecological Management Programme, MKE Management and stakeholders will strive to ensure that: MKE's rare and threatened species are protected, restored and monitored; MKE's habitats are protected, preserved and restored; ecosystem connectivity is established to increase resilience; and Mt. Kenya ecosystem functioning is understood.

Four objectives have been developed addressing threats to MKE's threatened large mammals (covering conservation targets: Elephant, Black rhino, and Mountain Bongo); addressing key threats to the MKE's critical habitats; addressing wildfire as a crosscutting threat to all conservation targets; and addressing cross cutting threats, including climate change, which threaten all conservation targets and require long-term monitoring.

Forest Resource Management Programme

The MKE Forest Reserve/ National Reserve consists of both natural and plantation forests providing a wide range of ecosystem services. The forests, however, face major challenges that threaten ecosystem integrity and the potential for continued provision of ecosystem goods and services. Some of the key threats include illegal logging of selected timber tree species, charcoal burning, and encroachment on the forest. To address these issues holisti-

cally, KFS has embraced Participatory Forest Management (PFM) approach in the management of its forest resources countrywide. MKE Forest Resource Management Programme aims to address the threats that are impacting on the most important ecological features and values of MKE ecosystem, and to provide a guiding framework for the long-term forest resource development of the area.

In implementing the MKE's Forest Resource Management Programme, MKE Management and stakeholders will strive to ensure that: wood and non-wood natural forest products are sustainably exploited; commercial production of wood and other forest products is sustainable; plantation forests are developed and managed to meet these market demands; degraded forest areas are restored; and local communities are actively involved in forest management.

This programme has community participation in forest management as its key driver to ensure a sustained delivery of forest products and services locally and regionally. Participation of the local communities in the forest management programme will however be guided by the existing Participatory Forest Management guidelines developed by KFS.

Water Resource Management Programme

The water resources management programme addresses issues affecting water resources in the protected water catchment area and the five kilometre influence zone surrounding the protected areas. The Water Resources Management Authorities covering MKE, Ewaso Nyiro North and Tana, have already developed robust and very elaborate 5-year Catchment Management Strategies covering the entire catchment area which are the key reference documents guiding the water resource management in MKE and the rest of the two catchment areas (Ewaso Nyiro North and Tana). The water resources management programme in this MKE plan has therefore been developed in line with these Catchment Management Strategies and focuses on management actions whose success hinge on close collaboration between the WRMAs, KWS and KFS.

In implementing MKE's Water Resources Management Programme, MKE Management and stakeholders will strive to ensure that: Water catchment areas are restored and conserved; and water abstraction from rivers is controlled and monitored. This will be achieved through implementation of two management objectives that have been designed to address key threats to water resource use and conservation in MKE (i.e. illegal abstraction, riparian cultivation, pollution and siltation of rivers and dams, and soil erosion). These objectives are: water resource use patterns regulated, controlled and monitored; and sustainable water management enhanced and natural water flow regimes protected

Tourism Development and Management Programme

Mt Kenya has attractive sceneries and great potential for tourism development, which is yet to be fully harnessed. The ecosystem is endowed with unique geomorphologic features, cultural and historical sites that are of great tourism attraction. In addition to this, there are wildlife populations of elephants, buffalos, reptiles and birds, which attract visitors. Mt Kenya is the second highest mountain in Africa and offers widely sought after challenges to mountain climbers. It is the only mountain in the world on the equator snow-capped through out the year.

Private eco-tourism firms offer alternative recreational tourism and have built strong collaboration with the MKE management to promote tourism in the region by offering a diversity of activities such as bird watching, trout fishing, walking and wilderness trails. Income from tourism in the ecosystem is approximately Ksh. 60 million per year but the potential of tourism, if fully developed and well regulated, will increase. Over 1,000 people earn occasional employment as porters and guides while the running of hotels around the ecosystem promotes employment both directly and indirectly through the follow on demand for goods and services.

The development of tourism in this ecosystem has, however, been faced with various challenges including poor infrastructure, uncontrolled entry into the ecosystem, visitor security and lack of equitable benefit sharing among all the stakeholders in this sector.

This programme sets out a series of management objectives and actions that the MKE management will implement over the next 10 years aimed at realising the ecosystem's full tourism potential. The following sections describe the guiding principles underpinning the MKE Tourism Development and Management Programme. These principles will guide MKE management in the implementation of the programme and thereby realising the programme purpose.

In implementing the MKE's Tourism Development and Management Programme, MKE Management will strive to ensure that: The MKE offers diverse low impact tourist activities; Tourism is developed to augment resource protection; MKE tourist products and services marketed; and Management of risk and safety. To ensure that there are adequate visitor accommodation facilities in the MKE, visitor facilities will be developed as follows:

Proposed accommodation facilities in the MKE

Name of facility	Location	Facility type	Institution Responsible
1. Ragati fishing Camp	Ragati Forest Station	Ecolodge	KFS
2. Marania Fishing and Sports tourism camp	Marania Forest Station	Ecolodge	KFS
3. Naro Moru Forest Station Camp Site	Naro Moru Forest Station	Ecolodge	KFS
4. Thegu Forest Lodge	Kabaru Forest	Ecolodge	KFS
5. Ngare Ndare	Ngare Ndare Forest	Ecolodge	KFS
6. Sacred Lake	Mucheene Forest	Ecolodge	KFS
7. Sacred Lake	Mucheene Forest	Tented camp	KFS
8. Chungu River Lodge	Chuka Forest	Ecolodge	KFS
9. Chogoria Lodge	Chogoria Forest	Ecolodge	KFS
10. Themwe/Kaburia Lodge	Ruthumbi Forest	Ecolodge	KFS
11. Irangi Forest Lodge	Irangi Forest	Ecolodge	KFS
12. Sirimon Lodge	Sirimon Salient	Ecolodge	KWS
13. Secret Valley	Gathiuru	Ecolodge	KFS

Community Partnership and Education Programme

The Mt Kenya Ecosystem contains several resources that are of benefit to local communities and the country at large. These resources are in terms of fauna, flora, soil, water and their ecological functions. Communities extract a variety of resources from the ecosystem including firewood, building materials, medicinal plants, fish, water, honey and fodder for livestock. These natural resource uses require an elaborate management system to ensure that resources are sustainably managed for both the present and future generations. The main conservation initiatives envisaged in this plan include: biodiversity, soil and water conservation which cannot be realized by government and NGO's working within the ecosystem, without the involvement of the local communities since they are the direct beneficiaries. In addition, Illegal activities, such as illegal logging, charcoal production in the forest, encroachment, and poaching can be minimized substantially if local communities are increasingly involved in the management of the MKE. Hence, elaborate participatory engagement with communities will be adopted to address community-forest relations.

In implementing the MKE's Community Partnership and Education Programme, MKE Management will strive to ensure that: community-protected area communications are improved; human-Wildlife conflicts are minimised in the MKE adjacent areas; communities and other stakeholders are aware of the MKE's values and importance; and communities are benefiting from natural resources in the MKE. This will be achieved through implementation of the following three management objectives: conservation education and awareness programme strengthened; human-wildlife conflict reduced; and opportunities for communities to benefit from the MKE improved.

Security Programme

Security is an important service for successful implementation of all the management programmes proposed in this management plan and for the overall resource management. Boundary encroachment, illegal water abstractions, marijuana cultivation, accidental forest fires, poaching of wild animals, illegal logging, visitor insecurity and other forms of illegal activities have been a major security challenge in the ecosystem. Hence, in implementing the MKE's Security Programme, MKE Management will strive to ensure that: security presence is extended across MKE; operational effectiveness is improved; and collaboration with key stakeholders in security matters is strengthened. The management objectives to be achieved through this programme focus on ensuring visitor security and enhancing security patrols to deter conservation related crimes.

Protected Area Operations Programme

A key element underpinning management programmes in this plan is that the MKE will be managed as a single integrated ecological unit. As the majority of the MKE falls under various management jurisdictions (KWS, KFS and LWC) managing this area for biodiversity will require the cooperation amongst these resource management agencies. Since Mt Kenya forests are under dual gazettement (gazetted by KFS as Forest Reserve and by KWS as National Reserve) collaboration between KWS and KFS in the management of the Forest is paramount. Hence, in implementing the MKE's Protected Area Operations Programme, MKE Management will strive to ensure that: management is integrated across the MKE; staff welfare and motivation is enhanced as employees are a critical component of MKE man-

agement system and conservation success is dependent on them; and that effective and efficient management infrastructure is provided.

Plan Monitoring

The plan monitoring section provides guidance for the assessment of the potential impacts resulting from the implementation of each of the seven management programmes. The plan monitoring framework sets out the desired positive impact of each programme's objectives, as well as any potential negative impacts that may possibly occur. The framework also includes easily measurable and quantifiable indicators for assessing these impacts, and potential sources of the information needed.

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Acronyms

BoT	Board of Trustees
CAAC	Catchment Area Advisory Committee
CAP	Conservation Action Planning
CBO	Community Based Organisation
CCC	Community Consultative Committee
CFA	Community Forest Association
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CP & E	Community Partnership and Education
CPT	Core Planning Team
CSF	Community Solar Fence
DRSRS	Department of Resource Survey and Remote Sensing
EIA	Environmental Impact Assessment
ERV	Exceptional Resource Value
GAW	Global Atmospheric Watch
GIS	Geographic Information System
GPS	Global Positioning Systems
HUZ	High Use Zone
HWC	Human-Wildlife Conflict
IUCN	The World Conservation Union
IFAD	International Fund for Agricultural Development
KATO	Kenya Association of Tour Operators
KEA	Key Ecological Attribute
KENGEN	Kenya Electricity Generating Company
KFS	Kenya Forest Service
KPSGA	Kenya Professional Safari Guides Association
KTF	Kenya Tourism Federation
KWS	Kenya Wildlife Service
LAU	Limits of Acceptable Use
LUZ	Low Use Zone
MAC	Management Advisory Committee
MKE	Mt. Kenya Ecosystem
MKEPP	Mt. Kenya East Pilot project
MoU	Memorandum of Understanding
NEMA	National Environmental Management Authority
NGO	Non-Government Organisation
NP	National Park
PA	Protected Area
PAC	Problem Animal Control
PAPF	Protected Areas Planning Framework
TD&M	Tourism Development and Management
RGS	River Gauge Station
TNC	The Nature Conservancy
WAZ	Wilderness Activity Zone
WCK	Wildlife Clubs of Kenya
WRUA	Water Resource Management Association

Plan Foundations

The Plan

This 10-year (2010-2020) management plan for Mt. Kenya Ecosystem (MKE) has been developed by MKE stakeholders through an elaborate and highly participatory planning process that benefited from a wealth of information and ideas provided by key MKE stakeholders. Plan implementation will similarly be quite participatory to ensure that management actions designed to address threats impacting on MKE's natural resources are effectively abated.

This plan is one in a series of protected area plans that have been developed in line with the KWS Protected Area Planning Framework (PAPF). These plans adopt an ecosystem approach to plan development and implementation with a view to addressing conservation issues holistically and actively involving local communities and other stakeholders in ecosystem conservation and management. PAPF-based plans are principally designed to be practical management tools to support day-to-day management of conservation areas. Unlike other types of plans where management actions are often stated but not expounded, management actions in PAPF-based plans are elaborated to improve understanding increasing prospects of implementation. The key elements of the PAPF-based plans are set out in box 1.

Box 1. The key elements of a PAPF-Based Plan

A PAPF-based Plan should:

- **Vision**: Set out a common understanding between stakeholders of the purpose of the PA and its most important values, towards which all management action in the PA will be focused
- **What**: Establish clear management objectives that are agreed by the PA stakeholders and managers and that, if achieved, will ensure the PA purpose will be fulfilled and exceptional resource values are conserved
- **How**: Provide clear and unambiguous guidance and a rationale for the specific management actions that PA Managers will need to implement over the 10-year timeframe of the plan to achieve the management objectives
- **Where**: Define a mechanism for PA zoning to enable different types and intensities of use in different parts of the PA, thereby facilitating reconciliation of the PA's sometimes competing conservation and development objectives
- **When**: Provide a detailed activity plan for the first three years of implementing the management plan, thereby establishing a crucial link between the plan's long-term management objectives and the annual operational planning and budgeting routinely carried out by PA Managers
- **Who**: Provide a practical framework enabling the collaboration of PA managers and other institutions and stakeholders in implementing the plan
- **Rules**: Set out clear and unambiguous prescriptions and regulations on what can and cannot occur in different parts of the PA in order to achieve the area's management objectives and fulfil the PA purpose.

The Plan is NOT designed to:

- Provide a comprehensive reference source for the PA, with detailed background information on the area's biodiversity, ecology, geology, soils, etc
- Set out a detailed inventory of issues or problems impacting the MKE, that are not directly addressed through the plan's management objectives and actions
- Provide detailed descriptions of the PAs management, administration, and national policies, unless they are relevant to the plan's management objectives and actions.

Plan structure

The plan is divided into seven main sections. These include the Plan foundations; the MKE zonation scheme; the seven management programmes; and plan monitoring sections.

- **Plan Foundations**. This section introduces the PAPF planning process used to develop the plan, and describes in general the key elements and functions of PAPF-based plans. An outline of the plan structure, planning process used to develop the plan and mechanisms for stakeholder participation in plan development are also discussed. The chapter also provides a brief description of MKE and its exceptional resource values. It sets out the MKE Purpose Statement and subsidiary purposes, which are the basis for which the MKE was established as a conservation status.

- **MKE Zonation Scheme.** This section defines the zonation scheme developed for the MKE. The scheme divides the MKE into visitor use zones and specifies allowed visitor activities and the type of visitor accommodation facilities that can be developed in each zone. In addition, the scheme describes KWS and KFS management sectors that the MKE is divided into to facilitate efficient and effective management of the area.

- **The seven management programmes.** The main bulk of the plan is divided into seven management programmes:

    1. **Ecological Management Programme**
    2. **Forest Resource Management Programme**
    3. **Water Resource Management Programme**
    4. **Tourism Development and Management Programme**
    5. **Community Partnership and Education Management Programme**
    6. **Security Management Programme**
    7. **Protected Area Operations Management Programme**

    Each programme includes a programme purpose statement, which sets out the overall goal to which management under this programme is working towards, and a strategy describing the overall management approach pursued through the programme. Each programme also contains management objectives that set out the goals that MKE management aims to achieve, and a set of specific management actions to achieve these goals.

    Each of the management programmes are completed by a ***3-year Activity Plan (Annex 1[1])***, which breaks down the individual management actions to be completed in the first three years of the plan implementation period into a series of tangible management ac-

[1] Activity plans for programmes that will be implemented by KWS are provided in Annex 1. These are the Ecological, Tourism Development and Management , Community Partnership and Education, Security, and Protected Area Operations Management Programmes.

tivities, and sets out the timeframe for their implementation, allocates responsibility for their completion, and the "milestones" that management aims to achieve.

- The **plan monitoring** framework provides guidance to enable the assessment of the potential impacts, positive, and where appropriate negative, resulting from the implementation of each of the five management programmes. The framework sets out the desired impact of each programme's objectives, and any potential negative impacts that may occur. The framework also includes easily measurable and quantifiable indicators for assessing these impacts, and potential sources of the information required.

Participation in planning

As discussed above, the PAPF planning process has been designed to ensure a high degree of stakeholder participation in the development of a PA management plan. This is achieved through a multi-layered approach involving a variety of mechanisms designed to ensure that all stakeholders can meaningfully contribute to the plan's development. The three principal mechanisms used to enable this participation are: the Core Planning Team, Stakeholder Workshops, and Expert Working Groups. The roles and functions of these mechanisms are elaborated in the following paragraphs:

- The ***MKE Core Planning Team*** (CPT) provided overall guidance and oversight to the entire planning process. The MKE CPT consisted of: MKE managers (KWS and KFS); KWS and KFS HQ planners; National Environment Management Authority (NEMA); Kenya Forest Research Institute (KEFRI); and Water Resources Management Authority (WRMA). The CPT was responsible for steering the planning process ensuring that planning events and activities are carried out as scheduled. It was also responsible for synthesizing outputs from planning activities into a management plan.

- ***MKE Stakeholder Workshops*** were held for various purposes including generating information relevant to planning; providing feedback on the draft plan; and endorsing the final plan. The workshops drew participants from a broad section of stakeholders including scientists, protected area managers, MKE adjacent local communities, Non-Governmental Organisations (NGOs), and government departments.

- Three ***Expert Working Groups*** were formed during the plan's development. The first working group was responsible for developing the Ecological, Forest Resource and Water Resource Management Programmes; the second working group developed the Tourism Development and Management Programme; while third working group developed the Community Partnership and Education, Security and Protected Areas Operations Programmes. Each working group refined the relevant management programme's purpose, strategy and objectives, and developed the subsidiary management actions necessary for achieving each objective. In addition, all working groups were involved in the development and review of the MKE Zonation Scheme.

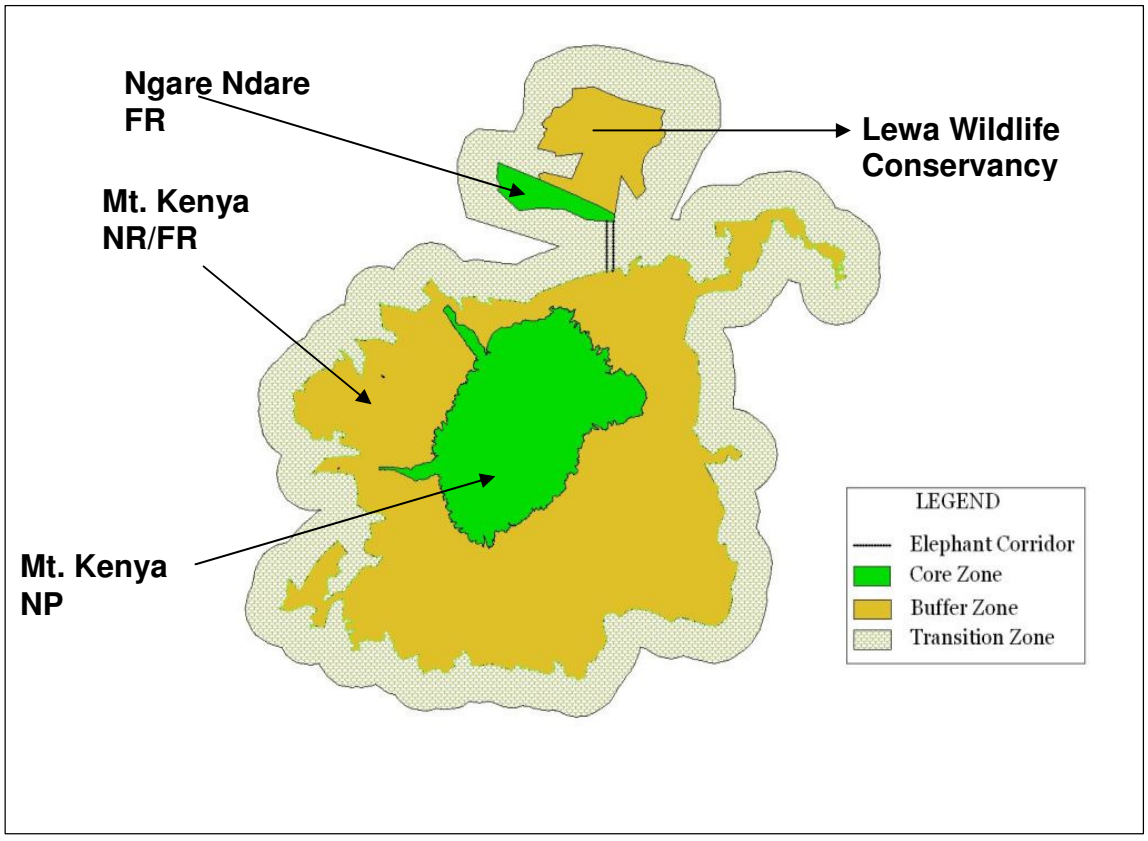
The Mt. Kenya Ecosystem

Area description

Mt. Kenya Ecosystem consists of Mt Kenya National Park, Mt Kenya Forest Reserve/ National reserve, and adjacent environs including Ngare Ndare Forest and the Lewa Wildlife Conservancy (see Figure 1). The Mount Kenya Forest Reserve was gazetted in 1932 and placed under the jurisdiction of the Forest Department (currently Kenya Forest Service) with the aim of forest conservation and development, which included establishing plantations in the place of harvested indigenous stands, regulating access to resources and sustaining a forest industry.

In 1978, the MKE was designated a Biosphere Reserve under the UNESCO's Man and Biosphere programme. In December 1997, the National Park and most of the undisturbed natural forest were inscribed as a Natural World Heritage Site under UNESCO's World Heritage Site programme. In 2000, through a government notice, the entire Mt. Kenya Forest Reserve was gazetted as a National Reserve under the management of KWS but the earlier Forest Reserve status was not revoked. This implies that the Forest Reserve/National Reserve is legally managed jointly by KWS and KFS.

Figure 1. The MKE's Key components



The following sections provide a brief overview of the MKE's four constituent conservation areas.

Mt. Kenya National Park

The Mt. Kenya National Park (58870 Ha) was demarcated within the Forest Reserve's upper zone above 3200m Above Sea Level in 1949 and placed under the management of the Game Department. It was the third National Park to be gazetted in Kenya after Nairobi National (1946) and Tsavo National Park (1948). The Sirimon and Naro Moru extensions (12640 Ha) were later added in 1968, bringing the size of the National Park to 71,510 Ha.

Mt. Kenya National Reserve/Forest Reserve

The Mount Kenya Forest area that is not included in the National Park is under dual gazettement as both a National Reserve under KWS and a Forest Reserve under KFS. The Forest Reserve was gazetted in 1932 and this gazettement was not revoked when the same area was gazetted as a national reserve in 2000 under the Wildlife Conservation and Management Act. This forest is therefore managed jointly by KWS and KFS.

There have been a number of other alterations to the Forest Reserve at its lower boundaries, including several excisions for settlement and agriculture and for the creation of the Nyayo Tea Zone. Since inception of the Forest Reserve, 6,361Ha have been excised.

Lewa Wildlife Conservancy

The area now referred to as Lewa Wildlife conservancy (LWC) was previously a 200 Km^2 privately owned cattle ranch known as Lewa Downs. In 1995, however the ranch was converted into a wildlife Conservancy for purposes of promoting wildlife conservation and placed under the management of a board of trustees. LWC is linked to Mt. Kenya Forest by a narrow 9 Km long corridor that crosses Ngare Ndare Forest and private land.

Ngare Ndare forest

Ngare Ndare Forest Reserve (NNFT) was originally gazetted in 1932 as Crown Forest, with an area of 10,290ha. Almost half of this area was excised in 1950 and currently the Forest covers 5554.3 hectares. This predominantly dry, cedar forest receives an annual rainfall of around 450mm, presenting a striking contrast to the densely populated land in the south and the dry savannah plateau toward North of the forest.

The forest is an important part of the wildlife corridor connecting Lewa Wildlife Conservancy (LWC) to Mt. Kenya Forest (See figure 2). It is also an important habitat for the black rhino and increases range for different wildlife species in the adjoining LWC and Borana ranch. In addition, the forest is a source of four rivers, some of which sustain the drier lowlands of LWC, Manyagalo and Borana while supporting the flow of Ewaso Ng'iro, (the life line for the pastoral communities in Isiolo and Samburu districts). The forest is also the source of Ngare Ndare River, along which most of the settlement is found.

KWS/KFS/LWC management collaboration

The implementation of a single ecosystem wide management plan requires a high degree of collaboration between the three institutions with jurisdiction over the constituent ecosystem components (i.e. KWS, KFS and LWC). Such collaboration requires clear allocation of roles

and responsibilities for management plan implementation between these institutions, and necessitates agreement on a variety of issues such as access control to the protected areas, visitor management, visitor facility development process, forest resource utilisation, and the distribution of tourism revenues. As such, Memorandums of Understanding (MoUs) concerning the implementation of this management plan will be agreed between KWS, KFS and LWC. Specific issues that will be addressed in these MoUs relating to the implementation of this management plan include:

- A definition of the roles and responsibilities of KWS;
- A definition of the roles and responsibilities of KFS;
- Agreements on management and access over the entire MKE; and
- Agreements on development of infrastructure in the MKE (i.e visitor, water resource use, fisheries, forest resource use)
- Maintenance of the elephant corridor

MKE Purpose Statement

The MKE Purpose Statement summarises the importance of the MKE, clarifies the reasons for its existence, and provides the overall goal that MKE managers are striving to achieve. The Purpose Statement is divided into a primary MKE Purpose followed by a series of supplementary purposes that expand on and complement the primary purpose. Both primary and supplementary purposes have been defined by MKE stakeholders.

The Purpose of the Mt. Kenya Ecosystem is:

To protect and conserve the water catchment and biodiversity, especially endemic, rare and threatened species, in the MKE for the present and future generations

Supplementary purposes of the MKE are:

- **To enhance forest production to generate economic benefits to the country**
- **To provide opportunities to local communities to benefit from the conservation of the forest resources**
- **To provide an opportunity for scientific research**
- **To preserve all sites of aesthetic, historical and cultural significance in the MKE**
- **To exploit the tourism potential offered by the diversity of species, habitats, sceneries and a wide array of possible tourist attractions**

The development of the above Purpose Statement was based on the stakeholder identification of the MKE “Exceptional Resource Values” (ERVs). These ERVs are discussed and elaborated in the following section.

MKE Exceptional Resource Values

The exceptional resource values of MKE are those features, which justify its protected area status. The primary objective of the plan is to conserve these features in perpetuity so that the ecosystem can continue providing ecosystem goods and services sustainably. The exceptional resource values are broadly classified into four categories: Biodiversity, Scenic, Social and Cultural (see table 1). The highest priority values of the MKE for the purpose of conservation are however, its biodiversity and water catchment values for which the MKE

has been designated a protected area. A description of MKE's ERVs is given in the following sections.

Table 1. MKE Exceptional Resource Values

Category	*Exceptional Resource Value*
Biodiversity	▸ Species of special concern
	▸ Important Bird Area
	▸ Afro-alpine ecosystem
	▸ Ecological diversity
Scenic	▸ Wilderness quality
	▸ The snow-capped peaks
	▸ Lakes, tarns and glacial features
Social	▸ Water catchment
	▸ Agricultural practices
	▸ Source of wood and non-wood forest products
	▸ Global Atmospheric Watch Station
	▸ Biosphere Reserve and World heritage site status
Cultural	▸ Historical sites
	▸ Religious importance

Biodiversity values

Species of special concern

The vast forest has large populations of several threatened animal species and the evolution and ecology of the Afro-alpine flora are outstanding for a wide range of rare and endemic species. Mammals with a conservation interest in the ecosystem include:

African elephant (*Loxodonta Africana*): Mount Kenya ecosystem supports the countries largest remaining forest population of elephants estimated at 2000-3000 individuals. There is documented movement of elephants from Mt. Kenya Forest Reserve to the savannah grasslands of Laikipa-Samburu ecosystem through a corridor connecting the forest to Lewa wildlife Conservancy. This corridor, which is under private ownership, has been set aside to facilitate elephant movement.

Black rhinoceros (*Diceros bicornis*) are classified as critically endangered by IUCN. Although two populations existed in the forest reserve up to early 2000, they are now extremely rare and none has been sighted for the last seven years in the protected areas of Mt. Kenya. However, LWC harbours a significant number of black rhinoceros (approximately 12% of Kenya's Black Rhinoceros).

White rhinoceros *(Ceratotherium simum simum)* is the world's largest land mammal after the elephant and it is classified by IUCN as vulnerable. It is one of the five species of rhinoceros that still exist and is one of the few megafauna species left. In the MKE they are found in the Lewa Wildlife Conservancy where they were introduced

from other rhino sanctuaries in the country. The white rhinos are however not endemic to Kenya having been introduced in Kenya from South Africa.

Grevy's Zebra *(Equus grevyi)* are classified as endangered by IUCN and in the MKE the Gevy's Zebra are found in the LWC where 22% of the world's population are known to reside.

Mountain Bongo (*Tragelaphus eurycerus isaaci*): The mountain bongo antelope is the flagship species of Kenya's high mountain forests. Once numerous within its restricted habitats, the mountain bongo population has declined dramatically over the past 40 years. This decline has probably been caused by a combination of several factors related to rapid human population growth: encroachment into forest estate, livestock-mediated disease events, and poaching.

Primates: Several primates are found in Mt. Kenya ecosystem, the most common being the black and white Colobus (*Colobus guereza*) and Sykes monkey (*Cercopithecus mitis*). These primates are widely spread within the ecosystem regardless of forest disturbances. The olive baboon (*Papio anubis*) is common on the forest margins where it is a nuisance to farmers from nearby communities. The lesser bush baby (*Galago senegalenses*) and greater bush baby (*Galago crassicaudatus*) have also been recorded in the ecosystem.

Important Bird Area

Mount Kenya is an important bird area (IBA) and home to the threatened and little known Abbott's starling. 53 out of Kenya's 67 African highland biome bird species, at least 35 forest specialist species and six of the 8 species from Kenyan Mountains Endemic Bird Area reportedly occur in Mt. Kenya ecosystem. Some of the bird species found within the ecosystem are; Ayres' hawk eagle (*Hieraaetus dubius),* crowned hawk eagle *(Stephanoaetus coronatus),* hartlaub's turaco *(Turaco hartlaubi),* Jackson's francolin *(Francolinus jacksoni),* scaly francolin (*Francolinus squamatus),* silvery cheeked-hornbill (*Ceratogymna brevis),* bronze-naped pigeon *(Columba iriditorques),* rufous-breasted hawk *(Accipiter tachiro).* Other birds include the hammercop *(Scopus umbretta),* green ibis *(Lambribis olivaceae),* olive pigeon *(Colomba arquatrix),* giant kingfisher *(Megacerryle maxima),* crowned hornbill (Tockus alboterminatus) and grey-headed kingfisher *(Halcyon leucocephala)* among other common birds.

Afro-alpine ecosystem

This ecosystem is rare and only occurs on a limited number of high-altitude areas in east and central Africa.

Ecological diversity

The attitudinal gradient of Mount Kenya leads to unusual varied range of ecosystems in a relatively small area.

Scenic

Wilderness quality

The vast majority of the mountain forms a wilderness, which has traditionally been the subject of minimal management activities and is rarely visited. It provides an important oppor-

tunity for solitude and for personal development (and growth) associated with exploratory mountain activities.

The snow-capped peaks

Snow-capped Mount Kenya is the second highest mountain in Africa after Kilimanjaro and one of the most impressive landscapes in East Africa. The peak area contributes to scenic beauty of the ecosystem. The majestic Nelion (5188 Meters ASL) and Batian (5199 Meters ASL) peaks are an international focal point for high altitude mountaineering and point Lenana is an important destination for hikers.

Lakes, tarns and glaciers

The glaciers are source of scenic beauty and also form a unique attestation of climatic change. The lakes and tarns are sites of particularly scenic beauty e.g. lakes; Alice, Hohnel, Michelson, Ellis, Carr, Rutundu, Sacred lake, and the Enchanted lake. The tarns include; Teleki, Hausburg, Oblong, Hidden and Hall tarn. These lakes habour special and unique benthic microbial life.

Social

Water catchment

Mt Kenya ecosystem plays a critical role in water catchment functions for the country and is one of the five main “water towers” in Kenya. It is a vital water catchment for seven million people. North East to South West of the mountain is the catchment for Tana River while western and north Western slopes form the catchment area for Ewaso Nyiro River. The Tana River basin supplies water to numerous hydro power stations as well as major irrigation schemes and for domestic users. Ewaso Nyiro transverses through the dry areas of Laikipia and Isiolo as it drain into the Lorian Swamp.

Agricultural practices

Agriculture is the main economic activity in the ecosystem. The type of agriculture practiced and productivity potential depend mainly on altitude, which in turn determines the temperatures and amount of rainfall. On the eastern and southern side of the mountain, where rainfall is high, intensive arable farming is practiced. Non-residential forest cultivation, which is currently referred to as Plantation Establishment Livelihood Improvement Scheme (PELIS) has recently been re-introduced in the area and it is helping to uplift the economic status of the local community.

Source of wood and non-wood forest products

Local communities surrounding Mount Kenya ecosystem rely on the use of forest products. Forest uses include: firewood, grass harvesting for animal fodder, livestock grazing, harvesting of medicinal plants, beekeeping and water collection from mineral saline springs for medicinal and cooking purposes.

Global Atmospheric Watch Station

The Mount Kenya Global Atmospheric Watch Station is one of the six monitoring stations established by World Meteorological Organization- Global Atmospheric Watch programme in 1990s. The station was established in 1993 and it is the only station located at the equator,

making it an important scientific site. Other sites of scientific importance within the ecosystem include; permanent vegetation sample plots, tree seed stands, and hydrologic stations.

Biosphere Reserve and World heritage site status

The mountain has international status as both a Biosphere Reserve and a world heritage site. It was designated a UNESCO Biosphere Reserve in 1978 and as a World Heritage site in 1997. Biosphere Reserves are areas of terrestrial and coastal/marine ecosystems or a combination thereof, which are internationally recognized within the framework of UNESCO's programme on Man and the Biosphere (MAB). They are nominated by governments to promote solutions to reconcile conservation and sustainable use. On the other hand, World Heritage Sites are sites that are on the list that is maintained by the international World Heritage Programme administered by the UNESCO World heritage Committee. The program catalogues, names, and conserves sites of outstanding cultural or natural importance to the common heritage of humanity.

Cultural

Historical importance

The mountain ecosystem is a valuable heritage to the people living within its vicinity. It's not merely a beautiful scenic site but an important reminder of their history. Culturally the mountain is perceived as a holy place where believers go to perform traditional rituals and ceremonies. In times of drought, the mountain offers livestock grazing range and other life supporting foods and fruits to the communities.

Burguret forest to the east and south of Mount Kenya served as hideout for Mau-Mau freedom fighters waging war against the British colonialists in the 1950s. The forest also provided a camping site for the runaway Italian prisoners of war during the Second World War.

Religious importance

Since time immemorial, Mount Kenya has been of spiritual and religious importance to local communities living adjacent to the ecosystem. The local communities revere the peak of the mountain as the home of their God, where prayers and rituals are conducted. Prayers and rituals are carried out in several sacred sites within the ecosystem in times of need e.g. during droughts. The sacred areas include hills (Kirima Kiamatu, Kirima Ntue, Kirima Kiamwioko and Kirima Kiamagimbi), the peaks of the mountain, lakes (Nkunga and Thae), caves and rivers. Many tree species of the ecosystem including the *Ficus sur* (Mukuu), *Ficus thonningii* (Mugumo), *Indogofera erecta* (Muthaara) among others are considered sacred and are used during performance of various rituals and ceremonies.

Threats to the MKE

Considerable resources and efforts have been invested in improving the management of the protected areas of Mt Kenya ecosystem in the past years. Although some successes have been achieved, tremendous threats and pressures on the ecosystem remain. The main source of this pressure arises from the depletion of resources and degradation within and near the populated areas of the ecosystem. The resource depletion and degradation are mainly due to unsustainable use levels and patterns as a result of poverty, rapid rural popula-

tion growth, poor or inappropriate management skills and weak management institutions and systems. As resources become scarce on private and community lands, the population turns to the neighboring protected areas for livelihood resources. The key threats to the ecosystem's values are given in the following sections:

Wildlife Poaching

Bush meat poaching is a threat to wildlife species of Mount Kenya ecosystem. Black rhino population is suspected to have been decimated by poaching while the Bongo population has considerably been reduced. Buffalo, eland and zebra, for example, are commonly hunted for their meat, which is sold locally. Snaring is prevalent principally targeting small antelopes (duiker, bushbuck, and waterbuck) and ground birds (francolin and guinea fowl).

There are however, a few isolated cases of "trophy poaching" of elephant, rhino, and leopard in the ecosystem. Illegal trade in live reptiles (Mt. Kenya forest viper and chameleons) has also been documented in the area, particularly in the Chuka and Chogoria forests.

Illegal Logging

Since the early 1970s, the indigenous forests have heavily been exploited through selective logging of important timber trees greatly reducing plant populations, and regenerative capacity of these tree species. Some of the most targeted tree species are cedar (*Juniperus procera*), wild olive (*Olea europaea*), East Africana Rosewood (*Hagenia abyssinica*), camphor (*Ocotea usambarensis*), *Olea capensis* sp., and *Vitex keniensis*.

In 1999 the government instituted a ban on all forest exploitation in the country and this included Mt Kenya Forest reserve. There however continued small sporadic activities on illegal harvesting associated with small forest poachers especially on the southeastern forests, particularly Chuka, Ruthumbi, Chehe and Kathendeini.

Charcoal Production

Illegal charcoal production is one of the major threats to forest's ecological integrity and health. This practice is prevalent in the lower elevations of the forest ecosystem. The highest concentrations of charcoal production sites occur in Thegu, Imenti, Burguret (Gathiuru), Naro Moru, Ragati and Chehe areas.

Illegal grazing

During the prolonged dry spells the ecosystem has experienced influx of livestock from the neighboring pastoral communities thereby over stretching the available resources. The large numbers of livestock and associated overgrazing have contributed to the degradation of the ecosystem.

Forest Fires

Unplanned or wild fires can alter structural and species diversity including proliferation of invasive species. Wildfires have been recurring annually from 1990 to date. The fire prone areas stretch in an arc across the lower western forests to the North eastern moorlands in Gathiuru, Nanyuki, Ontulili, Marania, Mucheene and Meru forest stations in dry seasons of January – March and June - September. Most wildfires are caused by arson and honey gathering; other important causes are lightning, illegal grazing, shamba clearing, poorly disposed cigarette stubs and charcoal burning.

Damage as a result of fire is highest in plantation forests due to the high tree uniformity, presence of flammable materials and lack of plantation hygiene.

Invasive Species

Some degraded sites in Mt Kenya Forest Reserve have experienced invasive plant species; key of which include Mauritius thorn, (*Caesalpinia decapelata),* Jimsonweed *(Datura dothistroma),* Sodom's apple (*Solanum incanum)*, Curse of India (*Lantana camara*) and (castor plant (*Resinus communis).* Mexican Green Ash *(Fraxinus pennysilvania*) displays opportunistic characteristics by naturally spreading their cover beyond firebreak lines they were initially designated for. Invasive plants are perceived to inhibit recovery of degraded or backlog forest sites. Areas affected are exotic plantation backlogs and indigenous forest sites namely Kangaita forest, Irangi forest, Chuka and Chogoria forests, Meru forest, and Mucheene forest. Since Mt Kenya ecosystem is a continuum of habitats and considering that invasive species impact on agriculture, livestock and conservation, the issues require multi-sectoral cooperation.

Pests and Diseases

Insect pests, pine woolly aphid and the cypress aphid (*Cinera cupressi*), have been a major problem to *Pinus patula* and *Cupresus lusitanica* plantations respectively. Other pests e.g. rats are a menace to tree seedlings, they feed on the roots and cause ring debarking in abandoned shamba areas.

Incidences of disease outbreaks have been reported for example rinderpest has been blamed for almost extinction of bongo antelopes (*Tragelaphus euryceros*) *isaaci*). Other species affected by the disease are cape buffaloes (*Syncerus caffer*) and giant forest hog (*Hylochoerus meinertzhageni*).

Marijuana Cultivation

Cultivation of marijuana/bhang is mainly in the bamboo zones of the ecosystem, and occurs mainly on the eastern side of the mountain, Meru South and Embu Districts. The cultivated fields are normally small in size, (0.1 to 0.5 ha) making them extremely difficulty to locate, access and eradicate. However, there has been a remarkable decrease of marijuana cultivation over the last few years. This could be attributed to effective law enforcement efforts by relevant Government bodies.

Illegal water abstraction

Unregulated and excessive water use for both commercial and subsistence agricultural activities has reduced reliability of downstream water supply, impacted on riparian environments and decreased water quality. Permits for the use of water are approved on the basis of a number of conditions including the availability of water and the construction of 90 day storage for water to capture the flood flow water to use for irrigation.

Abstraction above permit authorized levels has meant that the total amount of water being used is far above the amounts authorized. Tendency to locate water intakes close to the river sources is prevalent in the forest reserve but only a few are in the national Park. Illegal and over abstraction of water has been perpetuated by poor institutional patrol of water abstractors and inadequate enforcement of water regulations.

Visitor impact

The increasing tourism activities in Mount Kenya have some negative impacts to the ecosystem. This is experienced in high-density tourist areas. The increase in the number of hikers visiting the mountain contributes to construction of structures and footpath erosion on valley floors and boggy areas. Other adverse effects are destruction of vegetation and soil compaction through off-road driving especially in Naro Moru, Sirimon and Chogoria areas. Another problem is pollution caused by poor disposal of sewerage and litter especially in the remote, cold and alpine zone. This is likely to threaten both human and animal health through ingestion of toxic substances.

Human-Wildlife conflict

The close proximity of human settlements to Mount Kenya ecosystem results to continuous animal raids in surrounding farmlands. Animals raid croplands causing loss of produce, damage to infrastructure and injuries or death to people and their livestock. Elephants cause the most damage although buffalo, primates, birds and wild pigs also contribute to crop damage. Elephants and buffaloes also destroy tree plantations (*Pinus spp, Eucalyptus spp*. and *Prunus Africana*) through debarking, uprooting, and trampling. The damage is mostly experienced in Gathiuru, Mucheene, Nanyuki, Ontulili, Kabaru, Hombe and Naro Moru areas.

MKE Zonation Scheme

Introduction

MKE management zoning is meant to reconcile the principal purpose of protecting the water catchment and other resource values with limited use of these resources by visitors and local communities. The primary purpose of zoning is to provide for various forms of recreation and limited resource use while conserving biodiversity and its associated ecosystem processes. The zoning scheme therefore describes in detail what activities and developments are allowable in various parts of the ecosystem based on the future desired conditions (management objectives) that this plan aims to achieve. The zoning scheme is expected to guide MKE managers as they implement management and development prescriptions in the ecosystem, thereby achieving the MKE purpose. In addition it will be a valuable source of information for visitors on permitted visitor activities in various zones.

Management Sectors

Due to the vastness of the MKE, the difficult terrain, and the distances between various outposts, KWS has divided the MKE into four management sectors to facilitate effective administration of the entire forest ecosystem. These sectors are Naro Moru, Sirimon, Chogoria, and Kamweti. Naro Moru sector extends from Ragati River to Burguret River; Sirimon sector from Burgureti River to Kazita river; Chogoria Sector from Kazita river to Thuci River; and Kamweti sector from Thuci river to Ragati river. The KWS headquarters of the MKE is based at Naro Moru Gate. Each Sector is managed by a Warden who is based at the Sector headquarter and reports to the Senior Warden (based at Naro Moru) who is the overall officer in charge of the MKE.

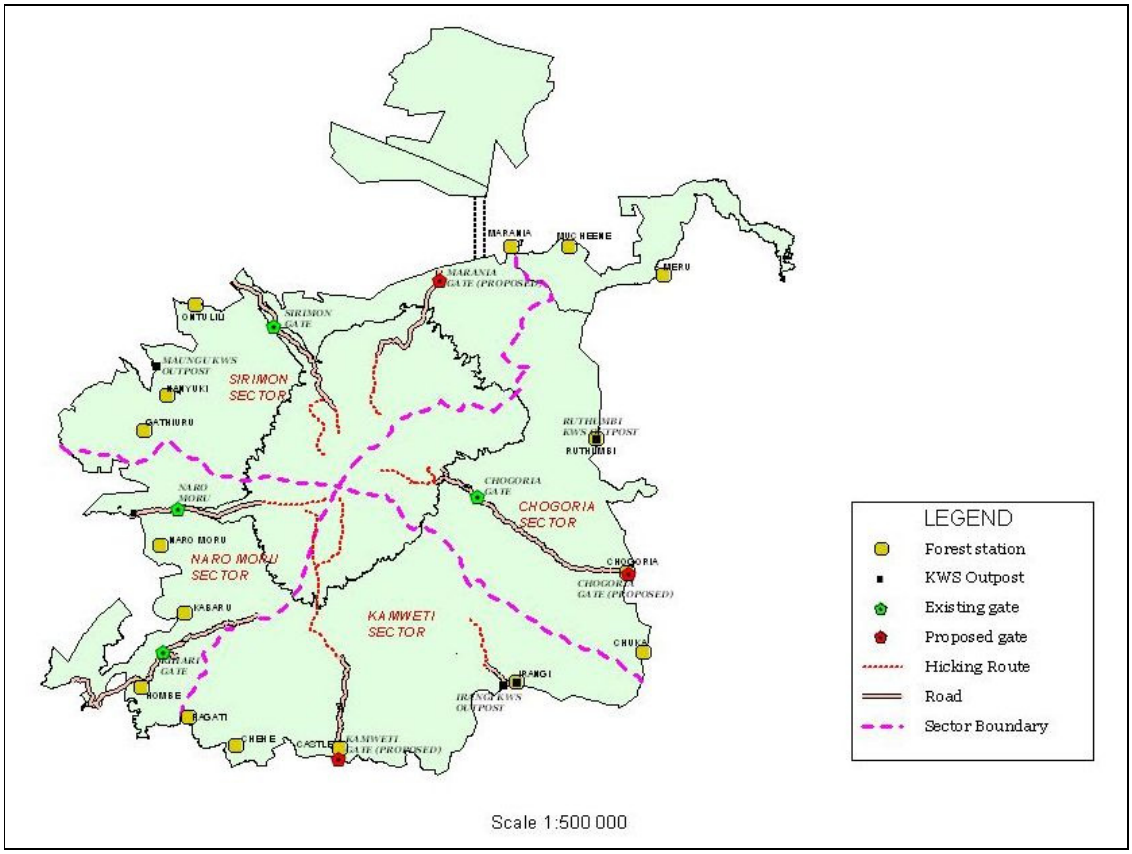
In addition, KFS has a corresponding management arrangement that divides the ecosystem into 16 sectors each administered by a forester. These sectors are: Chehe, Ragati, Hombe, Kabaru, Naro Moru, Gathiuru, Nanyuki, Ontulili, Marania, Mucheene, Meru, Ruthumbi, Chogoria, Chuka, Irangi, and Castle (see figure 2).

The location of the four sectors, their headquarters, and principal ranger outposts are shown in Figure 2. Details of the management sector headquarters, sub-headquarters and ranger outposts are set out in Table 2 below.

Table 2. MKE Management Sectors and Administration Centres

Management sector	*Headquarters*	*Sub-Headquarters*	*Ranger Outposts*
MKE	Naro Moru Gate	--	--
▸ **Naro Moru**	Naro Moru Gate	Kihari Gate	Naro Moru, Karundas
▸ **Sirimon**	Sirimon Gate	Marania Gate	Mawingu Airstrip
▸ **Chogoria**	Chogoria Gate	Ruthumbi, Meru station	Nkubu
▸ **Kamweti**	Kamweti Gate	Irangi	Ndunduri, Thabana, Kangaita

Figure 2. MKE Management zonation



Visitor Use Zones

The visitor use zoning divides the ecosystem into six distinct zones i.e. High Use Zone, Low Use Zone, Wilderness Activity Zone, Multiple Use Zone, Plantation Zone and Influence Zone (see figure 3). The summary of allowable maximum bed capacity for various categories of visitor accommodation facilities is shown in table 3, while zonal descriptions in terms of human use; permitted visitor activities; permitted visitor facilities; and natural resource management are given in the following sections.

Figure 3. MKE Visitor Use Zonation

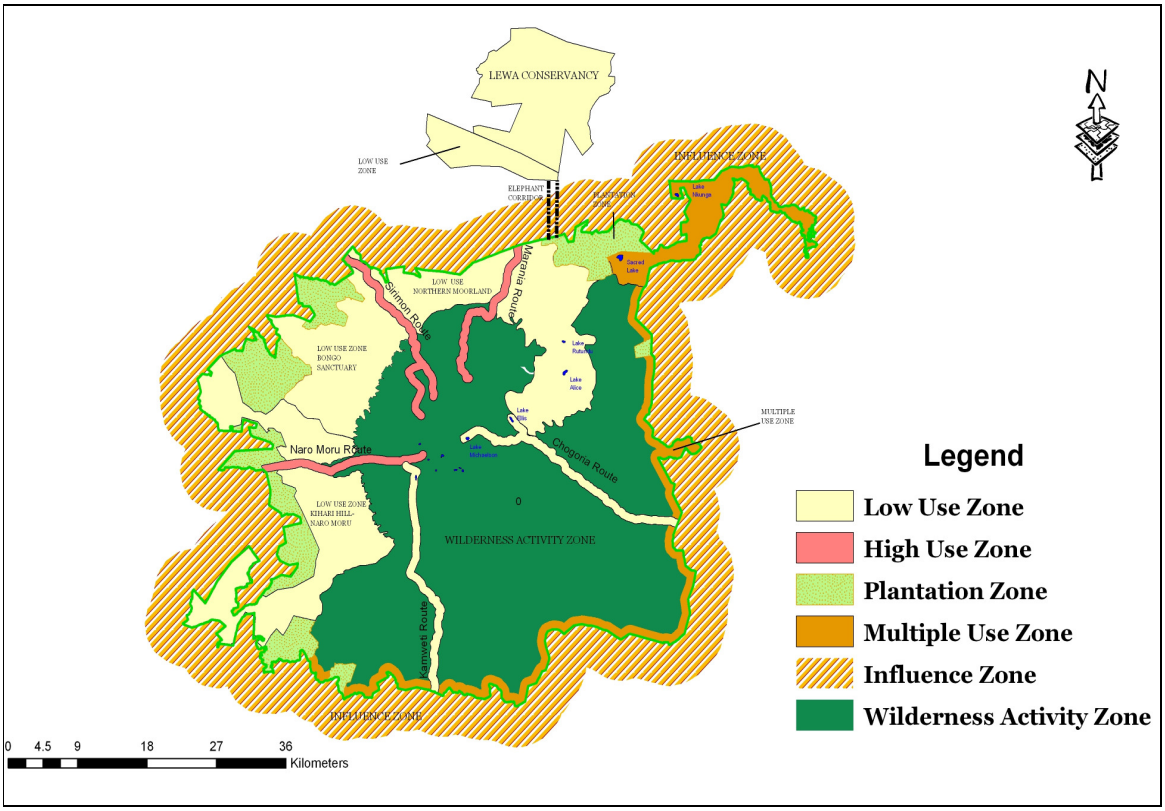


Table 3. Summary of permitted visitor facility categories in the MKE

Facility type	Maximum number of beds/capacity			
	High Use	Multiple Use	Low Use	Wilderness Activity
▸ Lodges	60	60	NA	NA
▸ Ecolodges	40	40	24	NA
▸ Permanent tented camps	40	40	24	NA
▸ Self help Bandas	20	20	12	NA
▸ Public campsite	20	20	12	NA
▸ Special campsites	16	16	16	4

High Use Zone

The High Use Zone comprises three sub-zones located along the three most popular and less challenging mountain hiking routes i.e Naro Moru, Sirimon and Marania. The sub-zones are located in the Western (Naro Moru and Sirimon) and Northern (Marania) leeward side of the ecosystem where, for most of the year, weather conditions are drier and warmer than the eastern. They consist of a 500 metre wide corridor on hiking routes from the National Reserve boundary to the mountain summit. These corridors are heavily used by visitors with over 65% of summit bound visitors using these routes. Majority of the hikers' accommodation facilities and ecosystem administrative facilities are concentrated in this zone, especially along Sirimon and Naro Moru routes. Marania route is not an official Park entry route, but it is commonly used by students from the Mt. Kenya School of Adventure and Leadership (KENSAL) to ascend to the mountain summit as part of their endurance training.

Limits of Acceptable Use (LAU)

From KWS visitor records for Mt. Kenya, the average number of visitors who used the Naro Moru and Sirimon routes to access the Park from 2002 to 2007 was 7786 and 10,753 visitors respectively. According to previous plans for Mt. Kenya National Park, 67% of the visitors to the Park are usually bound for Point Lenana. This translates to 5217 visitors entering through Naro Moru Gate and 7205 through Sirimon Gate. The current characteristic is that the majority of visitors aim to reach point Lenana at or around daybreak and the number of people that can safely or pleasurably reach this summit at the same time is limited to a few dozen people at maximum. Furthermore, there are several 'off-seasons' on the mountain which last for several weeks each, during which time only a handful of people summit each day. Hence, assuming a carrying capacity of 100 visitors at point Lenana per day, the LAU for Summit bound visitors is set at a maximum of 10,000 per year which limits daily summit bound visitors to 26 visitors per day (Table 4). This shows that the current level of visitation is below the carrying capacity. However, despite this, both visitor satisfaction and visitor impact studies will be carried out and an elaborate visitor monitoring system instituted to facilitate review of the hikers' LAU and make necessary adjustments based on the outcomes of the visitor monitoring studies.

Table 5 and Table 6 give the visitor accommodation and visitor activities prescriptions for the HUZ respectively as agreed upon by stakeholders and the Tourism Working Group.

Table 4. Limits of Acceptable Use for Summit bound Hikers in the HUZ

Route	Average number of Hikers per day	Maximum number of Hikers per day	Maximum number of Hikers per year
High use			
Naro Moru	14	26	10,000
Sirimon	19	26	10,000
Marania	N/A	26	10,000
Total		78	30,000

Table 5. Summary of Accommodation prescriptions for the HUZ

Status	Sub-Zone	Facility Name	Type	No. of Beds/Capacity
Existing	Sirimon	Sirimon	Bandas	6
		Sirimon Gate	Public campsite	100
		Judmaier	Bandas	60
		Judmaier	Public Campsite	100
		Shipton's	Bandas	40
	Naro Moru	Batian	Bandas	8
		Naro Moru Gate	Public Campsite	100
		Mackinder's	Bandas	60
	Marania	KESAL	Public Campsite	100
Proposed	Shipton's	Public Campsite	100	Shipton's
	Met Station	Public Campsite	100	Met Station
	Mackinders	Public Campsite	100	Mackinders
	Apart from Public Campsites, development of other types of tourist accommodation facilities is not permitted in this zone. Judmaier Bandas will be relocated from the top of the Hill to the southern hillside to mitigate visual intrusion. Similarly Shipton's Banda will be relocated to a new site for the same reason. These Bandas will be reconstructed according to new standard mountain-specific Banda designs that will be provided by KWS. In addition, the high altitude hiking huts and shelters will be remodeled according to new rustic designs to improve their aesthetic appeal. Additionally, camping will not be allowed within one Kilometer from ecologically sensitive areas such as L. Alice, L. Michaelson, L. Ellis and the alpine tarns.			

Table 6. Permitted activities in the in the HUZ

- **Hiking**: Strictly along the designated hiking trails.
- **Short walks:** Short walks will be restricted to designated nature trails that will be constructed at the Naro Moru, Sirimon and Marania gates; and Sirimon and Naru Moru road heads
- **Heli-tourism**: Heli-tourism is restricted to designated helipads only. Helipads sites have to be booked with the Senior Warden in advance.
- **Canopy walks:** This activity will be carried out at the canopy walkways to be constructed at the Equator crossing point and at the Naro Moru Gate.
- **Sport fishing**: This is 'catch and release' fishing. A fishing licence from the Fisheries Department is mandatory
- **Horse riding:** This will be carried out by authorized tour operators along designated sections of the hiking corridors
- **Mountain biking:** This activity will be organised by authorized tour operators. It will be restricted to the motorable sections of the three hiking routes and the forest link road
- **Cable car:** The cable car will be installed along the Sirimon Gorge
- **Orienteering**: This activity will not be restricted to any zone
- **Caving**: Exploration of caves will be allowed, but camping in the caves is prohibited.

Low Use Zone

The purpose of the Low Use Zone is to offer areas with low levels of visitor use compared to the High use Zone. This zone comprises of four sub-zones designed to provide diverse visitor experiences. These sub-zones are the Chogoria and Kamweti routes, established for hiking; Kihari Hill-Naro Moru established to provide both wildlife viewing and hiking opportunities; and the Northern Moorland and Bongo Sanctuary sub-zones that have primarily been established to provide opportunities for wildlife viewing from vehicles. Descriptions of the sub-zones are given in the following sections.

Kamweti Low use Hiking Zone

This sub-zone consists of a 500 m corridor along the Kamweti hiking route from the National Reserve Boundary to the mountain summit. Kamweti route is the longest route to the peaks and follows the Nyamindi West River. It is a seldom used route hence there is no manned KWS gate. However, visitors wishing to use this route to access the peaks are required to pay the requisite entry fees at Naro Moru Gate. The route has a section of motorable road starting at the current KFS Kamweti road barrier, passing next to Castle lodge, and ending at the Castle Banda (old Kamweti Forest Station). However, the Castle Lodge-Castle Banda section of the road section is only accessible using a 4WD vehicle. The key features encountered along this route include the Castle Lodge, Castle Banda, Sagana River, Thego River, and Lake Hohnel.

Chogoria Low Use Hiking Zone

The Chogoria Low Use sub-zone consists of a 500m corridor along the Chogoria hiking Route. This route is long and as such it is not preferred by many hikers. From the KFS Gate to the KWS Gate, the road is motorable using any vehicle, but the KWS Gate-road head section requires a 4WD vehicle. The Route has scenic views of key biodiversity resources such as natural forest, moorland heath, and the alpine zone with its lakes and tarns. It has outstanding geomorphological features like the Vivienne Falls near the start of the hike to Mintos Tarn, Gorges Valley and the breath-taking Lake Michaelson.

Kihari Hill-Naro Moru

The boundary of Kihari Hill-Naro Moru sub-zone follows the National Park boundary to the East; the forest plantation boundary to the West; Ragati River to the South; and Nanyuki River to the North. This sub-zone includes a 500m wide corridor along Gunia track which extends from Kihari Gate to the Park boundary. Key features in this sub zone include Thego forest, Kihari Hill, Sagana River, Thego River, Serena Mountain Lodge, Burguret River, and several 'Mau Mau caves'.

Bongo Sanctuary

The Bongo Sanctuary sub-zone is bounded by Likii South River to the south, Sirimon River to the north, the Park boundary to the east, while the western boundary follows the exotic forest plantation boundary. This is the target area for the Bongo release program through which captive Mountain Bongo will be re-introduced back into the wild. The vegetation is mainly wooded bushland with scattered glades. The proposed Sanctuary hosts many types of wildlife including elephants, buffaloes, zebras and waterbucks that attract tourists to the area. It is therefore expected that introduction of Bongo and Black Rhino to this area will significantly boost the sanctuary's wildlife viewing tourism potential. The Sanctuary has a functional airstrip which is used mostly by MKE management during aerial patrols. There are also abandoned roads that are not motorable at the moment as they are overgrown with

vegetation. These roads will be reopened and upgraded to all weather to facilitate both wild-life viewing and surveillance of threatened species.

Northern Moorland

The Northern moorland sub-zone has been established to exploit the huge tourism potential accorded by large plains game currently found in the expansive northern moorland grass-lands. The sub-zone hosts diverse wildlife such as Elands, Buffaloes, waterbucks, zebras and elephants among others. Like the Bongo sanctuary sub-zone, this sub-zone has an elaborate road network which is currently neglected but if reopened would encourage use of this zone for wildlife viewing.

The Western boundary of this sub-zone follows the Sirimon River and the 3500 m contour; the northern boundary follows the Mt. Kenya National Reserve boundary; the Southern boundary follows the 3000m contour; and the Eastern boundary follows river Kazita.

Limits of Acceptable Use

Currently, the two Low use Hiking Routes (Chogoria and Kamweti) are seldom used because they are more strenuous and require more time to ascend to the peaks. From 2002 to 2007, Chogoria Route recorded an average of 2595 visitors annually which is equivalent to 7% of total visitors to the Park. Assuming that 67% of these visitors were summit bound, this would translate to 5 and 1739 hikers ascending to the mountain peaks daily and annually respec-tively.

Visitor records for Kamweti Route are, however, not available as this is not an official route. However, under this plan, KWS will develop Kamweti Route as a low use hiking route to cater for the more discerning and adventurous visitors. To ensure that contact between hikers in this zone remain low thereby enhancing the level of solitude, the daily maximum number of hikers allowed to ascend the mountain using these hiking routes will be set at 10 visitors per route in two groups of a maximum of 5 hikers per group excluding the porters and guides (table 7). However, if special circumstances require that the set LAU surpassed, special permission will be sought from the Senior Warden.

The other Low use sub-zones aim to diversify tourism experiences capitalising on the oppor-tunities offered by the diverse scenery, unique biodiversity and dramatic geomorphological features. The aim is to attract both local and foreign visitors who would like to enjoy the MKE's attractions from vehicles or vantage areas set at ecolodges. Currently visitor infra-structure such as roads or tracks is lacking and visitor accommodation facilities are quite few. In regard to this then, no Limits of Acceptable Use for visitor numbers will be set for this zone. However, once the requisite infrastructure is developed, MKE will monitor use of these zones by visitors and if monitoring shows need for LAU, these will be set. The permitted visitor activities and facilities that will be developed in the low use zone are given in Table 8 and 9 respectively.

Table 7. Limits of Acceptable Use for Summit bound Hikers in the LUZ

Route	Average number of Hikers per day	Maximum number of Hikers per day	Maximum number of Hikers per year
Chogoria	5	10	3000
Kamweti	N/A	10	3000
Total		20	**6000**

Table 8. Permitted activities in the LUZ

- **Hiking:** Hiking is allowed along the two summit bound hiking routes and along the Gunia track trail
- **Guided short walks**: shorts walks will take place along designated nature trails that will be constructed around ecolodges. Nature guides will be sourced from the ecolodges.
- **Sport fishing**: This activity will take place at rivers and lakes that have been stocked with trout fish. To engage in sport fishing, visitors will require a Fishing Permit from the Fisheries Department.
- **Heli-tourism**: Heli-tourism is restricted to designated helipads only. Helipad sites will be booked with the Senior Warden in advance.
- **Para gliding**: This activity will be restricted to the northern moorlands and adjacent ranches
- **Bird watching**: Bird watching will be carried out along walking trails or at the lodge compounds. Guides will be required
- **Orienteering:** This activity will not be restricted to any particular zone. However, visitors will have to seek authority from the Senior Warden to be allowed to participate in this activity.
- **Adventure training:** Activities related to adventure training will be carried out in all parts of the LUZ, but permission will have to be sought from the Senior Warden
- **Caving:** Exploration of caves will be allowed, but camping in the caves is prohibited.
- **Game viewing:** Game viewing is restricted to four wheel drive vehicles along designated roads. Off road driving is prohibited

Table 9. Summary of accommodation prescriptions for the LUZ

Status	Sub-Zone	Facility Name	Type	No. of Beds/Capacity
Existing	Chogoria	Meru Mt. Kenya	Bandas	40
		Chogoria Gate	Public campsite	100
		Minto's	Public campsite	100
		Mintos	Hut	
		Chogoria	Special Campsite	100
		Kinondoni	Special Campsite	100
		Urumandi	hut	Derelict
	Kamweti	Castle	Lodge	40
		Castle	Banda	6
		Thiba Fishing Camp	Bandas	Derelict
		Sagana River camp	Special campsite	20
		Thego River camp	Special campsite	20
	Kihari Hill-Naro Moru	Serena Mountain Lodge	Lodge	80
		Thego Fishing camp	Banda	4
	Northern Moorland	Rutundu Fishing Camp	Bandas	8
Proposed	Bongo Sanctuary	Sirimon Lodge	Ecolodge	24
		Mawingu	Public Campsite	
		Mawingu	Special Campsite	20
	Northern Moorland	Sacred Lake	Ecolodge	24
		Sacred Lake	Permanent Tented Camp	24
		Marania fishing camp	Permanent Tented Camp	24
		Kazita	Special Campsite	20
	Kihari Hill-Naro Moru	Secret Valley	Ecolodge	24
		Ragati	Ecolodge	24
		Thegu Forest Lodge	Ecolodge	24
	Construction of additional lodges is not permitted. Ecolodges and permanent tented Camps will be of a rustic nature and limited to a maximum capacity of 24 beds.			

Wilderness Activity Zone

The wilderness Activity Zone has been established to provide a high degree of remoteness and solitude that is not provided in the other zones. The key consideration in this zone is offering large extensive areas with minimal human interference where visitors can enjoy unspoiled wilderness. The management objective is to encourage responsible (low impact) users who visit the mountain explicitly to utilize this zone.

This zone covers the majority of Mt Kenya National Park and the Kamweti and Chogoria KWS administrative sectors. The key features in this zone are the imposing rugged glacier-clad summits; high altitude lakes and tarns; Afro-alpine moorlands; and diverse scenic natural forest types. The management aims of this zone are to provide areas for recreation (hiking, camping, picnicking, and bird watching) forest restoration, rehabilitation of water catchment functions, and habitat for rare and threatened wildlife.

To safeguard natural ecological processes from human induced threats, only restricted recreational use confined to low impact facilities and sites will be encouraged in this zone. Natural resource utilization here is non-consumptive mainly through nature based tourism which includes hiking, mountain climbing, camping, picnicking, and bird watching. Facilities are restricted to trails, special campsites, mountain climbing huts and shelters. No limits of acceptable use for hikers has been set for this zone as tourism pressure is not envisaged given the vastness of the area and its unattractiveness to conventional tourism. However, visitor use in this zone will be monitored and limits of acceptable use set if necessary.

Accommodation and activity prescriptions for this zone are provided in table 10 and 11 respectively.

Table 10. Summary of accommodation prescriptions for the WAZ

Status	*Facility Name*	*Type*	*No. of Beds/Capacity*
Existing	Austrian	Hut	25
	Top	Hut	4
	Kami	Public Camp Site	20
	Howell	Hut	4
	Baillies bivvi	Emergency Shelter	1
	Two Tarn	Public Campsite	20
Proposed	Development of new facilities is not permitted in this zone. Accommodation facilities are limited to special campsites only.		

Table 11. Permitted activities in visitor use zones

- **Hiking:** There are no designated hiking routes in this zone.
- **Rock climbing:** This activity will be monitored closely by the Senior Warden. Only technical mountain climbers will be permitted to undertake this activity and they will be required to register their route and estimated time on the Mountain at their entry point for immediate inclusion into a database managed by the Mount Kenya Search and Rescue Team.
- **Backpacking:** Backpackers are expected to observe the leave no trace principles[2]
- **Orienteering:** This activity requires prior authorisation by the Senior Warden.
- **Caving:** Exploration of caves will be allowed, but camping in the caves is prohibited

Multiple-use zone

The multiple-use zone covers an area of about 330 km^2 comprised of a continuous belt of about 1 km into the reserve on the eastern and south eastern side of the mountain. The management aim of this zone is to provide wildlife migration corridors and an effective buffer for the indigenous forest against human related threats by engaging forest adjacent communities in Participatory Forest Management (PFM). This zone provides for multiple uses including tourism, apiculture, harvesting forest products and livestock grazing. However, to balance the demands of various uses and at the same time realise sustainable forest conservation in the targeted PFM sites, detailed forest management plans covering the target forest management units will be prepared. Tables 12 and 13 give the accommodation prescriptions and permitted land uses respectively.

Table 12. Summary of Accommodation prescriptions for the MUZ

Status	*Facility Name*	*Type*	*No. of Beds*
Existing	Mt. Rock Hotel	Lodge	
Proposed	Ragati Fishing Camp	ecolodge	24
	Irangi Lodge	ecolodge	24
	Themwe/Kaburia lodge	ecolodge	24
	Nanyuki Guest House	Bandas	24

[2] Plan Ahead and Prepare; Travel and Camp on Durable Surfaces; Dispose of Waste Properly; Leave What You Find; Minimize Campfire Impacts; Respect Wildlife; Be Considerate of Other Visitors

Status	*Facility Name*	*Type*	*No. of Beds*
	Development of all categories of visitor accommodation facilities apart from lodges is allowed. However, no facility will be developed within an 8 Km radius of another existing facility.		

Table 13. Permitted activities in the multiple use zone

- **Honey production:** This will require authorisation from the Forester.
- **Collection of medicinal herbs:** This will require authorisation from the Forester.
- **Fire wood collection:** This will require authorisation from the Forester.
- **Harvesting building materials:** This will require authorisation from the Forester.
- **Livestock grazing**: This will require authorisation from the Forester.
- **Recreation:** This will take place in designated areas only. Recreation activities will include mountain biking, marathon running, hiking, and sport fishing

Plantation Zone

The management aims of this zone include: sustainable production of timber through the KFS Plantation Establishment for Livelihood improvement System (PELIS) programme, and production of firewood, fibres, carving wood or any other wood for which there is demand. The plantation zone comprises 18130 ha in eight clusters i.e. Nanyuki (1560 ha), Ragati (3220 ha), Kabaru (1180 ha), Naro Moru (3300 ha), Gathiuru (2740 ha), Ontulili (2610 ha), Mucheene (3520 ha). Activities permitted in this zone are given in Table 14. Development of visitor facilities in this zone is prohibited.

Table 14. Permitted activities in the plantation zone

- **Timber production:** This will be carried out by KFS or its lessee only
- **Production of building posts and poles:** This will be carried out by KFS only or its lessee only
- **Farming through PELIS:** Farming will be carried out through supervision by KFS
- **Firewood collection:** A firewood permit will be required

Influence Zone

This zone comprises community land within a 5 Km belt from the Mount Kenya Forest/National Reserve boundary. It also includes the "Nyayo Tea Zones", which are concentrated along the eastern and south-eastern boundaries of the reserve**.** The management aims of this zone are to increase farm forestry to reduce community reliance on the national reserve for forest products. Since this zone has minimal potential for tourism development, prescriptions for visitor accommodation and activities are not necessary

Ecological Management Programme

Programme Purpose and Strategy

The purpose of the Ecological Management Programme is to ensure that:

> MKE threatened species and ecological processes are conserved, and ecosystem functioning restored and understood

The MKE ecology has been subjected to direct threats emanating from human activities. These include illegal extraction of natural resources e.g. illegal logging, charcoal burning, illegal livestock grazing, poaching and wildfires. In addition, in the face of climate change and the need for ecosystem resilience to cope with increasing hazards such as fire and droughts, connectivity of the MKE with adjacent savannah ecosystem to the north and west is critical as it increases the wildlife range enhancing their survival. Managing for ecosystem resilience therefore enhances the likelihood of sustaining ecosystem functioning likely to be significantly altered by declines in local diversity occasioned by the aforementioned threats.

The Ecological Management programme therefore addresses threats to MKE biodiversity by focusing on biodiversity restoration and protection, linking ecosystems, and carrying out applied research to understand how the ecosystem functions.

The following paragraphs set out the guiding principles that are designed to guide MKE managers and stakeholders in the implementation of the Ecological Management Programme and the achievement of the Programme Purpose.

In implementing the MKE's Ecological Management Programme, MKE Management and stakeholders should strive to ensure that:

MKE rare and threatened species are protected, restored and monitored

The MKE has three key mammal species of conservation concern including the elephant and Rhino that are listed as threatened, and the Mountain Bongo which is extremely rare in Kenya. These species are threatened primarily by poaching and habitat loss or degradation. In this programme, management of rare or threatened species requires that those species (e.g. Bongo and Rhino) whose population is dangerously close to being lost are moved to a sanctuary established within the ecosystem and their numbers boosted in line with each individual species recovery strategy. For the animals that have stable and viable populations (e.g. elephants), management action will focus on establishing corridors to increase wildlife range and enhance ecosystem resilience.

MKE habitats are protected, preserved and restored

Restoration of a degraded or former habitat to a healthy, self-sustaining condition that resembles as closely as possible its pre-disturbed state is essential in maintaining habitat diversity. Habitat diversity in turn increases species diversity which enhances ecosystem

resilience. Therefore, MKE will place a high priority on efforts to restore natural habitats and the services they provide. Recognizing the importance of restoration in the overall toolbox of environmental stewardship, MKE will support a variety of programs and projects that focus on restoring critical natural habitats, hence improving the health of the whole ecosystem.

Ecosystem connectivity is established to increase resilience

Large migratory mammal species (e.g. the elephant) that require a large foraging area depend on connectivity between MKE and adjacent savannah ecosystems to meet their physiological requirements. In addition, connectivity with other ecosystems increases ecosystem resilience by spreading risks and providing insurance making it possible for an ecosystem that is disturbed to recover. As such, as part of efforts to re-establish and conserve natural population dynamics and processes, management activities under this programme will aim to perpetuate the dispersal of animals into suitable conflict-free areas outside of the MKE.

Wildfire is managed and monitored effectively

Analysis of MKE wildfire incidences from 1990 to 2003 indicates that high fire seasons prevail from January to March (46% of cases) and September (23% of cases). Most fires are caused by arson and honey gathering. Other important causes are lightning, burning of farm litter, poor disposal of cigarettes butts and charcoal burning. Damage as a result of fire is highest in plantation forests due to the high uniformity of trees, presence of flammable materials and lack of plantation hygiene. As such, the response to the threat of wildfire in the MKE will be thoroughly planned to make it safe, effective, cost-efficient and environmentally sensitive. All fire management activities, including fire suppression and prevention, will be conducted in accordance with clearly defined procedures. Principles of environmental care will also guide all fire preparedness and suppression activities.

Mt. Kenya ecosystem functioning is understood

Reliable information generated according to well established scientific principles and methods is critical if environmental and natural resource management are to operate effectively. Without reliable information on changes in the environment and on the causes of those changes timely and adaptive management interventions on perceived biodiversity threats can not be made leading to ecosystem deterioration. Ecological monitoring can represent an important source of information in the decision-making process. It can provide early warning when ecosystem changes are discerned and help control degradation. As such, this programme will focus on developing a robust ecological monitoring programme and related database to track key elements of the ecosystem and threats to ecosystem functioning.

Targeting ecological management action

The PAPF prescribes the use of the ***Nature Conservancy's (TNC) Conservation Action Planning (CAP)*** process as a foundation for designing the PA plan's Ecological Management Programme. The rationale underlying this is that, with limited human and financial resources available to PA managers, it is impractical to attempt to manage and monitor every single aspect of the complex ecology of a protected area. The CAP methodology provides a tried and tested mechanism for targeting ecological management, by identifying and developing an accurate definition and understanding of the PA's most important ecological features

and their management needs, and the major threats to these features. In line with the PAPF, this programme also adopts the CAP framework.

The PAPF identifies three main stages in applying the CAP methodology: the selection of ***conservation targets***; the identification and ranking of ***threats*** to the conservation targets; and the development of ***management objectives and actions*** to address these threats as well as to enhance the conservation targets. These key stages and their application in the MKE planning process are elaborated in the following sections.

Conservation targets

The first stage of selecting conservation targets (equivalent to key ecosystem area values) for a planning area consists of two key steps. The first step deals with identification of the area's conservation targets which in this case are biodiversity elements whose continued conservation reflect conservation success. They are species, ecological communities and ecological systems that are selected to represent and encompass the biodiversity found in the planning area. Usually a small suite of about 8 conservation targets at different levels of biodiversity organization are sufficient to account for biodiversity in a given planning area.

The second step is to identify Key Ecological Attributes (KEAs) for each conservation targets. KEAs are aspects of a target's biology or ecology (e.g. biological composition, structure, interactions and processes, environmental regimes, and landscape configuration) that, if missing or altered, would lead to the loss of that target over time. The nine MKE conservation targets, the rationale behind their selection, important subsidiary targets (i.e. other ecosystem components that share KEAs and threats with the conservation target concerned), and each the KEAs for each target are set out in Table 15.

Threats to conservation targets

After identification of conservation targets, the next stage involves identifying and ranking threats to the conservation targets. Threats are human activities or processes that have caused, are causing or may cause the destruction, degradation and/or impairment of biodiversity and natural processes. Identification of threats helps to identify the various factors that immediately affect conservation targets and then rank them so that conservation actions and resources are concentrated where they are most needed. Table 16 shows the priority threats impacting or likely to impact on MKE conservation targets and their KEAs.

Ecological management objectives and actions

Four objectives have been developed addressing threats to MKE's threatened large mammals (covering conservation targets: Elephant, Black rhino, and Mountain Bongo); addressing key threats to the MKE's critical habitats; addressing wildfire as a crosscutting threat to all conservation targets; and addressing cross cutting threats, including climate change, which threaten all conservation targets and require long-term monitoring. The objectives developed for the MKE Ecological Management Programme are:

MO 1. Threatened mammal species conserved and restored
MO 2. Threats to MKE habitats reduced and monitored
MO 3. Wild fires are managed effectively and monitored

MO 4. Research and monitoring in the MKE improved

These management objectives and management actions developed to achieve them are described in detail in the sections below. Under each management objective there is a brief description of the relevant management issues and opportunities, which provides the specific context and justification for the management actions.

Table 15. MKE conservation targets

	Conservation target	Rationale for selection	Important subsidiary targets	Key ecological attributes
Species	**Black rhino**	Classified as critically endangered by the IUCN. Global population declined drastically over last 30 years. MKE Population remains unknown. Population increase targets are unlikely to be met without active management.	▸ Giant forest hog ▸ black fronted duiker Forest primates	▸ Habitat size and quality (water and forage) ▸ Population size, recruitment and structure ▸ Genetic diversity and variability
	Mountain Bongo	Population has declined drastically over last 30 years to about 400-500 individuals in the country. Population status in the MKE is unknown.	▸ Bamboo forest ▸ Giant forest hog ▸ black fronted duiker Forest primates	▸ Habitat size and quality (water and forage) ▸ Population size, recruitment and structure ▸ Genetic diversity and variability
	Elephant	Classified as vulnerable by the IUCN. Current population is stable at well over 3000 individuals Play a key role in maintaining MKE habitats, especially grasslands and bushlands. Threatened by closure of migration and dispersal routes outside MKE boundaries.	▸ Other species that migrate or disperse outside the MKE (e.g. buffalo, lions,)	▸ Thego forest (breeding area) ▸ Dispersal area (LWC and northern rangelands) ▸ Population size, recruitment and structure ▸ Genetic diversity and variability
Habitats	***Camphor (Ocotea) and Juniperus-Podo* forests**	Threatened by illegal logging	▸ Bamboo forest ▸ Giant forest hog ▸ black fronted duiker Forest primates	▸ Vegetation structure and composition
Systems	***Montane forest***	Important water catchment and contains a high diversity of tropical hardwood trees. It is a key habitat for the elephant and Rhino that are threatened and the rare mountain Bongo	▸ Bamboo forest ▸ Giant forest hog ▸ black fronted duiker Forest primates	▸ forest size ▸ vegetation structure and composition
	Wetlands	Lakes of scenic beauty and tourist attractions; the only glaciers in Kenya are found on Mt. Kenya; Key source of water for the adjacent local community and water supply for hydro power generation. Under threat from excessive water abstraction and forest destruction.	▸ Swamps ▸ Lakes ▸ Glaciers ▸ Riverine vegetation ▸ Bird species	▸ Forest catchment ▸ River regime (flow and pattern) ▸ Water quality and quantity ▸ Riparian habitat
	Afro-alpine ecosystem	This is rare and only occurs on a limited number of high-altitude areas in east and central Africa.	▸ Mt. Kenya Rock Hyrax ▸ Senecios and Lobelias	▸ Abundance of plant and animal species
	Moorland grasslands	Rare grass species; habitat for ungulates and zebras	▸ Ungulates such as elands, Burchells zebra	▸ Vegetation structure and composition

Table 16. Threats to MKE Conservation Targets

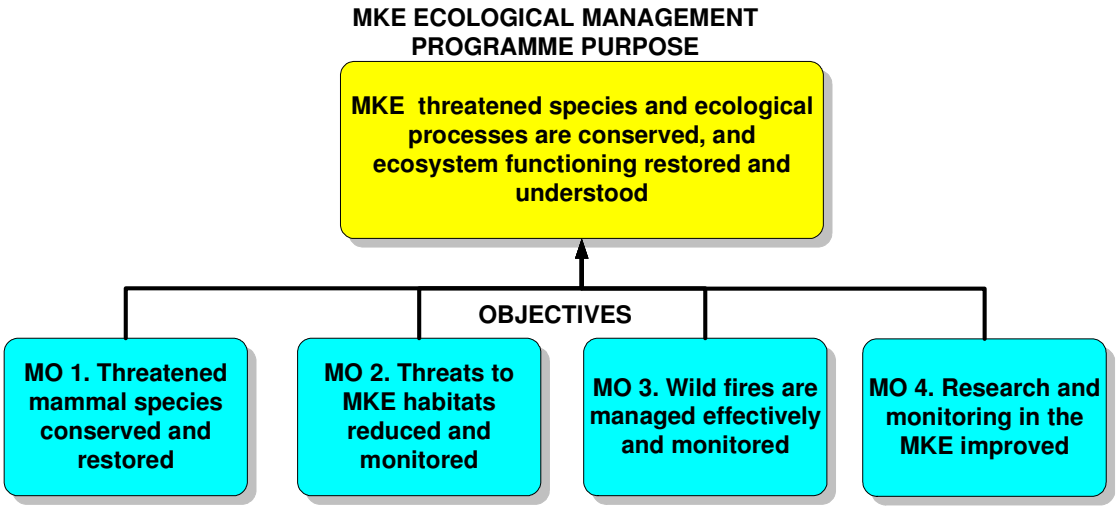
TARGETS / THREATS	Wetlands	Moorland grasslands	Afro-alpine	Montane forest	Camphor (Ocotea) and Juniperus-Podo forests	Elephant	Rhino	Bongo
Poaching						Low	Very High	Very High
Inbreeding						Low	Very High	Very High
Diseases and pests				Low	Low	Low	Very High	Very High
Alien and invasive species				Low	Low		Low	Low
Over-grazing of livestock				Medium	Medium		Low	Low
Charcoal burning				Medium			Low	Low
Human encroachment -Excision	High			High	High	Medium	High	High
Wild Fire	High	High		High	High	Low	High	High
Riparian cultivation	High							
Illegal logging	High			High	Very High	Low	Low	Low
Pollution	High							
Swamp drainage	High					Low		
Siltation or rivers and dams	Medium					High		
Soil erosion	Low		High					
Illegal water abstraction	Very High					High	High	High
Climate change	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High

Following the description of management objectives, the next section of the programme contains the **3-Year Activity Plan** for the Ecological Management Programme, and details the activities, responsibilities, and timeframe for completion of each of the management actions in the first 3-year timeframe of the management plan.

Management Objectives and Actions

Figure 4 below shows the overall objectives tree for the MKE Ecological Management Programme.

Figure 4. Ecological Management Programme objectives tree



Objective 1: Threatened mammal species conserved and restored

Mt Kenya ecosystem is recognized as a critical habitat for endemic, rare, endangered and threatened species that demand special attention. Mammals of conservation concern in the ecosystem include; African elephant (*Loxodanta africana*), Black rhinoceros (*Diceros bicornis*), Leopard (*Panthera pardus*), Giant forest hog (*Hylochoerus meinertzhageni*), Bongo (*Tragelaphus euryceros*), and Black fronted duiker (*Cephalophus nigrifrons hookii*).

In the past, interactions between the ecological components of the Mt Kenya ecosystem have led to considerable changes in populations of fauna in the forest; abundance and distribution of wildlife has been negatively affected mainly by illegal logging, poaching pressure and encroachments. To ensure that the status of mammal species of special concern are adequately protected, eight management actions have been designed focusing on assessing and monitoring populations of these species and restoring populations through translocations into a sanctuary that will be created in the MKE.

Action 1.1 Monitor elephant population dynamics and its impacts on people and the environment

Elephant population in Mt. Kenya is estimated at about 4000 individuals. Mt. Kenya elephant herd remain the biggest of elephants living in mountain areas in Africa. The elephant is a keystone species modifying habitat for other species to colonise. They are also the main problem animals in the ecosystem. In mitigating this problem, fences are being constructed cutting off elephants from critical habitat components e.g. breeding sites and salt licks. Given their scientific and ecological significance, elephant require special management intervention that will ensure that their population is maintained at levels that do not injure the environment and at the same time not aggravate human-elephant conflicts. Towards this, an elephant census will be carried out every two years to monitor elephant population dynamics. In addition, to discern the nature and extent of elephant–human conflicts and design pragmatic conflict mitigation measures, Mweiga Research Station will carry out an elephant–human conflict study. This will involve analysis of extant human-wildlife conflict data stored in the KWS human-wildlife conflict database supplemented with primary information which will be collected from the local community through interviews. The output of this study will be a detailed description of the types of conflict and a map showing key conflict hotspots. This information will be used to help in designing practical and pragmatic elephant management intervention measures. Moreover, this study will also assess the effectiveness of the current existing conflict avoidance measures, such as electric fences, that have been constructed in various conflict hotspots in the ecosystem. And to discern the impacts of the elephant on its habitat so that corrective action can be taken before elephant degradation of the environment reaches unacceptable levels, an elephant habitat interaction study will be carried out. This will involve initial collection of baseline information on the current levels of elephant impact on the natural forest and water sources, and subsequent updating of this information every two years.

Action 1.2 Carry out a study on elephant movement in the ecosystem

The range for the MKE elephants extends outside the MKE forest into adjacent rangelands and farmlands. The main migration corridors are from Imenti forest to the north east to the northern plains and from the forest reserve through Kisima ranch to Lewa Wildlife Conservancy. Another ancestral corridor used to link MKE and Aberdare forest but this route has since been cut off by human settlement. Interaction between MKE and other adjacent ecosystems is important as it increases ecosystem resilience. As such, to lay a strong case for keeping the migration routes open, an elephant movement study will be carried out. This will involve monitoring GPS collared elephants in the northern plains and Imenti forest to discern their movement patterns and deduce factors influencing their movements. Also, LWC elephants and those in the adjoining part of the MKE forest will be monitored to discern extent of elephant usage of the elephant corridor that is being established between LWC and Mt.Kenya Forest.

Action 1.3 Carry out an assessment of the MKE Rhino population

Black rhinoceros (*Diceros bicornis*) used to be in the MKE but they are extremely rare and currently they are not sighted. The last sighting of Rhinos in Mt. Kenya was at Mountain Lodge in 2003. However, despite non sighting of rhinos in the ecosystem for the last 6 years presence of rhinos in the MKE can not be ruled out as a definitive study to establish their status unequivocally has not been carried out.

As such, under this management action, the KWS Rhino programme will carry out an assessment of the status of the rhino population to verify the presence and numbers of rhinos in Sirimon and Mountain Lodge areas and establish why the rhinos are hard to see if at all they are still resident in the area. Further Rhino management actions in the MKE will depend on the outcome of this study. If the Rhinos are still present, their security will be enhanced, and if appropriate, the remaining rhinos will be moved to the Bongo sanctuary to be established under Action 1.5 of this programme to enhance their surveillance.

Action 1.4 Carry out a survey of the Bongo population in MKE

Mt. Kenya forest holds one of the four (4) isolated pockets of Bongo metapopulations. Other forests with confirmed Bongo populations are Aberdare forest, Eburru Forest, and Mau Forest. The national Bongo population has declined in the last few decades mainly due to poaching and habitat encroachment by human activities. However, the population status of Bongo in the country remains largely unknown. In Mt. Kenya forest the species ranges in the South West (Chehe) and Northern (Sirimon) within the Bamboo/ Podocarpus forest areas at higher altitude. However, numbers have not been confirmed.

To ascertain the population status of Bongos in the MKE, MKE management will collaborate with the Bongo Surveillance Group to carry out a survey of Bongos in the MKE. Because of the elusive nature of Bongos, the survey will employ several techniques to determine their number and distribution. First camera traps will be used to photograph Bongos in spots that they frequent such as watering points and salt licks. Secondly, Bongo dung samples will be collected for extraction of DNA material which will be analysed to accurately determine numbers. Finally, direct tracking will be used to determine habitat use in areas where they were known to have resided in the past.

Action 1.5 Establish a Bongo sanctuary

In the 1970s, out of concern for the observed alarming decline in Bongo population at the MKE, the government allowed Mt Kenya Game Ranch to capture and keep several Bongos at the ranch. Also, the government in collaboration with Mt. Kenya Game Ranch and the US exported 20 Bongos to the US for captive breeding (see action 1.6 of this programme). The Mt. Kenya Game Ranch Bongos have now increased in number such that they can now be re-introduced back into the wild. However, these Bongos are completely habituated to humans as they have been mostly hand reared and they would be vulnerable to poaching if they released into the forest without first putting in place effective security Mt. Kenya Wildlife Conservancy Mountain Bongo project to establish a secure Bongo sanctuary in the Mt. Kenya National Reserve. The first step in the establishment of the sanctuary will involve carrying out a feasibility study to assess the extent of the Bongo habitat, the population status of other competing herbivore species and presence of predator species. Guided by the outcomes of the study, a fenced sanctuary spanning 100 Km^2 will be established adjacent to the existing 100 acre Bongo holding enclosure at Mt. Kenya Wildlife conservancy.

Action 1.6 Re-introduce captive Bongos into the MKE

As noted in Action 1.5 above twenty Bongos were captured from Mt. Kenya and taken to the USA to form a foundation stock for a captive breeding programme for eventual return should they decline in their natural habitat. The captive programme was a success as by 1995 the US mountain Bongo population increased to 300 individuals. As part of the Bongo recovery

strategy, a Bongo repatriation project was therefore mooted in 2003 with Bongo holding facilities being constructed at Mt. Kenya Game Ranch and in 2004 eighteen Bongos were repatriated from the US. By 2008, the Game ranch had a total of 56 Bongos including those from the US. The ranch has set aside a 100 acre fenced bongo holding enclosure comprising of riverine forest habitat that mimic closely the array of habitat components that the Bongos will encounter in the Bongo sanctuary where they will be released(see action 1.5 above). Ten Bongos are currently held in this enclosure awaiting release once the Bongo sanctuary is established.

As such, under this management action, and in line with the Bongo recovery strategy, a systematic re-introduction of Bongo into the wild will be initiated once a secure sanctuary is established. It is expected that between 10-20 Bongos will be released to the sanctuary annually during the duration of this plan. The re-introduction will be followed by an elaborate post release monitoring to track adaptation of the individuals to the new habitat. This will involve use of GPS satellite tracking system to monitor the released Bongos. And to prevent the antelopes from being killed for bush meat, people living around the mountain will be educated on the need to conserve wildlife.

Action 1.7 Release the Mt. Kenya white zebras into the Bongo Sanctuary

In 1963, the white zebras of Samburu Country which numbered four at the time were given a special status of protection by presidential decree. As poaching increased countrywide in the early 1970s the government requested the proprietors of Mt. Kenya Game ranch to capture the white zebras and take them to the Mount Kenya Game ranch. The threat to viability of these rare zebras has now reduced as the population has grown to over 30 individuals. To relieve grazing pressure from the Mount Kenya Game Ranch, a few white zebras have been released in the grassland-bushland next to Mawingu airstrip which is earmarked for establishment of the Bongo sanctuary. To boost this population, at least 20 white zebras will be moved to the Bongo sanctuary.

Action 1.8 Monitor Lion movement in the MKE

Currently, there are no Lions in the MKE but it is expected that with the completion of the establishment of the Mt. Kenya-Ngare Ndare-LWC corridor, lions from Lewa could move through the corridor in pursuit of prey and re-establish themselves in the northern moorlands where ungulate prey is plenty. Lions used this range in the past but they no longer find way to this area as the corridor has since been cut off by farming.

Hence, considering that Mt. Kenya's main tourist attraction is hiking, re-establishment of lions in the MKE is not desirable as it will pose danger to visitors. In order to keep track of the lion movement in the MKE including LWC, MKE management will collaborate with the LWC researchers in monitoring lion movement in the ecosystem. Towards this, collared lions will be monitored to discern their movement patterns. In case it is ascertained that lions are re-establishing themselves in the Mt. Kenya forest, measures will be taken to translocate them to other areas.

Objective 2: Threats to MKE habitats reduced and monitored

The natural forests of MKE serve as a source of fuel wood, medicinal herbs, building and construction materials as well as providing ecological functions of soil and water conservation and carbon sequestration. However, these functions are threatened by human activities such as charcoal burning and illegal logging, which are increasingly degrading the forest. This objective has therefore been designed to address threats to the natural forest and its associated wildlife. Management actions that have been designed to realise this objective and maintain habitat integrity relate to control of illegal forest activities; control of diseases and pests; control of alien and invasive species; establishing wildlife corridors; having insight on key habitat components; and carrying out environmental assessments. These actions are elaborated in the following sections.

Action 2.1 Control charcoal burning and illegal logging

The communities living within the ecosystem have caused deforestation by engaging in charcoal production as a source of energy and income. This practice is prevalent in the lower elevations of the forest ecosystem. The highest concentrations occur in Thegu, Imenti, Burguret (Gathiuru) and Naro Moru, areas and to some extent in Ragati and Chehe areas. The difficultly in addressing charcoal production as effectively as logging seems, *inter alia*, to be because charcoal, once removed outside the National Reserve, cannot be easily intercepted, since proof of origin is difficult to determine.

To minimize illegal charcoal burning in the forest, several approaches will be applied. First MKE management will promote use of energy saving jikos in schools and other high energy using institutions in the MKE adjacent areas. This will be carried out through community education and outreach programmes implemented by both KFS and KWS. A similar approach has been initiated by LWC in LWC adjacent schools and it has been very successful. Second, for commercial production of charcoal in community areas, charcoal producers will be encouraged to use efficient kilns (Metal rather than earth) for conversion of wood to charcoal to prevent wastage. Third, establishment of woodlots with trees that are suitable for charcoal production will be promoted. Finally, MKE management will collaborate with other government enforcement agencies to curb transportation of illegal charcoal. Towards this, KFS will be very strict while issuing charcoal movement permits in the MKE and the adjacent Laikipia district.

On the other hand, although logging was 'banned' in 1999, illegal harvesting of tree species has persisted in the south eastern forests, particularly in Chuka, Ruthumbi, Chehe and Kathendeini albeit at low levels. Some of the most targeted tree species are cedar (*Juniperus procera)*, wild olive (*Olea europaea*), East African Rosewood (*Hagenia abyssinica*), camphor (*Ocotea usambarensis), Olea capensis* ssp., and *Vitex keniensis*. Notably, camphor is threatened by selective logging and clearing because of its easy availability and high demand. To control illegal logging MKE management will increasingly use CFA in identifying the culprits and patrolling the forest to minimize illegal activities. Towards this, MKE management will work closely with the community to ensure that the CFAs are well equipped with communication equipment and members of the community are rewarded appropriately for any information leading to arrest of culprits or prevention of illegal activity.

Action 2.2 Carry out surveillance of plant and animal diseases

Incidences of disease outbreaks such as Rinderpest have been blamed for almost extinction of Bongo antelopes (*Tragelaphus eurocerus isaaci*). Other species affected by the disease were cape buffaloes (*Syncerus caffer*) and giant forest hog (*Hylochoerus meinertzhageni*). On the other hand, insect pests (pine woolly aphid and the cypress aphid *(Cinera cupressi)* are a major problem in exotic tree plantations, of *Pinus patula* and *Cupresus lusitanica* respectiviely. Other pests e.g. rats are a menace to tree seedlings, they feed on the roots and cause ring debarking in abandoned *shamba* areas.

To ensure timely and appropriate management interventions are implemented to prevent catastrophic impacts of plant and animals diseases on MKE biological values, the on going wildlife disease surveillance and monitoring programme will be enhanced. The MKE disease surveillance team which is currently based at LWC will be strengthened in terms of funding and human capital to adequately cover the entire ecosystem. This team will work closely with the Vet Department of the Ministry of Livestock to ensure that disease prevention measures such as domestic animal vaccination campaigns are carried out when there is an outbreak of a transmissible disease.

In regard to plant diseases and pests, KEFRI will monitor plant diseases and pests such as Cypress aphid and Eucalyptus chalcid and advice on appropriate control measures in case of tree infestation. KEFRI will also screen for resistant materials in order to help develop trees that are resistant to these pests. In addition, biological control assessments will be carried out.

Action 2.3 Control and monitor spread of alien and invasive species

Alien and invasive species are recognized as one of the greatest threats to the integrity of natural communities and also as direct threats to the survival of many indigenous species. Locally occurring species can turn invasive when local ecological factors and processes constraining the growth of their populations are excluded. The removal of these factors and processes results in explosive population growth of some plant species replacing others and dominating the community composition. Invasive species have spread in the exotic plantations and could inhibit recovery of reforested sites. Common invasives include *Caesalpinia decapelata* (Mauritius thorn), *Datura dothistroma* (Jimson weed), *Solanum incanum* (Sodom's apple), *Triumfetta tomentosa*, and castor oil plant. Opportunistic species which have naturally spread their cover beyond firebreak lines include the *Fraxinus pennysilvania* (Mexican Green Ash).

To mitigate the impacts of alien and invasive species, under this management action, MKE management will carry out a comprehensive georeferenced inventory of alien and invasive species encountered in the MKE. In regard to this, MKE management will first develop a standard operating procedure or technical note for control and management of invasives in the MKE. Thereafter, based on this procedure, ranger patrols and research expeditions, equipped with GPS, will be used to collect data on invasive species. Once the inventory is complete, the alien and invasive species will be eradicated manually.

Action 2.4 Carry out a comprehensive inventory of critical habitat components such as salt licks and water points

Mt Kenya Ecosystem has special habitats that are critical to the maintenance of healthy populations of many large mammals e.g. elephants. These habitats include natural salt licks, water points, and elephant breeding sites. However, proposed developments in the MKE, such as construction of wildlife barriers and water supply systems that exclude wildlife from certain parts of their natural range, could cut off wildlife from some of these critical habitat components if these are not identified in advance and measures put in place to ensure that they continue to be available to wildlife. Under this management action therefore, a study will be carried out to identify and map all the key habitat components for the animals. This will build on the preliminary work carried out by the Department of Resource Survey and remote Sensing (DRSRS) during their Plantation boundary alignment study. Based on the results of this study, new wildlife barriers will be aligned in such a way that majority of the critical habitat components are fenced in.

Action 2.5 Establish wildlife corridors between MKE and adjacent ecosystems to increase ecosystem resilience

The MKE has four corridors[3] that used to connect Mt. Kenya to other adjoining ecosystems. However, these corridors have since been encroached by cultivation and human settlement delinking the MKE from the lower lying savannah ecosystems that are essential in times of stress e.g. droughts. As such, to provide connectivity to adjacent ecosystems and in so doing increase ecosystem resilience in the face of climate change, MKE will carry out a study to identify potential corridors to Laikipia and determine the feasibility of the existing corridors to the northern rangelands. Based on the outcome of the study, MKE management will collaborate with the local communities to establish the corridors that are deemed viable.

Action 2.6 Carry out Environmental Audits of existing tourism and protected area administration facilities

In 2008, Mweiga Research Station carried out EA for KWS operated tourist facilities in the Park[4]. The EA revealed that most of the facilities have major waste disposal problems. Similarly, it has been observed that other privately operated tourist facilities in the MKE have similar waste disposal problems. As such, to minimise environmental pollution, MKE management will liaise with NEMA to ensure that all tourist and administration facilities in the MKE carry out an initial EA and that subsequent audits are carried out annually. In addition, MKE management will organise regular clean-up campaigns along walking routes and trails involving MKE stakeholders to ensure that the area remains free of litter. The management will also construct adequate latrines along the climbing routes at suitable intervals to prevent poor disposal of human waste that could pollute rivers.

[3] Mt Kenya-Lower Imenti Forest-Northern Grazing Zones (35 Km)
Mt Kenya – Upper Imenti Forest (4 Km)
Mt Kenya-Ngare Ndare FR (9 Km)
Mt Kenya-Thegu-Aberdare Ranges (50 Km)

[4] These included: Batian guesthouse, Naro Moru gate campsite, Meteorological station bandas, American campsite, Austrian hut, Mountain Top hut, Mintos hut and campsite.

Objective 3: Wild fires are prevented and managed effectively

Wild fire is one of the major threats to biodiversity in MKE. Fire frequencies are higher in the western leeward side of the mountain which is drier. These fires are hard to control because of the limitations of the rugged and steep mountainous terrain. Further, effective fire management is constrained by lack of wildfire preparedness (e.g. adequate facilities, trained personnel) and weak enforcement of relevant fire related laws. In order to achieve this objective and thereby maintain ecological integrity that can not be disrupted by ravages of human caused fires, several management actions relating to development of a fire management plan and fire fighting operational guidelines, awareness creation and collaboration with stakeholders in fire prevention and suppression, improving fire preparedness, and enhancing fire detection and monitoring systems have been designed. These actions are elaborated in the following sections.

Action 3.1 Develop a fire management plan

To enhance fire preparedness, a well developed fire management plan is critical as it helps natural resource managers in fire prone areas to prepare in advance for fire hazards. As such, MKE management will prepare a joint KFS-KWS fire management plan that will specify actions that will be taken to suppress fires, management measures to be taken during periods of high fire dangers and guidelines for managers to follow when addressing fire issues in MKE. As part of the fire management plan, a fire management map will be prepared to help in locating forest fires by providing information on roads, tracks or trails to facilitate quick access. The map will also provide information on physical features that can be used to provide barriers to prevent fire from spreading. It will also show vulnerable natural features and dwellings that may be damaged and water availability for controlling the fire.

In addition, the plan will include fire prevention measures that are appropriate and specific to MKE which will be implemented upon increased incidence of human-caused fires and/or a high fire danger rating. These will include hazard management on and around sites of known high hazard and/or risk in both the National Park and National Reserve (e.g. rubbish pits, picnic areas, and camping sites) and where appropriate, implement measures (e.g. slashing, prescribed burning) to mitigate that hazard or risk.

Action 3.2 Establish fire fighting operational guidelines

Without a clear well structured procedure for fighting wildfires, confusion reins among staff on occurrence of wildfire resulting in emergence of diverse and divergent command centers, inefficient allocation of fire fighting resources, and hence ineffectiveness in fighting fires. To streamline fire fighting operations in the MKE, KWS and KFS will develop operational guidelines giving standard operating procedures for wild fire suppression activities. These guidelines will sequence the actions to be taken once a fire is reported, specify roles, responsibilities, and obligations of each partner organisation whenever a wildfire breaks out. It is expected that when a fire breaks out in the National Park or the National Reserve, KWS will take the lead role of coordinating and mobilising resources for fire suppression, whereas KFS will be expected to play a similar role in the suppression of fires in the Plantation and multiple use zones. The guidelines will also specify resources to be deployed and methods to be used to combat forest fires depending on their behaviour and extent.

Action 3.3 Create awareness among the local community and visitors on the impacts of wildlife and how wildfires can be prevented and suppressed

Use of fire by local communities to burn farm litter in lands surrounding the MKE has been identified as one of the major causes of forest fires in the MKE. Nnegligence on the part of forest resource users e.g. honey harvesters and campers have also been blamed for many wild fires. It is much easier to prevent fires than to contain them, hence it is essential that measures that will ensure responsible use of fire by the community be instituted to help save on scarce protected area resources. Fires started by the community and other forest resource users can be sufficiently prevented through extensive awareness campaigns particularly during the high fire alert seasons. Hence, to create public awareness on fires and prevent deliberate or accidental fire ignitions and in so doing avert consequent forest damage, several public awareness creation measures will be applied by KWS and KFS MKE management. Firstly, KFS will declare a fire alert during the fire prone season between December and April. During the fire alert season, the community will not be permitted to burn farm litter to clear land. This Information will be relayed to the community through local public meetings, schools, the mass media and strategically located posters warning the community not to light fires on their farms. In addition, a simple fire management brochure outlining fire risk in the MKE will be produced and disseminated to the local community. Secondly, every forest station will establish a strategically located fire rating billboard to warn the community and other forest users on the level of fire danger. This billboard will be updated regularly depending on the perceived level of fire threat. Thirdly, the collaborative forest management agreements entered between KFS and CFAs will be exploited to sensitize the community on the importance of being vigilant during fire seasons. Fourthly, pertinent fire alert signs will be installed in all fire prone tourist sites in addition to fire messages that will be included in MKE tourist publications. Finally, MKE management will collaborate with the local administration to ensure that the specified fire precautionary measures are strictly adhered to. In regard to this, the local administration will be used to enforce the relevant fire laws.

Action 3.4 Establish and equip CFA fire fighting crews and train them to effectively manage wild fires

The key to preventing great losses in timber and other natural resources from forest fires is to keep forest fires as small as possible. To do this, forest fires must be controlled as soon as possible after they are detected. It is much cheaper to have a handful of people put out the fire when it is small than to have to mobilise enormous resources trying to stop the fire once it is out of control.

The MKE lower zones adjacent to community land are the key fire hot spots and as such the communities in these areas will be incorporated in the fire fighting strategy. In regard to this, Foresters will sensitize the Community Forest Associations (CFAs), which have been established to promote and implement participatory forest management, on fire preparedness through fire seminars and workshops. The CFAs will be trained fully in fire fighting to ensure that they can mobilise and suppress fires in their forest management units before the fire runs out of control. From among the CFA members, a fire fighting crew will be selected and trained in the use of fire fighting equipment and in basic fire drills. The training will focus on topics such as forest fire detection and reporting, use of forest fire fighting tools, forest fire control methods, basic forest fire behaviour and how to fight forest fires safely. When a fire occurs in the CFAs area of jurisdiction, the leader of the fire fighting crew will sound an alarm to alert crew members who will assemble in a designated point and each crew member will be assigned a role during the fire fighting operation in line with the fire suppression procedures to be developed under action 3.2 of this programme.

To enhance fire preparedness for effective response to fires, it is important that the CFAs be provided with a set of hand tools to facilitate fire fighting. Hand tools play an important role in suppressing wild fires and constitute the basic suppression resources. Some of these are standard tools like machetes, shovel, rake, backpack pump and other adaptations that have been specifically constructed for fire fighting. These tools should be kept in a central designated place in a locked container to ensure that they are readily available. The fire fighting crew leader and a few other members should have custody of the keys to the container. In addition to hand tools, the fire fighting crews will be provided with cell phones to facilitate reporting fire incidents and coordination of fire fighting with foresters and KWS Wardens.

Action 3.5 Establish an elaborate fire detection and reporting system

It is easier to fight a fire immediately they are started when it requires few resources to contain, rather than intervening when it has spread and become huge and hard to contain. To intervene promptly therefore, it is important that a practicable and elaborate fire detection system be instituted. Such a system would require identification and mapping of all fire hotspots and being vigilant in these areas during the fire season.

As such, to ensure timely intervention in case of fire occurrence, MKE management will develop a fire detection and reporting system. The key players in fire detection will be MKE management, the local community and other forest users such as visitors. During the fire season, MKE management will intensify ground patrols to detect fires. In regard to this, the KWS Mountain Rescue rangers will carry out patrols along the mountain climbing routes to detect fires and also sensitize visitors and their porters and guides on precautionary measures that can be taken to prevent wildfire occurrence. In addition, aerial patrols of the fire hotspots will be carried out. The KFS fire watchtower network will also be rehabilitated to not only facilitate fire detection activities, but to also help in deployment of resources during fire suppression activities. Furthermore, the local communities, through their community conservation CBOs such as CFAs, will be used to sensitize forest users and forest adjacent communities on safe methods of using fire in addition to scouting for fires during the fire season (see action 3.4 of this programme).

Action 3.6 Improve MKE fire preparedness capacity

Human-caused wildfires have become a predictable recurrent annual occurrence in the MKE. It is therefore vital that fire preparedness is enhanced to effectively tackle fires when they occur. As such, under this management action, MKE management will develop and maintain communication systems to support its fire management activities. In regard to this, sufficient and effective telecommunication systems (radio and telephone) will be maintained to support fire management activities. All the key fire fighting agencies in the MKE, including partner community conservation groups, will be linked by either radio or telephone to facilitate communication. And to ensure efficient use of the radio communication equipment during fire management activities, all personnel required to use radios will be provided with the requisite basic training in radio communication.

As regards availability of fire fighting resources such as skilled personnel and fire fighting equipment, MKE management will, as far as is practicable, ensure that selected staff that are physically fit to fight fires receive basic fire fighting training. In regard to this MKE management will liaise with the relevant KWS and KFS Headquarters fire sections to organize in-house fire fighting training for relevant staff. The training will be carried out by competent resource persons drawn from the partner organizations. Selected competent fire team leaders will, however, be provided additional training at the Nairobi Fire fighting department to

sharpen their leadership and organizational skills enabling them to coordinate fire fighting activities effectively. MKE management will further ensure that the trained staff are appropriately distributed in the ecosystem based on Fire Risk information. In addition, to ensure rapid and effective response to wildfires, MKE management will provide adequate personnel and resources in all the MKE administration stations that are regarded as fire hotspots. In regard to this, these stations will be provided with adequate and serviceable fire fighting equipment such as power saws, shovels, pangas, and slashers. MKE management will also ensure that vehicles are appropriately distributed and readily available to facilitate quick response to fires. Further, bulldozers or other earthmoving machinery that could be required to create firebreaks will be strategically located and easy to deploy during the fire season. And to ensure quick access to fires, MKE management will maintain all the major roads, tracks and access routes necessary for fire management purposes. All existing firebreaks will also be rehabilitated and continually maintained to effectively stop fires from spreading. MKE management will also plant fire resistant plants at the edges of forest plantations to act as fire breaks.

Action 3.7 Prepare a comprehensive report for each wildfire occurrence

In order to develop effective and efficient fire preparedness and fire suppression strategies, it is vital that information (e.g. location, weather condition, type of fire, possible cause of fire, resources deployed to fight fire) on each wildfire occurrence be collected and analyzed to inform future decision making. Towards this, MKE management will develop and implement procedures for reporting of wildfire. For each wildfire, regardless of whether it has caused a major or minor damage, a fire report will be prepared and shared among KWS and KFS managers both at the field and headquarters levels.

Moreover, in all wildfire occurrences, MKE management through its security network will seek to establish the origin and cause of every wildfire that occurs within MKE boundaries. Wild fire causes will be investigated fully to ascertain whether the fires were natural or human-caused and if human caused, who was responsible, and whether the fire was caused deliberately or accidentally. The fire investigators will thereafter prepare a fire incident report which will be incorporated in the fire report. And where, arson or negligence has been proved MKE management will, as appropriate, prosecute persons suspected of being responsible for these wildfires.

Objective 4: Research and Monitoring in the MKE improved

The future desired state of the MKE in regard to ecological research and monitoring is where key ecosystem components such wildlife, vegetation, hydrology and climate are monitored to discern ecosystem functioning and changes in habitat components so that timely and appropriate management intervention measures can be taken by MKE management. Currently, research and monitoring work at MKE entails collection of baseline data, development of new and improved technologies, and trend analysis. Due to its strategic location at the equator coupled with altitude influenced vegetation distribution, Mt. Kenya is an ideal scientific site for monitoring climate change. In this regard a Global Atmospheric Watch Station has been established at the mountain and is one of the six monitoring stations established by World Meteorological Organization. However, although there have been long term research and monitoring programs at the MKE, their impact on ecosystem management has been

minimal. This is because ecological research and monitoring at the MKE face many challenges including lack of adequately defined research protocols leading to inconsistency in data collection methods making data collected on similar aspects by different researchers impossible to compare. Ecological databases are also lacking, capacity to conduct research is inadequate, and research outputs are poorly disseminated. As such, management actions that have been designed to realize this objective focus on establishing a long term ecological monitoring programme, establishing an ecological database, carrying out priority research, and establishing a fully equipped KWS research sub-station at Naro Moru Gate. These management actions are elaborated in the following sections.

Action 4.1 Establish a long-term ecological monitoring programme

Although MKE management has been carrying out ecological monitoring activities in the MKE for a long time, these activities, to some extent, have been ad hoc responding mostly to perceived threats to the ecosystems. Hence, methods that have been used to assess and monitor ecosystem components at various times are full of inconsistencies and therefore difficult to compare results from the same monitoring aspects. This therefore calls for establishment of a well designed ecological monitoring programme that facilitates monitoring of the MKE ecological systems to better understand their functioning and allow comparability of data over time. Establishing and maintaining a functional and effective ecological monitoring program requires major investments in terms of human capital, scientific equipment and infrastructure, and transportation. Hence, the purpose of the programme has to be clearly defined and the protocols to achieve the programme objectives have to be practical and of high standard to fully justify the investment in the monitoring program.

MKEPP is supporting foundation baseline studies to enable establishment of a long term ecological monitoring programme. These studies are being carried out by researchers from NMK, KEFRI, and KWS who are experts in some of the biodiversity components that will be monitored. Georeferenced transects have been established in various vegetation strata to document biodiversity status. Biodiversity surveys have also been carried out along these transects focusing on assessing the abundance and distribution of vertebrate and invertebrate species, and plant species that can be used as indicators of ecosystem change.

To further enhance ecological monitoring in the MKE, which KFS and KWS recognize as being vital in evaluating existing and planned forest management activities, a long-term monitoring program will be established. First, ecological parameters to be monitored will be identified and rationale for their selection and monitoring protocols developed. Second, baseline data on a select set of ecological indicators comprising of ecological processes that drive the ecosystem and a set of species and habitats that are sensitive to ecosystem change will be collected. Finally, data on these ecological indicators will be collected in line with the defined data collection protocols (see action 4.2 of this programme) and stored in the ecological monitoring database that will be developed under action 4.5 of this programme. These indicators will include weather, threatened species ecology and dynamics, vegetation dynamics, predator abundance, land birds, water quantity and quality, ungulate abundance, small mammal abundance, glacier thickness and size, trout fish and insects. Since not all ecological components can be monitored, these selected indicators constitute the best balance for obtaining early warning of ecosystem change, evaluating forest management practices and understanding the dynamics of the forest ecosystem.

Action 4.2 Develop research and monitoring protocols

Without clear statements of methods and the rationale for using them, or records of what methods were actually used, the quality of the ecological data will be unknown and the ability

of a monitoring program to achieve its goal diminished. It is therefore vital that research and monitoring protocols are comprehensively documented to standardize data collection, analysis and reporting. To achieve this, substantial work is required to develop and test monitoring methods to ensure they will be consistent and comparable over a long period of time.

As such, under this management action research and monitoring protocols will be developed and produced in form of Standard Operating Procedures (SOPs) that allow data collection, analysis and reporting to be done in a way that meets the research and monitoring program objectives. Writing protocols will involve documenting data collection and handling methodologies for the ecological parameters currently being monitored e.g. rainfall, temperature, land cover, wildlife diversity, wildlife population status, plant species diversity and abundance, and other parameters that will be included in a robust ecological monitoring programme to be established under action 4.1 of this programme. Once the SOPs are documented by key research institutions (NMK, KEFRI, KWS, KFS, and WRMA) that are implementing the ecological programme, the protocols will be peer reviewed to assess the adequacy of the protocol to meet the stated research and monitoring objectives.

Action 4.3 Carry out natural resource inventories

Natural resource inventories (NRI) and analyses are the basis for any natural resource management programme and planning. In the MKE, NRIs have been carried out at various times and critical information on climate, flora, fauna, geology, soils, and water is available. However, in most cases this information is not comprehensive necessitating further inventories to fill gaps regarding the status of various taxa of fauna and flora. In addition, most of the inventories are found in published books and journals or in unpublished scientific reports that are not centrally located, hence hard to find and use. To ensure that MKE has adequate knowledge of the natural resources under its charge, MKE management will collaborate with relevant research institutions to ensure that comprehensive inventories are carried out. Information generated from these inventories will be stored in the ecological database that will be developed under action 4.5 of this programme for easy retrieval and shareability.

Action 4.4 Establish a management information database to integrate research and monitoring information in the MKE planning, management and decision making

Timely and relevant information is a key pillar in an efficient and effective protected area management system. The many diverse activities and managers involved in the natural resource stewardship at the ecosystem level require information to support decision making. The managers and projects involved with activities such as park inventories, short- and long-term monitoring, research studies, restoration activities, control of invasive species, threatened and endangered species management, fire management, trail and road maintenance, law enforcement, and interpretation all require and/or provide natural resource information to others. Moreover, poor dissemination of research outputs is mentioned as one of the key challenges facing the MKE research programme leading to inconsistent support for research activities by natural resource managers and the local communities.

As such, under this management action, MKE researchers, will develop, organize, and make available natural resource data and facilitate the transformation of data into information through analysis, synthesis, and modelling. To realize this, a comprehensive GIS based natural resource database management system will be implemented at the King'ong'o Research Station. This will require provision of adequate infrastructure (e.g., staffing, hardware, software) to support database establishment and ensure that relevant natural resource data collected by various stakeholders such as KWS, KFS, KEFRI, WRMA and individual re-

searchers are entered, quality-checked, analyzed, reported, archived, documented, catalogued, and made available to others for management decision-making. In addition, since the primary consumers of the information are the ecosystem managers, information resource centres will be established at Mt. Kenya National Park headquarters and King'ong'o Research Station. These resource centers will consist of published and unpublished research reports both in analogue and digital media for easy access to ecosystem managers.

Action 4.5 Establish an ecological monitoring database

A lot of ecological data on the MKE has been generated by researchers over the years. This data, however, has not been organized in a database for easy manipulation and retrieval; hence it is not easy to share it with other users. A database is an essential tool for effective monitoring of long-term ecological processes. It enables data analysis and sharing. The main issues of ecological interest to be monitored at the MKE include loss of biodiversity, climate change, changes in water quality and the availability of water.

Hence, to facilitate ecological monitoring work, an ecological monitoring database will be established at the King'ong'o Research Station. The database will include existing data from three general categories: Environmental (climate, vegetation, soils, topography, hydrology and floristic dynamics) Faunal (wildlife numbers and distribution, population dynamics and habitat utilization) and Economical (current land-use and regional development plans). The database will also capture future data on these three broad categories which will be collected in line with the procedures developed under action 4.2 of this programme. Furthermore, in order to display and analyse the spatial aspect of the ecosystem, the database will be linked to a Geographic Information System (GIS). It is expected that with the implementation of this ecological database, long-term climatic and ecological monitoring will be enhanced and cooperation between various research institutions and management organisations collecting data and researching in the MKE at different sites in the ecosystem will be improved leading to synergy in the development of a wider understanding of ecosystem functioning.

Action 4.6 Carry out a biodiversity valuation study

Support for conservation of Mt. Kenya ecosystem largely depends on increased support by a large constituency of both local and international stakeholders. As such, stakeholders have to be educated on the environmental as well as economic importance of the ecosystem for them to offer this support. To shed light on the value of the ecosystem therefore, a valuation of the ecosystem goods and services in terms carbon offset value of the montane forests, and the contribution of the water catchment in providing water for urban, industrial, irrigation and power generation uses is needed. Hence, KWS and KFS will collaborate in carrying out a specialist study on biodiversity valuation of MKE. The output from this study will then be disseminated to stakeholders through scientific seminars and workshops and the research bulletins.

Action 4.7 Support climate change monitoring

Healthy forests are the foundation of the MKE Management Plan. It is therefore vital that the effects of climate change which is expected to determine how MKE habitats might be affected by global warming be monitored and understood. Climate-associated impacts such as drought, wildfire, and outbreaks of insects and diseases – already concerns in Kenya – are projected to become more frequent and severe, affecting forest productivity, ecosystem functioning, and habitat values in the country. The development of a sound, knowledge-based decision-making capacity for the region is therefore critical.

Several effects of the warming climate are becoming increasingly evident in the MKE. For instance, warming temperatures may be responsible for the observed receding of glaciers at the peaks of Mt. Kenya. Understanding the effects of climate change on forests in the MKE is critical for making sound regional forest management decisions as this phenomenon is regarded as one of the most serious long-term threats to the ecosystem values of Mt. Kenya.

As a first step in a long-term process of evaluating climate impacts, assessing risks to ecosystem and community values, and developing scenarios for ecosystem management, a project to collect and assess available information on climate change in the MKE will be initiated. The project will aim to synthesize available information on climate change for the region and explore the pros and cons of various forest management actions that could reduce the vulnerability of the forest ecosystem to global warming. In regard to this, MKE management will collaborate with Kenya Meteorological Department (KMD) to acquire climatic information generated from the meteorological stations in the Mt. Kenya region. It will also liaise with University of Nairobi researchers and other research institutions that have been monitoring Mt. Kenya glaciers to acquire data and information on glaciers. In addition, MKE management will support development of models to show the contribution of MKE in carbon fixing. This will first involve a baseline study to assess current carbon stocks of MKE and based on these, predictive models will be generated based on various forest management actions (e.g. forest enrichment, forest rehabilitation, and plantation establishment) that will be implemented through this plan.

Action 4.8 Carry out priority management oriented research

Research provides information for planning, implementation and monitoring of programmes. It also fills gaps in knowledge that is required for sustainable management of natural resources. Hence, to fill gaps and improve understanding of ecosystem functioning, the following is a list of research projects that have been prioritized by MKE stakeholders (see box 3). These projects will be carried out within the plan period.

Box 3. Preliminary priority research identified for the

1. Natural resource inventories and valuation
2. Ecosystem carrying capacity and species-habitat interactions
3. assessment of reforestation of degraded areas
4. Regeneration and propagation of indigenous tree species e.g. Ocotea Forest Study of ecology of endemic threatened species i.e. montane viper, abbort's starling, sharpes long claw and endemic chameleons;
5. Ecosystem restoration;
6. Elephant ranging patterns;
7. Systematic reconnaissance surveys;
8. corridor management strategies;
9. Hydrological studies;
10. Community-forest interactions.
11. Invasive species study;
12. Fire ecology
13. Visitor impact

Forest Resource Management Programme

Programme Purpose and Strategy

The purpose of the Forest Resource Management Programme is to ensure that:

> Wood and non-wood forest products are produced and sustainably managed, degraded natural forest patches are restored, and threats to forests are minimised

The MKE Forest Reserve/ National Reserve consists of both natural and plantation forests providing a wide range of ecosystem services. For example, the forests act as carbon sinks absorbing the carbon dioxide that is contributing to climate change. They regulate water cycles, maintain soil quality and reduce the risks of natural disasters such as floods. The Forest Reserves also offer diverse resources for consumptive use, and local people are allowed to access these products through a KFS permit and licensing system. The common forest products and services include firewood, livestock grazing, collection of herbs for medicinal use, water abstraction, fish farming and beekeeping. The communities are also benefiting from the re-introduced non residential cultivation of forests which is being carried out under a programme named Plantation Establishment and Livelihood Improvement Scheme (PELIS).

However, despite the importance of this forest ecosystem, deforestation through illegal logging, over grazing, invasive species, tree diseases and pests, wild fires, charcoal burning, encroachment, and excision threaten the ecological integrity of MKE. To address these issues holistically, KFS has embraced Participatory Forest Management (PFM) approach in the management of its forest resources countrywide. This is out of realisation that involvement of the wider stakeholders, some of who are responsible for the major management issues facing Kenya's forests, will significantly contribute towards reduction of threats and subsequently to sustainable management and exploitation of forest resources. MKE Forest Resource Management Programme aims to address the threats that are impacting on the most important ecological features and values of MKE ecosystem, and to provide a guiding framework for the long-term forest resource development of the area.

The following sections set out the guiding principles that are designed to guide MKE managers and stakeholders in the implementation of the PFM Programme and the achievement of the Programme Purpose. These principles are derived from the following KFS policy documents:

- Forest policy, 2007
- Forest Act, 2005
- Participatory Forest Management Guidelines, 2006

In implementing the MKE's PFM Programme, MKE Management and stakeholders should strive to ensure:

Wood and non-wood natural forest products are sustainably exploited

The Forest Act 2005, states that all indigenous forests and woodlands shall be managed on a *sustainable basis for purposes of both social as well as ecological functions*[5]. For a long time management of MKE forests and Kenyan forests at large has been based on the narrow concept of sustained yield principle with emphasis being on maximizing the production of timber with silvicultural systems for non-wood resources,[6] which can be developed in combination with timber, receiving little attention. As such, the main thrust of this program is to find ways to balance extractive uses in indigenous forests with the need to conserve the resources for other non-extractive benefits such as conservation of biodiversity, soil, and water, ecotourism, and carbon fixing.

Sustainable commercial production of wood and other forest products

According to the Forest Act 2005, *all plantation forests owned by the state shall be managed by the KFS on a sustainable basis with the primary objective being the production of wood and other forest products and services for commercial purposes.* Plantation forests in MKE fulfil a valuable role of meeting the growing demands for forest products, goods and services and provide the necessary protection for water catchment, as well as helping to conserve biological diversity and providing a carbon store. MKE plantation forests will therefore be developed and managed to meet these demands.

Degraded forest areas are restored

In the 1990s, MKE natural forests suffered acute degradation resulting from excessive harvesting and wanton destruction of forest resources. Large swathes of degraded forest areas are now found in the MKE but they are regenerating, albeit slowly. To hasten the regeneration however, there is need to rehabilitate these areas to restore the capacity of the forest to supply products and services, which had been degraded through human activities. Plantation establishment and enrichment planting therefore, will help rehabilitate the fragile and degraded areas that are prone to erosion and excessive water run off.

Local communities are actively involved in forest management

In regard to enhancing community livelihoods the Forest Policy (2007) states that "*The Government will encourage sustainable use of forest resources by communities*." To operationalise this, the Forest Act, 2005, states that a member of a forest community may, together with other members or persons resident in the same area, can register a community forest association under the Societies Act for purposes of participating in the conservation and management of a state forest or local authority forest. Such an Association can be given forest user rights to reciprocate on its input in the forest management.

[5] Functions of forests include-Conservation of water, soil and biodiversity; riverine and shoreline protection; cultural use and heritage; recreation and tourism; sustainable production of wood and non-wood products; carbon sequestration and other environmental services; education and research purposes; and habitat for wildlife in terrestrial forests and fisheries in mangrove forests.

[6] such as wild fruits, edible nuts, mushrooms, gums, and latex

In this programme, therefore, forest management approach will lean towards community participation in forest management to yield a sustained flow of products and other benefits to the local communities. Participation of the local communities in the forest management programme will however be guided by the existing Participatory Forest Management guidelines developed by KFS.

The two objectives developed for MKE Forest Resource Management Programme are:

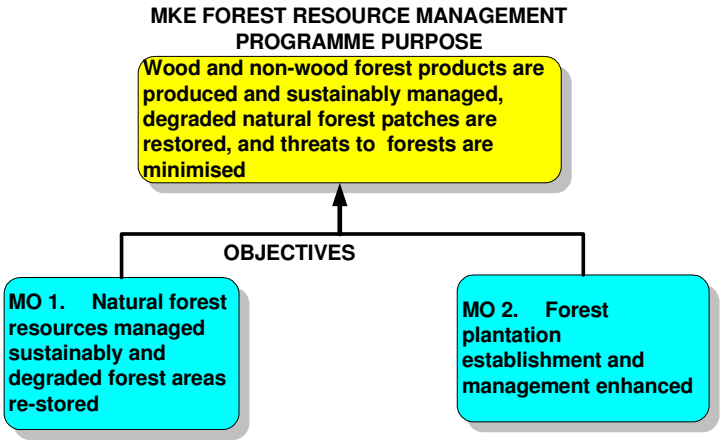
MO 1. Natural forest resources managed sustainably and degraded forest areas restored
MO 2. Forest plantation establishment and management enhanced

These management objectives and their respective management actions are described in detail in the sections below. Under each management objective there is a brief description of the relevant management issues and opportunities, which provides the specific context and justification for the management actions.

Management Objectives and Actions

Figure 5 below shows the overall objectives tree for MKE Forest Resource Management Programme.

Figure 5. Forest Resource Management Programme objectives tree



Objective 1: Natural forest resources managed and utilised sustainably and degraded forest areas restored

The future desired state of MKE is where natural forests are clearly zoned and sustainnably managed to fulfill social, economic, ecological, cultural and spiritual needs of the present and future generations. Currently, the MKE natural forests are facing threats from illegal logging of selected indigenous trees, charcoal burning, and over-grazing. The magnitude of these threats has however been declining and are no longer comparable to the situation in the 1990s when the MKE experienced indiscriminate and uncontrolled wanton destruction of the forest through logging. For instance a KWS study of 1999[7] indicated that over 6,700 Camphor (*Ocotea usambaresis*) trees had been destroyed in Mt. Kenya forest over a one year period, but a follow up survey carried out in 2002[8] revealed that logging had declined by 93 percent between 1999 and 2002. It was also noted that intensive logging leading to loss of canopy was no longer occurring. This significant decrease in forest destruction through illegal logging can be attributed to the ban on logging and intensification of forest patrols by MKE management. It is vital that forest destruction be minimised and degraded areas are rehabilitated as destruction of the natural forest erodes MKE's catchment value which is the main reason for the ecosystem's protection. On the other hand over-grazing which is mainly attributed to stocking beyond the forest's carrying capacity, can be detrimental to tree regeneration and wildlife herbivores by limiting their food requirements. It is therefore important that the livestock carrying capacity of the forest be established taking cognizance of the requirements of wildlife grazers.

This objective has been designed to address threats to the natural forest and maintain forest integrity. To achieve this objective several management actions have been developed relating to development of management plans for forest stations; carrying out natural resource assessments; regulation of utilisation of non wood forest products; establishing livestock carrying capacity; carrying out an assessment of degraded forest areas; carrying out enrichment planting; converting island exotic plantations to natural forest; and developing local PFM guidelines. These management actions are elaborated in the following sections.

Action 1.1 Develop comprehensive management plans for all MKE forest stations

The Forest Act (2005) requires that KFS management and CFAs that have entered into management agreements with KFS for purposes of management of specific forest management units develop comprehensive management plans covering a wide range of forest sector and related interests[9]. Towards this, KFS is developing management plans for its 18 stations[10] in MKE and they are in various stages of development with some planning processes having been completed while others are at the drafting stage. However, a number of stations are yet to start preparing management plans for their forest management units.

[7] Gathaara, N.G. 1999. Aerial Survey of the Destruction of Mount Kenya, Imenti and Ngare Ndare Forest Reserves. KWS

[8] Vanleeuwe, H. 2003. Changes in the State of Conservation of Mt. Kenya: 1999-2002. An Interim Report. KWS

[9] Including for example; tourism, wildlife, biodiversity research and conservation, conservation education, small scale enterprise development, identification of new products, service provision, watershed protection and energy provision

[10] MKE Forest stations - Hombe, Ragati, Nanyuki, Gathiuru, Chehe, Chuka, Ruthumbi, Marania, Ontulili, Naro Moru, Kabaru, Mucheene, Njukiini East, Meru, Chogoria, Irangi, Kathendeini, and Castle

Consequently, MKE management will liaise with KFS Headquarters to ensure that high quality collaborative and participatory management plans are developed for all the forest stations in line with the PFM guidelines and the Forest Act (2005). The plans will clearly spell out the roles and responsibilities and obligations of KFS and CFAs in regard to the management of each forest station. The plan will zone the forest management unit according to various conservation and management purposes including protection, livestock grazing, bee keeping, grass harvesting, fire wood collection, and harvesting building materials. In addition the plan will contain rules and regulations to be followed by KFS and CFAs to ensure sustainable conservation and management of the of the forest resource.

Action 1.2 Carry out Natural Resource Assessment (NRA)

Natural resource assessment (NRA) is an activity that is undertaken at the national, regional or global level to ascertain the availability and extent of natural resources in a region of interest. NRA supports formulation of appropriate measures to prevent the potentially disastrous effects of the trends in the depletion and degradation of natural resources. It also assesses national, regional and global resources, and the rate and pattern of their depletion and degradation, so as to define and implement appropriate mitigation measures.

Degradation of forest cover in the MKE is having serious effects on the production of forest goods and services necessitating the need of NRA to ascertain the forest status. Lack of NRA protocols, weak capacity to undertake NRA, and lack of participatory community NRA have been identified as some of the main obstacles that have to be overcome for a successful NRA to be carried out. As such, under this management action, MKE forest management will liaise with KEFRI to carry out a Natural Resource assessment study in the MKE. This study will seek to shed light on the nature and extent of various levels of biodiversity and their socio-economic as well as biodiversity values.

Action 1.3 Regulate utilisation of Non-wood Forest Products (NWFPs)

Although harvesting of forest products is going on in the Forest/National Reserve, information on the needs of the community and the level of available forest resources is scanty. As such, MKE forest management will carry out a study to determine the growth, yield and extraction levels of wood and non-wood products in MKE multiple use zone. The outcomes from this study will then be used by the Community Forest Associations (CFAs) in designing appropriate extraction levels for wood and non-wood products in their areas of jurisdiction. Further, to facilitate forest resource use, CFAs will use the outcomes of the study to develop guidelines for various allowable forest uses including honey harvesting, grass harvesting, and collection of medicinal herbs.

On the other hand, MKE is an important source of a wide range of NWFPs[11]. Production and marketing of these forest products contributes significantly to the local economy. However, although local communities are reaping benefits from these forest resources, little is given back by the community in terms of revenue to support conservation and management activities as most of the resource exploitation is done illegally. To ensure that KFS is receiving maximum returns from exploitation of NWFPs, MKE management in collaboration with the CFAs will put in place mechanisms to ensure that only licensed forest users will be allowed to extract NWFPs from the forest.

[11] NWFPs include medicinal plants, honey, thatching grass, fodder, fuel wood, charcoal, sand, saplings, seeds, cultural/ceremonial sites, water and food (vegetables, honey, fruits, and game meat).

Action 1.4 Establish livestock carrying capacity for each forest station

Illegal livestock grazing has been identified as one of the threats to forest conservation in the MKE. Illegal grazing leads to forest grazing pastures hosting livestock that are beyond the carrying capacity leading to overgrazing and subsequent degradation of pastures through soil erosion. To regulate and control livestock grazing in each forest management unit, it is vital that the livestock carrying capacity of each management unit be established. Towards this then, MKE management will carry out a study to assess the livestock carrying capacities of each forest management unit in MKE. The environmental factors to be considered in this study include quantity and quality of forage, type of forage, season in which it can be grazed, kind and mix of grazing animals, presence of water, topography, soil, climate and disturbance regimes. Hence, the first step in this study will involve carrying out a detailed environmental profile for each forest management unit and thereafter calculating the livestock carrying capacity based on forage demand and supply and environmental limitations. And to ensure that only authorized livestock are allowed in the forest and thereby ensure that livestock is maintained below the carrying capacity, MKE management will register and tag all livestock that is grazed in the forest. In addition all authorised herders will be issued with identification cards to make sure that illegal herding is reduced.

Action 1.5 Carry out an assessment of degraded forest areas

Since the countrywide ban on logging was effected in 1999, natural regeneration of indigenous forest in Mt. Kenya has been observed from both aerial survey and satellite imagery. However, a comprehensive inventory and mapping of degraded areas has not been carried out with the aim of informing the rehabilitation programme. As such, MKE forest management will carry out a study to map degraded forest patches using remote sensing techniques. MKE forest management will also liaise with KEFRI to carry out a species site matching assessment to ensure that each degraded forest patch is restored with species that have a high success rate of establishment. The MKE forest management will thereafter prepare a forest rehabilitation action plan involving multiple stakeholders. However, secondary natural succession will be allowed in sites that are sufficiently stocked with adequate densities of indigenous species while enrichment planting will be carried out on sites with relatively low densities of trees (see action 1.6 of this programme).

Action 1.6 Carry out enrichment planting in degraded forest patches

Mt Kenya Forest Ecosystem contains a wide range of plant species of actual or potential social and economic importance such as *Vitex keniensis, Ocotea usambarensis, Polyscias kikuyuensis* that are important hardwood timber; *Brachylaena huilensis* that is used in the carving industry; and *Prunus Africana* and *Warbugia ugandensis* that have medicinal qualities. However, overexploitation and mismanagement of Mt. Kenya ecosystem has resulted in some of these tree species becoming rare requiring active management to prevent further depletion and eventual extinction in MKE. The aforementioned species that have been overexploited do not necessarily regenerate and it is apparent that logged-over forest patches will become impoverished unless silvicultural interventions are instituted. Thus to provide material for future harvesting from the few economically desirable tree species, enrichment planting will be carried out in the degraded forest patches. This will however be preceded by initial forest assessments of the target enrichment areas to gain sufficient knowledge of forest composition and dynamics. Enrichment will be followed by continuous maintenance to give seedlings the best chance of survival. And to enhance monitoring of rehabilitated areas and prevent duplication of efforts amongst stakeholders, each interested stakeholder will be

allocated specific degraded forest patches to rehabilitate and in so doing enhance monitoring tree establishment and the effectiveness of the forest rehabilitation programme.

Action 1.7 Convert 'island' exotic plantations to natural forest

There are a few scattered pockets of 'island' exotic plantations covering 1184 Ha (see table 1) that are located in the natural forest zone. As part of implementation of the MKE zonation scheme, these island plantations will be harvested on maturity and the harvested patches rehabilitated through enrichment planting or allowed to regenerate naturally. However, natural forest patches totalling approximately 10,068 Ha (see table 17) that are in the plantation zone will be left intact and managed by the CFAs for production of wood and non wood forest products.

Table 17. Expected forest status after the construction of the electric ring fence surrounding MKE

Forest Station	Natural Forest fenced out (Ha)	Plantation Area fenced in (Ha)
Hombe	0.5	52.0
Ragati	9,134.5	177.5
Nanyuki	29.3	-
Gathiuru	163.3	-
Chehe	216.7	41.0
Chuka	78.1	-
Ruthumbi	8.4	92
Marania	8.5	429.5
Ontulili	113.4	62.7
Mucheene	158.9	38.1
Njukiini East	4	11.2
Irangi	152.1	200.8
Kathendeini	-	78.7
Total	**10,067.7**	**1,183.5**

Action 1.8 Develop local PFM guidelines

The long term strategy of managing forest resources in MKE is through Participatory Forest Management approaches. However in the short term, before strong community forest management institutions evolve, KFS will have to continue taking the lead in managing the forest management units. The community perception that the forest resource are 'common pool resources' hence anybody has the right to access such resources should be debunked first if quick and productive progress is to be made in the implementation of PFM principles. The community should be made aware that those contributing their time and resources in the management of the forest resource are supplementing KFS management resources; hence are entitled to reap direct benefits accruing from these resources in accordance with well laid rules and regulations. As such, MKE management will prepare PFM guidelines specific to MKE and in line with the national PFM guidelines issued by KFS. The guidelines will define roles and responsibilities and contributions of the communities participating in various forest uses and the benefits expected from their participation in the PFM. To support development of these guidelines however, a socio-economic study will be carried out to discern utilization of the forest by the forest adjacent communities. The outcome of this study will help focus the guidelines and also help determine sustainable use levels of various forest products.

Objective 2: Forest plantations establishment and management enhanced

The future desired state for the MKE in regard to forest plantations is where the plantations are managed sustainably for production of wood and other forest products and services for commercial purposes. However, with the ban on felling of timber in government forests still on, plantations due for harvesting are not being harvested occasioning plantation backlogs. Further, despite the ban, illegal felling of trees continues driven mainly by the high timber prices since the demand for timber is very high and it can not be met from legal sources such as farm forestry alone.

This management objective has therefore been developed to address issues affecting plantation establishment and management and farm forestry at MKE. It is expected that the ban on timber harvesting in plantations will be rescinded during the plan period allowing professional management of plantations. However, it is crucial that issues that occasioned the ban i.e breakdown in the control, policing and enforcement of rules and regulations relating to timber harvesting, be addressed before the ban is lifted.

To address the forest plantation management issues and establish new plantations to meet the growing demand for timber, management actions have been designed focusing on the following thematic areas: establishment of tree nurseries; establishment of plantations through the PELIS programme; carrying out forest plantation inventories; developing detailed plantation operational plans; carrying out silvicultural operations; promoting farm forestry; developing guidelines on wood harvesting; and marking the forest boundary. These actions are elaborated in the following sections.

Action 2.1 Increase outputs from KFS tree nurseries to meet the demand for plantation backlog

With the reintroduction of community participation in plantation forest establishment, new plantations are being established in the plantation backlog areas. However, there is need to ensure that adequate and quality tree seedlings are available for not only exotic plantation establishment but also for rehabilitation of natural forest and farm forestry programmes in the community areas.

The establishment of well-sited and efficiently run forest tree nurseries is an important prerequisite for the plantation development programme. This therefore calls for adherence to best practices in nursery establishment and management to ensure that adequate planting stock is available for the success of afforestation programmes. As such, to meet the tree seedling demand, MKE management will establish and maintain its own tree nurseries and at the same time support establishment of community or private tree nurseries. Tree nursery establishment and management will be guided by Forest Technical Orders to ensure that quality seedlings are produced. Tree nurseries will be established with appropriately tested quality tree seeds sourced from KEFRI. In addition to the seeds that will be sourced from KEFRI, the existing seed production stands at Chehe forest will be used for harvesting seeds for commercial plantation establishment. KFS will also carry out an assessment to establish the optimum number of nurseries that will meet the projected demand for seedlings to cater for the KFS afforestation and community farm forestry programmes. In addition, a scheduled planting programme will be established and strictly adhered to in line with the forest technical orders.

On the other hand, plantation establishment in MKE like the rest of the country has been dependent on a narrow choice of species mainly cypress, pines and eucalyptus. In addition, the existing plantations have been developed from a narrow genetic base reducing the quality of tree products. This challenge will be addressed through providing adequate information on the growth of indigenous species for plantation purposes, supplying a wide range of exotic species, appropriate species site matching and diversifying seed sources.

Action 2.2 Support establishment of tree nurseries in community adjacent areas

To increase tree seedling production for natural forest rehabilitation and agroforestry and provide income generating opportunities to members of the local community, KFS has been supporting and encouraging the local community to establish tree nurseries with suitable community-preferred tree species adapted to the mountain region. Seedlings from these tree nurseries are later sold to KFS for rehabilitation of degraded forest areas, or to members of the local community for agroforestry and establishment of farm woodlots. However, viability of community and private nurseries face several challenges that need to be addressed if these tree nurseries are to be profitable ventures to those who have established them. As such, KFS in liaison with KEFRI will first establish the number of community tree nurseries needed and their spatial distribution in the ecosystem to ensure even coverage (see action 2.1 of this programme). Secondly, KFS will liaise with respective CFAs to train members of the local community who have already established tree nurseries and those wishing to establish new ones on tree nursery establishment, management and silvicultural operations. This will include training on tree propagation techniques for indigenous tree seedlings required by KFS for forest rehabilitation and enrichment planting, and appropriate seed collection methods to enhance seed quality and seedling production.

Action 2.3 Support plantation establishment through the Plantation Establishment Livelihood Improvement Scheme (PELIS)

With the ban on the Non Residential Cultivation (NRC) in the early 1990's and KFS lack of requisite capacity (human and resources) to establish plantations, the end result was backlogs in planting, weeding, silvicultural operations, and poor plant establishment and losses from game damage. The total plantation backlog is estimated at 1,694 Ha distributed among the forest stations as shown in table 18.

Table 18. Extent of Exotic plantations and indigenous forest in the plantation zone

Forest Station	Total Area (Ha)	Plantations				Indigenous (Ha)	Un-Planted areas (Ha)	Plantation Area Zoned Out (Ha)	Total Area After Zoning (Ha)
		Cypress (Ha)	Pines (Ha)	Eucalyptus (Ha)	Other Exotics (Ha)				
Hombe	1,215.0	793.4	50.0	156.6	17.5	0.5	145.0	52.0	1,163.0
Ragati	10,477.6	508.0	179.6	127.0	275.0	9,134.5	76.0	177.5	10,300.1
Nanyuki	1,110.1	910.5	35.8	134.5	-	29.3	-	-	1,110.1
Gathiuru	14,985.0	1,193.2	1.6	206.4	54.7	163.3	969.0	-	14,985.0
Chehe	485.7	163.0	16.5	13.6	-	216.7	38.4	41.0	406.3
Chuka	190	-	4.8	110.5	10	78.1	5.78	-	200.18
Ruthumbi	379.8	-	290.4	1	3.2	8.4	60	92	287.8
Marania	572.9	-	138	51.8	-	8.5	14.4	429.5	143.4
Ontulili	1565.4	-	57.3	138.6	28.3	113.4	102	62.7	1502.7
Mucheene	10200	-	231	231.1	43.9	158.9	266.7	38.1	10161.9

Forest Station	Total Area (Ha)	Plantations				Indigenous (Ha)	Un-Planted areas (Ha)	Plantation Area Zoned Out (Ha)	Total Area After Zoning (Ha)
		Cypress (Ha)	Pines (Ha)	Euca-lyptus (Ha)	Other Exotics (Ha)				
Njukiini East	273.2	59.2	17	167.2	9.3	4	16.5	11.2	262
Irangi	200.8	-	-	48.7	-	152.1	-	200.8	-
Kathendeini	94.1	78.7	-	15.4	-	-	-	78.7	15.4
	41,749.6	**3,706**	**1,022**	**1,402.4**	**441.9**	**10,067.7**	**1,693.8**	**1,183.5**	**39,427.8**

The NRC has since been reinstated through PELIS and it is anticipated that timber harvesting is going to resume within the duration of this plan. Unlike its predecessor the NRC, the new PELIS model is community based ensuring that the participating community is held responsible for the success or failure of the scheme. Towards this, the CFAs have been empowered to supervise PELIS implementation in all PELIS sites in the country.

To ensure that the PELIS experiment is a success in the MKE, MKE management will adopt several approaches aimed at strengthening the CFAs and giving incentives to farmers. First, MKE management will provide each PELIS farmer the PELIS guidelines to ensure that all farmers are familiar with the expectations of KFS. Second, MKE management will draw MOUs with each farmer participating in the PELIS obliging the farmer to offer maximum care and protection to trees planted on their forest plots. Third, to prevent misuse of PELIS by influence peddlers, the area opened up in a given Forest Station will strictly correspond with the planting requirements and the station's capacity to produce seedlings from certified seeds. Fourth, to prevent encroachment, construction of temporary structures for over night stay will not be allowed. Fifth, Foresters in the MKE PELIS sites will be trained on best management practices regarding PELIS including public relations, good governance and record keeping. Sixth, to ensure that the farmers are unreservedly supportive of PELIS it is essential that they continue reaping benefits from the forest even after the tree canopy closes making crop production impossible. This will be realized by allowing the farmers to protect the forests through their respective CFAs and harvest forest products during subsequent scheduled thinnings and prunings. Finally, the PELIS programme in MKE will be evaluated annually to find out whether the objectives of the programme are being realised.

Action 2.4 Protect PELIS sites from game damage

A ring fence is being constructed around MKE to minimise human-elephant conflicts in the area and in so doing gain community support for conservation of the mountain ecosystem. According to recommendations of the fence's EIA carried out by KWS, stakeholders have agreed that for effective fence maintenance, the fence alignment should follow the boundary between the community land and the forest/National Reserve fencing in both the plantation and natural forests that are habitats for the crop raiding wildlife. However, to prevent crop raiding wildlife from destroying crops and young plantations in the PELIS sites, appropriate and effective wildlife barriers such as electric fence or game moats will be constructed to hem in these sites (see action... of the Community Partnership and Education Programme.

Action 2.5 Carry out an inventory of forest plantations

Plantation forest inventory is a vital prerequisite for developing felling plans and planting programmes. In MKE, the ban on logging has occasioned lack of prioritization of plantation inventories. However, with the anticipated lifting of the ban on logging during the plan period, it is important that a plantation inventory be carried out to assess the status of various forest plantations in MKE in terms tree species, age, the quality and quantity of harvestable wood products, and their economic value. This will form the basis for determining allowable cut,

clear modalities for executing the contractual felling agreements, and piloting on alternative systems for plantation establishmentt. As such, KFS will collaborate with KEFRI to carry out an inventory of the MKE forests, the output of which will be used to lobby for logging licensing and the lifting of the ban on commercial logging in forest plantations.

Action 2.6 Develop detailed operational plans for forest plantations

In addition to the forest management plans that will be developed for the forest stations through action 1.1 of this programme, detailed operational plans will also be prepared to guide the day to day management of forest plantations. The operational plans will specify areas to be opened for plantation establishment annually through PELIS (see action. of this programme), tree planting needs, silvicultural requirements, and felling plans.

Action 2.7 Establish forest plantations based on market demands

To ensure that forest plantations recoup the cost of their establishment and management, it is vital that forest plantation establishment is geared towards production of specific products targeting an identifiable market. For instance species (e.g. *Acacia melanoxylon*) that are suitable for charcoal production can be established for this purpose. Plantations of hardwoods like V*itex keniensis* can be established for purposes of producing wood for the furniture industry, while exotic soft wood plantations of species like *Pinus patula* and *Cupressus lusitanica* can be established to provide timber for the construction industry. Production and utilisation of species like bamboo and *Prosopis juliflora* can also be explored to reduce pressure on species that are traditionally over-utilized. In view of this then, under this management action, MKE management will ensure that new forest plantations will be established based on the demands of specific markets and expected returns on investment. To guide plantation establishment therefore, a study will be carried out to find out the demand levels of various forest products in MKE wood markets. On the other hand, to facilitate establishment and management of indigenous plantations to provide hardwood products, KFS will liaise with KEFRI to develop guidelines for establishment and management of indigenous plantations. In regard to this KEFRI will carry out experiments on stands of indigenous trees such as Podo, meru oak and cedar to discern tree requirements for establishment and growth.

Action 2.8 Carry out scheduled silvicultural activities in the plantations

There is a huge backlog in silvicultural operations in MKE, which is attributed to the ban on *Shamba system* and the moratorium imposed on timber harvesting in 1999, resulting in poor quality plantations. To ensure that forest plantations are producing the envisaged quality and quantity of wood products, MKE Foresters will carry out silvicultural activities in accordance with plantation management plans that will be prepared through the implementation of action 2.5 of this programme. The Foresters will employ casual labour from the local community to carry out scheduled supervised silvicultural activities on newly established plantations. These activities will mainly focus on thinning and pruning as weeding will have been carried out by farmers raising the trees through PELIS. The wood products that will be yielded from these activities will be sold to the local community as firewood or construction material. In addition, for the older plantations, that require pruning, thinning or clear felling, the backlogs will be cleared in accordance with schedules to be developed by the MKE foresters.

Action 2.9 Support production of wood products through farm forestry

KFS carries out its Forest extension services through its Farm Forestry Programme whose main objective is to increase wood production in farmlands to release pressure on the forest and at the same time generate income to farmers. The demand of wood after the ban on logging is very high as private farms have become the main source of wood for both industrial scale and mobile sawmills. Consequently, farmers are increasingly embracing farm forestry in appreciation of the commercial value of trees. However, the farm forestry sector faces many challenges including lack of skills among farmers to produce trees for commercial purposes. As such, MKE management, through its Farm forestry programme will carry out farm forestry extension services in MKE adjacent areas to ensure that farmers are provided with tree product market information, certified tree seeds, and requisite training in tree management. In this regard, on-farm tree planting demonstration plots will be established in farms adjacent to the MKE and used as focal point for technology dissemination at the farm level.

Action 2.10 Monitor tree pests and diseases

Due to the narrow range of plantation species, the standing plantations have been prone to pests and diseases. The main pests include cypress aphid, pine woolly aphid and eucalyptus chalcid. However, the ecosystem has not suffered from major pest attacks and thus no extensive damage has occurred. As such, to ensure that plantations are not lost to controllable diseases and pests, MKE forest management will collaborate with KEFRI to carry out regular monitoring of pests and diseases that afflict plantations. In addition, studies will be carried out to develop appropriate eco-friendly pest and disease control intervention measures.

Action 2.11 Develop guidelines on wood harvesting to enhance integrated harvesting and utilization of wood products

Utilization of wood and wood products from plantations by the private sector and communities has not been optimal. The private sector has been using equipment which has very low recovery rates leading to high losses of round wood. There is need to adopt modern technology, e.g. change from circular saws to band saws, to reduce wastage and increase wood yield. Towards this, MKE forest management will liaise with KFS Headquarters to ensure that the current forest technical orders regarding wood harvesting are revised so that loggers are required to use wood harvesting equipment that minimizes losses. In addition, the technical orders will also require that plantations that are highly suitable for production of high quality timber e.g. eucalyptus are reserved for this purpose and not harvested for other purposes e.g. firewood. Once the technical orders have been revised, MKE management will disseminate this information to all the loggers in MKE for implementation. Further to this, KEFRI will carry out research to generate information on the most appropriate wood harvesting technology that minimises wastage. The results of this research will then be disseminated to KFS and the wood harvesters. And to ensure that wood harvesters are more conscious of wasteful wood harvesting procedures, KFS will ensure that wood harvesting will be carried out through competitive bidding, hence the winning bidder will bear the losses accruing from applying inappropriate wood harvesting methods.

Additionally, there are other timber species that have not commanded a high market demand due to their need for pre-treatment and preservation to withstand ravages of weather and wood pests. These include pine, grevillea and eucalyptus. In order to increase the longevity of timber derived from these species and reduce the rate of wood degradation, KFS will promote use of wood preservatives in the local timber industry. This will be carried out

through forest conservation and management training workshops targeting the key players in the MKE timber industry.

Action 2.12 Demarcate forest boundaries to prevent encroachment

MKE has experienced pressure from small holder encroachment in some areas because the forest boundary is not clear in many areas or it is poorly demarcated. The actual physical demarcation of the boundary between the plantation and indigenous forests is also not clear inviting potential encroachment on natural forest by PELIS. The plantation boundaries have been surveyed but boundary marking has not been carried out. It is important that the boundary between the natural forest and the plantations be clearly marked to prevent encroachment of PELIS into the natural forest. As such, to prevent encroachment on the gazetted forest area the forest boundary will be re-surveyed after which the boundary will be marked with cut lines where appropriate or by use of clearly visible rock cairns with inscription indicating that the cairn is the boundary between the forest and community areas. And to ensure that the boundary between the forest stations (i.e plantation zone) and the natural forest zone is clear, the boundary will be marked using fire resistant plants (e.g. Mexican green ash) to act as fire breaks. The Stations will also be ring fenced with a 2-strand electric fence to prevent destruction of plantations by large herbivores, such as elephants and buffaloes. However, before the installation of the electric fence, rock cairns will be used to mark the boundary.

Water Resource Management Programme

Programme Purpose and Strategy

The purpose of the Water Resource Management Programme is to ensure that:

> Water resources in the MKE are sustainably conserved and managed to meet domestic, irrigation, hydropower, and industrial needs of the local people

The water resources management programme addresses issues affecting water resources in the protected water catchment area and the five kilometre influence zone surrounding the protected areas. The Water Resources Management Authorities (WRMA) covering MKE, Ewaso Nyiro North and Tana, have already developed robust and very elaborate 5-year Catchment Management Strategies covering the entire catchment area which are the key reference documents guiding the water resource management in MKE and the rest of the two catchment areas (Ewaso Nyiro North and Tana). The water resources management programme in this MKE plan has therefore been developed in line with these Catchment Management Strategies and focuses on management actions whose success hinge on close collaboration between the WRMAs, KWS and KFS.

The major water resource management challenges in MKE include: water scarcity due to increasing demand from competing uses such as irrigation, domestic and commercial activities; over abstraction from the main rivers, particularly in the dry season; conflicts due to different water demands in the arid and semi-arid zones of the rivers; deforestation and vegetation clearance of wetlands, springs and swamps by way of cutting of indigenous trees in the catchments; pollution due to use of agro-chemicals in the farmlands; and siltation of rivers from sediments and silt from erosion process due to poor farming methods.

The following sections set out the guiding principles that are designed to guide MKE managers and stakeholders in the implementation of the Water resource management programme. These principles have been drawn from the following policies:

- The Water Act (2002)
- National Water Policy (1999)
- National Water Resource Management Strategic Plan 2006 (NWRMS)
- Tana Water Catchment Area: Catchment Management Strategy (2007
- Ewaso Nyiro North Catchment Area: Catchment Management Strategy(2007)

In implementing MKE's Water Resources Management Programme, MKE Management and stakeholders should strive to ensure that:

Water catchment areas are restored and conserved

Water is needed for domestic uses such as washing and cooking, as well as for agricultural and industrial uses. This water comes from rivers and streams. It is therefore necessary to ensure their constant flow throughout the year and the only way to do this is to maintain an adequate vegetation cover in water catchment areas. In the absence of vegetation cover, most of the rainwater flows downhill as runoff. This results in floods during rainy seasons and very little or no flow in the streams during the dry seasons. In addition, the sustainability of waterpower resources in the greater MKE is dependent on the presence of a vegetation

cover in the water catchment areas. This ensures an almost even flow of water throughout the year. In addition, the presence of vegetation cover along the river valleys prevents soil erosion. This in turn prevents siltation of hydroelectric power dams and control flooding. The development of hydroelectric power projects is associated with other benefits. The dams can be used to provide irrigation water, for navigation, flood control, recreation and the development of fisheries.

Water abstraction from rivers is controlled and monitored

Water abstraction is largely unregulated and there is significant water wastage at abstraction points in most of the drainage systems in this ecosystem. While the number and size of abstraction structures are increasing, the effort towards forest conservation is decreasing. This has led to reduction in the volumes and availability of water throughout the year in rivers, springs and aquifers. The lack of water utilization plans has led to uncontrolled off takes from the rivers and streams and the main beneficiaries are largely unorganized. This kind of scenario poses a big problem to the ecosystem, which has led to insufficient in-stream flows to sustain domestic, agricultural and industrial uses. The generation of hydroelectric power and impairment of hydrological balance is also compromised due to reduced stream flow. This management programme seeks to address issues related to uncontrolled water abstraction to ensure rational allocation and use of water resources.

Two management objectives have been designed to address key threats to water resource use and conservation in MKE (i.e. illegal abstraction, riparian cultivation, pollution and siltation of rivers and dams, and soil erosion). These threats are addressed in detail in the CMSs for Tana and Ewaso Nyiro North catchment areas; hence the aim of the Water Resources Management Programme is to highlight those issues that affect the upper catchments of the two rivers and are within the geographic scope of the plan.

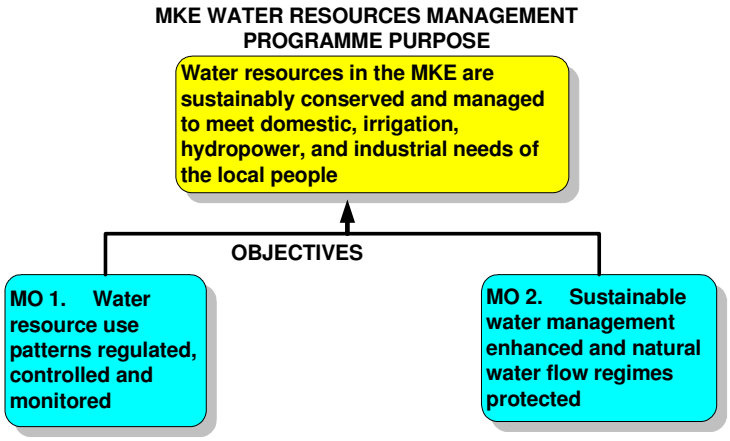
The objectives developed for the MKE Water Resource Management Programme are:

MO 1. Water resource use patterns regulated, controlled and monitored
MO 2. Sustainable water management enhanced and natural water flow regimes protected

Management Objectives and Actions

Figure 6 below shows the overall objectives tree for the MKE Water Resources Management Programme.

Figure 6. Water Resources Management Programme objectives tree



Objective 1: Water resource use regulated and controlled

Over 300 water abstraction intakes occur in the Mt Kenya ecosystem. Most rivers, especially those in the leeward side of the mountain are over abstracted. Illegal abstraction is a major challenge and the percentage of water abstracted illegally has not yet been established. This objective has therefore been developed to address water use problems in the MKE. The management actions that have been designed to achieve this objective relate to development of sub-catchment water allocation plans; collaboration with KFS and KWS in monitoring water abstraction; clustering intakes to facilitate regulation of water abstraction; collaborating with Water Resource Users Associations (WRUAs) to enforce water regulations; collaborating with KFS and KWS in monitoring river water levels in the MKE; and monitoring ground water abstraction. These actions are expounded upon in the following sections.

Action 1.1 Develop sub-catchment water allocation plans

The main instrument to guide water allocation is the Water Allocation Plan (WAP). The WAP provides the rules and procedures that govern the way in which the allocatable water is to be allocated to different uses and users, and the management controls that are required to safeguard the Reserve. To streamline water allocation in MKE and mitigate impacts of excessive abstraction from water bodies, Water Resources Management Authority (WRMA) will prepare sub-catchment WAPs for all the major rivers. The WAPs will spell out how water will be allocated to various types of users based on priority of use, measures to be taken during seasons of water stress, and ways and means of enforcement and compliance.

Action 1.2 Collaborate with KFS and KWS in monitoring water abstraction in the MKE

As a result of enactment of the Water Act, which decentralized permit issuance to the Regions, there is need to take an inventory of all valid water permits and review them with a view of making them compliant with the requirements of the Water Act 2002. In regard to this, the two WRMAs (Ewaso Nyiro and Tana) will create comprehensive databases of water abstractors which will be updated continuously. This information will be shared with the other stakeholders, and particularly KFS and KWS, who are involved in the management of the MKE. In addition, the WRMAs will collaborate with both KFS and KWS in carrying out inspections of water abstraction points inside the MKE to ensure that illegal water abstraction is stopped.

Action 1.3 Cluster intakes to facilitate regulation of water abstraction

Illegal abstraction of water is exacerbated by proliferation of communal as well as individual water intake points which are difficult to monitor as they are far apart. Hence to curb illegal water abstraction, WRMA will cluster all authorised water intakes that are in close proximity of each other into common intake points to facilitate control and monitoring of water abstraction in the MKE water catchment. And to facilitate the establishment of common intake points, WRMA will carry out water abstraction surveys for all the major rivers flowing out of the ecosystem to discern water demand and supply in MKE. In addition, all water abstractors will be required to install water meters to facilitate monitoring water utilisation and levying appropriate fees to water users.

Action 1.4 Collaborate with WRUAS to enforce water regulations

The Ministry of Water and WRMA, in collaboration with other stakeholders, have prepared a set of regulations in line with Water Act 2002 (Legal Notice 171-The Water Resources Management Rules, 2007). WRMA has the responsibility of enforcing these regulations, but WRUAs and other water users can also be used to support enforcement of the regulations. WRUAs have a role through MoUs signed between them and WRMA in: Identifying members who are not compliant; sensitizing members on the need to become compliant conducting inspections as well as patrols on compliance; recommending remedial measures and preparing proposals for funding; and embedding code of practice for water users in their various constitutions. In view of this, WRMA will increasingly work with WRUAS to enforce water regulations ensuring that water allocation plans are adhered to and land use activities that injurious to riparian systems are curbed.

Action 1.5 Collaborate with KFS and KWS in monitoring river water levels in the MKE

MKE has several Regular Gauging Stations (RGSs) for monitoring water quantity[12]. However, data from some of these RGSs are not collected regularly as the WRMAs lack requisite capacity to do this. Several rivers, such as River Ragati, lack RGSs altogether. To rectify this, all the existing non-functional RGSs will be rehabilitated and upgraded to the automatic water gauges. Additionally, new RGSs will be installed along the rivers that currently lack

[12] RGSs in ENCA are found along Naro Moru, Burgureti, Nanyuki, Likii, Teleswani, Ontulili, Sirimon and Timau Rivers

such stations. And to ensure that data is collected consistently, WRMA will engage WRUAs in reading the regular gauging stations and pay honoraria to data recorders.

Action 1.6 Monitor ground water abstraction

Several boreholes have been developed in MKE, especially towards the lower western slopes between Kiganjo and Nanyuki, because river flow is insufficient to supply the increasing water demand from the farms. Development of these boreholes is, however, not informed by sound hydrological data as this is collected erratically. In regard to this, therefore, WRMA will commission water assessment studies that will involve carrying out detailed hydro-geological surveys and development of hydro-geological maps to discern ground water availability, its quality and quantity, type, and chemical composition in the ecosystem. In addition, WRMA will establish a ground water monitoring network involving data collection from existing boreholes. And in order to ensure that ground water data is spatially comprehensive, new boreholes will be drilled where boreholes are far apart. And to enhance collection of ground water data, WRMA will involve ground water users in data collection.

Objective 2: Sustainable water management enhanced and natural flow regimes protected

This objective is designed to ensure sustainable management of the water resources and maintaining natural water flow regime in the MKE. The management actions that have been developed to realise this objective relate to: construction and maintenance of water storage dams to regulate river flow; creating inter basin water transfer; supporting irrigation farmers to harvest run-off or flood water for irrigation; monitoring water quality and quantity from water sources; controlling farmland nutrient, sediment and pollution discharge into water bodies; developing sub-catchment management plans; building the capacity of MKE WRUAs to effectively participate in water resource management; and drawing a collaborative MOU between WRMA, KWS and KFS to monitor water quality and quantity. These actions are elaborated in the following sections.

Action 2.1 Construct water storage dams to regulate river flows

So far there are no dams in MKE. However, according to Ewaso Nyiro North Catchment Area Management Strategy, dams are needed to reduce water demand deficit by 25% by 2015. This will require construction of 8 dams of total storage capacity of 7,000,000 M^3. The potential sites for the 8 dams have been identified in the Forest Reserve along Rivers Nanyuki, Naromoru, Burgureti, Teleswani, Thiba, Mathioya, Likii and Mutonga. Once constructed, the dams are expected to have a 90-day storage capacity ensuring downstream users water during both the wet and dry seasons unlike presently when they receive river water during the wet season only.

However, despite the strong justification for these dams, construction of huge dams in protected areas and water catchments have major negative environmental impacts including clearance of natural forest, interference with wildlife habitats, and soil water retention capacity. Hence, before a decision on construction of these river flow stabilizing dams is made, detailed Environmental Impact Assessments (EIAs) of the dams will be carried out in accordance with the requirements of the Environmental Management and Coordination Act, 2000.

Action 2.2 Create inter basin transfer

Increasing demands for irrigation and domestic use have generated a need to transfer water from basins considered to have surplus water to those where the demand for water has exceeded or is expected to exceed supplies to reduce imbalances in water availability in the Tana and Ewaso Nyiro River basins. The benefits of such transfers are many including, flood control, drought mitigation, increased irrigation, additional food-grain production and electricity generation. Potential inter basin transfer include water transfer from River Thego to Nairobi River basin.

However, inter basin transfer projects can be costly and can have major social impacts in the future; hence the need to carry out thorough feasibility and EIA studies to discern the appropriateness of these projects. In this regard, a feasibility study will be carried out for the target inter basin water transfer projects. In this regard, the water deficit in each basin will be calculated, taking into consideration both the available surface and ground water. Once there is ample justification for the water transfer, link systems will be established to transfer the amount of water needed to meet the demands in the deficit basins with desired reliability.

Action 2.3 Support irrigation farmers to harvest run-off or flood water for irrigation

Rainwater harvesting for agriculture by local farmers in the river basins of MKE Rivers can immensely augment surface water use in agricultural production and address environmental problems such as soil erosion. Harvesting rainwater to support meaningful irrigated agriculture requires that simple, appropriate and affordable rain harvesting and irrigation technologies be availed to farmers. Towards this, to increase gains from the rain harvesting, it is essential that farmers in water deficit basins are not only facilitated to harvest rain water, but they are also helped to adopt water-saving irrigation systems, and highly effective crop production systems.

In view of this, to enhance rain water harvesting for irrigation and domestic use, WRMA will provide training and extension services to farmers to facilitate adoption of rain water harvesting.

Action 2.4 Monitor water quality from water sources

It has been observed that downstream, beyond the forest, where human activities take place, water quality deteriorates. Maintenance of high quality standards for river water is hampered by an inadequate water quality monitoring network, inconsistent monitoring due to inadequate transport, and lack of appropriate reagents and water analysis equipment. One of the guiding principles of WRMA is to enhance protection of the quantity and the quality of all water resources based on improved information. Hence, for proper assessment of the status of the water resources within the catchment, improved monitoring of water resources will be carried out, and decision support tools developed for each sub-catchment or region.

Water sampling will be carried out monthly at the River Gauge Stations (RGSs) and samples will be tested at the regional water quality labs in Nyeri (ENNCA) and Embu (for Tana) and at the other satellite labs in Isiolo, Nanyuki, and Kerugoya.

And to curb against deterioration of the water resource due to pollution, WRMA will be vigilant in identifying pollution sources and taking appropriate management or legal action where necessary. Other measures to curb pollution will include encouraging livestock keepers to

construct water troughs; disseminating recommended water quality standards to stakeholders; involving the local community in monitoring and reporting water pollution incidents; and discouraging car washing along rivers.

Action 2.5 Control farmland nutrient, sediment and pollution discharge into water bodies

Intense farming in the upper arable water catchments of most of the major rivers is a major source of water pollution in these rivers. Farm run-off that is rich in sediments and farm chemicals and fertilizers usually finds its way to these rivers compromising the water quality. Some of the farmland issues in the two catchment areas (Ewaso Nyiro and Tana catchment) include planting of crops that do not cover the ground against erosion, and removal of vegetative cover for agricultural use.

To mitigate water pollution wrought by farm run-off, farmers will be encouraged to utilize erosion controls to reduce runoff flows and retain soil on their fields. In regard to this WRMA will work closely with the Ministry of Agriculture to promote adoption of soil erosion prevention practices such as contour ploughing, crop mulching, crop rotation, planting perennial crops and installing riparian buffers. And to minimize pesticide impacts, farmers will be encouraged to adopt Integrated Pest Management (IPM) techniques to minimise pesticide usage and thereby avert contamination of water bodies.

Action 2.6 Control siltation of rivers and dams

The sustainability of hydropower stations that rely on water from MKE is dependent on presence of adequate vegetation cover in the water catchment areas. Vegetation cover ensures an even flow of water throughout the year. In addition, vegetation cover along river valleys prevents soil erosion. This in turn prevents siltation of hydroelectric power dams and controls flooding.

To minimise threat of siltation of rivers and dams, WRMA will support rehabilitation of riparian land and degraded catchment areas to increase vegetation cover. Towards this, WRMA will collaborate with WRUAs and other key stakeholders such as KFS, KWS and KENGEN to carry out the rehabilitation work. In addition, WRMA will support construction of check dams to control siltation of rivers from road run-off.

Action 2.7 Develop Sub-catchment management plans(SCMPs)

The two catchments of the MKE (Tana and Ewaso Nyiro) face a number of challenges related to Water Resource Management. Among these are water deficit areas where water conflicts occur. A solution to these water conflicts can be addressed through the formulation of Sub-catchment Management Plans (SCMP) that gives guidelines on water conservation and use in subcatchment areas. In the Tana catchment, two sub-catchment management plans have been prepared i.e. Ngakinya Sub-Catchment Management Plan (Kazita Management Unit) and Bwathenaro Watershed Sub-Catchment Management Plan (Rujirweru Management Unit). The Catchment has therefore prioritized some pilot areas within the catchment for implementation of SCMPs which will be implemented through WRUAs. These are namely Kitimui in Kitui Sub-region; Lake Kenyatta in Garissa Sub-region; Nairobi River in Muranga Sub-region; Kapingazi in Kerugoya Sub-region and Thingithu in Meru Subcatcment. In ENCA Laikipia Wildlife Forum has supported the preparation of 13 sub catchment management plans.

To further enhance water resource management in the MKE, WRMA and other stakeholders will support all WRUAs to develop Sub-catchment management plans. WRUA's will also be given technical assistance for preparation of funding proposals to enable them solicit for funding from the Water Services Trust Fund(WSTF) and other donors.

Action 2.8 Build the capacity of MKE WRUAs to effectively participate in water resource management

Abut 40 WRUAs have been established in the ecosystem and many others are going through the WRUA establishment process. The WRUAs are supposed to coordinate Water resources management issues at the catchment level, advice the Catchment Area Advisory Committee (CAAC) on water allocation, and develop, monitor and reassess catchment management strategies among other functions. However, WRUAs lack the requisite capacity to carry out these actions effectively. In view of this, WRMA will train WRUAs in water resource conservation and management and water quality monitoring. WRUAS will also be assisted in sourcing funds from other funding sources to support implementation of planned WRUA programmes.

Tourism Development and Management Programme

Programme Purpose and Strategy

The purpose of the Tourism Development and Management Programme is to ensure that:

> The MKE is providing low impact tourism experience based on the unique wilderness, scenery, wildlife and geomorphological values that offer diverse tourism opportunities

Mt Kenya has attractive sceneries and great potential for tourism development, which is yet to be fully harnessed. The ecosystem is endowed with unique geomorphologic features, cultural and historical sites that are of great tourism attraction. In addition to this, there are wildlife populations of elephants, buffalos, reptiles and birds, which attract visitors. Mt Kenya is the second highest mountain in Africa and offers widely sought after challenges to mountain climbers. It is the only mountain in the world on the equator snow-capped through out the year.

Private eco-tourism firms offer alternative recreational tourism and have built strong collaboration with the MKE management to promote tourism in the region by offering a diversity of activities such as bird watching, trout fishing, walking and wilderness trails. Income from tourism in the ecosystem is approximately Ksh. 60 million per year but the potential of tourism, if fully developed and well regulated, will increase. Over 1,000 people earn occasional employment as porters and guides while the running of hotels around the ecosystem promotes employment both directly and indirectly through the follow on demand for goods and services.

The development of tourism in this ecosystem has, however, been faced with various challenges including poor infrastructure, uncontrolled entry into the ecosystem, visitor security and lack of equitable benefit sharing among all the stakeholders in this sector.

This programme sets out a series of management objectives and actions that the MKE management will implement over the next 10 years aimed at realising the ecosystem's full tourism potential. The following sections describe the guiding principles underpinning the MKE Tourism Development and Management Programme. These principles will guide MKE management in the implementation of the programme and thereby realising the programme purpose.

In implementing the MKE's Tourism Development and Management Programme, MKE Management will strive to ensure that:

The MKE offers diverse low impact tourist activities

Mt Kenya has very attractive scenery that is highly appreciated by tourists. Although it is still underdeveloped as a recreational and tourist destination, it attracts both domestic and international visitors, including climbers, hikers, birdwatchers and sport fishermen. To ensure that the primary purpose of protecting the MKE's water catchment value is safeguarded, only low impact visitor activities will be developed. In addition, only environmentally sensitive visitor accommodation facilities such as eco-lodges will be developed in the area.

Tourism is developed to augment resource protection

Visitor accommodation in MKE has in the past been developed with minimal consultation among stakeholders resulting in low quality facilities and poor services. Some of the facilities have been inappropriately sited creating unwelcome visual intrusions. Huts that have been constructed to provide shelter to hikers have been abused and some of them are derelict and no longer used. On the other hand, tourism use in remote parts of a protected area can play a major role in improving Protected Area (PA) security as the presence of visitors and tour operators in the area discourage conservation related illegal activities. In view of this, development of visitor facilities will be driven by both environmental and security considerations in the area.

MKE tourist products and services marketed

Marketing of Mt. Kenya in such a way that the ecosystem generates increased tourism revenues and at the same time assures preservation of the ecological integrity is crucial. A marketing strategy should be prepared for all tourism products that include inter alia issues such as local information delivery, Internet promotion, media, and guidebook coverage. Additionally, the area should be marketed as a low impact tourist destination to safeguard the natural qualities of the area.

Management of risk and safety

The MKE is prone to visitor recreation related incidents whose prevention requires a concerted effort among tourism stakeholders. Some of the existing visitor activities such as mountain climbing have inherent risk associated with them. Hence, to minimize incidents, the development, dissemination and implementation of visitor safety measures should be a shared responsibility between MKE management, tourism operators and visitors.

These guiding principles are intended to guide the implementation of the Programme's four management objectives that, when taken together, achieve the Programme Purpose. These four objectives are:

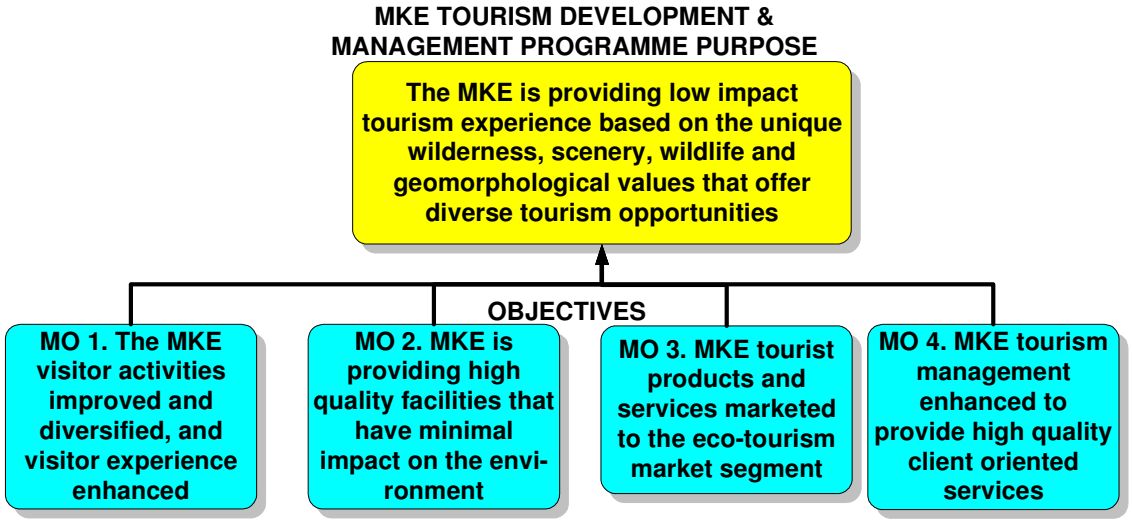
MO 1. The MKE visitor activities improved and diversified, and visitor experience enhanced
MO 2. MKE is providing high quality facilities that have minimal impact on the environment
MO 3. MKE tourist products and services marketed to the eco-tourism market segment
MO 4. MKE tourism management enhanced to provide high quality client oriented services

The following sections describe these management objectives and the management actions needed to achieve them. Under each management objective there is a brief description of the relevant management issues and opportunities, which provides the specific context and justification for the management actions. The final section of the programme contains the **3-Year Activity Plan** for the Tourism Development and Management Programme, and details the activities, responsibilities, timeframe and milestones for delivery of each management action over the first 3-year timeframe of this management plan.

Management Objectives and Actions

Figure 7 below shows the overall objectives tree for the MKE Tourism Development and Management Programme.

Figure 7. Tourism Development and Management Programme objectives tree



Objective 1: The MKE visitor activities improved and diversified, and visitor experience enhanced

The MKE has high potential for eco-tourism. There are a number of religious, cultural and historical sites within the ecosystem. The forest cover provides spectacular scenery and sites for recreation, which are suited for bird watching, picnics and camping. The numerous rivers are also used for sport fishing. Other areas attractive for eco-tourism include lakes and swamps.

Areas adjacent to the protected area have potential for eco-tourism development, which could be exploited. Presently, there are a number of private tourism developers who are operating and have established eco-tourism ventures in their farms and also assist in promotion of tourism in the area. Interventions aimed at eco-tourism development within the ecosystem will be implemented to ensure communities derive maximum benefits.

This objective is designed to diversify tourist activities by exploiting all appropriate tourism opportunities in MKE. This is achieved through offering new visitor activities and associated support infrastructure targeted at various market segments. Hence, the management actions that have been designed to achieve this objective relate to establishing new hiking routes; developing nature trails; rating hiking and climbing routes; and improving sport fishing. These actions are elaborated in the following sections.

Action 1.1 Open new summit bound hiking routes to offer diverse tourist experiences

There are several hiking routes in the MKE leading to the peak area, but the official and gated ones are three i.e. Sirimon, Naro Moru, and Chogoria. Other routes that are used occasionally by visitors, but with special permission from the Senior Warden are Timau, Burguret, Kamweti, and Marania. The Marania route is used a lot by tourists but no revenue is collected unless the visitors report at one of the other KWS Gates. Similarly, Kamweti route is used mostly by Castle Lodge guests, but the proprietor of the Lodge pays the required park entry fees to KWS. Currently, the biggest challenge in visitor management is regulation and coordination of visitor entry into the ecosystem. This is due to the presence of many uncontrolled entry points around the ecosystem. To effectively manage the number of visitors, it is important to put in place mechanisms to coordinate and control entry. Thus to continue offering hiking alternative routes with varying levels of use, streamline revenue collection, and at the same time enhance forest security in the northern and south-eastern sectors of MKE, MKE management will establish Marania and Kamweti routes in line with the zoning prescriptions. Standard entry gates with associated facilities will be constructed at suitable sites along these routes in line with Action 3.7 of the Protected Areas Operations Programme.

Action 1.2 Develop nature trails at the gates

The MKE offers vast opportunities for walking and hiking. Magnificent scenery with a diversity of landscape and physical features all contribute to an excellent walking landscape. There are many benefits and reasons for developing recreational trails including provision of a safe and pleasant trail for non summit bound visitor to walk and enjoy. Demand in MKE is growing steadily for shorter walking trails of a varied nature especially for visitors who are residing at the MKE visitor facilities. Good quality, well marked walks with a biodiversity or environmental focus can go along way in increasing the visitor's appreciation of the biodiversity values enhancing visitor experience. As such, walking trails of between 3-5 Km will be constructed at the three gates that are in the High Use zone, i.e. Sirimon, Marania and Naro Moru. These will be walking trails designed with start/finish points in the same location which is convenient and popular with non-summit bound visitors. The trails will be developed to the appropriate standards that seek to minimise erosion and maintenance, protect biodiversity and landscape and maximise the scenic potential of MKE. Overall, the walking trails will offer variety of physical challenges utilising the steep terrain and have supporting facilities (e.g. picnic sites, latrines) and services (e.g. interpretation materials) for good quality walking experience. Additionally, trail brochure and map will also be produced and availed to visitors to enhance their experience. And to ensure that the trails are in good condition throughout the year, MKE management will ensure that all trails are always kept in good order through continuous trail maintenance such as replacement of missing or damaged signposts and cutting back vegetation.

Action 1.3 Rate hiking and climbing routes according to difficulty and danger

The safety of hikers and their enjoyment on a trail is of paramount importance in marketing the MKE hiking opportunities thereby attracting new hikers. According to MKE records, approximately two-thirds of hikers are bound for point Lenana (4985m) which is easily accessed by hikers with minimum climbing skill and requisite fitness. However, the other taller peaks are rugged and demand considerable technical mountain climbing skills and experience to surmount.

As such, to assist visitors in making informed selection of the hiking route that suits them, and that they know what to expect on the hike, there is need to rate the hiking routes according to difficulty and danger. Consequently, each hiking route will be mapped, and described in terms of distance, terrain and the pace required at various sections of the route. This will help tour guides consider the different facets of the hike to help ensure that hikers have both safe and enjoyable experiences. On the other hand, climbing routes at the rocky peaks have been graded by some of the technical climbers, but there is need to gain consensus among technical climbers on the grading system given that climbing grades are inherently subjective. In regard to this, MKE management will liaise with the Mountain Clubs of Kenya (MCK) in collecting and collating information on climbing route grading. This information will be discussed in a workshop organised for local technical mountain climbers where the grading system will be refined. The agreed upon climbing route grading will thereafter be disseminated through the brochures and updated climbing guidebooks.

Action 1.4 Promote development of horse riding, mountain biking and ornithological safaris

Opportunities for recreation in MKE are as plentiful as they are widespread. In addition to hiking which is the most popular activity other popular activities include camping, picnicking, sightseeing, and sport fishing. Although the potential for horse riding and ornithological safaris is very high given the scenic landscape hosting numerous bird species, these activities are least developed in MKE. On the other hand, mountain biking is currently being carried out in the lower forest zone of the mountain, but without following any regulatory guidelines.

As such, under this management action, MKE will partner with private tour operators to exploit the high tourism potential by encouraging development of low impact tourist activities. In regard to horse riding and mountain biking, MKE management will identify tour operators who have the necessary experience to successfully operate these activities. The identified operators will thereafter be issued with licenses to operate along routes designated for these activities. And concerning, ornithological safaris, this will be encouraged in the Low Use and Wilderness Activity zones. For a start, the Chogoria route has great potential for developing ornithological safaris as some of the most rare bird species including Abbott's Starling, African Green Ibis and African Crowned Eagles, three species that may be difficult to see elsewhere in Kenya can be seen here easily. The route will therefore be marketed as a birding route in addition to the many other attractions it offers.

Action 1.5 Improve sport fishing in the MKE

Fishing has been a popular recreational activity with visitors in MKE. Consequently, in an attempt to enhance recreational opportunities in the National Park, several rivers and lakes (e.g. Nanyuki River, Lake Rutundu, Lake Alice, and Lake Michaelson) are stocked regularly with exotic rainbow and brown trout fish. Fly fishing is the allowed method of sport fishing and to participate, a Government Trout License, which is issued by the Fisheries Department, is required.

To streamline sport fishing, MKE management will review the sport fishing guidelines to make procuring a fishing license easy. In this regard, MKE management will liaise with the Fisheries Department to ensure that fishing permits are issued at the protected area access points. KWS will collect revenue accruing from fishing and remit it to the Fisheries Department. And to facilitate monitoring of fish stocks, each sport fisher will be required to fill a catch record register on exit from the Protected Area. On its part, the Fisheries Department will ensure that selected rivers and lakes are adequately stocked with sport fish. In addition, to ensure that the review is well coordinated and participatory, a task force comprising of

Fisheries Department, KWS, KFS and relevant stakeholders in the sport fishing sector will be formed to steer the review process. This task force will identify potential fishing sites and designate rivers and lakes that will be stocked with fish to support sport fishing as a recreation. However, a biodiversity assessment of fish in MKE carried out in early 2009 attributed rarity of *Chiloglanis* and *Amphilius* endemic fish in several streams to effect of trout introductions. Hence, restocking activities will be restricted to designated sites only and an elaborate fish monitoring programme instituted.

Action 1.6 Install a cable car at Sirimon Gorge

One of the many ways that a wide array of both local and foreign visitors can enjoy the mountain resources without being constrained by physical fitness is through use of an aerial cable car. A cable car can provide spectacular views of MKE landscapes that comprise of gorges, valleys, rivers, forests and moorland. A cable car can carry those visitors who are physically challenged to the moorland to enjoy the mountain peaks from a close range. As such, under this management action, a cable car will be established at the Sirimon Gorge starting from the Sirimon Gate and ending at the upper moorland zone. This cable car project will be developed through a public private partnership arrangement.

Action 1.7 Develop Heli-tourism guidelines

Heli-tourism is one of the activities that has recently been introduced in MKE. This form of tourism involves a helicopter tour around the mountain and since it is a very expensive activity, it is an up market activity targeting high end visitors. Since heli-tourism, unless appropriately controlled, can result in conflicts between recreational enjoyment of the wilderness and the conservation of the fragile alpine zone of the mountain where the activity takes place, it is vital that mechanisms are put in place to ensure that this activity does not infringe on the rights of other users to enjoy a high quality experience in the high altitudes through unacceptable noise pollution. To ensure that heli-tourism is acceptable to majority of the mountain users, therefore, MKE in conjunction with the helicopter tour operators will develop heli-tourism guidelines that will be followed to regulate heli-tourism activities in the MKE in line with the Kenya Civil Aviation Regulations. The guidelines will specify helicopter routes and official helipads which will require advance booking with the Senior Warden. They will also detail the activities that heli-tourism visitors will be allowed to participate in during their tour.

Action 1.8 Construct Vie Ferrate at Sirimon Gorge, Gorges Valley, giant Billiard table and access routes to Point Lenana

The MKE has several ideal sites for establishment of Via Ferrata and by so doing increase the visitor activities in the area. A Via Ferrata (Italian for "iron road". Plural vie ferrate) is a mountain route which is equipped with fixed cables, stemples, ladders, and bridges. The use of these allows otherwise isolated routes to be joined to create longer routes which are accessible to people with a wide range of climbing abilities. Walkers and climbers can follow vie ferrate without needing to use their own ropes and belays, and without the risks associated with unprotected scrambling and climbing. Via ferratta gives visitors enthusiasism and creates interest in scaling difficult rock faces and gorges. This activity would be ideal at the above inclined areas since it enhances safety and reduces accidents to hikers and climbers. At the Sirimon Gorge, the Via ferratta will be 4 Km long running along the Gorge. It will start at a point opposite the Sirimon gate and end at the water falls south of the equator crossing point. Other sites whose suitability for establishment of vie ferrate will be assessed are the the Gorges valley, Giant Billiard Table, and access routes to Point Lenana. The Vie ferrate sites will be leased to competent private investors who will operate this activity.

Objective 2: MKE is providing high quality visitor facilities that have minimal impact on the environment

This management objective has been designed to address issues relating to visitor accommodation in MKE. These range from inadequate accommodation, misuse of shelters, facility designs that are not in harmony with mountainous environment, lack of coordination in facility development, and poor access to the protected area's resources. The management actions that have been developed to address these issues include improving visitor facilities along hiking routes, developing standard facility designs appropriate to mountain areas, establishing camping sites, identifying tourism facility sites and leasing the sites to investors, and rehabilitating wildlife viewing roads. These management actions are elaborated in the following sections.

Action 2.1 Improve visitor accommodation along the hiking routes

The MKE has a wide variety of visitor accommodation facilities that include tourist lodges, self catering Bandas, and mountain climbing huts. However, since some of these facilities were established without following any defined standards, the condition of some of the facilities is poor and the service provided below average. This mostly applies to the privately operated Bandas and the mountain climbing huts.

Consequently, to improve visitor experience, Liki north hut will be removed as it is obsolete i.e. too old and Urumandi Hut along Chogoria route will be relocated near the current track alignment. Mackinder's bunkhouse is too congested and is a fire hazard. In regard to this, the facility will be remodelled in line with the standards established under action 2.2 of this programme. In addition, in order to prevent misuse of the huts by poachers, large huts with care takers will be constructed. These huts will then be leased to private developers.

Action 2.2 Develop standard visitor facility designs specific to Mountain ecosystems

Several accommodation facilities along the hiking routes have not incorporated aspects of blending with the environment during their design and construction stages. Consequently some are very visually intrusive as they are located on prominent rising areas. To mitigate this problem, MKE management will liaise with both KFS and KWS headquarters to develop standard designs for bandas, huts and shelters in the MKE. Once standard designs acceptable to all tourism stakeholders are ready, they will be adopted when relocating or remodelling facilities in the MKE. For instance, Judmaier, Shipton's and Minto's bandas that need to be relocated to suitable sites to mitigate their visual intrusion will apply the new designs during the construction stage. Further, all visitor facilities will be required to maintain high standards of hygiene in line with the requirements of the Food and Drugs Act and the Hotel and Restaurants Act.

Action 2.3 Establish and maintain camping sites

In accordance with the MKE zonation scheme, campsites will be established in all management zones. As a start, MKE management in collaboration with tourism stakeholders will carry out an assessment of the need for additional camping sites and thereafter identify new

sites if this is necessary. To minimise pollution and disturbance to the fragile riparian vegetation, camp sites will not be allowed very close to rivers and lakes. In addition, where practicable, camping grounds will be established out of sight of hikers and at least 200 meters from walking trails. And to promote use of camping sites, adequate non obtrusive directional and informational signage that blends well with the environment will be provided. In addition, information regarding location and facilities provided at each camp site will be included in brochures and disseminated to visitors as they enter the protected area. Visitors camping in the PAs will be expected to bring in their own firewood and fire will be allowed only in the fire pit provided at the campsite. Alternatively, a visitor can use any other source of energy so long as it is environmentally friendly and not a fire hazard. In addition, depending on demand, MKE management will provide cooking materials for sale at the park gate.

Action 2.4 Identify tourism facility development sites and concession the sites to investors

The visitor accommodation prescriptions outlined in the MKE Zonation Scheme permit development of tourism accommodation facilities in the Low Use and Multiple Use Zones but prohibit permanent facilities in the Wilderness Activity Zone during the ten-year period of this plan. Since the MKE is being managed by both KWS and KFS as a single ecological unit, it is vital that the site identification and award process is harmonised to ensure that only ecologically acceptable sites are developed. As such, KWS and KFS management will form a tourism development task force comprising of KWS, KFS, NEMA, Kenya Association of Tour Operators (KATO), and Kenya Tourism Federation (KTF) to carry out a thorough criteria-based assessment of the proposed sites (see table 19 below) and make recommendations on the sites that can be developed.

Table 19. Proposed accommodation facilities in the MKE

Name of facility	Location	Facility type	Institution Responsible
1. Ragati fishing Camp	Ragati Forest Station	Ecolodge	KFS
2. Marania Fishing and Sports tourism camp	Marania Forest Station	Ecolodge	KFS
3. Naro Moru Forest Station Camp Site	Naro Moru Forest Station	Ecolodge	KFS
4. Thegu Forest Lodge	Kabaru Forest	Ecolodge	KFS
5. Ngare Ndare	Ngare Ndare Forest	Ecolodge	KFS
6. Sacred Lake	Mucheene Forest	Ecolodge	KFS
7. Sacred Lake	Mucheene Forest	Tented camp	KFS
8. Chungu River Lodge	Chuka Forest	Ecolodge	KFS
9. Chogoria Lodge	Chogoria Forest	Ecolodge	KFS
10. Themwe/Kaburia Lodge	Ruthumbi Forest	Ecolodge	KFS
11. Irangi Forest Lodge	Irangi Forest	Ecolodge	KFS
12. Sirimon Lodge	Sirimon Salient	Ecolodge	KWS
13. Secret Valley	Gathiuru	Ecolodge	KFS

Action 2.5 Rehabilitate wildlife viewing roads to promote tourism

An elaborate road network is necessary to facilitate management functions in a protected area. Roads are necessary to facilitate vehicle patrols thereby deterring illegal and destructive forest activities. In addition, roads facilitate movement of tourists assisting them to access and enjoy many diverse attractions.

There is an elaborate road network established for administrative purposes but this network has been neglected in many parts and is not usable because of the overgrown vegetation. To enhance tourism through wildlife viewing, therefore, efforts will be made to rehabilitate the road network in the Low Use zone. To start with, priority will be given to roads in the Bongo sanctuary sub zone to facilitate wildlife patrols, wildlife viewing from vehicles and horse back safaris. Additionally, rehabilitation of the entire MKE link road will be prioritized as this road is critical for both administration of the lower forest areas and tourism promotion.

Action 2.6 Provide toilets along hiking routes

Human waste management along hiking routes and at accommodation facilities is a major challenge in this mountain ecosystem. This is partly attributed to lack of toilets along hiking routes which forces hikers to relieve themselves in the open. To manage human waste appropriately, ecotoilets will be constructed as follows:

- **Chogoria Route** - midway between road head and Mintos;
- **Sirimon Route** - midway between Judmeir and Shipton; and
- along new routes i.e. Marania and Kamweti.

Objective 3: MKE tourism products and services marketed to the eco-tourism market segment

The MKE has immense potential to attract a high number of environmentally sensitive eco-tourists thereby raising substantial revenue to support conservation efforts in the ecosystem. However, this tourism potential is hampered by lack of an elaborate and well coordinated marketing strategy that capitalises on the unique values that this ecosystem offers. This objective has therefore been designed to enhance marketing of the ecosystem as a unique tourist destination that offers visitor experiences that can not be enjoyed elsewhere in the country. The management actions that have been designed to address gaps relating to effective marketing of MKE are: market MKE as a unique destination in Kenya capitalising on its exceptional resource values; carry out a Visitor satisfaction surveys; update the MKE visitor map; develop a guidebook covering the entire MKE; and establish tourist information centers at the gates. These actions are outlined in the following sections.

Action 3.1 Market the MKE as a unique destination in Kenya capitalising on its exceptional resource values

This action will focus on identifying and marketing outstanding tourism values, which distinguishes MKE from other protected areas of tourism value in Kenya. In this regard, the mountain hiking routes will be described in detail highlighting the unique scenic features of tourism interest that can be enjoyed along the routes. Information on services and facilities available along the routes will also be provided in the marketing materials. In particular, the marketing material will have a local as well as regional comparative analysis of the tourism values outlining the uniqueness of MKE and the reasons for its recognition by UNESCO as both a World Heritage Site and a Biosphere Reserve. The marketing material will be produced in liaison with KWS and KFS marketing Sections and it will be availed to tour operators through KATO and KTF. This material will also be available at the gates for distribution to visitors for free. In addition, to reach the international market, the material will be posted in the KWS

Website, published in specialist magazines, and shared in social internet networks such as *Facebook* and *blogs*. And to reach the local market, MKE management will use the local print and electronic media, particularly the local papers and television, to market the MKE. Additionally, bill boards containing pictorial information on recreation opportunities offered by MKE will be installed along the major access roads.

Action 3.2 Carry out Visitor satisfaction surveys

Visitor satisfaction is key to successful tourism enterprises and to tourism overall. Satisfaction derives from visitors' pre-visit expectations and their actual experiences on the visit. From a marketing perspective, visitors' actual experiences need to exceed their expectations so that they visit again, stay longer and convince others to do the same. From a broader management perspective, evidence of a satisfying experience for the visitor is a key indicator of tourism business performance. Hence, to determine the extent to which services and products offered at MKE are perceived by visitors, visitor satisfaction surveys focusing on visitors' expectations of, and satisfaction with, particular components of the range of products, services, activities, and infrastructure that contribute to their visitor experience will be carried out. In this regard, MKE management will develop a survey questionnaire which will be provided to visitors at the gates for filling. The information collected through these questionnaires will be analyzed and the results used to inform tourism infrastructure planning and visitor amenity provision projects.

Action 3.3 Update the MKE visitor map

A visitor map of the MKE is available but it leaves out many features of tourist interest, especially those found in the National Reserve. To encourage visitors to explore the MKE and sample the various attractions it offers, an updated visitor map presenting tourist attractions and facilities is essential. As such, through this management action, MKE management will liaise with KWS marketing section and KFS tourism section in updating the visitor map. As a starting point, MKE management will carry out a comprehensive spatial inventory of all tourist attractions and facilities in MKE. In carrying out this inventory, GPS technology will be used to capture spatial data on all the attractions and facilities like roads, tracks and trails. This information will then be forwarded to the KWS Geographic Information System (GIS) Section for analysis and digital cartographic production of the visitor map. Once a map acceptable to MKE management is produced, the KWS Marketing Section will make arrangements to have high quality prints produced. These maps will then be available for sale at all the MKE Gates and in KWS shops nationwide.

Action 3.4 Develop a guidebook covering the entire MKE

A tourist guidebook is an invaluable source of information for a visitor and it enhances visitor experience at a tourist destination. The first guidebook to Mount Kenya was produced by the Mountain Club of Kenya in 1959 and thereafter other guidebooks on the Mountain have been published, including one published by Kenya Wildlife Service. The guidebooks provide information on the visitor facilities around the Mountain and give a synopsis of visitor attractions and services offered. However, with the envisaged development of new visitor facilities and introduction of new visitor activities like wildlife viewing from vehicles and horse riding, the guidebook will have to be updated to reflect the new developments. In view of this, MKE management will liaise with the KWS marketing section in reviewing and updating the KWS Mt. Kenya Tourist Guidebook. Towards this, MKE management will work closely with the Mountain Clubs of Kenya in generating all the relevant tourist information that will be incorporated in the Guidebook. This information will thereafter be forwarded to the KWS Marketing

Section who will prepare it for publication. Once published, the guidebooks will be made available for sale at the MKE Gates and other KWS and KFS outlets in the country.

Action 3.5 Establish tourist information centers at the gates

Suitably located Tourist Information Centres offering visitor information on attractions and accommodation facilities are vital in assisting visitors to plan their tour of MKE effectively. Visitor experience can further be enhanced if tourist services, such as introducing tourist facilities and accommodation, maps, and pamphlets are readily available at these centers. As such, to enhance visitor satisfaction, tourist information centers will be constructed at all MKE access gates (proposed and existing gates). These will be one-roomed facilities providing visitors with information through maps, pamphlets, leaflets and simple brochures. The information centers will be operated by trained customer care staff that will answer questions regarding permitted activities in MKE and give relevant advice on coping with MKE challenges with a view of making a visitor's tour of the MKE successful.

Objective 4: MKE tourism management enhanced to provide high quality client oriented services

With increasing visitor numbers that has been noted in the MKE in the last five years, visitor impact on the environment has increased in tandem. As a consequence, the popular and intensively used hiking routes are normally littered with paper wrappings requiring regular clean up campaigns that can be expensive and arduous in a mountainous terrain. With increase in tourist facilities that are proposed in this plan, visitors and MKE usage will increase correspondingly. This management objective has therefore been designed to influence the behaviour of MKE users to safeguard environmental values. Management actions under this objective focus on management of visitor facilities, training guides and porters, setting environmental standards, and improving the health and safety systems in the MKE. These actions are elaborated in the following sections.

Action 4.1 Develop tourist facility environmental management standards

A comprehensive list of environmental standards for tourist facilities will be developed to guide facility operators, tour operators, guides, and visitors on how to manage waste and interact with the environment. The centrepiece of these standards will involve creating 'buy-in' for the adoption of a sense of ownership in the protected area by stakeholders and educating stakeholders on the consequences of complying or not complying with the standards. And to further ensure compliance with the standards, annual environmental audits of the tourist facilities and activities will be carried out in line with Action 2.6 of the ecology programme. In addition, MKE management will carry out regular inspections of the facilities and based on the recommendations from these inspections, require implementation of remedial actions by facility operators.

Action 4.2 Establish effective waste management procedures in line with tourism sector EIA guidelines

Waste generated by visitors in the MKE belongs to either biodegradable or non biodegradable categories. Biodegradable waste includes food remains and human waste while the non biodegradable includes plastic items, and glass and aluminum containers. This waste, if not properly managed, can harm the environment decreasing the tourism carrying capacity of the area. In view of this, MKE management will develop waste management guidelines in line with the national Tourism Sector EIA guidelines. The guidelines will focus specifically on management of waste produced by visitors and other PA users. In this regard, the 'Pack it in, Pack it out' waste management philosophy will be applied. This will require that descending trekking groups deliver their litter at the exit gates as part of the checking out procedure.

Action 4.3 Develop and enforce code of conduct for porters and guides

In a primarily hiking protected area like the MKE, Porters are an important factor in a visitor's satisfaction while on the hike by making the visitor's hike less tedious and comfortable. Guides are equally important as they interpret the PAs cultural and natural resources to the visitor making a hike to the summit more enjoyable. In MKE, however, porters have been associated with unbecoming behaviour to their clients and their hygiene standards have often been wanting. Although the porters and guides have an Association meant to promote high standards of behaviour among its members, little has been achieved as attested to by the detestable state of accommodation facilities used by porters.

Consequently, to address the behavioural problem among porters and guides, MKE management will liaise with the Mt. Kenya Porters and Guides Association to develop a porters and guides code of conduct. This code will specify a porter's or guide's behaviour towards visitors, the hiking dressing code, visitor handling, hygiene standards, maximum luggage weight that a porter can carry, minimum age and requisite physical fitness and registration requirements. Once developed, KWS will enforce the code by restricting entry to the protected area to only those who comply with the code.

Action 4.4 Train guides and porters

Since porters and guides are in contact with the visitors majority of the time they are in the protected area, their conduct and handling of visitors is critical in influencing the visitor to have a repeat visit or make them market the MKE when they go back home. To have effective porters and guides, training in basic customer care is therefore essential. In view of this, MKE in collaboration with Mt. Kenya Porters and Guides Association will train both porters and guides in Environmental Management, Tourism and Travel agent Management, and Tour Guiding and Customer care. Porters will be trained in the many duties they will carry out on the mountain hike, such as packing and safely handling their loads, setting up tents, and gear maintenance. Additionally, they will be trained in First Aid, Health and Safety issues, including the symptoms of altitude sickness, management of emergencies, general health and hygiene, and 'leave no trace principles'. Also, in light of the many porters and guides who have succumbed to HIV/AIDS, awareness on prevention and management of sexually transmitted diseases including HIV/AIDS will be created among this group through seminars and workshops organised by MKE management in collaboration with the KWS HIV awareness section and the Guides and Porters Association. The guides will be trained in effective interpretation of natural and cultural history in addition to the other training that is offered to porters. Equipped with this training, the porters and guides will be expected to influence visitor behaviour to prevent harassment of wildlife by visitors.

Action 4.5 Register trained guides and porters

Once porters and guides have received requisite basic training they will be required to register with the Porters and Guides Association which will be regulating and promoting tour guiding best practice. In regard to this, MKE management will work closely with the Mt. Kenya porters and Guides Association, KPSGA and the MCK to develop a certification similar to the one issued by the KPSGA. MKE management in collaboration with other stakeholders in mountaineering will also develop a curriculum and certification process for guides and porters. And for a porter or guide to operate in the MKE, management will require that they subscribe in writing to the Guide and porters code of conduct and the mountain code developed through action 4.2 and 4.7 of this programme. Failure on the part of the guides to adhere to the codes will result in stiff penalties instituted by their Association and MKE management. This may include revocation of the porter or guide certificate.

Action 4.6 Develop a mountain code

To standardise visitor behaviour in the MKE it is vital that a set of rules be established to guide visitors on the dos and don'ts while they are participating in various recreation activities in the area. This helps visitors to take responsibility for themselves when hiking and makes them aware about how to relate with fellow visitors, treat natural and cultural values they encounter, and manage waste. Towards this therefore, MKE management will develop a Mountain code specific to MKE. MKE management will review other mountain codes from other countries and prepare a code that meets international best practice and which addresses visitor behavioural issues at the MKE.

Action 4.7 Establish a tourism investors and operators forum

Tourism investors and operators can play a major role in enhancing tourism development and management in a protected area. As tourism investors market their facilities locally and internationally they also market the MKE as a tourism destination. It is therefore critical that this segment of stakeholders is increasingly involved in the management of the MKE to have a more coordinated marketing and tourism development in the MKE. In view of this, MKE management will establish a MKE tourism committee which will aim to lobby for sustainable tourism development in the MKE. As a start, MKE management will organise a workshop to sensitize stakeholders on the vision and objectives of the tourism committee. Once formed, the committee will be meeting quarterly and it will be chaired by the Senior Warden of MKE.

Action 4.8 Communicate site-specific hazards to tourism operators, stakeholders, visitors and other users

This will include creating awareness among users on the importance of having a health insurance cover, producing and issuing safety brochures at PA access points and providing prior information on health and safety requirements to visitors through the internet and tour operators. In addition, current health and safety problems will be evaluated and rated according to their frequency and severity. Emergency telephone numbers will be provided at the gates and also they will be included in the free MKE brochures that will be issued to visitors at the gates. In view of the risky nature of some mountain recreation activities such as mountain climbing and altitude related health complications that might face a visitor, visitors destined for the summit will be expected to sign forms indemnifying KWS from any liabilities. These Indemnity forms will be availed at all entry gates and overnight visitor accommodation

facilities in MKE. Safety warning signs will also be displayed at selected visitor facilities in the MKE.

Action 4.9 Strengthen the capacity of the MKE Search And Rescue(SAR) Team

As a starting point KWS will procure the services of an SAR expert to evaluate the SAR needs and develop suitable strategies for upgrading the SAR team to the required international standards. Following the recommendations of the evaluation report the human resource capacity of the SAR team will be boosted to fill the existing shortage and the required mountain rescue equipment will be procured.

With regard to recruitment of suitable rescuers, KWS will select these from the already active porters and guides operating in the MKE. Towards this, preference will be given to candidates who have received basic mountain climbing training from KWS and have had extensive mountain climbing experience. Apart from recruiting from outside KWS, in-house recruitment will be carried from among suitable serving rangers who have an inclination to the challenging and physically demanding mountain rescue work. Fifty personnel will be recruited initially and they will undergo a rigorous mountain rescue training which will be conducted by skilled trainers in line with international standards. After the training the twenty most promising recruits will join the SAR team while the other 30 will be posted to work elsewhere in KWS. In addition, KWS will select a few of the best trainees and give them further training to qualify as instructors to build and strengthen SAR skills among the SAR team. And to make the training successful, the requisite mountain rescue gear and communication equipment will be procured for the team for use during and after the training to enhance efficiency of mountain rescue capability. However, in addition to building internal capacity for SAR, KWS will maintain close linkages with SAR partners such as helicopter operators and MCK, so that SAR cases are attended to promptly to save lives.

Action 4.10 Train rangers in basic natural history to effectively interpret MKE values to visitors

Rangers, who interact with visitors often e.g. the Mountain Rescue team, require additional training to equip them with basic knowledge in ecology so that they can interpret the MKE to visitors effectively. Consequently, MKE management will liaise with the KWS Human Capital Department to train these rangers at the KWSTI in basic entomology, ornithology, and botany.

Community Partnership and Education Programme

Programme Purpose and Strategy

The purpose of the Community Partnership and Education Programme is to ensure that:

> MKE adjacent communities are supporting conservation efforts and livelihoods are improving through sustainable use of natural resources

The Mt Kenya Ecosystem contains several resources that are of benefit to local communities and the country at large. These resources are in terms of fauna, flora, soil, water and their ecological functions. Communities extract a variety of resources from the ecosystem including firewood, building materials, medicinal plants, fish, water, honey and fodder for livestock. These natural resource uses require an elaborate management system to ensure that resources are sustainably managed for both the present and future generations. The main conservation initiatives envisaged in this plan include: biodiversity, soil and water conservation which cannot be realized by government and NGO's working within the ecosystem, without the involvement of the local communities since they are the direct beneficiaries. Hence elaborate participatory engagement with communities are needed to address differential interpretation and enforcement of regulations, lack of well established community structures, and put in place cost and benefit sharing mechanisms.

The key guiding principles, which will guide the implementation of the Community Partnership and Education Programme over the next 10 years and the achievement of the programme purpose, are set out below.

In implementing the MKE's Community Partnership and Education Programme, MKE Management will strive to ensure that:

Community-protected area communications are improved

To stimulate positive communication between local communities and the MKE management and thereby strengthen community participation in conservation and management of natural resources, a communication mechanism to bridge the gap between the community and MKE authorities is essential. Such a communication mechanism would help in resolving conservation issues of mutual concern and in particular it would play a crucial role in minimizing negative community-protected area interactions wrought by incessant human-wildlife conflicts.

Human-Wildlife conflicts are minimised in the MKE adjacent areas

A fundamental goal of wildlife conservation efforts at the MKE is minimizing human-wildlife conflicts which can adversely affect local economic and social development. Since the mainstay of the community living adjacent to the MKE is agriculture, crop raiding by wildlife can have far reaching impacts on the livelihoods of the local community. In MKE, the community has raised their concerns about reduced agricultural productivity, and in some cases lost economic opportunity, caused by wildlife. To address this problem, this management programme will use proactive efforts and an adaptive management approach based on ecologically sensitive methods that do not impact negatively on survival of threatened species such as elephants. Actions to address this problem will include measures such as installation of

wildlife barriers in conflict hotspot areas, scaring problem animals, and outreach activities that have positive impacts on community livelihoods.

Communities and other stakeholders are aware of the MKE's values and importance

Conservation Education has been an important part of the strategy to manage Kenya's biodiversity for the present and future generations. A set of educational programs designed to encourage the public to learn about wildlife and environmental resources in general have been initiated by both government and nongovernmental environmental agencies in the country and in the MKE specifically. These programs aim to help the public to realize what wildlife needs to survive, how ecosystems work and what they can do to ensure that wildlife requirements are met and the environment is sustainably conserved. Such information and knowledge can be imparted to the public through well designed conservation programs with messages designed and targeted at different strata of the public. This management programme therefore aims to increase the community's appreciation of environmental conservation and thereby gain the much needed support for conservation efforts. This is in line with the KWS Conservation Education Strategy which seeks to *"develop conservation education programmes and disseminate information to targeted groups*". It is also consistent with the aims of the Forest Policy, 2007, ppolicy statement 4.2.6, which states that "*Public awareness-creation with regard to forest conservation, management and utilization will be supported".*

Communities are benefiting from natural resources in the MKE

Involvement of local communities in the management of natural resources found in the protected areas can help in minimizing many illegal activities taking place in such areas. Illegal activities, such as illegal logging, charcoal production in the forest, encroachment, and poaching can be minimized substantially if local communities are increasingly involved in the management of the MKE. The MKE is vast and majority of it is difficult for rangers to control or patrol effectively leading to some forest sections deteriorating due to illegal activities. To counteract this problem, Community Forest Associations have been established to manage specific forest blocks and thereby reap benefits accruing from conservation of these forests. This management programme will therefore promote activities that increase community involvement in natural resource management and it is hoped that this will result in sustainable development within MKE.

These guiding principles are intended to guide the development and implementation of the three management objectives that have been identified by stakeholders to achieve the Programme Purpose. These are:

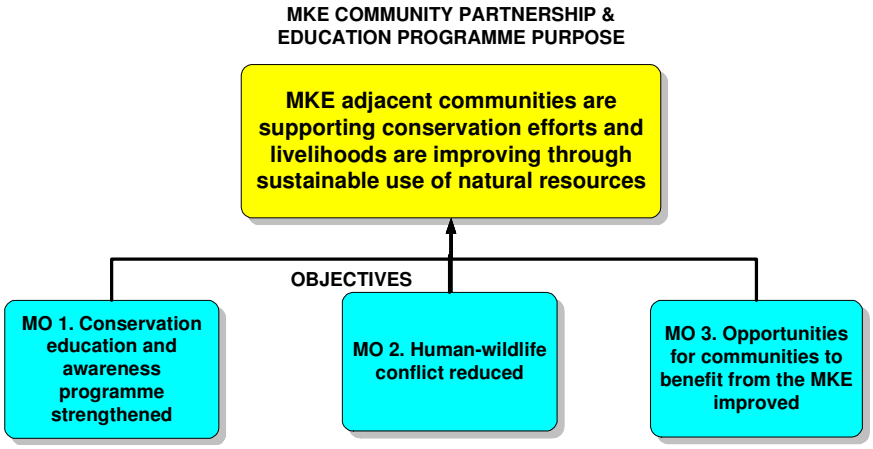
MO 1. Conservation education and awareness programme strengthened
MO 2. Human-wildlife conflict reduced
MO 3. Opportunities for communities to benefit from the MKE improved

The following sections describe these management objectives and provide an outline of the management actions needed to achieve them. The final section of the programme contains the **3-Year Activity Plan** for the Community Partnership and Education Programme, and details the activities, responsibilities, timeframe and for delivery of each management action over the first 3-year timeframe of this management plan.

Management Objectives and Actions

Figure 8 below shows the overall objectives tree for the MKE Community Partnership and Management Programme.

Figure 8. Community Partnership and Education Programme objectives tree



Objective 1: Conservation education and awareness programme strengthened

A robust conservation education programme is needed to educate communities on how natural environments function and, particularly, how communities can play an active role to ensure ecosystems are sustainably managed. Conservation education increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.

This objective has been developed to promote conservation education and by so doing increase public support for conservation in the MKE and Kenya at large. The management actions that have been designed to achieve this objective focus on: carrying out community outreach activities in MKE adjacent areas; supporting the conservation education activities of William Holden Education Center, Nature Kenya and Wildlife Clubs of Kenya; promoting the MKE through the mass media, Internet, and organising and participating in both local and international conservation awareness events; and supporting the William Holden's Education Center in creating awareness on the repatriation and release of Bongos into the MKE. These management actions are expanded upon in the following sections.

Action 1.1 Carry out community outreach activities in MKE adjacent areas

To gain support for conservation of natural resources in MKE, the MKE adjacent communities need to appreciate the importance of the MKE both locally and nationally. They also need to be aware of what they should do or not do in order to promote sustainable conservation of natural resources at MKE. For the community to gain this much needed environmental awareness, MKE management (KWS and KFS) should educate the communities in various aspects of natural resource management. In regard to this therefore, MKE management will

design and implement community outreach programmes for communities living adjacent to the MKE. These programmes will involve creating environmental awareness through film shows at trading centres and schools and lectures to targeted groups such as CFAs, WRUAs and CBOs.

Action 1.2 Support the conservation education activities of William Holden Education Center, Nature Kenya and Wildlife Clubs of Kenya

William Holden Education Center and the Nature Kenya Resource Center, both located in MKE and operated by NGOs, are prominent conservation education focal points providing conservation education to school pupils both at the local and national levels. In addition, the WCK has officers who liaise with local schools to enhance conservation education among pupils. To strengthen the relationship between the MKE management and the above mentioned conservation education NGOs, MKE management will support their activities such as organising conservation rallies, seminars and workshops for teachers and students, and in organising visits for community members and school groups to the MKE.

Action 1.3 Promote the MKE through the mass media, Internet, and organising and participating in both local and international conservation awareness events

The mass media (radio, television and the press) plays an important role in conveying conservation education messages to the community. Special radio and TV programmes will therefore be designed and aired through radio and TV stations that can be received in the MKE adjacent areas. Efforts will also be made to prepare articles on MKE and publish these in the local dailies. It is expected that this strategy will increase the variety of audiences that are educated on conservation issues within the MKE, and further enhance appreciation of the area.

In addition, MKE managers will increasingly participate in local as well as international events such as World Environment Day, World Wetlands Day, and Agricultural Society of Kenya (ASK) shows, among others. During these events, the community will be enlightened on the unique MKE natural resources, and issues and challenges facing their conservation.

Action 1.4 Support the William Holden's Education Center in creating awareness on the repatriation and release of Bongos into the MKE

To gain community support in Bongo surveillance, there is need to create awareness on the release of repatriated Bongo into the wild. Towards this, KWS will collaborate with the William Holden's Education Center in educating the community on the Bongo and its requirements. This will involve developing and disseminating appropriate community education materials containing messages targeting threats such as bush meat poaching. This information will be disseminated to students visiting the Education Center and also to the community through outreach activities in schools and public meetings. Brochures and posters on Bongos' ecology and threats to Bongos will be produced and disseminated to schools. In addition, Bongo information will be disseminated to the public through the print and electronic media.

Objective 2: Human-wildlife conflict reduced

Protected areas and the presence of wild animal populations inflict costs on local communities. In turn, local communities residing adjacent to these areas can develop negative attitudes towards protected areas and wildlife, exacerbating the conflict and undermining conservation efforts. In order to break this cycle, there is need to protect rural livelihoods by instituting measures that can mitigate Human-Wildlife Conflicts (HWCs). This could include measures aimed at reducing community vulnerability to wildlife menace; measures aimed at counterbalancing losses with benefits; and measures that promote involvement in natural resource use and management.

This objective is designed to provide measures that will minimize HWCs and engage communities in dialogue to minimize hostilities against wildlife. The management actions that have been designed to address the HWC problem relate to construction and maintenance of a perimeter electric fence encompassing the MKE protected areas; carrying out an assessment of the impacts and effectiveness of existing wildlife barriers; strengthening community based human-wildlife conflict management measures; developing a human-wildlife conflict database to support better definitions and prediction of hot spots and evaluation of the impacts; establishing problem animal control (PAC) outposts; and building capacity of Community Consultative Committees in project management. These management actions are elaborated in the following sections.

Action 2.1 Construct and maintain a perimeter electric fence encompassing the MKE protected areas

Most of the conflict on Mount Kenya arises when elephants move out of the forest in search of mineral salts or following inherent pull to migrate. As the population of elephant within the PAs increases, so will the level of conflict between elephants and people. Hence, to mitigate elephant crop raiding and at the same time protect people from injury and elephant caused deaths, a perimeter electric fence will be constructed along the National/Forest Reserve boundary to keep elephants from crop farms. This fence will be constructed in several phases (see table 20 for completed sections) until the entire 397 Km forest perimeter is covered. As the fence is being constructed, a fence maintenance team will be established and equipped with requisite fence monitoring and maintenance tools. This team will be monitoring the fence to ensure that it is functional at all times. And to protect exotic plantations from wildlife damage, new plantations will be enclosed by electric fences.

Table 20. Electric Fences in Mt. Kenya National Reserve[13]

Name	No. of strands	Alignment	Length Distance (Km)	Comments
Kangaita-Sirimon gorge	2	FR/Community	30	Professionally done/ can be upgraded
Kibirichia Community Solar Fence (CSF)	2	FR/Community	18	Professionally done/ can be upgraded
Weru CSF	2	FR/Community	5	Professionally done/ can be upgraded
Ontulili CSF	2	FR/Community	25	Professionally done/ can be upgraded
Naari Murugumo-Nchoriboro	4	FR/Community	30	Professionally done/

[13] Kamfor, 2009. EIA study for the proposed electric fence and associated civil works for the Mt. Kenya East Pilot Project (MKEPP-GEF)

				can be upgraded
Imenti CSF Mpori-Mukundu	2	FR/Community	30	Professionally done/ can be upgraded
Sagana CSF	4	FR/Community	10	Professionally done/ can be upgraded
Mt. Kenya East Solar Fence (Mpuri-Kuku Prisons)	2	FR/Community	14	Professionally done/ can be upgraded
Naro Moru Solar fence	2	Natural forest	26	Temporary
Warazo CSF	2	FR/Community	11	Temporary
Gaki CSF	2	FR/Community	15	Temporary
Tagwa-Maragima CSF	2	FR/Community	15	Temporary
Kimahuri-Ndathi	2	FR/Community	20	Temporary

Action 2.2 Carry out an assessment of the impacts and effectiveness of existing wildlife barriers

Several wildlife barriers have already been constructed in the MKE to keep crop raiding wildlife from farms (see table 20). Majority of these barriers are electric fences which are designed purposely to keep out elephants. These barriers are expensive to install and maintain; hence there is need to assess whether they are meeting the objectives for which they have been established. In this regard, MKE management, through its Community Wildlife Service Programme, will carry out an evaluation of all the installed fences to discern their effectiveness and constraints that are being experienced in the maintenance of these barriers. The outcome of this study will be used to improve the management of existing barriers and also inform the installation and management of future fences in the area.

Action 2.3 Strengthen community based human-wildlife conflict management measures

The MKE ecosystem teems with roaming large herbivores and primates that occasionally raid farms bordering the protected areas. Perpetual crop raiding is a challenge to conservation as it results in lack of community support for conservation initiatives. Management of the crop raiding problem is complicated by the vastness of the MKE that hinders effective coverage by MKE Problem Animal Control (PAC) teams. To mitigate against crop raiding, MKE management will establish a human-wildlife conflict management system that incorporates the local communities living in the MKE's human-wildlife conflict hot-spot areas (see table). In regard to this, MKE management will identify suitable CFA and WRUA officials living in the HWC hot-spots who have demonstrable passion for wildlife conservation and recommend them to the Director KWS for appointment as Honorary Wardens. These Wardens will work closely with MKE management in reducing human-wildlife incidents in the hot-spot areas. In addition, conservation-linked community organised groups will be trained on simple human-wildlife conflict mitigation methods that can be used to keep marauding wildlife out of farms. Education and training activities will aim at disseminating innovative techniques to build capacity in conflict management and increase public understanding of HWC.

Action 2.4 Develop a human-wildlife conflict database to support better definitions and prediction of hot spots and evaluation of the impacts

Currently, a human-wildlife conflict database is lacking at the MKE. HWC data defining the magnitude of the damage caused by different wildlife species is therefore lacking making evaluation of HWC impacts a daunting task. However, selected data on HWC is available at the centralised HWC database located at KWS. But this is not comprehensive as it covers only the major incidents, despite the fact that the true severity of social and economic losses

can only be estimated with accurate data that take into account all the incidents taking place in MKE. In view of this, a MKE based HWC database will be established at the Mt. Kenya National Park Headquarters. This database will provide information on impacts of wildlife on local communities and facilitate identification of areas that are prone to HWC and which species are commonly causing conflicts. As a result, it would support decision making in regard to resource allocation to mitigate conflicts.

Action 2.5 Establish problem animal control (PAC) outposts

The MKE has several Problem Animal Control outposts which are strategically located in the HWC vulnerable areas. However, the out posts are not adequate to satisfactorily minimise conflicts to acceptable levels. Hence, to mitigate HWC, additional PAC outposts will be established in HWC hot-spots that currently do not have outposts. In addition, since some of the crop raiding conflicts are seasonal, some of the outposts will be temporary being established during the periods of high HWC incidents.

Action 2.6 Strengthen and support MKE-community consultation mechanisms

An effective community consultation mechanism is critical in resolving issues of resource use conflicts in MKE. As such, a community consultative committee will be established to among other things to deal with biodiversity resource utilisation conflicts and HWC issues in the area. The committee will participate in implementing measures to control activities destructive to the ecosystem such as poaching, illegal grazing in protected areas and charcoal burning.

Action 2.7 Build capacity of Community Consultative Committees in project management

Sustainability of some of the community projects being implemented through Government agencies and NGOs in the area is largely dependent on continuous maintenance of the developed facilities or infrastructure. It will therefore be critical that the Community Consultative Committee is adequately equipped to manage such projects. Consequently the committees will be trained in various aspects of project planning and management and in maintenance of implemented projects. This will ensure that community projects do not stall because of poor management or lack of maintenance skills.

Objective 3: Opportunities for local communities to benefit from the MKE improved

While the primary beneficiaries of conservation activities at the MKE usually live far away from the ecosystem, the ecosystem adjacent communities bear most of the negative impacts associated with the Ecosystem, such as crop raiding by problem animals. In view of this, there is need to develop a positive relationship between the communities directly affected by the existence of the MKE to ensure sustainable conservation. As such, mechanisms for supporting the development and welfare opportunities of local communities is needed to placate communities on losses incurred due to wild animals and at the same time recruit them to watch against illegal forest activities.

This management objective has therefore been developed to provide mechanisms of ensuring that communities living within and adjacent the MKE are receiving tangible benefits from conservation. The management actions that have been designed to realize this objective focus on: supporting design and implementation of social projects; facilitating the community living adjacent to the forest to sustainably manage and use forest resources; supporting establishment of income generating activities; collaborating with stakeholders in building the capacity of WRUAs and CFAs to conserve forest resources. These management actions are elaborated in the following sections.

Action 3.1 Support design and implementation of social projects

It is possible to achieve positive community attitude towards conservation if communities are receiving tangible benefits from conservation efforts at a protected area. At the MKE, communities are mainly benefiting through harvesting of wood and non-wood forest resources from the forest. They are also benefiting from implementation of other community projects that are not directly related to conservation such as construction of schools and rehabilitation of roads. Therefore, in order to maintain a positive community attitude towards conservation, MKE will increase its support for community social projects. Towards this, the Community Officers at the MKE will assist communities in designing projects, soliciting for funds to implement these projects, and provide technical assistance during project implementation.

Action 3.2 Facilitate the community living adjacent to the forest to sustainably manage and use forest resources

The communities bordering the Forest reserve have been utilizing forest resources for their livelihood since time immemorial. These communities mainly use the forest for livestock grazing, firewood collection and honey production. Thus, through this management action, and in line with the zonation scheme, areas where conservation compatible land uses can be practiced by the community will be identified jointly by MKE management and the communities. Rules and regulations controlling use of each resource will also be developed to prevent overexploitation of resources. In addition, the wildlife barriers that will be installed under action 2.1 of this programme will have appropriately located gates to allow the community to access the forest.

Action 3.3 Support establishment of income generating activities

For the local communities bordering the MKE protected area to increasingly support conservation, they need to receive tangible incentives that improve their livelihoods. By doing this, the pressure exerted on the ecosystem through illegal and unsustainable extraction of forest resources will be reduced ensuring long term sustainable conservation. In the MKE, the communities are involved in the production of various products including horticultural products, honey, beeswax, silk, and wood products. These products are sold as raw materials in the local markets with high post harvest wastages and consequently low financial returns.

To ensure that the communities are reaping from conservation and returns from their efforts are appreciable, MKE management will support establishment of income generating activities including beekeeping and ecotourism among other projects. However, the funding support will be based on well researched project feasibility studies and business plans to ensure viability. In addition value addition to forest and agricultural products will be supported to increase returns from these products. Towards this, KFS extension efforts will expose

farmers to buyers, increase farmers' understanding of market demand, and link farmers to other resources (e.g., credit facilities, organization development training).

Action 3.4 Collaborate with stakeholders in building the capacity of WRUAs and CFAs to conserve forest resources

To effectively conserve the natural resources of the MKE, KFS and KWS have adopted participatory natural resource management strategies to overcome threats facing the ecosystem. The communities adjacent to the forest are now increasingly involved in forest and water resources management through Community Forest Associations (CFAs) and Water Resource Users Associations (WRUAs) respectively. However, since these associations are new players in the management of natural resources it is essential that they receive appropriate skills to effectively manage natural resources in the area. Consequently, KFS and WRMA will collaborate with other MKE stakeholders in building the capacity of these Associations. Support will be sought from stakeholders, like Laikipia Wildlife Forum (LWF), to help WRUAs and CFAs in developing sub-catchment management plans and forest station management plans respectively.

Security Management Programme

Programme Purpose and Strategy

The purpose of the Security management programme is to ensure that:

> The MKE and surrounding community areas are a safe and secure environment, and illegal natural resource uses within the protected areas are minimised

Security is an important service for successful implementation of all the management programmes proposed in this management plan and for the overall resource management. Boundary encroachment, illegal water abstractions, marijuana cultivation, accidental forest fires, poaching of wild animals, illegal logging, visitor insecurity and other forms of illegal activities have been a major security challenge in the ecosystem. Since, majority of the illegal activities are carried out by members of the local community, this programme will apply strategies that integrate stakeholders to deliver the security programme.

The following sections outline the guiding principles that will guide MKE Management in the implementation of the Security Programme and the achievement of the Programme Purpose.

In implementing the MKE's Security Programme, MKE Management will strive to ensure that:

Security presence is extended across MKE

With the anticipated increase in tourism because of the implementation of this plan, it will be critical that security presence is felt in all corners of MKE. In addition, to ensure that illegal activities are deterred, MKE security system should cover all illegal activity hot spot areas effectively. As such, a high priority of this management programme is the intensification and extension of security and management presence across the entire MKE. This will be supported by the decentralised sectoral management of the area, which aims to increase management presence and infrastructure development across the MKE, and the establishment of new ranger outposts in line with the sectoral management strategy.

Operational effectiveness is improved

The operations of MKE security team can be enhanced if there is a system of gathering intelligence on conservation crimes, analysing this information and disseminating the same to patrol teams. When acting on good intelligence information, many conservation crimes can be prevented thereby saving wildlife and its habitats. As such this programme will seek to build a strong intelligence network spread out in MKE.

Collaboration with key stakeholders is strengthened

Success of security operations in a vast ecosystem such as the MKE requires that stakeholders are increasingly integrated in the delivery of the security strategy. Despite the significant expansion of management presence and improvement of security operation effectiveness outlined in this management programme, communication and collaboration with key stakeholders in and around the MKE will remain essential to improve security responses, strengthen the deterrent against illegal activities in the area, and improve the overall effec-

tiveness of security operations. As such, and in particular to ensure a safe and secure environment for visitors and tourism investments in the area, this programme will strengthen security collaboration with key stakeholders.

These guiding principles are intended to guide the implementation of the Security Programme's two management objectives that, when taken together, achieve the Programme Purpose. These two objectives are:

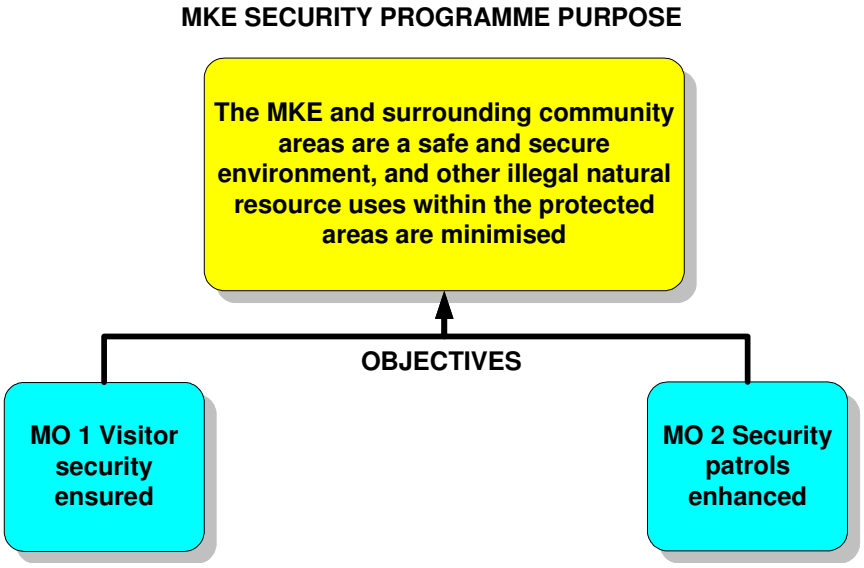
MO 1. Visitor security ensured
MO 2. Security patrols enhanced

The following sections describe these management objectives and provide an outline of the management actions needed to achieve them. Under each management objective there is a brief description of the relevant management issues and opportunities, which provides the specific context and justification for the management actions. The final section of the programme contains the **3-Year Activity Plan** for the Security Programme, and details the activities, responsibilities, and timeframe for delivery of each management action over the first 3-year timeframe of this management plan.

Management Objectives and Actions

Figure 9 shows the overall objectives tree for the MKE Security Programme.

Figure 9. Security Programme objectives tree



Objective 1: Visitor, revenue and asset security ensured

The MKE is an area that is increasingly becoming popular with visitors because of the unique visitor experience it offers. However, incidents like pilfering of visitor's luggage can roll back the steady growth in both tourism numbers and revenue that is being registered at the MKE. The MKE is also not divorced from the security issues that trouble the rest of the MKE adjacent areas. Incidents of vandalism of MKE public assets have been recorded. To ensure increased security of visitors, revenue and MKE assets, three management actions have been designed. These relate to establishing a communication network between the MKE security and key tourism stakeholders in the region; instituting measures to curb visitor, revenue and asset related crimes; and expanding the intelligence gathering network to cover the MKE effectively. These actions are elaborated in the following sections.

Action 1.1 Establish a communication network between the MKE security and key tourism stakeholders in the region

Visitor security can be enhanced substantially if there is an established mechanism for involving key tourism stakeholders in visitor security. In respect to this therefore, MKE management will establish a communication link with all the key players in the local tourism industry. The communication network will be mostly through mobile telephony, but radio communication will also be used where mobile telephone networks are not available. A 24 hour security telephone number will be established to facilitate timely sharing of tourist related security information and by so doing enhancing response time to tourist incidents.

Action 1.2 Institute measures to curb visitor, revenue and asset related crimes.

Petty crime such as pilfering luggage and vandalism of KWS and KFS assets has been noted within the MKE. Hence, to enhance visitor and asset safety, MKE Security will take several measures to boost security in the area. First, in addition to measures specified under Action 1.1 above, collaboration with other security agents like tourist and administration police will be increased to stop pilferage of visitor luggage. Towards this, MKE Security will share security information with the other security forces to facilitate prevention of visitor related crime. Second, the KWS mountain Rescue Unit will be strengthened through provision of standard equipment for mountaineering activities and appropriate personnel deployment to not only offer Search And Rescue (SAR) services, but security services as well. Third, discipline among the security forces, from both KWS and KFS, will be enhanced through regular refresher courses. Finally, revenue security will be enhanced through introduction of the Safari Card system to support revenue collection at the entry gates. And to ensure that collusion of security staff with criminals is minimised, these staff will be rotated frequently among the security outposts.

Action 1.3 Expand the intelligence gathering network to cover the MKE effectively

The MKE is vast and faces many threats from the adjacent local communities. However, these threats can greatly be abated through an effective intelligence gathering system that involves the local community. Hence, MKE security sections will put in place appropriate

measures to ensure that all the illegal activity hot spots are effectively covered by the intelligence network. This will require increasing intelligence capacity through deployment of relevant manpower to cover the area effectively.

Objective 2: Security patrols enhanced

The MKE faces many conservation related crimes which could be reduced substantially if patrols are used as deterrent tools. Wildlife poaching, particularly for bush meat is common along the forest reserve boundary. Charcoal burning, illegal logging and illegal honey gathering are crimes that also occur in many parts of the Mt Kenya forest. These types of crimes can be effectively prevented through intensification of both ground and aerial patrols.

This objective has therefore been designed to deter conservation related crime in the MKE. The management actions that have been developed to realize this objective pertain to carrying out intense ground and aerial patrols; collaborating with Lewa Wildlife Conservancy (LWC) and Marania Game scouts in enhancing MKE security; establishing an MKE security database to support patrols; reviewing security operations and identifying new security outpost locations; and training rangers and forest guards in jungle operations. These actions are elaborated on in the following sections.

Action 2.1 Carry out intense ground and aerial patrols

Because of its vastness, rugged terrain and paucity of patrol roads, the MKE is a challenge to patrol effectively. The problem is further exacerbated by lack of adequate controls to regulate entry to the National Reserve/Forest Reserve. This has occasioned continued illegal activities in the forest albeit at a lower level compared to the period before the establishment of the Mt. Kenya National Reserve in year 2000. Hence, to minimise illegal activities, MKE management will intensify both foot and aerial patrols in the entire forest. Aerial patrols will be carried out regularly to detect illegal activities such as marijuana cultivation, which is a very difficult activity to detect through foot patrols. The aerial patrols will specifically be intensified in the identified illegal activity hotspots such as south-eastern forests, particularly Chuka, Ruthumbi, Chehe and Kathendeini. Foot patrols will be carried out by both KWS and KFS security patrol teams either jointly or singly. However, to avoid a disjointed patrol approach which increases duplication of effort, and security gaps, the KWS and KFS Security commanders will work in concert to ensure efficiency and effectiveness of patrols. In addition to intensification of well coordinated patrols, patrol teams will be expected to search and remove wildlife snares to minimise bush meat poaching. The community will also be sensitized on the dangers of bush meat poaching.

Action 2.2 Collaborate with LWC and Marania game scouts in enhancing MKE security

LWC and Marania game scouts are appropriately equipped with requisite security tools such as patrol vehicles and guns making their patrols very effective. These scouts normally patrol the part of the forest bordering Marania ranch and they have assisted in curbing illegal activities in this area. In view of the important role played by LWC and Marania game scouts in boosting MKE security, MKE management will increasingly collaborate with LWC and Marania management in enhancing security in the north western part of MKE (Sirimon Sector). Towards this, the LWC and Marania game scouts will be assigned a specific forest section that they will be patrolling jointly with KWS and KFS rangers.

Action 2.3 Establish a range-based management and security data collection system

KWS management has decided to adopt the Management Information System (MIST) in the collection and analysis of management and security data. The MIST is a user-friendly application programme incorporating GIS features that enable recording and display of geo-referenced data. The MKE management will liaise with the KWS Headquarters Wildlife Protection Department to ensure that the MIST programme is installed at the MKE. MIST at the MKE will be on a stand alone computer which will be linked to the central MIST at the KWS Headquarters. Rangers on patrol will record observed illegal activities and geo-reference these activities using a GPS. Patrol rangers will also collect simple ecological data which will be used to discern wildlife status in the patrol sectors. Information generated from the MIST is expected to be instrumental in supporting most of the management and security decisions at the MKE.

Action 2.4 Train rangers and forest guards in jungle operations

In order to operate effectively and covertly in the mountainous jungle environment of Mt. Kenya, key Security staff such as Rangers and Forest guards, require training in jungle operations. Hence, to fully equip security staff at the MKE with jungle survival skills, a jungle operations course with particular emphasis being placed on navigation will be given. This will be combined with a mountaineering course that will focus on outdoor leadership and teamwork development; minimum impact camping skills development; wilderness risk management; first aid; and emergency procedures in the wilderness. The instructors for this course will be drawn from KWS and Mt. Kenya School of Adventure & Leadership (KESAL).

Protected Area Operations Management Programme

Programme Purpose and Strategy

The purpose of the Protected Areas Operations Management Programme is to ensure that:

> The MKE's operational systems are effectively and efficiently supporting the implementation of MKE's management programmes

Since Mt Kenya forests are under dual gazettement (gazetted by KFS as Forest Reserve and by KWS as National Reserve) collaboration between KWS and KFS in the management of the Forest is paramount. An effective mechanism needs to be instituted to ensure that there is no duplication of efforts and that development of the tourism product in the ecosystem is well coordinated.

The MKE suffers from inadequate staff while welfare services for existing staff are still unsatisfactory. There is a shortage of staff houses and offices, while recreation facilities for staff are not adequately catered for. In respect to transport and communications, vehicles and road maitenance machinery are not sufficient and telecommunication and related equipment require regular upgrading. Further, forest roads are in a deplorable condition and require major rehabilitation to ensure that the road network is effectively supporting management of the ecosystem.

The following sections outline the guiding principles that will guide MKE Management in the implementation of the Protected Area Operations Programme and the achievement of the Programme Purpose.

In implementing the MKE's Protected Area Operations Programme, MKE Management will strive to ensure that:

Management is integrated across the MKE

A key element underpinning management programmes in this plan is that the MKE will be managed as a single integrated ecological unit. This is the most reliable way of ensuring that ecosystem integrity is maintained and practices that promote the long-term health of the MKE are implemented. As the majority of the MKE falls under various management jurisdictions (KWS, KFS and LWC) managing this area for biodiversity will require the cooperation amongst these resource management agencies. Due to the diverse authority and mandates for ownership and management of the MKE components, cooperation and coordination is critical to success. As such, this programme will aim to ensure that agreements and mechanisms to enable the effective management of the MKE as an integrated and unified management unit are put in place, and that KWS, KFS and LWC are collaborating together in the management of the MKE. In addition, to ensure that the MKE is capitalising on its international designation as both a World Heritage Site and UNESCO Biosphere Reserve, and its local importance as one of the five major water towers, MKE management will forge constructive relationships with a variety of stakeholders to boost conservation efforts in the area.

Staff welfare and motivation

Employees are a critical component of MKE management system as conservation success is dependent on them. Employees can contribute effectively to the achievement of conservation goals when their worries are taken care of and when they feel their welfare needs are considered. As such, this programme will aim to provide for the physical as well as the social needs of staff. Staff will be encouraged to organise and participate in activities such as sports for social interaction. In addition, employee personal development will be a focus of this programme. In respect to this MKE management will provide training opportunities to staff in line with the identified training needs.

Effective and efficient management infrastructure

Effective and efficient management infrastructures (such as road network, water and power supply, airstrips and vehicles, plant and machinery) are a prerequisite for registering success in conservation of a protected area. The poor state of some of the infrastructure e.g. roads, has been identified as a major hindrance to security management in the MKE. It is therefore essential that priority be given to providing adequate infrastructure in the MKE to support conservation efforts aimed at reversing ecological degradation wrought by past uncontrolled human activities.

These guiding principles are intended to guide the implementation of the Programme‘s three management objectives that are set out below:

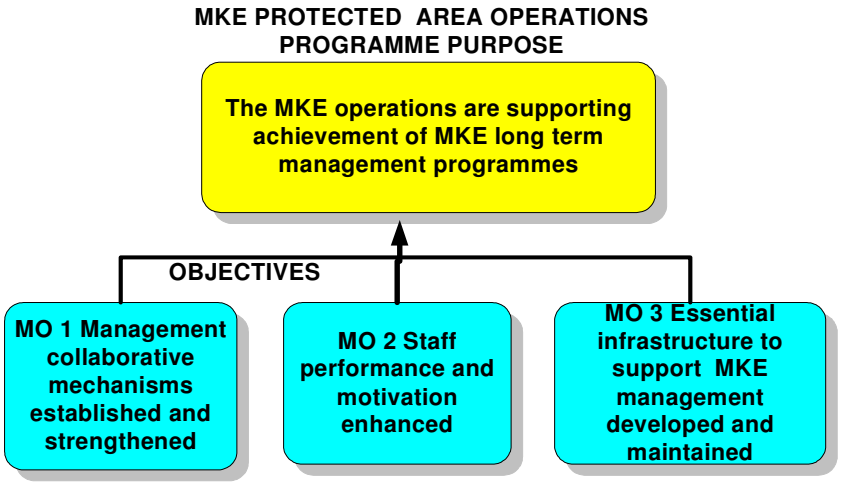
MO 1. Management collaborative mechanisms established and strengthened
MO 2. Staff performance and motivation enhanced
MO 3. Essential infrastructure and equipment to support MKE management developed and maintained

The following sections describe these management objectives and provide an outline of the management actions needed to achieve them. Under each management objective there is a brief description of the relevant management issues and opportunities, which provides the specific context and justification for the management actions. The final section of the programme contains the **3-Year Activity Plan** for the PA Operations Programme, and details the activities, responsibilities, and timeframe for delivery of each management action over the first 3-year timeframe of this management plan.

Management Objectives and Actions

Figure 10 below shows the overall objectives tree for the MKE Protected Area Operations Programme.

Figure 10. Protected Area Operations Programme objectives tree



Objective 1: Management collaborative mechanisms established and strengthened

The MKE is one of the forest ecosystems[14] that are managed jointly by KWS and KFS. The Mt. Kenya Forest Reserve is gazetted as both a forest reserve through the Forest Act and as a National Reserve through the Wildlife Act. In view of this dual gazettement, effective collaborative mechanisms are needed to ensure that management of the ecosystem is coordinated and management issues are addressed in a collaborative and synergistic manner that optimizes management and administrative resources. The future desired state of the MKE is therefore where KFS and KWS are collaborating to minimize threats to the ecosystem's integrity. In order to achieve this desired state, management actions that will be implemented focus on liaising with both KWS and KFS legal departments to gazette rules for management of Mt. Kenya National Reserve; drawing and implementing MoU agreements between KWS and KFS; establishing an MKE Management Advisory Committee (MAC) comprising all stakeholders with interest in the conservation of the MKE; collaborating with District Security Committees to control illegal encroachment on MKE protected areas; and liaising with other stakeholders in fund raising to support management activities. These management actions are expanded upon in the following sections.

Action 1.1 Liaise with Both KWS and KFS legal departments to gazette rules for management of Mt. Kenya National Reserve

Currently, the management responsibility for the Mt. Kenya National Reserve is shared between the two institutions, KWS and KFS, which have legal mandate for the management of the Reserve. However, the roles and responsibilities of each institution have not been explicitly defined creating a management environment rife with duplication of efforts as most functions of the two institutions overlap. For instance, the two institutions are mandated to develop ecotourism, and provide security for natural resources in protected areas under their jurisdictions. Since Mt. Kenya National Reserve is under dual gazettement (it is both a Forest Reserve and a National Reserve) KWS and KFS find themselves working at cross purposes

[14] Others are Shimba Hills and Marsabit National Reserves

as each organization tries to achieve its mandate. To resolve this management problem, in 2005, KFS and KWS, with funding from UNEP, commissioned a study whose objective was to delineate the boundaries of the forest stations and inventory KFS' physical assets in the Mt. Kenya National Reserve. This was carried out by a consulting firm which in 2007 submitted a report entitled *Consultancy Services to Map/Survey of the Boundary Delineation of Plantations and Indigenous Forests in Mount Kenya.* The key outputs from this study are clear geo-referenced boundaries of the forest stations in the National Reserve. As a follow up to the recommendations of this study, KWS and KFS legal departments will collaborate in developing and gazetting special conditions to allow continued management of the forest stations by KFS in line with Section 18 of the Wildlife Act. The boundary between the forest stations and natural forest will also be marked (see action 2.12 of the Forest Resource Management Programme).

Action 1.2 Draw and implement MoU agreements between KWS and KFS

Unaccountable management wrought by dual gazettement has complicated conservation of natural resources at the MKE. Institutional jurisdiction in regard to the management of the National/Forest Reserve is therefore required to promote synergy and prevent duplication of efforts. For instance, it is essential to clarify explicitly the authority responsible for tourism development and management to prevent applying different tourism standards in the same management area. In addition, since lax security measures can lead to escalation of illegal activities in the area, it would be prudent if the security of natural resources was placed under one command. As such, as a starting point in creating synergy in the MKE management system, KWS and KFS will draw and sign an MOU for the implementation of this management plan. The MOU will specify each organization's roles and responsibilities in the implementation of this management plan. It will also define the licensing framework for utilisation of forest resources including use of the forest for tourism development.

Action 1.3 Establish an MKE Management Advisory Committee (MAC) comprising all stakeholders with interest in the conservation of the MKE

To increase support of the MKE by stakeholders, an MKE Management Advisory Committee will be established. The functions of the MAC will be to advise MKE management on the effective implementation of this management plan and on other matters relevant to the MKE. It will therefore facilitate the development, implementation and revision of management plans; monitor the management of the National Park and Forest/National Reserve; identify and recommend conservation priorities within the MKE; make recommendations on additional programmes required to address management issues in the MKE; recommend studies as appropriate, to assist the management of the MKE; raise funds to support conservation programmes in the MKE; and provide a forum for members of the MKE community to raise issues relevant to the management of the MKE. It will be composed of all representatives of stakeholders who share the vision of preserving the integrity of Mt. Kenya. These stakeholders will be identified by MKE management and welcomed to join the MAC. The MAC will be meeting quarterly and it will be chaired alternately by MKE Senior Warden and the KFS Head of Central Highlands Conservancy.

Action 1.4 Collaborate with District Security Committees to control illegal encroachment on MKE protected areas

Despite the eviction of illegal settlers who had invaded the MKE in the 1990s, some social infrastructure remained and they are still in use by the local community adjacent to the forest. This is particularly the case in Marania area where a school is located within the forest. To

maintain the forest integrity and avoid creating a precedent, the school will be relocated to a suitable site outside the National/Forest Reserve. To facilitate the relocation, the community will be sensitized on the relocation by KFS, KWS and the relevant District Administration. A suitable site for the school will be identified and the government and other stakeholders will support the community in re-building the school at the new site. In addition, there are reported cases of encroachment on the forest as the boundary is not clear. This is particularly common in the Western and South eastern parts of the MKE. Thus, to rectify this, the forest reserve boundary will be surveyed and new beacons installed, and anybody found encroaching on the forest will subsequently be evicted.

Action 1.5 Liaise with other stakeholders in fund raising to support management activities

Substantial funds will be needed for capital development, purchase of machinery/equipment or plant, and construction and rehabilitation of roads, buildings and outposts. Resources required for capital development may not be met by the managing institutions necessitating financial support to be sought as early as possible from other sources during the plan period. Development budgets will be managed following the financial regulations of the KFS and KWS. Funds raised for the ecosystem based on this plan should be used for the specific purpose it was intended.

Objective 2: Staff performance and motivation enhanced

Kenya Forest Service manages Mt. Kenya Forest Reserve through Eastern and Central Highland Conservancies, under which are 5 forest zones and 18 Forest Stations each under a Forester. Zonal offices are administered by District Forest Officers (DFOs). Kenya Forest Service staffing levels in the field has, however, been greatly reduced through the Public Service Reform Programme (PSRP) since 1998 impacting negative on service delivery. Mt Kenya is a vast ecosystem and an equitable coverage, and distribution of security personnel is required. Adequate patrol forces that are well equipped and trained are vital if effective policing measures are to be achieved.

This objective has therefore been developed to address staff related issues and by so doing increase the effectiveness of staff in managing the MKE. Management actions that have been designed to realise this objective focus on deployment of adequate staff to the MKE; training staff in relevant skills; providing TVs and DVD players to staff canteens; and establishing sport and recreational facilities at MKE. These actions are expanded upon in the following sections.

Action 2.1 Liaise with the KWS and KFS Human Capital Departments to deploy adequate staff to the MKE

KWS has 110 staff in the Mt Kenya ecosystem, with a deficit of 87 personnel. Security personnel make 42% of the total staff. Current shortfalls in staffing range from inadequate numbers, skills, welfare and deployment. Adjustments in staffing and organization are necessary to effectively patrol and administer the MKE and adjacent areas. Currently, the Deputy Senior Warden is doubling up as a Community Wildlife Officer (CWO). A CWO should be operating from Naro Moru while the Deputy Senior Warden is engaged in Protected Area administration and offering guidance to the sectoral CWOs. In addition, only Chogoria sector has a Warden.

On the other hand, the ideal status for Forest Guards staffing is 1 person for every 400 ha of forest reserve, therefore for a total area of about 240,000 ha, six hundred (600) Forest Rangers are required. However, the current staffing level is 293, leaving a shortfall of 307. To address this shortfall and ensure effective protected area operations at the MKE, MKE management will liaise with the KWS and KFS Human Capital Departments to deploy adequate and suitable staff to the MKE in line with the recommended optimal staffing levels.

Action 2.2 Liaise with the KWS and KFS Human Capital Departments to train staff in relevant skills

It has been noted that various cadres of staff lack requisite training and appropriate capacity to effectively carry out their work. Security staff require training in jungle survival skills; management staff need training in fire management; and with the rapid advancement in office management, navigation and communication technologies, staff skills in these technologies need to be upgraded to be in tandem with new technologies.

However, in order to determine training requirements, MKE management will liaise with the Human Capital Departments in carrying out comprehensive training needs assessments for MKE staff. Thereafter implementation of the assessment findings will be given priority to improve staff efficiency, productivity and performance to attain the objectives of this management plan. Priority will be given to training that will increase harmony in the management of the MKE. Hence, joint training courses and workshops in various aspects, including team building will be given highest priority.

Action 2.3 Establish and equip staff canteens at all administrative stations and sub-stations

Most of the MKE administrative stations are located far from trading centers; hence in most cases, staff are ferried to far off trading centres regularly to procure domestic provisions. For instance, staff stationed at Naro Moru Headquarters and Sirimon Gate have to be transported to Naro Moru and Nanyuki Towns respectively for shopping. While such shopping arrangements will continue to be necessary during the duration of this plan, it is essential that basic domestic provisions are readily available at the major administrative stations and sub-stations. In addition, staff require social points where they can interact and unwind after work. In view of this, all MKE administrative stations and sub-stations will establish staff canteens which will cater for the social needs of staff. A typical canteen will have a shop selling basic domestic provisions and a bar where beverages will be sold. The canteens will be equipped with facilities for popular indoor games such as darts and pool, and TV sets and DVD players.

Action 2.4 Establish sport facilities at MKE Stations and Sub-stations

Sporting activities are healthy tools for staff interaction and promotion of physical fitness. Given that Majority of staff at both KWS and KFS are deployed on security duties, participation in sports ensures that they are fit to carry out security operations that require excellent body fitness. On the other hand, KWS has institutionalised an annual sporting competition amongst all its eight Conservation Areas and MKE, which is in the Mountain Conservation Area, participates in this annual event. Consequently, to ensure that staff are physically fit and that they participate actively in the annual KWS sports competition, sporting facilities will be provided at all the stations and sub-stations. The facilities to be provided include foot ball pitches which will also be used for athletic training.

Action 2.5 Carry out a staff welfare survey

In order to ensure a high level of staff welfare and thereby enhance staff motivation among MKE staff, both the KWS and KFS Human Capital Departments at the MKE will carry out staff welfare surveys to discern employee welfare issues. And based on the results of these surveys, concrete plans for action will be prepared to improve staff welfare.

Objective 3: Essential infrastructure and equipment to support MKE management developed and maintained

The future desired state of the MKE is where infrastructure and equipment to support ecosystem management and facilitate tourism development is sufficient. Currently, staff houses are not adequate for the work force and in some cases existing houses are in poor condition. Forest roads are also in poor state hindering vehicle patrols. In addition, management tools such as vehicles are not adequate to support effective management of the ecosystem. To address these infrastructural and equipment problems, ten management actions have been developed. These relate to construction and rehabilitation of residential buildings and non-residential buildings; construction of new roads and rehabilitation of existing ones; procurement of vehicles, machinery and equipment; carrying out preventive maintenance of vehicles, machinery and equipment; improvement of telecommunication network; rehabilitation and maintenance of MKE airstrips; construction of entry gates along Marania and Kamweti routes, and relocation of Chogoria Gate to the Forest boundary; improvement of signage throughout the MKE; and mitigation of visual intrusion from the overhead electric cables and Global Atmospheric Watch (GAW) station along Sirimon Route. These management actions are elaborated in the following sections.

Action 3.1 Construct and rehabilitate residential buildings and non-residential buildings

Provision of quality housing and office space is essential in boosting staff morale and enhancing staff performance. However, shortage of funds tends to reduce expenditure on such items with the result that morale and performance of the staff suffers. An assessment of the condition of buildings under KFS shows that most of the forest guard posts have inhabitable housing due to lack of maintenance. In Some forest stations, the existing buildings are in a very bad state of disrepair and an elaborate rehabilitation exercise is required. The buildings have leaking roofs and have gone for a long period without painting. In view of this, major rehabilitation works will be carried out on all KFS residential and office buildings. Forest guard posts in the reserve will need to be constructed to cater for rangers manning these gates. In addition at least 120 additional staff houses will be constructed to accommodate the optimal KFS staff to be deployed to the MKE.

Pursuant to the KWS sector operationalization and official establishment of new mountain routes, entry gates and associated staff accommodation will be constructed at Marania, Kamweti and the new Chogoria gate. A research sub-station will also be constructed at the Naro Moru Gate to support research in the Sirimon Sector. A summary of buildings to be constructed by KWS is given in table 21 while annex 2 provides building construction and rehabilitation works to be carried out by KFS.

In addition, to ensure that buildings are in good condition, regular preventive maintenance of buildings will be carried out. This will include painting and repairing of buildings and fittings.

Table 21. Proposed New KWS Buildings

ITEM	DESCRIPTION
1.	1 unit, 2 bed roomed at Chogoria. (Floor area 150m^2)
2.	Small office Block with 3 offices at PHQ's (floor area – 72m^2) - Masonry walls with a random rubble wall (1.5 from ground level - Shingles high pitch roofs
3.	Visitor's waiting bay with, - Changing room - Bathroom rooms (4 no.showers) - Toilets (4 no.) - Common Room At PHQ's (Floor area 130m^2)
4	As above but at Sirimon
5	Proposed research sub- station at Naro Moru Gate(Floor area 150m^2)

Action 3.2 Construct new roads and rehabilitate existing ones

According to a road condition survey carried by KFS, majority of the 879 km road network in the Forest reserve is in poor condition because of lack of scheduled maintenance. KFS has identified and prioritized about 100 km of old and abandoned roads for rehabilitation. These are key roads leading to administrative stations and forest blocks and if rehabilitated, will be instrumental in enhancing forest conservation and rehabilitation programmes. Existing bridges are estimated at 66 (number) and 60 of these have been earmarked for initial up-grading and reconstruction to accommodate flood flows during heavy rains. As a start, the bridges along the link road connecting the forest stations will be rehabilitated to facilitate, security operations, tourism and access to forest stations

Currently, the National Park is served by 97 km of motorable roads; 81 km of which are unclassified and 16 km classified. Most of the road network, although supposedly classified as all-weather, is not motorable during the wet season. Hence, to facilitate tourism activities in the MKE, the road network will be gravelled, culverts installed, and at least 10 bridges constructed. Access to the park will be improved by upgrading the Naro Moru to Park Head-quarters (16Km) to tarmac; and rehabilitating and maintaining the Nanyuki/Meru road to Sirimon gate (9km); and Main road (Embu-Meru) to Chogoria Gate (25 Km). Further to this the following roads will be rehabilitated:

- Park Headquarters-Met station (9 Km)
- Met station to Police repeater (2 km)
- Sirimon Gate - Judmeir (9 Km)
- Chogoria Gate to end of climbing route (6km)

In addition, one new road network will be constructed within the proposed Bongo Sanctuary to facilitate tourism and vehicle patrols.

Action 3.3 Procure Vehicles, Machinery and Equipment

Forest management and extension staff have inadequate vehicles and equipment necessary for implementation of day-to-day activities. The identified requirements for KFS are as fol-lows:

- Each of the 18 forest stations will require a four-wheel drive vehicle mainly for security patrols and supervision of other activities; and a tractor and trailer for transportation of nursery soil and seedlings during planting and for use during fire fighting.
- Divisional extension staff require motorcycles to support their outreach and extension activities.
- Each of the two forest conservancies require a minibus for ferrying staff and facilitating forest extension work in adjacent community areas.
- Each zonal office requires a lorry to support emergency activities and transport of bulk cargo like seedlings in the stations under their jurisdiction.
- For disaster management, KFS requires an ambulance vehicle.
- One (1) grader is also required for regular routine maintenance of roads in the forest reserve.
- Additional fire fighting and office equipment are also required to supplement the existing ones.

As regards KWS requirements, vehicles will be replaced as appropriate and plant and machinery will be provided as shown in table 22 below.

Table 22. MT. Kenya National Park Plant and Machinery requirements

No.	Type	Available	Status	Optimum	Variance	Remarks
1	Tractor	2	Serviceable 2WD and 4WD	2	0	One is a 2 wheel drive and is not ideal for the terrain and should be replaced with a 4 wheel drive
2	Shovel	1	Very old and serviceable	1	0	It is a 1940s model and should be replaced since it breaks down quite often.
3	Bulldozer	1	Unserviceable	1	1	A new one should be procured
4	Grader	1	Unserviceable	1	1	A new one should be procured
5	Hand roller	1	Serviceable	1	1	
6	Tipper	None	Not applicable	1	1	Preferably a 20 ton tipper

Action 3.4 Carry out preventive maintenance of vehicles, machinery and equipment

For efficient transport and communication, regular preventive maintenance aimed at prevention of breakdowns and failures of vehicles, machinery and equipment is essential. Preventive maintenance is designed to preserve and enhance reliability of tools by replacing worn components before they actually fail. Mt. Kenya National Park has a regular equipment maintenance schedule which it adheres to. KFS Mechanical workshops operate from district level

serving respective forest stations and they also strive to implement preventive maintenance of equipment.

To ensure that MKE management is effective and efficient, preventive maintenance schedules of all management equipment will be developed, where they don't exist, and the existing ones adhered to. KWS and KFS will also assess status of vehicles, machinery and equipment under their respective jurisdictions with a view to rehabilitating the serviceable ones and disposing the unserviceable ones.

Action 3.5 Improve telecommunication network

Telecommunication systems are required to enhance the effectiveness of management operations, particularly visitor and staff security, problem animal control, patrolling against illegal logging, poaching of forest products, game and fire management. In view of this, to enhance management and security operations in the MKE, telecommunication equipment will be upgraded and the existing telecommunication system expanded through installation of additional radio repeater stations. Additional communication VHF radios will also be procured to enhance communication between stations and outposts. On the other hand to enhance communication with outside stakeholders, where practicable, administrative stations will be provided with *internet* connection.

Action 3.6 Rehabilitate and maintain MKE airstrips

Four (4) airstrips (Sirimon, Park headquarters, Chogoria and Mawingu) exist within the MKE but these airstrips are in bad repair and require urgent rehabilitation. In view of this the four (4) airstrips will be rehabilitated through heavy grading and gravelling to improve aircraft landing safety. Once rehabilitated the airstrips will be maintained through regular scheduled light grading.

Action 3.7 Construct entry gates along Marania and Kamweti routes, and relocate Chogoria gate to the Forest boundary

There are three gates for ticketed entry to the MKE. These are located along the three mountain climbing routes: Naro Moru, Sirimon and Chogoria. However, it has been noted that visitors are increasingly using Marania and Kamweti routes to access MKE. This is partly because of increased marketing of these routes by tour operators and the tourist accommodation facilities along these routes. With the increase in tourist accommodation facilities, especially along the Marania route visitors will increase in tandem. In view of this, MKE management will liaise with the KWS headquarters building section in the construction of new gates along the Marania and Kamweti routes. In addition, to tap revenue from non-summit bound visitors who use the Chogoria route, the current Chogoria gate will be relocated to a site close to the Chogoria Forest Station.

Action 3.8 Provide mains electricity to Park headquarters and Kihari gate

The national park Headquarters at Naro Moru is close to the mains electricity which supplies electricity to a Police radio repeater station close by. Similarly, Kihari gate is located next to the mains electricity grid supplying electricity to Serena Mountain lodge. In view of the ease of supplying mains electricity to the National Park Headquarters and Kihari gate MKE management will liaise with the Corporate Services Division to supply mains electricity

to facilities at these two administrative stations. However, backup diesel generators will be availed at the two gates to supply power during periods of power failure.

Action 3.9 Improve signage throughout the MKE

One of the purposes for designation of the MKE protected areas is the recognition of its pristine landscape quality, and to ensure it is conserved, enhanced, understood and enjoyed. In regard to this, new signage will only be installed where there is a clearly demonstrated purpose and need consistent with MKE purpose and management objectives. Locations will be selected which offer maximum opportunities for delivering messages with greatest impact and offer full range of potential audiences (e.g. vehicle users, hikers). Design principles, where appropriate, will include: clarity, simplicity and achievement of purpose; attractiveness and in keeping with the forest environment; and sustainability and durability. In addition, the MKE protected areas boundary will be indicated through the use of appropriate markers.

Informational and directional signs will be installed along the roads, climbing routes, trails and tourist accommodation facilities to ensure that the special qualities of the MKE protected areas are conserved and enhanced – particularly as regards visual impact; and that visitors enjoy and understand the protected area attractions. On the other hand, existing unnecessary, out of date, or misleading signs will be removed.

Action 3.10 Mitigate visual intrusion from the overhead electric cables and Global Atmospheric Watch (GAW) station along Sirimon Route

The overhead electricity power line supplying power to the GAW weather station along Sirimon route and the highly obtrusive GAW station itself are a source of visual pollution in this rather pristine environment. Since visitors normally hike from Sirimon Gate to Sirimon Road head, the power line is a constant distraction along the hike. To mitigate this visual pollution, MKE management will liaise with NEMA and the Met Department to ensure that mitigation measures specified in the EIA report that allowed construction of the GAW station are effected. The electricity cables will be buried underground and the GAW camouflaged to minimise visual pollution. This will ensure that the pristine values for which MKE has been inscribed as a UNESCO World Heritage Site are protected.

Plan Monitoring

The plan monitoring framework set out in the following tables has been designed to provide guidance for the assessment of the potential impacts resulting from the implementation of each of the seven management programmes. The framework sets out the desired positive impact of each programme's objectives, as well as any potential negative impacts that may possibly occur. The framework also includes easily measurable and quantifiable indicators for assessing these impacts, and potential sources of the information needed. Monitoring the impacts of the plan implementation is a key aspect of the ultimate success of the plan and for informing adaptive management of the area, and as such ensuring that overall benefits from plan implementation are maximised, and that any negative impacts are appropriately mitigated.

Table 23. Ecological Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Threatened mammal species conserved and restored	**The Bongo population in the MKE is increasing** **The Rhino population is increasing**	**Population size and recruitment rates of rare and endangered species**	**Bongo census**
Objective 2: Threats to MKE habitats reduced and monitored	**The forest reserve's ecological integrity and rare indigenous tree species are conserved**	**Forest area and species composition**	**Satellite imagery and reports on floral structure**
	Habitat connectivity between the MKE and surrounding natural habitats is maintained	**Extent of conservation compatible land uses in MKE wildlife dispersal areas**	**MKE land cover change study**
	Elephants and other key species are able to continue moving between the MKE and dispersal areas	**Elephant movements**	**Tracking of GPS Radio collared elephants**
Objective 3: Wild fires are prevented and managed effectively	**Wildfires are controlled and there is minimal habitat destruction attributable to fire**	**Incidence of wild fires in the MKE**	**Fire outbreak reports and MKE Fire Management Plan**
Objective 4: Research and Monitoring in the MKE improved	**Research is supporting MKE management**	**Management oriented research carried out**	**Research papers and reports that are management oriented**

Table 24. Forest Resource Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Natural forest resources managed and utilised sustainably and degraded forest areas restored	Degraded forest patches are rehabilitated	Extent of natural forest	Satellite imagery and reports on floral structure
	Communities are benefiting from the natural forest resources	Harvested natural forest resources	CFA reports
Objective 2: Forest plantations establishment and management enhanced	Plantation backlog is cleared	Extent of new plantations	Plantation establishment reports
	Communities are benefiting from Plantation establishment	Extent of PELIS projects	Plantation establishment reports

Table 25. Water Resource Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Water resource use regulated and controlled	Illegal water uses are minimized; revenue to WRMA is increasing;	Water quantity and revenue accruing from water fees	Water flow and revenue reports
Objective 2: Sustainable water management enhanced and natural flow regimes protected	Water ensuing from the MKE is of acceptable quality and sufficient for all target uses	Water quantity and quality	Water flow and quality analysis reports

Table 26. Tourism Development and Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: The MKE visitor activities improved and diversified, and visitor experience enhanced			**KWS HQ visitor database and concession holder records**
	Increased number of visitors to the MKE	**Annual visitor numbers**	**KWS HQ visitor database**
	Improved financial sustainability of the MKE	**Annual revenue**	**MKE Finance Dept records**
	Environmental degradation from new tourist activities and/or supporting infrastructure	**Evidence of pollution/litter or habitat degradation at sites where activities or infrastructure are located**	**Targeted inspections by MKE staff**
Objective 2: MKE is providing high quality visitor facilities that have minimal impact on the environment	**Improved visitor satisfaction**	**MKE visitor satisfaction**	**Visitor satisfaction survey reports**
	New developments impact on the MKE's wilderness characteristics	**MKE visitor and investor satisfaction**	**Feedback from MKE investors**
Objective 3: MKE tourist products and services marketed to the ecotourism market segment	**Improved visitor understanding of the MKE's conservation issues and ERVs**	**Number of guidebooks and maps sold**	**MKE tourism records**
	The MKE's wilderness and environmental qualities are compromised around attractions	**Evidence of litter and environmental damage at MKE attractions**	**Targeted inspections by MKE staff**
Objective 4: MKE tourism management enhanced to provide high quality client oriented services	**Increased collaboration between KWS and tour operators, tour guides and porters**	**Trained guides and porters**	**Training reports prepared by the Mt. Kenya Guides and Porters Association**

Table 27. Community Partnership and Education Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Conservation education and awareness programme strengthened	**Enhanced relationships between MKE management and surrounding communities**	**Incidences of MKE - community conflict**	**MKE Community Wildlife Service records**
	Improved understanding of the MKE's conservation importance	**Number of outreach activities in MKE adjacent areas**	**MKE Community Wildlife Service records**
	Increased community awareness of and respect for MKE rules and regulations	**Number of local community members arrested for illegal activities in the MKE**	**Security Section Records**
	Reduced illegal natural resource use in the MKE	**Number of local community members arrested for illegal natural resource use the in MKE**	**Security Section Records**
Objective 2: Human-wildlife conflict reduced	**Reduced costs of wildlife to MKE adjacent communities**	**Incidents of human-wildlife conflict around the MKE**	**MKE Community Wildlife Service records (monthly reports and occurrence books)**
Objective 3: Opportunities for local communities to benefit from the MKE improved	**Increased value and importance of the MKE to surrounding communities**	**Income from activities linked to the conservation of the MKE**	**Conservation CBOs reports**

Table 28. Security Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Visitor, revenue and asset security ensured	**The establishment of the MKE as a safe and secure destination for visitors and investors**	**Number of visitor security incidents in the MKE**	**MKE Security Section records (incident reports)**
Objective 2: Security patrols enhanced	**Reduced impact of illegal activities (e.g. poaching, logging, and charcoal burning) on MKE natural resources**	**Number of arrests**	**MKE Security Section records and aerial surveys**

Table 29. Protected Area Operations Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Management collaborative mechanisms established and strengthened	**Enhanced management collaboration between KWS, KFS and LWC**	**Percentage of joint responsibility 3-year activity plan milestones achieved**	**MKE annual reports**
	Increased stakeholder support for management of the MKE	**Number of MKE advisory meetings or other stakeholder collaboration events held**	**Meeting minutes or MKE management records**
Objective 2: Staff performance and motivation enhanced	**Improved efficiency of MKE staff undertaking their roles**	**Staff performance against 3-Year Activity Plan "milestones"**	**MKE annual reports**
	Improved morale of MKE staff	**Number of poor morale related incidences**	**MKE annual reports**
Objective 3: Essential infrastructure to support MKE management developed and maintained	**Improved visitor and management access across the MKE**	**Kilometres of roads built and/or improved**	**MKE management records and KWS/KFS HQ GIS database**
	Environmental disturbance and pollution during road construction	**Evidence of litter, pollution or excessive environmental damage**	**Targeted inspections by MKE staff**
	Improved efficiency in management operations (especially security and PAC responses)	**Ratio of operational to non-operational vehicles**	**MKE management records and/or periodic surveys**
	Environmental disturbance and pollution during gate or airstrip construction	**Evidence of litter, pollution or excessive environmental damage**	**Targeted inspections by MKE staff**
	Enhanced ability of MKE management to implement the plan	**Percentage of 3-Year Activity Plan milestones achieved**	**MKE annual reports**
	Increased external financial support for MKE management	**MKE revenue sources**	**MKE annual budget reports**