KENYA WILDLIFE SERVICE

KENYA Forest Service

Aberdare ecosystem Management Plan, 2010-2020

"Majestic Peaks, Moorlands and Falls"

Aberdare ecosystem Management Plan, 2010-2020

Planning carried out by

AE Managers and
AE Stakeholders

In accordance with the

PROTECTED AREAS PLANNING FRAMEWORK

Acknowledgements

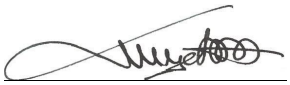
This General Management Plan has been developed through a participatory planning process involving a cross section of AE stakeholders, under the coordination of a Core Planning Team comprising representatives from AE managers (KWS and KFS), KWS and KFS Headquarters Planners, and National Environment Management Authority (NEMA) and Water Resources Management Authority (WRMA) officers.

KENYA WILDLIFE SERVICE	KWS 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 to development of the Water Resource Management Programme.
KENYA FORESTRY RESEARCH INSTITUTE KEFRI	Kenya Forestry Research Institute (KEFRI) participated in the Core Planning Team and provided technical advice and information for development of the three Forest Resource Management Programmes.
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY KENYA	NEMA participated in the Core Planning Team and ensured that the plan addressed key environmental management issues.
RHINO ARK	Rhino Ark co-funded the planning process and participated in stakeholder meetings.

Approval Page

The management of Kenya Wildlife Service has approved the implementation of this management plan for the Aberdare ecosystem

On behalf of the **KENYA WILDLIFE SERVICE**



Julius Kipng'etich
Director

Date: 21.09.2010

Executive Summary

Plan Foundations

This 10-year (2010-2020) management plan for Aberdare ecosystem (AE) has been developed through an elaborate and highly participatory planning process that benefited from a wealth of information and ideas provided by key AE stakeholders. Stakeholders were involved in the planning process through many forums including participation in the core planning team, stakeholder planning workshops, expert working groups, village level community consultative meetings and individual consultations.

The purpose of the plan is to ensure that the AE has a clearly defined direction for resource protection and visitor use. It is developed based on current scientific knowledge of various components of the ecosystem and ensures that management intervention measures are in line with the AE purpose (i.e. the reasons for the establishment of the AE protected areas).

The plan is divided into ten main chapters. These include the Plan foundations; the AE zonation scheme; the seven management programmes; and plan monitoring framework.

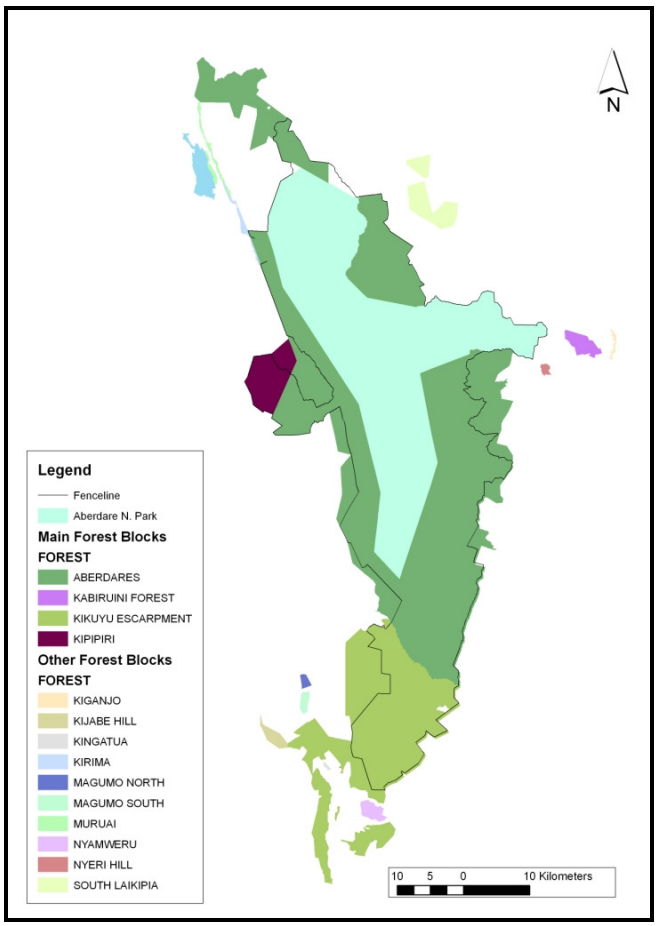
Area description

The name Aberdare is attributed to a British Explorer, Joseph Thompson, who in 1884, named the mountain range in honour of Lord Aberdare, then President of the Royal Geographic Society. This massive range covers a protected area of about 2,162 km^2 consisting of Aberdare, Kikuyu Escarpment, and Kipipiri Forest Reserves, and Aberdare National Park (see table below). Also included is Lake Ol bollosat and the surrounding riparian system. The calculated area coverage does not reflect the true area of the ecosystem due to the ragged terrain with deep valleys, gorges and hills with wide altitudinal range(1800m-4001m) which were not considered in the calculation. The area covered by the ecosystem is therefore higher than 2162km^2 and could even go up to 3000km $^{2.}$

Aberdare ecosystem's Protected Areas

Protected Area	Initial Gazetted area (Ha)	Formal excisions	Non formal excisions	Additions	Total Area in Ha (current)
Aberdare forest reserve	122033.20	19709.08	3344.60	285.50	**99,265.02**
Kikuyu Escarpment	42,372.44	4933.44	1104.00	-	**36335.00**
Kipipiri Forest Reserve	5,019.00	1119.00	-	-	**3900.00**
Aberdare National Park	57220.0	-	-	19480.	**76700.68**
Total					**216,200**

The AE's Key Components



AE Purpose Statement

The purpose statement and its supplementary statements are founded on the outstanding exceptional resource values (ERVs) identified and prioritized by stakeholders during a series of planning meetings. Conservation of the ERVs ensures that the unique qualities of the AE are preserved in perpetuity.

The Purpose of the Aberdare ecosystem is:

To protect and conserve the principal water catchment for Kenya's major rivers, the wilderness character, cultural resources and threatened and endemic species associated with the Aberdare ecosystem, for the present and future generations

Supplementary purposes of the AE are:

- To enhance forest production in order to generate economic benefits to the country;
- To provide opportunities to local communities to benefit from the conservation of forest resources;

- To provide an opportunity for scientific research;
- To preserve all sites of aesthetic, historical and cultural significance; and
- To responsibly develop tourism potential offered by the diversity of species, habitats, sceneries and wide array of tourist attractions.

AE Exceptional Resource Values

The exceptional resource values of AE are 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 five categories: Biodiversity, Scenic, Social, Cultural and Environmental. The highest priority values of the AE for the purpose of conservation are however, its biodiversity and water catchment values for which the AE has been designated a protected area. A summary of AE's ERVs is given in the table below.

AE Exceptional Resource Values

Category	*Exceptional Resource Value*
Biodiversity	▸ Threatened, rare and endemic species (e.g. Black Rhino, African Elephant, Hinde's Viper, Mountain Bongo, Giant Forest Hog, Bush Pig, Aberdare cisticola, Sharpe's Long claw, Wild Dog, Serval Cat, Leopard, Aberdare Shrew, Cedar forest)
	▸ Important Bird Area (IBA)
	▸ Montane Forest
	▸ Moorland
	▸ Bamboo forest
Scenic	▸ Scenic mountain peaks and hills (e.g. Oldoinyo Lesatima peak, Kinangop peak, Elephant hill, Twin hills, Table Mountain, Kamatongu hill)
	▸ Cascading waterfalls (e.g. Karuru, Chania, Gura)
	▸ Deep V-shaped ravines and high steep cliffs
	▸ Evergreen montane forest
	▸ Lake Ol Bollosat
Social	▸ Potential for Plantation Establishment and Livelihood Improvement Scheme (PELIS)
	▸ Potential for Participatory Forest Management
	▸ Tourist hotels and lodges (The Ark and Tree Tops)
	▸ Provision of timber products
	▸ Support to livelihoods through provision of Non-wood forest Products (NWFP)
	▸ Provision of water for domestic use, irrigation and hydropower generation
Cultural	▸ Historical sites (e.g. Mau Mau hideout caves, Kimathi Post Office, Queen's cave)
	▸ Religious Shrines in the forests
Environmental	▸ Water catchment for major rivers (e.g. Tana, Athi, Malewa and Ewaso Ng'iro)
	▸ Mitigation of climate change impacts (i.e. carbon sink)

Category	*Exceptional Resource Value*
	▸ Soil and water conservation function

Zonation Scheme

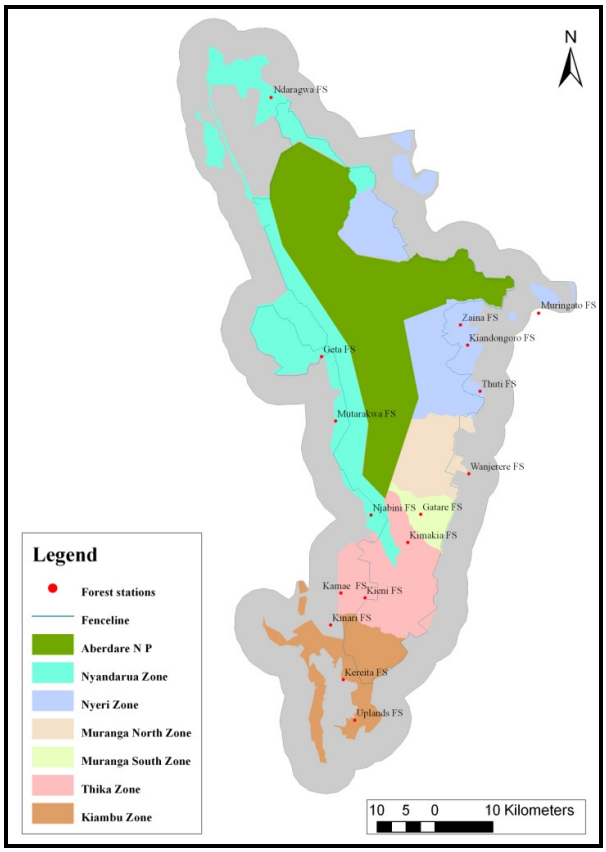
The primary objective of this management plan is to provide a framework to guide AE managers in their day-to-day management activities at the AE. A key element of the plan is the zoning scheme, which provides prescriptions on what should occur or not occur in different parts of the protected areas and devolves protected area administration and management to smaller management units to enhance service delivery. Zoning plays an important role in minimizing conflicts between different users of a protected area by separating potentially conflicting activities whilst ensuring that activities which do not conflict with the protected area's values and objectives can continue in appropriate areas.

The AE is zoned in accordance with management and administration needs of both KWS and KFS, and land use potential of the area. The ecosystem's *management* and *use* zoning are discussed in the following sections.

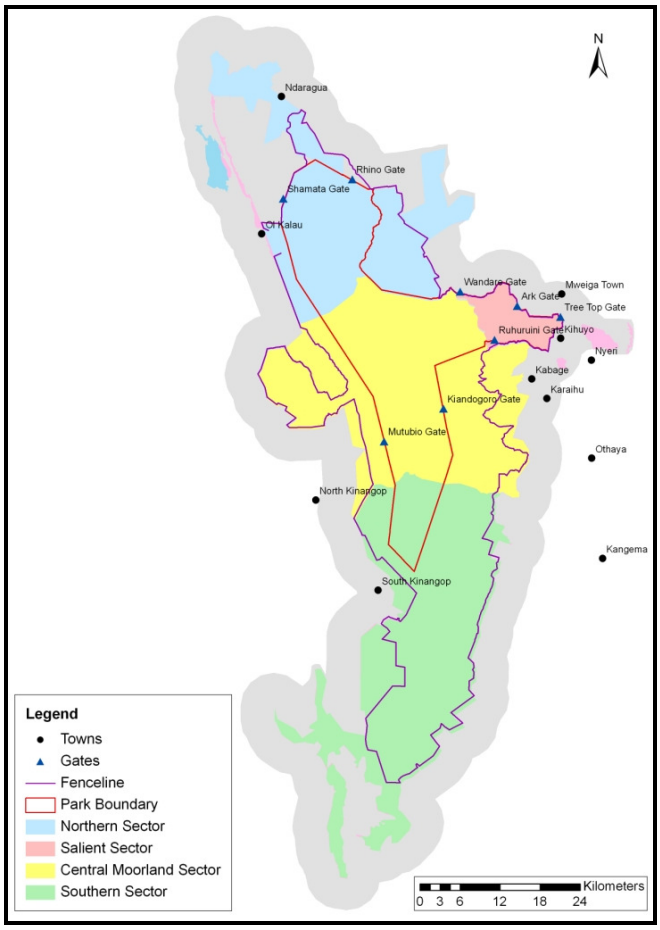
Management zoning

The KFS divides the ecosystem into six management zones which are aligned with administrative district boundaries. KWS on its part has divided the ecosystem into four management zones (or sectors) that are largely based on ecological as well as tourism development considerations (see maps below).

KFS Management Zones



KWS Management Sectors



AE Use Zoning

The AE use zoning is designed to apply different management prescriptions to different parts of the ecosystem in order to achieve the AE's purpose and management objectives. The primary purpose of zoning is to protect the water catchment value of the area while at the same time exploiting the ecosystem's resources sustainably. Zoning is primarily geared towards ensuring environmental sustainability and responsible tourism for the next 10 years, and include low impact and environmentally sensitive development, avoidance of development in critical water catchment areas, and conservation of wilderness.

The AE use zoning is an integrated approach dividing the ecosystem into five distinct zones (i.e. High Use Zone, Low Use Zone, Wilderness Activity Zone, Multiple Use Zone and Influence Zone) which support the desired and legally acceptable land uses in the ecosystem. These land uses include tourism, biodiversity protection, and forestry and its associated uses, such as livestock grazing and plantation establishment. Zonal prescriptions and the zoning map are given below.

Zonal accommodation facility prescriptions

High Use Zone	Low Use Zone	Wilderness Activity Zone	Multiple Use Zone	Influence Zone
Lodges	Ecolodge	Special Campsites	Lodges	Zonal accommodation prescriptions do not apply
Ecolodge	Permanent Tented Camps	Fly camping	Ecolodge	
Permanent Tented Camps	Public campsites		Permanent Tented Camps	
Public campsites	Special Campsites		Public campsites	
Special Campsites	Bandas		Special Campsites	
Bandas			Bandas	

Tourism zonal activity prescriptions

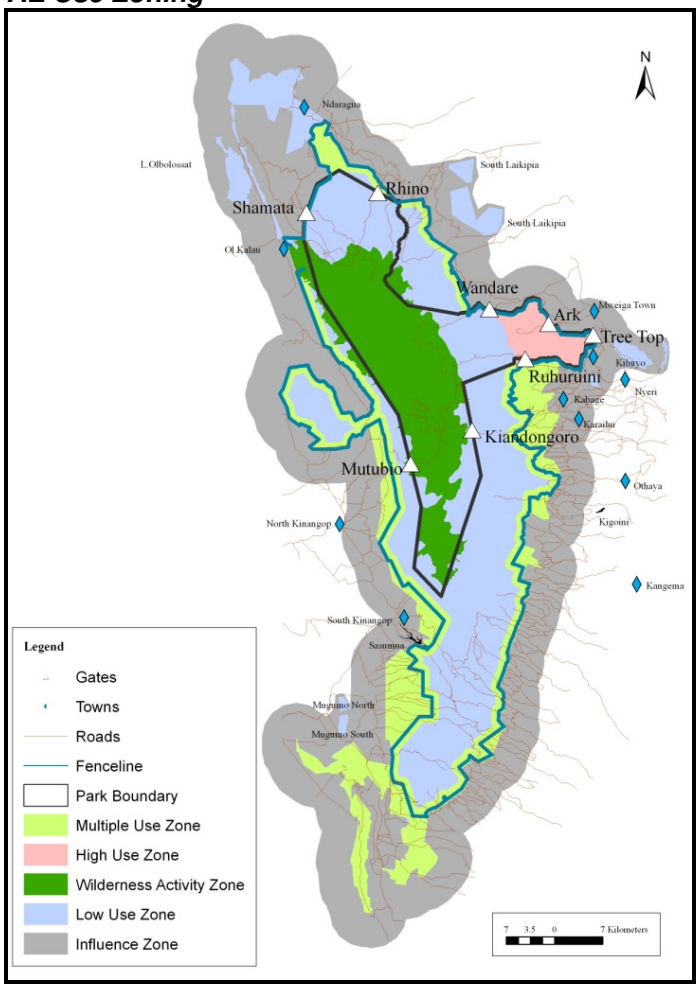
High Use Zone	Low Use Zone	Wilderness Activity Zone	Multiple Use Zone	Influence Zone
Game drive	Game drive	Camping	Game drive	No Limits of acceptable use as this is primarily agricultural land
Camping	Camping	Bird watching	Camping	
Picnicking	Picnicking	Filming & photography	Picnicking	
Bird watching	Bird watching	Hiking & Backpacking	Bird watching	
Sun downers	Sun downers	Caving		
Filming & photography	Filming & photography	Short walks/nature trails		
Caving	Nature walks	Sport fishing		
Paragliding	Hiking			
Biking	Sport fishing			
	Caving			
	Biking			
	Helitours			

Summary of maximum bed capacity permitted for visitor facility categories in the AE

Facility type	High Use Zone	Low Use Zone	Wilderness Activity Zone	Multiple Use Zone	Influence zone
▸ Lodges	80	NA	NA	80	No Limits of acceptable use as this primarily agricultural land
▸ Ecolodges	30	24	NA	40	
▸ Permanent tented camps	40	30	NA	40	

Facility type	High Use Zone	Low Use Zone	Wilderness Activity Zone	Multiple Use Zone	Influence zone
▶ Self help Bandas	20	12	NA	20	
▶ Public campsite	20	12	NA	20	
▶ Special campsites	16	12	8	16	

AE Use Zoning



Ecological Management Programme

The purpose of the Ecological Management Programme is to ensure that *AE threatened species and ecological processes are conserved, and ecosystem functioning restored and understood.* The Aberdare ecosystem (AE) faces many direct and indirect challenges and threats mostly associated with human activities. These include illegal logging, charcoal burning, illegal livestock grazing, poaching and wildfires. In addition, connectivity of the AE with adjacent savannah ecosystem to the north and east is critical as it increases wildlife range thereby enhancing survival of animals and general ecosystem resilience. However,

this connectivity is increasingly being lost through settlement and cultivation along traditional wildlife migratory routes.

The Ecological Management programme addresses itself to the above threats by focusing on biodiversity restoration and protection, relationship with adjacent ecosystems, and carrying out applied research to give a better understanding of the various ecosystem functions and dynamics. The key management actions that will be implemented to achieve the programme purpose and objectives focus on: carrying out a feasibility study for elephant corridors through easements; strengthening existing monitoring systems and conducting priority research to provide information for adaptive management and protection of elephants and critical habitats; investigating impacts of predators on Black rhino; monitoring and protecting the status of the Black rhino population in the AE; collaborating with other stakeholders to enhance Bongo surveillance; evaluating the impacts of bush meat poaching on ungulate species; establishing the population status of carnivores in the ecosystem; carrying out a study on hyena-prey relationships; collaborating with other stakeholders to minimize siltation of Lake Ol Bolossat and downstream dams; and nominating the AE as a UNESCO Man and Biosphere Reserve.

Natural Forest Management Programme

The purpose of the Natural Forest Management Programme is to ensure that *Natural forests are sustainably managed for provision of wood and non-wood forest products, and environmental, socio-economic services.* The Programme aims to address the threats that are impacting on the most important ecological features in the ecosystem, and to provide a long-term guiding framework for management of natural forests in the area. The management objectives that have been designed to realize the programme purpose focus on *managing and utilizing Natural forest resources sustainably* and *restoring degraded forest areas*. To achieve these objectives several management actions have been developed relating to development of management plans for forest stations; carrying out natural resource assessments; regulating utilisation of non wood forest products; establishing livestock carrying capacity; controlling charcoal burning and illegal logging; developing and implementing a forest restoration action plan; carrying out enrichment planting and lobbying for harmonisation of conflicting policies e,g. the forest act which allows grazing while water act advocates for protection of the watercatchment.

Plantation Forest Establishment and Management Programme

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 has been backlogs in planting, weeding, silvicultural operations, poor plantation establishment and losses from game damage. However, the NRC has since been reinstated through (Plantation Establishment Livelihood Improvement Scheme (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. This programme has therefore been designed to address issues relating to plantation establishment through PELIS. The key management actions that will be implemented to achieve this objective focus on: increasing output from KFS tree nurseries to meet the demand for plantation backlog; supporting establishment of tree nurseries in community adjacent areas; converting fenced-in exotic plantations to natural forest; supporting plantation establishment through PELIS;

protecting PELIS sites from game damage; developing detailed operational plans for forest plantations; establishing forest plantations based on market demands; carrying out scheduled silvicultural activities in the plantations; monitoring tree pests and diseases; and demarcating forest boundaries to prevent encroachment. By implementing these management actions it is expected that the programme purpose which is *"to maintain and enhance productivity of industrial forest plantations and increase efficiency in wood utilization for wealth and employment creation"* will be achieved.

Farm Forestry Management Programme

The purpose of the Farm Forestry management Programme is to *promote farm forestry to increase tree cover for sustained timber, wood fuel, non-wood forest products and environmental conservation.* To promote production of forest products from private and communal land, KFS has established a farm forestry programme to support and facilitate farmers to raise trees and forest products in their farms and by so doing ease pressure on gazetted forests. At the AE, the farm forestry programme focuses mainly on provision of farm forestry extension services in the influence zone located within a 5 km distance from the forest boundary. The activities undertaken include; providing technical assistance to communities on nursery establishment, and advising farmers on suitable species for farm forestry, tree planting techniques and tree husbandly. However, implementation of this programme is hampered by inadequate resources such as transport, funding and personnel. This management programme will seek to address these problems to realise the programme purpose.

Water Resource Management Programme

The primary purpose of the Water Resources Management Programme is to ensure that *water resources in the Aberdare ecosystem are protected, conserved and utilized judiciously, to meet domestic, agricultural, and industrial needs of the present and future generations.* This programme sets out a series of management objectives and actions that if implemented will result in sustainable exploitation of the area's water resources. The management objectives focus on enhancing protection and conservation of AE's water catchment areas; improving allocation of water resources; and monitoring water quantity and quality in collaboration with stakeholders. The Key management actions that will be implemented include development and implementation of sub-catchment management plans and Water Allocation Plans (WAPs) to regulate water abstraction.

Tourism Development and Management Programme

The purpose of the Tourism Development and Management Programme is to ensure that *AE is providing a wide range of unique, sustainable tourism experiences capitalizing on the ecosystem's special wilderness values, opportunities for solitude, and unique history.* Tourism development in this ecosystem faces several challenges which include poor infrastructure, uncontrolled entry into the ecosystem, visitor security and lack of equitable benefit sharing among the stakeholders in the tourism sector. This plan proposes management interventions that will address the problems facing the tourism sector at AE including low visitation, lack of adequate visitor facilities, poor coordination of visitor management, and poor benefit sharing mechanisms. The management objectives that the AE management will implement over the next 10 years to realize the programme purpose entail improvement of tourism facilities; developing and marketing visitor activities and attrac-

tions; and strengthening tourism administration and management. The key management actions that will be implemented to achieve these objectives focus on identifying and awarding tourist facility concession sites; rehabilitating Bandas; upgrading public campsites; upgrading and maintaining tourist roads; establishing and maintaining nature trails, hiking routes, *Via ferrata,* horse safaris, and a visitor centre. In addition, establishment of community based tourism enterprises will be supported; new entry gates will be established and some existing gates will be relocated to the forest reserve boundary. Also, a tourism investors' and operators' forum will be established.

Community Partnership and Education Programme

The future desired state at the AE is where *AE adjacent communities are supporting conservation efforts and community livelihoods are improving through sustainable use of natural resources.* To achieve this desired state four management objectives have been designed focusing on: reducing human-wildlife conflict incidences; improving community benefits from the AE; and improving AE Community conservation awareness and PA-community communication. Key management actions that will be implemented under this programme to achieve these objectives include: creating awareness on the importance of the electric fence; maintaining the electric fence; supporting establishment of viable tourism related community projects; supporting establishment of a Guides and Porters Association; providing employment opportunities to PA-adjacent communities; supporting community conservation and social projects to improve livelihoods; promoting the carbon credit programme; establishing wind farms to produce electric power; establishing a conservation education centre with hostels at Bondeni; and establishing and equipping a mobile outreach unit.

Security Management Programme

The Security management Programme aims to ensure that *the AE and surrounding community areas are sAE and secure for visitors; and natural resources are protected from illegal exploitation.* 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 major security challenges in the ecosystem. Since, majority of the illegal activities are carried out by members of the forest-adjacent community, this programme will apply strategies that integrate stakeholders in security issues.

In implementing the AE's Security Programme, AE Management will be guided by the following principles: security presence is extended across AE; operational effectiveness is improved; and collaboration with key stakeholders is strengthened. The management actions that have been designed to contribute to the achievement of the programme's aims focus on: carrying out Joint patrols; developing a security database; procuring modern security equipment; carrying out a strategic re-organization of stations and sectors to cover the AE effectively; training staff in emerging conservation concepts and technologies; creating awareness among members of the judiciary and police on the importance of the ecosystem; establishing a Joint fire station; establishing an Intensive Protection Zone (IPZ) for rhinos; improving fence security; and carrying out regular de-snaring operations. In addition modern security technology e.g. camera based surveillance system will be adopted and intelligence systems enhanced.

Protected Area Operations Management Programme

The purpose of this programme is to ensure that *operational systems are effectively and efficiently supporting the implementation of AE's management programmes.* The AE requires adequate infrastructures to support its operations. Staff houses, offices, transport and communication systems are required for effective delivery of this plan. Further to this, management systems designed to facilitate the decentralization of management to the sectoral and station level, harmonize KWS and KFS spatial administrative zones, harmonize the gate management between KWS and KFS and establish an effective communication system are required to achieve the prorgamme purpose.

In implementing the AE's Protected Area Operations Programme, AE Management will be guided by the following principles: strengthening stakeholder collaboration; enhancing staff welfare and motivation; and providing effective and efficient management infrastructure. The key management actions that will be implemented under this management programme include: establishing effective communication between KWS and KFS; reviewing existing KWS/ KFS MoU; sharing management resources to enhance AE management; developing and implementing MoUs with Rhino Ark and other NGOs; developing and reviewing existing concessions and agreements; establishing the Aberdare Trust; carrying out Joint training programmes; establishing a Resource Centre; constructing and rehabilitating AE buildings; constructing and maintaining the AE road network; rehabilitating and maintaining airstrips; improving the telecommunication network; rehabilitating fire towers; establishing a fire and rescue centre at Mweiga to serve other areas; and procuring and maintaining plants, vehicles and equipment.

Plan Monitoring

The plan monitoring framework 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.

Contents

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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
AE	Aberdare Ecosystem
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	Regular Gauging Station
RAOB	Rhino Ark Operations Base
RA	Rhino ark
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 Aberdare ecosystem (AE) has been developed through an elaborate and highly participatory planning process that benefited from a wealth of information and ideas provided by key AE stakeholders. The purpose of the plan is to ensure that the AE has a clearly defined direction for resource protection and visitor use. It is developed based on current scientific knowledge of various components of the ecosystem and ensures that management intervention measures are in line with the AE purpose (i.e. the reasons for the establishment of the AE protected areas).

The plan is one in a series of protected area plans[1] that have been developed in line with the Protected Area Planning Framework (PAPF). These plans adopt an ecosystem approach to plan development and implementation with a view to addressing conservation issues holistically through active involvement of local communities and other stakeholders in ecosystem 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 and thereby increasing prospects of plan 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[2]:

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 actions in the PA will be focused
- **What**: Establish clear management objectives that are accepted 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

[1] Other PAPF based plans include: Tsavo Conservation Area, Meru Conservation Area, Amboseli Ecosystem, Mt. Kenya Ecosystem, Samburu-Isiolo Conservation Area, and Kakamega Forest Ecosystem Management Plans
[2] KWS 2007. KWS Protected Areas Planning Framework

- Set out a detailed inventory of issues or problems impacting the PA, 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 ten main chapters. These include the Plan foundations; the AE zonation scheme; the nine management programmes; and plan monitoring framework.

- **Plan Foundations**. This chapter introduces the PAPF planning process used to develop the plan, and generally describes 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 AE and its exceptional resource values. It sets out the AE Purpose Statement and supplementary purposes, which are the basis for which the AE was established as a protected area.

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

- **The nine management programmes.** The main bulk of the plan is divided into nine management programmes as follows:

    1. **Ecological Management Programme**
    2. **Natural Forest Management Programme**
    3. **Plantation Forest Establishment and Management Programme**
    4. **Farm Forestry Management Programme**
    5. **Water Resource Management Programme**
    6. **Tourism Development and Management Programme**
    7. **Community Partnership and Education Management Programme**
    8. **Security Management Programme**
    9. **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 AE management aims to achieve, and a set of specific management actions to achieve them.

    Each of the management programmes are completed by a ***3-year Activity Plan (Annex 5[3])***, 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 activities, and sets out the timeframe for their implementation, allocates responsibility for their completion, and the milestones that management aims to achieve.

[3] Activity plans for programmes that will be implemented by KWS are provided in Annex 5. These are the Ecological, Tourism Development and Management , Community Partnership and Education, Security, and Protected Area Operations Management Programmes.

- The **plan monitoring** framework provides guidance to enable the assessment of the potential positive and (where appropriate) negative impacts 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 measurable and quantifiable indicators for assessing these impacts, and potential sources of the information required.

Participation in planning

The planning process involved a multi-layered participation of stakeholders in plan development. Stakeholders participated in the planning process through the core planning team, plan scoping meetings, stakeholder workshops, expert working groups, and community consultative meetings (see annex 1). Description of each of these stakeholder participation mechanisms is given below.

- The ***AE Core Planning Team*** (CPT) provided overall guidance and oversight to the entire planning process. The AE CPT consisted of: AE managers (KWS and KFS); KWS and KFS HQ planners; and representatives from 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.

- ***Plan Scoping meetings***. Plan scoping meetings were held to define the plan scope of work and establish a clear road map to be followed during the preparation of the management plan. At these meetings, management issues to be addressed by the plan were identified, stakeholder analysis was carried out, and a stakeholder communication and participation strategy was developed.

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

- ***Expert Working Groups*** were formed during the plan development to develop and refine the management programmes identified at the plan scoping meeting. 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 the third working group developed the Community Partnership and Education, Security, and Protected Areas Operations management Programmes. Each working group refined the relevant management programme's purpose statement, guiding principles, and objectives, and developed the management actions necessary for achieving each objective. In addition, all working groups were involved in the development and review of the AE Zoning Scheme.

- ***Community Consultative meetings:*** To ensure that as many stakeholders were consulted and informed of the planning process, village level consultative meetings were organised for forest-adjacent communities. At these meetings participants were identified issues that were hindering effective management of the AE and opportunities that could be exploited to address these issues. In addition, participants developed actions plans for natural resource management at the AE.

A chronology of key planning events is given in table 1.

Table 1. Chronology of key planning activities and events

Date	Activity/event	Comments
Plan Scoping meetings		
14 -16 April, 2004	First Plan Scoping Meeting held at Out Span Hotel, Nyeri	Participants were drawn from KWS departments at Aberdare National Park. Management issues were identified and action plans developed for each department. Information generated at this workshop was expected to support the development the Aberdare ecosystem Management Plan.
21 -24 July, 2004	2nd Plan Scoping Meeting held at Outspan Hotel, Nyeri	Participants in this meeting were drawn from KWS, KEFRI, Rhino Ark and Ministry of Water. The planning terms of reference were developed and a stakeholder analysis carried out.
Stakeholders' Workshops		
10 March 2005	First Stakeholders' Workshop held at Green Hills Hotel, Nyeri.	This workshop identified 13 thematic areas to guide the core planning team in data collection. Workshop participants were drawn from all categories of stakeholders of the Aberdare ecosystem
Community Consultative Meetings		
Ten community Consultative meetings held on various dates From November 2005-July 2006	Community Consultative Workshops	In order to enhance community participation, nine consultative workshops were held at Kangema, Othaya, Kimende, Mweiga, Ndaragwa, Engineer, Njabini, Kipipiri and Thika to discuss issues regarding community-PA interactions and draw action plans to address identified issues for subsequent synthesis and incorporation into the strategic ecosystem-wide management plan. Participants were drawn from AE-adjacent communities from Murang'a, Kiambu, Nyandarua and Nyeri Counties
Core Planning Team Meetings		
25-28 February 2008	Core Planning Team Meeting at SACDEP, Thika	The plan scope of work was reviewed, management issues discussed and management objectives developed.
Expert Working Group meetings		
16th-17th February 2010	Development of the Tourism Development and Management	Tourism management issues were identified and corresponding actions to address these issues developed. A provisional zoning scheme was also developed.
10th -12th March 2010	Development of the Ecological, Forest and Water Management Programmes	Management issues were identified and corresponding actions to address these issues developed using the Nature Conservancy Conservation Action Planning methodology. The zoning scheme was reviewed and a final zoning scheme developed and adopted
25-27 May 2010	Development of Community, Security and PA Operations	Management issues were identified and corresponding actions to

Date	Activity/event	Comments
	Management Programmes	address these issues developed

The AE

Area description

The name Aberdare is attributed to a British explorer, Joseph Thompson, who in 1884, named the mountain range in honour of Lord Aberdare, then President of the Royal Geographic Society. Traditionally it is known as 'Nyandarua' by the local Kikuyu community who inhabit this region. However, all the mountain peaks have local Maasai names namely Ole satima peak (4001m) and il Kinangop peak which is 3906m a.s.l. It is the third highest mountain in Kenya, after Mt. Kenya and Mt. Elgon, reaching a summit of just over 4000 meters. This massive range is located in central Kenya (see Figure 1) and cover a protected area of over 2,162 Km^2 consisting of Aberdare, Kikuyu Escarpment, and Kipipiri Forest Reserves, Aberdare National Park (see table 1) and lake ol bollosat and river systems . Administratively, the AE is shared among Nyeri, Murang'a, Kiambu and Nyandarua Counties.

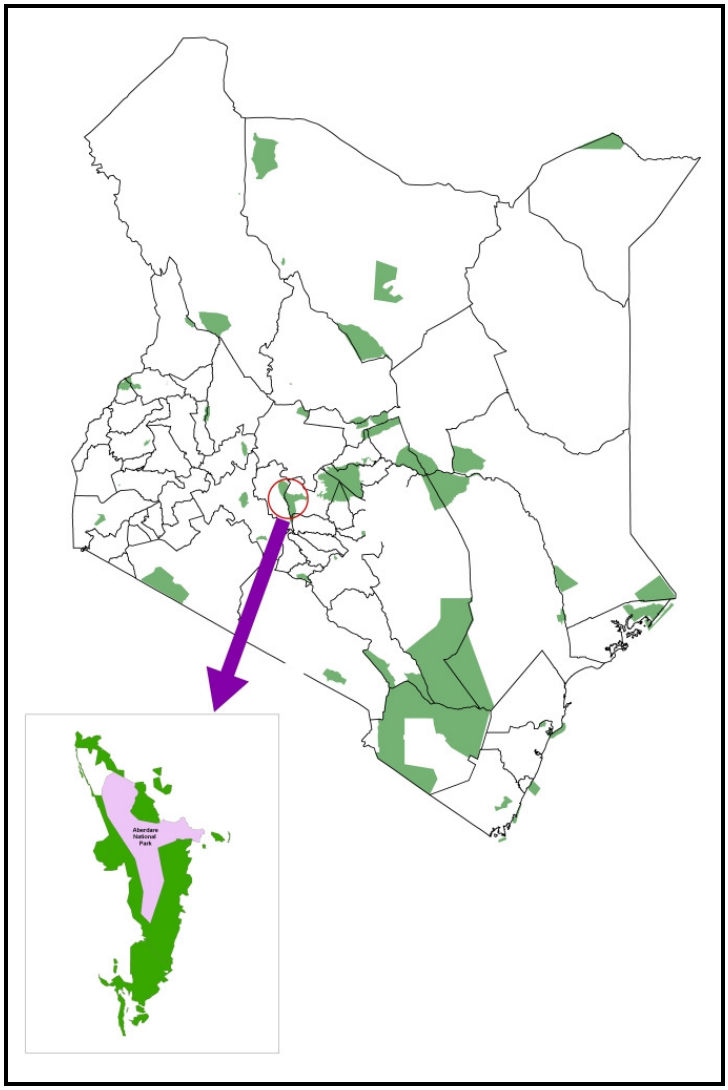
The ecosystem is one of Kenya's five[4] main "water towers". It is the main water catchment area for Sasumua and Ndakaini dams, which provides all the water (both surface and subterranean water)for Nairobi city and adjacent towns of Thika, Nyeri, Naivasha, Nyahururu among others. The northern slopes provide catchments for the Ewaso Nyiro River, the main river crossing the semi-arid Laikipia plateau and the Samburu plains and deserts beyond. The Malewa River, the major surface source of water for Lake Naivasha, originates from the north-western slopes. It's also the catchment of the Tana River, Kenya's largest river that supplies water to the Seven Forks hydropower plants where over 55 percent of Kenya's total electricity output is generated.

Table 2. Aberdare ecosystem's Protected Areas

Protected Area	Initial Gazetted area (Ha)	Formal excisions	Non formal excisions	Additions	Total Area in Ha (current)
Aberdare forest reserve	122033.20	19709.08	3344.60	285.50	**99,265.02**
Kikuyu Escarpment	42,372.44	4933.44	1104.00	-	**36335.00**
Kipipiri Forest Reserve	5,019.00	1119.00	-	-	**3900.00**
Aberdare National Park	57220.0	-	-	19480.	**76700.68**
Total					**216,200**

[4] Kenya's five main water towers comprise the following forests: Mt. Kenya, Aberdare, Mt. Elgon, Mau, and Cherag'ani Hills.

Figure 1. AE Regional Setting



The AE's Key Components

The following sections provide a brief overview of the AE's key constituent conservation areas.

Aberdare National Park

The Aberdare National Park was the fourth national park to be created in Kenya. It was demarcated within the Forest Reserve and gazetted in 1950 covering an area of 57,220 ha. An additional area of 19,364 ha was degazetted from the forest reserve vide legal notice No. 171 of 1968 and gazetted and added to the national park vide legal notice No. 172 of 1968.

Thus the Park currently covers 76,700 ha. The boundaries of the Park follow approximately the 3048m contour line, except the Salient section to the east of the Park which stretches out to 1920m.

The Park contains two high peaks; Oldonyo Lesatima and Kinangop and, due to its altitude, the Park's climate resembles temperate climate.

Aberdare forest reserve

Aberdare Forest was first gazetted as a forest reserve under legal notice No. 7 of 1943 and covered 181,594.3 ha. The gazettement was aimed at forest conservation and development, which included establishing plantations in place of harvested indigenous stands, regulating access to resources, and sustaining a forest industry.

Kikuyu Escarpment

The Kikuyu Escarpment Forest reserve covers 37,600 ha and lies 30 Km north-north-west of Nairobi. It covers the eastern slopes of the escarpment from about 2,700 m in the north-west (bordering grassland at the edge of the Kinangop Plateau) to around 2,050 m in the east, where it borders agricultural land. The main block of forest (sometimes called Kieni) lies either side of the Kamae-Kieni-Thika road, and is bounded to the north by the Chania River; northwards it is continuous with the forest of the southern Aberdare. On the south-west, a narrow strip extends along the wall of the Rift Valley, beyond Kijabe, down to 1800m contour. To the south, the forest has been much fragmented, and there are only scattered forest relics towards its limits (e.g. Gatamaiyu forest, near Uplands). The topography is rugged, with many steep-sided valleys containing fast-flowing permanent streams.

Kipipiri Forest Reserve

Kipipiri Forest Reserve is an isolated cone-shaped hill outside the Aberdare Forest Reserve. It covers 3,900ha and stands at 3349m above sea level within the Wanjohi Valley. Since its gazettement, Kipipiri escarpment has experienced the most excisions. From 1963 to 1994, eleven (11) excisions totalling to 4,806.96 ha were made from the forest reserve. However, an addition of 45.33 ha. was made through legal notices 105 and 1228 of 1973.

Lake Ol Bolossat

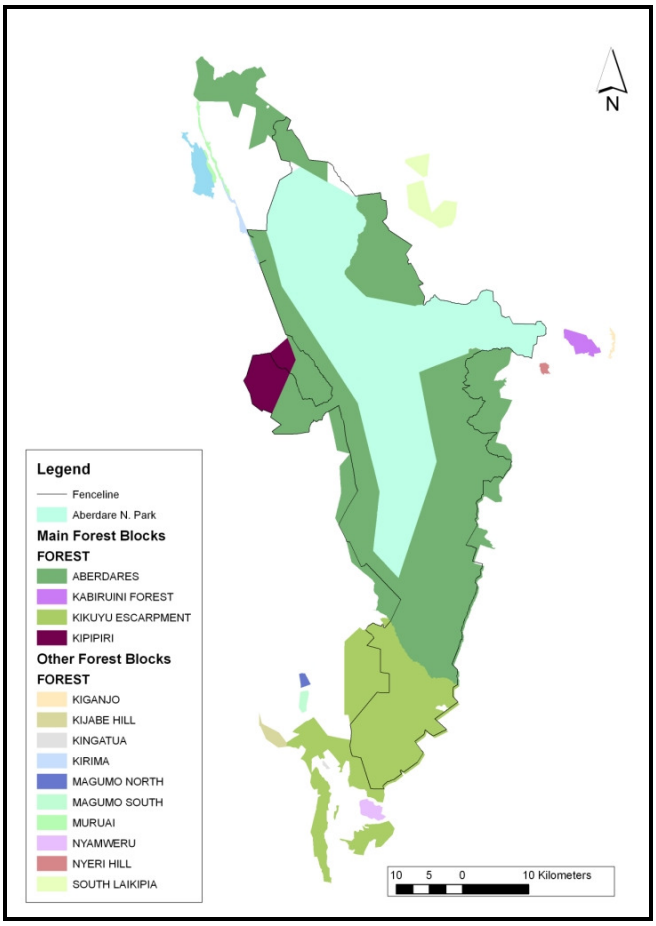
Lake Ol Bolossat is located in Nyandarua County, Central Province. The lake lies at an average altitude of 2,340 m above sea level. It has an area of 90 km^2 (fluctuates seasonally) and it is situated in a wedge shaped rift valley whose floor slopes eastwards and northwards. Water flows northwards out of the lake into the River Ewaso Narok via Thomson's Falls. The lake is the source of River Ewaso Narok, a tributary of Ewaso Nyiro, which serves an important function in supporting the economy and lifestyles of communities living in the arid and semi arid parts of North Eastern, Eastern and Rift Valley provinces. Lake Ol Bolossat Conservation Area comprises of 4, 330 Hectares of land that is not yet allocated for settlement. The area includes the open water, marshes and riparian reserve. The lake and the surrounding riparian land fall under the jurisdiction of the Settlement Fund Trustees.

The lake is the only natural lake in Central Province and is unique due to its proximity to the equator. The open water part of the lake is saline while the water that flows out of the lake as Ewaso Narok River is fresh.

The ecology of the lake is largely influenced by fluctuations in water levels, a phenomenon currently aggravated by human activities. The lake periodically dries up with documentation of it drying in 1960, 1984, 1987, 1994, 2000 and 2001.

Figure 2 below shows AE's constituent components.

Figure 2. The AE's Key Components



AE Purpose Statement

The AE Purpose Statement summarizes the significance of the AE in the national network of protected areas. The Purpose Statement is divided into a primary AE Purpose followed by a set of supplementary purposes that expand on and complement the primary purpose.

The purpose statement and its supplementary statements are founded on the outstanding exceptional resource values (ERVs) identified and prioritized by stakeholders during a series of planning meetings. Conservation of the ERVs ensures that the unique qualities of the AE are preserved in perpetuity.

The Purpose of the Aberdare ecosystem is:

To protect and conserve the principal water catchment for Kenya's major rivers, the wilderness character, cultural resources and threatened and endemic species associated with the Aberdare ecosystem, for the present and future generations

Supplementary purposes of the AE are:

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

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AE Exceptional Resource Values

The exceptional resource values of AE 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 five categories: Biodiversity, Scenic, Social, Cultural and Environmental (see table 3). The highest priority values of the AE for the purpose of conservation are however, its biodiversity and water catchment values for which the AE has been designated a protected area. A description of AE's ERVs is given in the following sections.

Table 3. AE Exceptional Resource Values

Category	*Exceptional Resource Value*
Biodiversity	▸ Threatened, rare and endemic species (e.g. Black Rhino, African Elephant, Hinde's Viper, Mountain Bongo, Giant Forest Hog, Bush Pigs, Aberdare cisticola, Sharpe's Long claw, Wild Dogs, Serval Cats, Leopards, Aberdare Shrew, Cedar forest)
	▸ Important Bird Area (IBA)
	▸ Montane Forest
	▸ Moorland
	▸ Bamboo forest
Scenic	▸ Scenic mountain peaks and hills (e.g. Oldoinyo Lesatima peak, Kinangop peak, Elephant hill, Twin hills, Table Mountain, Kamatongu hill)
	▸ Cascading waterfalls (e.g. Karuru, Chania, Gura)
	▸ Deep V-shaped ravines and high steep cliffs
	▸ Evergreen montane forest
	▸ Lake Ol Bollosat

Category	*Exceptional Resource Value*
Social	▶ Potential for Plantation Establishment and Livelihood Improvement Scheme (PELIS)
	▶ Potential for Participatory Forest Management
	▶ Tourist hotels and lodges (The Ark and Tree Tops)
	▶ Provision of timber products
	▶ Support to livelihoods through provision of Non-wood forest Products (NWFP)
	▶ Provision of water for domestic use, irrigation and hydropower generation
Cultural	▶ Historical sites (e.g. Mau Mau hideout caves, Kimathi Post Office, Queen's cave)
	▶ Religious Shrines in the forests
Environmental	▶ Water catchment for major rivers (e.g. Tana, Athi, Malewa and Ewaso Ng'iro)
	▶ Mitigation of climate change impacts (i.e. carbon sink)
	▶ Soil and water conservation function

Biodiversity values

Species of special concern

The AE harbours a wide range of fauna and flora species that are threatened, rare or endemic to this region. These species of special concern include:

Black rhinoceros (*Diceros bicornis)*

The Black rhino is classified as critically endangered by IUCN. In the Aberdare Ecosystem, black rhinos occurred in very high densities in the 1940s and 1950s. However, during the late 1970s and early 1980s the Aberdare forests suffered extensive illegal hunting of rhinos. A rhino survey carried out in 2006 found very few indirect rhino signs. It is estimated that the current number may be as low as 10 individuals.

African elephant (***Loxodonta africana)***

The African Elephant is classified as vulnerable by IUCN. An elephant survey carried out in the Aberdare ecosystem in 2005 estimated that there were 3,540 elephants. This makes the Aberdare home to one of the largest populations of confined elephants in Kenya. Within the ecosystem, elephants occur over nearly all of the Aberdare range but the densities vary considerably from place to place. The only exception is the western side where some sections are impassable due to the high cliffs and steep, rugged terrain. Traditionally, elephants were known to avoid the wet, cold and slippery conditions of the mountain by migrating to the lower altitude areas at the Salient and the Laikipia plateau. This has changed with the construction of the fence confining the elephants within the ecosystem.

Bongo (*Boocercus eurycerus issaci)*

The Aberdare is a strong-hold of the wild Bongo population in the world hosting an endemic subspecies of the mountain Bongo (*Boocercus eurycerus isaaci*). In the Aberdare, Bongos are found in the northern part of the Salient, particularly in the bamboo zone, east of Kiandongoro Gate, and at Kanjwiri in the northern Aberdare. They are also reported to occur in a few areas, such as south of Elephant Peak in the southern extreme of the Park. A recent study of Bongos concluded that there are about 50 individuals mainly in the northern sector (around Kanjwiri hill) and the Salient sector around the Park sub-headquarters.

Wild dogs (*Lycaon pictus)*

Wild dogs are classified as critically endangered by IUCN. They have disappeared from much of their former range. Population densities in well-studied areas suggest that between 3,000–5,500 free-ranging wild dogs remain in Africa. Population size is continuing to decline as a result of ongoing conflict with human activities, infectious disease, and habitat fragmentation.

Within the Aberdare, occasional opportunistic sightings are made within the Salient region of the National Park and the northern parts of the ecosystem. However, there is paucity of information on the status and distribution of the species.

Hippopotamus (*Hippopotamus amphibious)*

Within the Aberdare ecosystem, hippos occur in Lake Ol Bollosat and adjacent swamps of Manguo. Hippos at the lake are of great concern to the local farming community because they are responsible for majority of the human-wildlife conflicts. In spite of this, they are a major tourist attraction at Lake Ol Bolosat.

African Golden Cat (*Profelis aurata)*

The total effective population size of the African golden cat in the world is estimated at below 10,000 mature breeding individuals. Hence it is classified as vulnerable by IUCN. In Aberdare, rare sightings of the Golden Cats are made higher up in the moorlands. However, very little is known of the abundance and distribution of the species.

Aberdare Shrew (*Surdisorex norae)*

The Aberdare Mole Shrew (*Surdisorex norae*) is a species of mammal in the Soricidae family. It is endemic to Kenya. Its natural habitat is subtropical or tropical high-altitude grassland. This species is known only from the eastern side of the Aberdare.

Montane Dancing Jewel (*Platycypha amboniensis)*

The montane dancing jewel is an insect assessed as Critically Endangered by IUCN in view of its limited extent of occurrence and area of occupancy along montane forest streams of the Aberdare and Mt Kenya between 1,600 and 2,000 m altitude.

Aberdare Cisticola (*Cisticola aberdare)*

The Aberdare Cisticola is a species of bird which is endemic to Kenya and is classified as endangered by IUCN. Its natural habitat is subtropical or tropical high-altitude grasslands which are currently threatened by habitat loss. Within the AE and adjacent areas it occurs on the moorland above 3,000 M and in the agriculture dominated Kinangop grasslands between 2,400 M and 2,700 M above sea level.

Montane Viper (*Montatheris hindii)*

This is a small terrestrial venomous viper species endemic to the high altitude moorlands of Mount Kenya and the Aberdare mountain range in Kenya. Currently this species is threatened by frequent fire incidents in the moorlands.

Giant Forest Hog (*Hylochoerus meinertzhageni meinertzhageni)*

The giant forest hog is a species that is in decline throughout its range. In Kenya this pig is present in several scattered populations. As the largest of the world's species of pig, the giant forest hog is an attraction to tourists.

Primates

Several primates are found in the AE, 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 also 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 (IBA)

Four of Kenya's 61 IBAs are found in the Aberdare ecosystem. These are Aberdare mountain, Kikuyu Escarpment, Kinangop Grasslands, and Lake Ol Bolossat IBAs. Lake Ol bolossat is the only significant lake in Central Province of Kenya and the most recent IBA in Kenya at position 61.

The Aberdare mountain IBA hosts globally threatened species such as Sharpe's Long claw, Aberdare Cisticola, Abbott's Starling, and Jackson's Widowbird, while the Kikuyu escarpment is recognised because of the Abbott's starling.

The Aberdare mountain range holds 52 of Kenya's 67 Afrotropical Highlands species of birds and 6 of 8 restricted range species in the Kenyan Mountains. Birds with a restricted range and found in the Aberdare range are Jackson's Francolin and Hunters Cisticola. Regionally threatened bird species are African green Ibis, Ayre's Hawk Eagle, African Crowned Eagle, Stripped, Flufftail, Bailon's Crake, African Grass owl, Cape Eagle Owl and Long-tailed Widowbird.

Endemic plant species

Plants endemic to Aberdare include *Lobelia deckenii sattimae*, *Helichrysum gloria-dei* and *Alchemilla hageniae*. Endemics shared with Mount Kenya are *Lobelia bambuseti*, *Senecio keniensis*, *Senecio johnstonii battiscombei* and *Senecio keniodendron*.

Moorland

The high altitudes of the AE above 3000 meters are dominated by moorland vegetation that is characterised by distinct habitat types harbouring endemic wildlife and vegetation forms that are adapted to harsh soil and climate conditions of this ecological zone. For example, the Hinde's Viper is endemic to the moorland zones of Aberdare and Mt. Kenya. Also, the moorland zone is a critical water catchment for most rivers originating in the Aberdare. The bogs and springs in this zone are the sources of most Aberdare rivers.

Scenic

Peaks

There are several mountain peaks in the Aberdare. Among the most popular ones are Ol Donyo Lesatima peak (4001m), Kinangop peak (3906m), Elephant Hill (3906m), Chebuswa Hill (3364m) and the Twin Hills (3300m). These hills and peaks are very popular with hiking and mountain climbing visitors.

Water falls

There are numerous magnificent and breathtaking waterfalls in the central moorlands which attract a good number of visitors in the Aberdare. Among the most prominent and famous ones are Karuru, Chania and Magura. Karuru falls is the longest and indeed it is the highest waterfall in Kenya, a breathtaking sight that stretches 273 metres below the viewing point.

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 opportunity for solitude and for personal development associated with exploratory mountain activities.

Socio-economic

Water catchment

AE 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 millions of people around the mountain, including Nairobi City whose main water supply source are the Sasumua and Ndakaini dams that receive their water from the Aberdare forest. The southern region of the ecosystem is the Tana and Athi catchment, western region is the Rift valley catchment while the northern area is the Ewaso Ngiro River catchment serving the northern region of the country. The Tana River supplies water to the Seven Forks hydropower plants where over 55 percent of Kenya's total electricity output is generated.

Agriculture

Agriculture is the main economic activity in the greater AE. The type of agriculture practiced and productivity potential depend mainly on altitude. On the western side of the mountain, where rainfall is high, intensive arable farming is practiced. On the eastern leeward side, crop farming is being tried through irrigation.

Source of wood and non-wood forest products

Local communities rely on the Aberdare ecosystem for forest products including firewood, grass for animal fodder, livestock grazing, harvesting of medicinal plants, and beekeeping.

Tourism

The ecosystem constitutes a recreational area used by domestic and international tourists. The core area of the ecosystem (the National Park) receives approximately 50,000 visitors and generating over Ksh. 100 Million annually from park entry fees.

Cultural

Historical importance

The Aberdare forest served as the base for Mau Mau war of liberation from the British colonial government in the 1950s. Both Kimathi's hideout and Kimathi Post Office are so named because they were used by the legendary Mau Mau General, Dedan Kimathi, during the state of emergency in the early 1950s. The forest also provided a camping site for the runaway Italian prisoners of war during the Second World War. In addition, the Aberdare National Park is profoundly associated with the Royal family of the United Kingdom as the present Queen Elizabeth II ascended to the throne in 1952 while spending a night at the Treetops Lodge within the park.

Religious importance

Since time immemorial, AE has been of spiritual and religious importance to local communities living adjacent to the ecosystem. The local communities traditionally conducted ceremonies or rituals in the wilderness forests or even visited the pristine parts of the ecosystem for prayers. Prayers and rituals are carried out in several sacred sites within the ecosystem in times of need e.g. during droughts. 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.

Environmental

The main environmental benefits of the ecosystem comprise the regulation of water flow, quality, seasonality and volume, as well as sequestration of carbon and other greenhouse gases. Besides, a range of plant and animal species depend on the Aberdare ecosystem for habitat.

Threats to Ecological Integrity

The ecological integrity of the AE is threatened by many activities which could seriously impair ecological processes if intervention measures are not put in place to reduce or eliminate the threats. The major threats impacting on the ecosystem include: Illegal logging; over grazing; poaching of wildlife and trees; over abstraction of water; degradation of riparian systems; habitat loss; alien and invasive species; forest excisions and encroachment; wild

fires; illegal charcoal production; pests and diseases; human-wildlife conflict; and visitor impact. These threats are elaborated in the following sections.

Illegal Logging

Since the early 1970s, the indigenous forests were over-exploited through selective logging of important timber trees, which greatly reduced plant populations, and regenerative capacity of such 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* ssp., and *Vitex keniensis*.

Although logging was 'banned' in 1999, illegal harvesting of these tree species has persisted in the forests, particularly in southern Aberdare parts of Njabini, Engineer, etc. This practice has also negatively impacted on watershed stability.

Over-Grazing

Livestock grazing is largely uncontrolled and hence, not linked to the carrying capacity of the forage resource. Many local farmers have formed large herds of livestock which depend on the forest for forage. Such high numbers of livestock have been detrimental to forest regeneration as well as increasing pressure on wildlife range.

Poaching of Wildlife

Wildlife poaching remains a threat to the unique animal species of Aberdare ecosystem, the rare and commercially valuable species being most vulnerable. Most affected species are the black rhino, bongos and African elephant. Buffalo, eland and zebra are commonly hunted for their meat, which is sold locally below price of beef, mutton, or goat meat.

Snaring is prevalent around the Aberdare National Park salient area and it targets the black rhinos and elephants. Other target species include antelopes (duiker, bushbuck and waterbuck) and ground birds (francolin and guinea fowl) in other areas outside the salient. Hundreds of the snares are recovered and destroyed annually through 'de-snaring' operations.

Over abstraction of water

Unregulated and excessive water use for irrigation has reduced reliability of downstream water supply and impacted on riparian environments. Small-scale irrigation projects in the ecosystem are many and most of them have abstracted water from the rivers without having the requisite water permits. There are also cases of inefficient water use where some projects use open furrows or sprinklers which lead to water loss due to evaporation.

Degradation of riparian systems

Cultivation and destruction of vegetation on riparian areas has resulted in soil erosion, siltation and pollution of rivers. This also contributes to increased flush floods and landslides.

Forest excisions and encroachment

Aberdare ecosystem has been subject to excisions totaling to 3278.91 since 1950 and another 1251.43 ha which has been exercised and not degazetted. Another 874.74 ha is not excised but is under other users like Nyayo tea zones.

Wild fires

Fire plays a significant role in the ecology of the Aberdare ecosystem. Records of fire incidence in the park date as far back as 1912 and have been consistent to date. An analysis of the fire outbreaks indicate that 96% of the fires occur in January, February and March while 4% occur in September. The frequency and spatial extent of these fires pose serious threats to the structure and composition of the forest. Fire is also a major threat to the survival of endemic species found nowhere else other than the moorland e.g. the montane viper and Aberdare cisticola. The causes of the fires are diverse but the more common ones are honey gathering and clearing of neighbouring farms in preparation for cultivation. While the negative impacts of fire in the Aberdare ecosystem are yet to be quantified, there is evidence that fire could be necessary for the natural regeneration of Cedar trees whose saplings require high light intensities to get established.

Illegal charcoal production

Charcoal production has been observed in various parts of the ecosystem. The highest concentrations occur in the northern side. Nevertheless, charcoal production has decreased over the years due to increased patrols by both KFS and KWS.

Pests and diseases

Incidences of disease outbreaks have been reported in the Aberdare. Insect pests (pine wool aphid and the cypress aphid (*Cinera cupressi*) are a major problem in exotic tree plantations, particularly *Cypress lusitanica* and *Pinus patula*. Other pests (e.g. rats) are a menace to tree seedlings as they feed on the roots and cause ring barking.

Alien and invasive species

AE is increasingly being affected by invasive and alien plant species. Invasive plants are perceived to inhibit recovery of degraded or backlog forest sites. Among the invasive plants are: Mauritius thorn (*Caesalpinia decapelata),* Jimsonweed *(Datura dothistroma),* Sodom's apple (*Solanum incanum)*, Senna *(Senna didymobotrya), Passiflora edulis,* and *Acacia mearnsii.*

Human-wildlife conflict

Although most of the ecosystem is ring fenced, human-wildlife conflicts are still registered albeit in a small magnitude. The fence can contain the major problem animals like the elephants, but small and agile species e.g. primates can go through the fence. Sometimes large herbivores break the fence and invade surrounding farmlands damaging crops and infrastructure and causing injuries or even death to people and their livestock. Elephants and buffaloes also destroy tree plantations (*Pinus spp, Eucalyptus spp*. and *Prunus Africana*) through debarking, uprooting, and trampling.

Visitor impact

Tourism has had negative impacts to the ecosystem. These impacts include animal disturbance, and feeding of animals (i.e. provision of salt) which has exacerbated habitat degradation. In addition, visitors are concentrated within the Salient causing road deterioration during the rainy season. Other impacts include off-road driving and inappropriate litter disposal.

Major management Issues of concern

Management of the AE as an integrated unit: It is important that the AE is managed as a single ecological unit to ensure that the key values for which the area is legally protected are sAEguarded. It is therefore critical that all resource use activities, be they extractive or non extractive, are coordinated and managed in a manner that is not injurious to the AE's ecological integrity. The future desired state at the AE is therefore where consumptive utilization of forest products in the fenced-in forest land is carefully coordinated and managed to ensure that activities in this area do not degrade the high quality tourism product that both KWS and KFS are jointly developing in the AE. To realize this, both institutions will have to collaborate in the implementation of the zoning scheme provided in this plan to ensure that incompatible land uses, such as tourism and livestock grazing, are spatially separated. In addition, one of the key threats to ecological integrity at the AE is poaching of both trees and animals. None of the two institutions can successfully deal with this threat singly as the AE is vast and would require enormous security resources to cover the entire area effectively. Therefore, to ensure that human-caused threats are minimized significantly, an integrated security unit is needed. The KWS and KFS security teams at the AE should be able to communicate through an integrated telecommunication network; carry out joint patrols to deter poaching; and share intelligence information. In addition, deployment of security staff should be carried out in a manner that ensures there is no duplication of efforts.

Tourism Development: Tourism development should be carried out at the ecosystem's spatial scale and not at the composite management units (National Park and Forest Reserves). As such, the number, type and size of permitted facilities and tourist activities should be determined at the ecosystem functioning level in light of the conservation area's primary purpose which is to conserve a critical water catchment area in the country. Also, development of tourism support infrastructure will have to be integrated so that a standardized and distinct tourism product and experience can be developed for the ecosystem. In view this, an integrated road network that links the National Park and Forest Reserve tourism circuits should be considered. In addition, facility planning should be based on the entire ecological unit to prevent haphazard development, pre-empt facility congestion and ensure that adverse tourism impacts are minimized. On the other hand, some forest areas (such as the Gatare area) have a high potential for tourism development and can be developed along the lines of the Salient. In such areas tourism development and wildlife conservation should be the focal management objectives.

Tourism management: Tourism growth in the AE will depend on how the ecosystem is satisfying the recreation needs of visitors. If visitor expectations are met repeat visits can be expected and satisfied visitors can be expected to market the AE to other potential visitors. How visitors are handled by ecosystem managers is therefore critical to tourism growth in the area. However, with the ecosystem falling under the jurisdiction of two autonomous government institutions (KWS and KFS) it is important that standardized customer service is offered across the ecosystem (National Park and Forest Reserves). In addition, since the AE will be marketed as a single tourist destination, it is vital that this integration is reflected in the visitor management strategy. In this regard, it is prudent that some of the KWS entry gates i.e. Mutubio, Ruhuruini, and Kiandongoro, are relocated to the fence line or forest boundary to ensure that all visitors to the AE are paying requisite entry fees.

Water resource management: Satisfying the water demand for a growing population in the AE-adjacent areas and beyond is a major challenge that needs to be overcome to mitigate water resource use conflicts. AE Water resource is used mainly for hydropower generation, irrigation and domestic use. Domestic water for a large population in large urban areas, such as Nairobi City, Thika and Nyeri is from the AE. However, with increase in population both

locally and nationally, demand for water for irrigation and domestic use has increased threatening hydropower generation. It is therefore paramount that water allocation is prudently planned and coordinated to ensure that water is available for key social and economic sectors. And for such water allocation plans to work, there is need for close collaboration between KWS, KFS and WRMA in monitoring water abstraction to ensure that there are no illegal water intakes in the AE.

Harmonisation of conflicting natural resource management policies: In order to harmonise conflicting water and forest conservation policies, the plan implementers will lobby for harmonisation of conflicting policies e,g. the forest act which allows grazing while water act advocates for protection of the water catchment while at the same time negotiate with the community forest users associations (CFAs) to stop grazing in the natural forests and communities in return get economic returns from programmes such as carbon credits for use in putting up zero grazing facilities.

Aberdare Fence management: During construction of the Aberdare fence phase IV, a huge indigenous forest was left out of the electric fence contrary to the agreed fence alignment protocols. It is therefore recommended that the fence alignment along this section be reviewed to protect this important indigenous forest which was left out.

Zonation Scheme

Introduction

The primary objective of this management plan is to provide a framework to guide AE managers in their day-to-day management activities at the AE. A key element of the plan is the zoning scheme, which provides prescriptions on what should occur or not occur in different parts of the protected areas and devolves protected area administration and management to smaller management units to enhance service delivery. Zoning plays an important role in minimizing conflicts between different users of a protected area by separating potentially conflicting activities whilst ensuring that activities which do not conflict with the protected area's values and objectives can continue in appropriate areas.

The AE is zoned in accordance with management and administration needs of both KWS and KFS, and land use potential of the area. The ecosystem's *management* and *use* zoning are discussed in the following sections.

Management zoning

The KFS divides the ecosystem into six management zones which are aligned with the administrative district boundaries. KWS on its part has divided the ecosystem into four management zones (or sectors) that are largely based on ecological as well as tourism development considerations.

Details of the KFS and KWS zones/sectors and administrative stations are given in tables 4 and 5 respectively, while figures 3 and 4 shows the extent of the zones and sectors and the location of the stations.

Table 4. KFS Management Zones and Forest Stations

Forest Management zone	***KFS Headquarters***	***KFS Sub-headquarters***	***Forest Stations***
Central Highlands Conservancy	Nyeri		
Maragua	Maragua	Gatare	-
Nyeri	Nyeri	Kiandongoro	Kabage, Zuti, Muringato, Zaina
Kiambu	Kiambu	Kereita	Kinale, Kamae, Uplands, Ragia
Murang'a	Murang'a	Wanjerere	-
Nyandarua	Nyandarua	Ndaragwa, Geta	South Kinangop
Thika	Thika	Kieni	Kimakia

Figure 3. KFS Management Zones

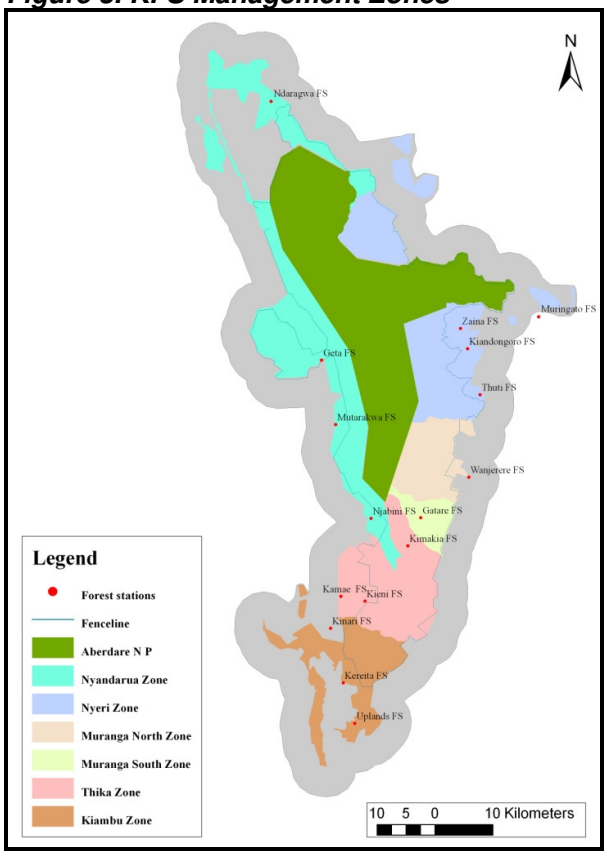
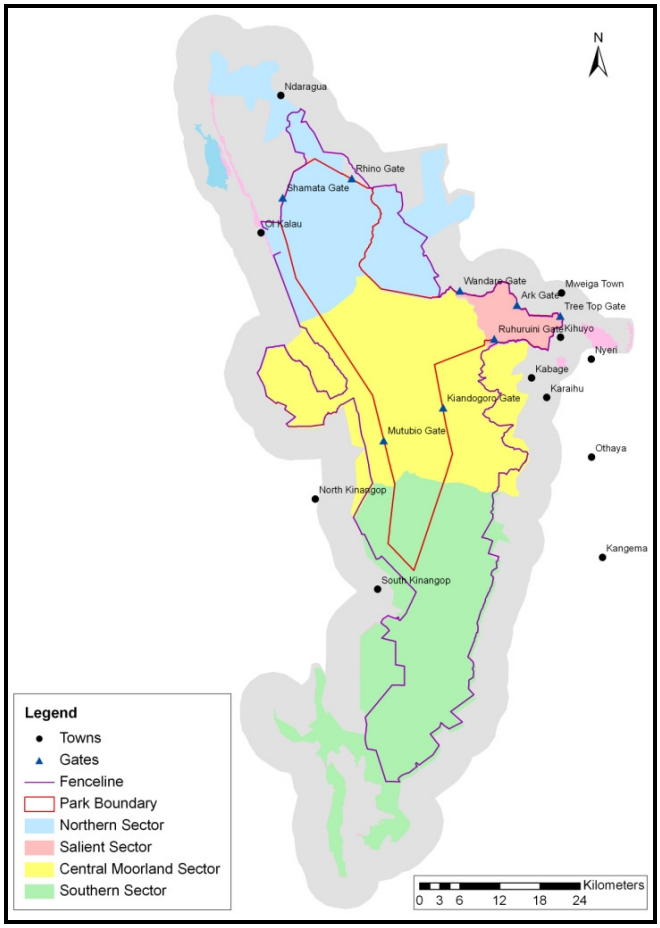


Table 5. KWS Management Sectors and Administration Centres

Management sector	***Headquarters***	***Ranger Outposts***
AE	Mweiga	
Northern	Shamata	Shamata gate, Rhino gate,
Central Moorland	Kiandongoro	Kiandongoro gate, Mutubio gate, Geta town
Salient (*Sub-Headquarters)*	Rhino Base	Ruhuruini gate, Treetops gate, Ark gate, Wandare gate,
Southern	Njabini	Gatare fence gate, Njabini town

Figure 4. KWS Management Sectors

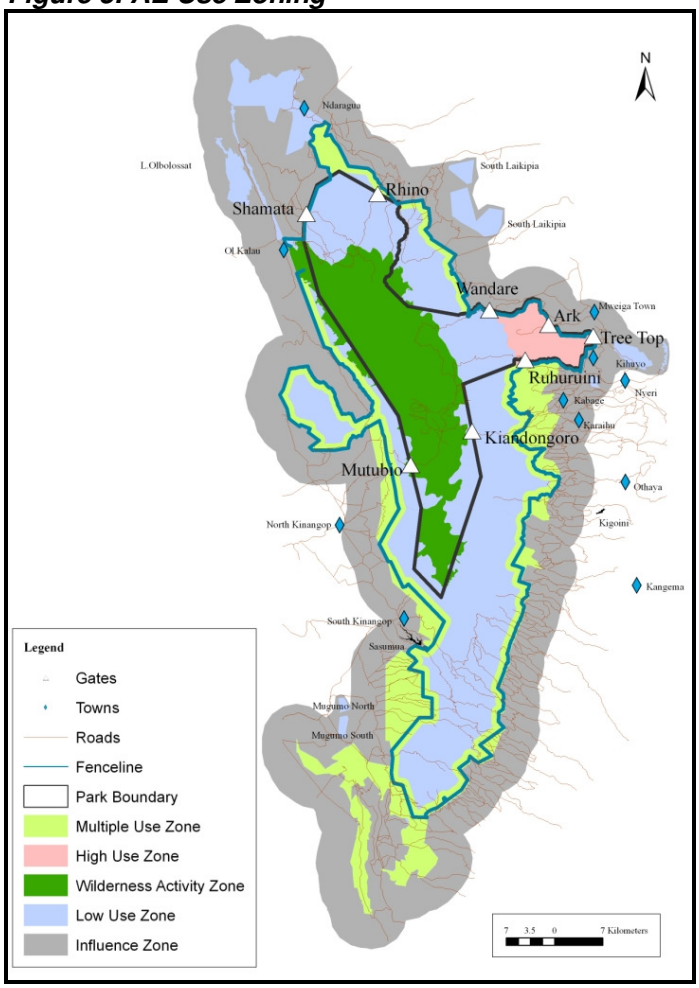


AE Use Zoning

The AE *use zoning* is designed to apply different management prescriptions to different parts of the ecosystem in order to achieve the AE's purpose and management objectives. Zoning is expected to regulate use of the ecosystem over the long term to ensure that development is not haphazard and resource use conflicts are resolved.

The AE use zoning is an integrated approach that divides the ecosystem into five distinct zones (i.e. High Use Zone, Low Use Zone, Wilderness Activity Zone, Multiple Use Zone and Influence Zone) which support the desired and legally acceptable land uses in the ecosystem (see Figure 5). These land uses include tourism, biodiversity protection, and forestry and its associated uses, such as livestock grazing and plantation establishment. The primary purpose of zoning is to protect the water catchment value of the area while at the same time exploiting ecosystem's resources sustainably. Zoning is primarily geared to ensure sustainability of the environment and responsible tourism for the next 10 years, and include low impact and environmentally sensitive development, avoidance of development in critical water catchment areas, and conservation of wilderness.

Figure 5. AE Use Zoning



In the development of the AE use zoning scheme, AE management and stakeholders were guided by the following principles:

Zoning Guiding Principles

Separate conflicting uses

Zoning plans should solve conflicts of interest among stakeholders who depend on the forest for supply of various goods and services to support their livelihood, including water supply, harvesting of wood and non wood forest products, livestock grazing, tourism and cultivation. Hence, ecosystem zoning should ensure that conflicting uses e.g. tourism and plantation establishment; livestock grazing and tourism or plantation establishment; and conservation of ecologically sensitive areas and intense tourism use are spatially separated. Ecologically sensitive areas, critical habitats for threatened species, and critical water catchment areas should be conserved for their own biodiversity value. In such areas management should endeavour to minimise negative impacts, including pollution of air, water, and soil resources by limiting tourism development to very low impact activities and facilities.

Minimize habitat fragmentation

Zoning indicates where facilities, activities or services should or should not be developed. However, it is imperative that the decision to locate facilities in the protected area is guided to avoid interference with natural ecosystem processes through habitat fragmentation that ensues from establishment of administrative and tourism facilities inside a protected area. Hence, when there is ample justification to locate developments in the protected area, they should be located away from ecologically sensitive areas, such as habitat for threatened species and fragile habitats to ensure that there are no adverse effects on natural resources and values. As such, in order to limit the development footprint, habitat fragmentation, and promote interaction with neighbouring local communities, where practicable facilities will be located at the periphery of the protected area.

Manage the AE within Limits of Acceptable Use

Limits of acceptable use (LAU) refer to the maximum level of use an area can sustain without compromising visitor experience or ecological, aesthetic, or natural resource values. In order to ensure that the ecosystem's values are sAEguarded each AE use zone will contain LAU on the allowable activities and developments. These LAU will be limited to those that AE management can easily implement and monitor.

The AE Limits of Acceptable Use

Stakeholders have agreed on LAU that are allowable in different use zones to ensure that ecological integrity of the AE is not compromised. In regard to LAU for tourism use, these are based on the maximum number of beds and type of facilities allowed in each zone.

The summary of allowable maximum bed capacity for various categories of visitor accommodation facilities is shown in table 6, while zonal prescriptions in terms of human use; permitted visitor activities; permitted visitor facilities; and natural resource use and management are given in tables 7 and 8.

Table 6. Summary of permitted visitor facility categories in the AE

Facility type	High Use Zone	Low Use Zone	Wilderness Activity Zone	Multiple Use Zone	Influence zone
▸ Lodges	60	NA	NA	60	No Limits of acceptable use as this primarily agricultural land
▸ Ecolodges	40	30	NA	40	
▸ Permanent tented camps	40	30	NA	40	
▸ Self help Bandas	20	20	NA	20	
▸ Public campsite	20	20	NA	20	

Facility type	High Use Zone	Low Use Zone	Wilderness Activity Zone	Multiple Use Zone	Influence zone
▸ Special campsites	16	16	4	16	

Table 7. Zonal accommodation facility prescriptions

High Use Zone	Low Use Zone	Wilderness Activity Zone	Multiple Use Zone	Influence Zone
Lodges	Ecolodge	Special Campsites	Lodges	Zonal accommodation prescriptions do not apply
Ecolodge	Permanent Tented Camps	Fly camping	Ecolodge	
Permanent Tented Camps	Public campsites		Permanent Tented Camps	
Public campsites	Special Campsites		Public campsites	
Special Campsites	Bandas		Special Campsites	
Bandas			Bandas	

Table 8. Tourism zonal activity prescriptions

High Use Zone	Low Use Zone	Wilderness Activity Zone	Multiple Use Zone	Influence Zone
Game drive	Game drive	Camping	Game drive	No Limits of acceptable use as this is primarily agricultural land
Camping	Camping	Bird watching	Camping	
Picnicking	Picnicking	Filming & photography	Picnicking	
Bird watching	Bird watching	Hiking & Backpacking	Bird watching	
Sun downers	Sun downers	Caving		
Filming & photography	Filming & photography	Short walks/nature trails		
Caving	Nature walks	Sport fishing		
Paragliding	Hiking			
Biking	Sport fishing			
	Caving			
	Biking			
	Helitours			

High Use Zone

The High Use Zone (HUZ), is designated for areas capable of accommodating a broad range of opportunities for visitor recreation and enjoyment. The HUZ in the AE comprises the Salient area which is the best wildlife viewing area in the ecosystem because of the bushland land cover type that is suitable for this activity. The zone covers approximately 10% of the Aberdare Conservation Area (Forest reserve and National Park) and over 90% of visitors to the AE visit this zone.

A summary of accommodation prescriptions and permitted visitor activities for the HUZ are given in table 9 and 10 respectively.

Table 9. Summary of accommodation prescriptions for the HUZ

Status	*Facility Name*	*Type*	*No. of Beds/Capacity*
Existing	Ark	Lodge	123
	Tree Tops	Lodge	102
	Rhino Retreat	Banda	6
	Olive	Banda	4 (to be relocated to the Ranger's Camp)
	Tusk Camp	Banda	6 (to be upgraded)
	Sapper Hut	Banda	2
	Queen Beatrice	Public Campsite	
	Prince Charles	Public Campsite	
	Muringato	Public Campsite	
	Nyati	Public Campsite	
	Bongo	Public Campsite	
	Kifaru	Public Campsite	
	Al haji	Public Campsite	
	Ruhuruini	Public Campsite	
	Reedbuck	Public Campsite	
	Rhino	Public Campsite	
	Honi	Public Campsite	
	Total beds from permanent and semi-permanent facilities		**243**
Proposed	Additional accommodation facilities are not allowed in this zone.		

Table 10. 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 entrance gates and permanent tourist facilities
- **Heli-tourism**: Heli-tourism is restricted to designated helipads only. Helipads sites have to be booked with the Senior Warden in advance.
- **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 and KWS along designated sections of the hiking corridors
- **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 Low Use Zone (LUZ) covers approximately 80% of the Aberdare Conservation Area. It is provided to ensure that large areas are maintained in a natural state, while supporting diverse low impact visitor activities. In the National Park, this zone covers majority of the Northern Sector, the upper Salient and a small section of the Southern Sector. The road network in this zone is not well developed, partly because of the rugged terrain that characterizes this zone. Visitor accommodation prescriptions and permitted activities are given in table 11 and 12 respectively.

Table 11. Summary of accommodation prescriptions for the LUZ

Status	*Facility Name*	*Type*	*No. of Beds/Capacity*
Existing	Shamata	Public Campsite	
Proposed	**National Park**		
	Shamata Gate	Ecolodge	30
	Rhino Gate	Ecolodge (Tree house)[5]	6
	Dyer's Salt Lick	Ecolodge (Tree house)	6
	Kaheho River	Ecolodge	30
	Wambuku	Ecolodge	30
	Upper Salient	Ecolodge	30
	Njabini	Ecolodge	30
	Southern Sector	Bandas	20
	Forest Reserve		
	Kimakia Forest	Ecolodge	30
	Kikuyu Escarpment Forest	Ecolodge	30
	Rhino gate	Ecolodge	30
	Thaba Falls Luxury	Ecolodge	30
	Kwa-Joni Tuthus	Ecolodge	30
	Northern Aberdare Wilderness Retreat	Ecolodge	30
	Tucha/Kagumo	Eco-lodge	30
	Total beds from permanent and semi-permanent facilities		392
	Construction of tourist accommodation facilities is permitted. Ecolodges and permanent tented camps will be of a rustic nature and limited to a maximum capacity of 30 beds. Permitted minimum distance between permanent facilities is 6 Km. and a visitor use intensity of 1 bed/Km^2 is recommended.		

[5] To be offered with the Northen Aberdare Wilderness Retreat

Table 12. Permitted activities in the LUZ

- **Hiking:** Hiking is allowed along established walking routes
- **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 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.
- **Paragliding**: This activity will be restricted to specific designated areas.
- **Bird watching**: Bird watching will be carried out along walking trails or at the lodge or ecolodge 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.
- **Caving:** Exploration of caves will be allowed, but camping in the caves is prohibited.
- **Game viewing:** Game viewing is restricted to designated roads or animal water holes. Off road driving is prohibited.

Wilderness Activity Zone

Wilderness Activity Zone (or Moorland Environmentally Significant Area), is designated to protect the moorland ecosystem which is important for its water catchment value and harbours rare associations of species some of which are endemic to the AE e.g. Hinde's Viper. The zone comprises of undulating hills, bogs, clear mountain streams, numerous waterfalls and magnificent views. Several rivers originate from the slightly sloping ground in the water bogs. The rivers emanating from this zone include Chania, Gura, Magura, Gikururu, Engare Ongobit, Ewaso Nyiro, Karuru, Karimu, Honi among others. The zone represents approximately 17 % of the Aberdare Conservation Area. The key physical features that characterize this zone are the Oldonyo Lesatima and Kinangop peaks and scenic torrential waterfalls such as Gura falls, Chania Falls, Magura Falls, and Karuru Falls the longest (273 m), occurring in three steps of 117 m, 26 m and 130 m.

In view of the ecological fragility of this zone visitor use is controlled to protect natural resource degradation. Infrastructure development in this zone is limited to developments required for essential services and resource protection. In much of this zone, visitors have the opportunity to experience remoteness and solitude and participating in backcountry adventure activities in diverse natural settings.

Accommodation and activity prescriptions for this zone are provided in table 13 and 14 respectively.

Table 13. Summary of accommodation prescriptions for the WAZ

Status	Facility Name	Type	No. of Beds/Capacity
Existing	Fishing lodge	Banda	14
	Sapper Hut	Banda	2
	Mutubio	Public Campsite	
	Chania	Public Campsite	
	Hagenia	Public Campsite	
	Gikururu	Public Campsite	
	Total number of beds from permanent and semi-permanent facilities		**9**
	Development of visitor facilities of a permanent or semi-permanent nature is not permitted. Accommodation facilities are limited to special campsites only.		

Table 14. Permitted activities in WAZ

Hiking: Hiking is allowed along the hiking corridors that will be established under action 2.2 of the Tourism Development and Management Programme to provide access to Oldonyo Lesatima and Kinangop peaks.

- **Backpacking:** Backpackers are expected to observe the leave no trace principles[6]
- **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 (MUZ) comprises of a one Kilometre forest belt inside the fence and all forest reserve land that has been fenced out. This zone will be managed primarily for realising the social and economic needs of the forest-adjacent community. The community, through the Community Forest Associations (CFA), will be assigned specific sections of this zone to protect and sustainably manage and in return they will be permitted to exploit wood and non wood forest products. In addition, CFAs will be encouraged to establish eco-tourism ventures in forest blocks that have exploitable visitor attractions. However, this will require that a tourist facility is allowed an exclusive zone where other human activities will be restricted.

In addition, this zone includes forest land under exotic plantations, indigenous forest or the "*Nyayo Tea Zones*" that have been fenced out. The zone also contains KFS houses that are earmarked for upgrading and subsequent conversion into guest houses or Bandas. Hence

[6] 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

additional objectives of this zone are timber and tea production for economic development of the country. However, visitor activities (e.g. agricultural tourism) that can be combined with timber and tea production will be allowed. In addition, sustainable uses of non-wood forest products like grass and medicinal herbs, honey production, and livestock grazing will be allowed in designated areas. A summary of accommodation and activity prescriptions are given in table 15 and 16 respectively.

Table 15. Summary of accommodation prescriptions for the MUZ

Status	*Facility Name*	*Type*	*No. of Beds*
Exist-ing	NA	NA	NA
Proposed	Sasumua Dam	Ecolodge	30
	Geta	Guest House	8
	North Kinangop	Guest house	8
	Muringato	Guest house	8
	• Construction of lodges, ecolodges, and tented camps is allowed. However an exclusive area of not less than 6 Km radius will be provided for each facility. • Livestock grazing will not be permitted in a tourist facility's exclusive area		

Table 16. Visitor activity prescriptions in the MUZ

- **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**: Livestock grazing will be carried out in designated areas only. Livestock grazing license will be sought from the forester.
- **Farming through PELIS:** Farming will be carried out through supervision by KFS
- **Recreation:** This will take place in designated areas only. Recreation activities will include mountain biking, marathon running, hiking, and sport fishing.

Influence Zone

This zone comprises of a 5 km buffer around the Aberdare Conservation Area. The primary management objective of this zone is agricultural production. However, this zone is of special importance to the adjacent protected areas as most threats to AE's ecological integrity are caused by the residents from this zone.

To mitigate the threats to the exceptional biodiversity resource values in the ecosystem, the management focus in this zone will revolve around providing forest extension services to increase the area under farm forestry and by doing so, reduce pressure on the forest. In addition, since this zone contains critical habitats for the threatened bird, Sharpe's long claw,

wildlife extension activities will be carried out with the aim of securing viable habitats for this bird in the Kinangop grasslands. Furthermore, communities residing in this zone will be involved in establishing new forest plantations through PELIS.

Since this zone is not legally protected, and given that this is primarily agricultural land, no visitor accommodation or visitor activity prescriptions are provided for it.

Ecological Management Programme

Programme Purpose and Strategy

The purpose of the Ecological Management Programme is:

> To conserve the AE threatened species and ecological processes and restore and understand ecosystem functions and dynamics

The Aberdare ecosystem (AE) faces many direct and indirect challenges and threats mostly associated with human activities. These include illegal extraction of natural resources e.g. logging, charcoal burning, livestock grazing, poaching and wildfires. In addition, connectivity of the AE with adjacent savannah ecosystem to the north and west is critical as it increases wildlife range thereby enhancing survival of animals and general ecosystem resilience. Maintaining this linkage is critical in sustaining ecosystem functioning and make up for declines in local diversity occasioned by the aforementioned threats.

The Ecological Management programme addresses itself to the above threats by focusing on biodiversity restoration and protection, relationship with adjacent ecosystems, and carrying out applied research to give a better understanding of the various ecosystem functions and dynamics.

Guiding Principles

The following sections set out the guiding principles that are designed to guide AE managers and stakeholders in the implementation of the Ecological Management Programme and the achievement of the Programme Purpose. The guiding principles include: maintaining, restoring and monitoring AE rare and threatened species; restoring and maintaining ecological processes to increase ecosystem resilience; monitoring and managing wildfires effectively; and increasing understanding and appreciation of the ecosystem's biodiversity and ecological processes.

Maintain, restore and monitor AE rare and threatened species

The AE has three key mammal species of conservation concern. These are the African Elephant and the Black Rhino, both listed as threatened, and the Mountain Bongo which is critically endangered and extremely rare in Kenya. These species are threatened primarily by poaching and habitat loss or degradation. Under this programme populations of threatened species will be monitored and where appropriate restored to maintain viable populations. In addition, as regards migratory species such as elephants, which have now been fenced in the ecosystem, opportunities for interactions with other populations in Laikipia and Mt. Kenya will be provided through establishment of a corridor. This will contribute to the achievement of one of the objectives of the vision 2030 Medium Term Plan (2008-2012) which has identified *"Securing the Wildlife Corridors and Migratory Routes Initiative*" as one of its flagship projects for the environment.

Restoring and maintaining ecological processes to increase ecosystem resilience

Restoration of a degraded habitat back to a healthy, self-sustaining condition that resembles the initial natural state is essential in maintaining habitat diversity. Habitat diversity in turn increases species diversity which enhances ecosystem resilience. In the AE, the health of riparian habitats has declined remarkably in the agriculture dominated influence zone as a result of increased cultivation, tree cutting, water abstraction for irrigation and domestic use, and over grazing. In addition, destruction of grasslands for cultivation is resulting in habitat loss for some bird species, such as the threatened Sharpe's long claw which is found in the Kinangop grasslands. Further, alien and invasive species are establishing in the Park degrading the habitat by taking over from indigenous species. Hence, this programme will endeavour to restore degraded areas to enhance ecosystem resilience.

Wildfire is managed and monitored effectively

Most wild fires in the AE result from accidental sources like, poor honey gathering methods, inappropriate disposal of cigarette butts by visitors and charcoal burning. Human activities in the neighbouring farms, like burning of farm litter, can also cause fire in the protected area. Vegetation damage as a result of fire is highest in the moorlands where accumulated biomass supports burning, and in the plantation forests due to the high uniformity of trees and lack of plantation hygiene. As such, under this management programme, the response to the threat of wildfire in the Aberdare will be thoroughly planned to make it sAE, 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.

Increasing understanding and appreciation of the ecosystem's biodiversity and ecological processes

Reliable information generated by well laid out research programmes and scientifically sound methodology is critical if environmental and natural resource management interventions are to be effective. Without reliable information on ecological changes and their causes, timely and corrective management interventions will remain elusive leading to further ecosystem degradation. Ecological monitoring can serve as an important source of information in the decision-making process by providing early warning signs of ecosystem changes. As such, this programme will focus on developing a robust ecological monitoring programme and related database to track key elements of ecosystem functioning.

Targeting ecological management action

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

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 AE planning process are elaborated in the following sections.

Conservation targets

The first stage of selecting conservation targets 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 ecosystems 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 target. 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 AE 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 the KEAs for each target are set out in Table 17

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 18 shows the priority threats impacting or are likely to impact on AE conservation targets and their KEAs.

Table 17. AE 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 40 years. AE Population is small and vulnerable. Population increase targets are unlikely to be met without active management.	▸ Giant forest hog ▸ Forest primates ▸ Bush pigs	▸ Habitat size and quality ▸ Population size, recruitment and structure ▸ Genetic diversity
	Mountain Bongo	Population has declined drastically over last 40 years to about 400-500 individuals in the country. The population of Bongos in the AE is estimated at 100 individuals	▸ Giant forest hog ▸ Forest primates	▸ Habitat size and quality ▸ Population size, recruitment and structure ▸ Genetic diversity
	Elephant	Classified as vulnerable by the IUCN. Current population is stable at well over 3000 individuals. It is a keystone species maintaining AE habitats, especially the salient grasslands and bushlands. Threatened by closure of migration and dispersal routes outside AE boundaries.	▸ Buffalo ▸ Bongos ▸ Rhino ▸ Giant Forest Hog	▸ Dispersal area (Laikipia ranches) ▸ Population size, recruitment and structure ▸ Genetic diversity
Habitats	**Camphor and Podo forests**	Threatened by illegal logging	▸ Bamboo forest ▸ Giant forest hog ▸ black fronted duiker	▸ Vegetation structure and composition
	Corridors and forest patches	Important for establishing ecosystem connectivity. These ecological networks are threatened by increased habitat conversion to agricultural use	▸ Riverine vegetation	▸ Corridor status (Land use and land tenure) ▸ vegetation structure and composition ▸ Forest size and distribution ▸ Population structure and distribution of forest dependent species
	High Altitude grasslands	Habitat for the Sharpe's Long claw which is a threatened bird species.	Other grassland birds	Vegetation structure and composition; and Habitat size and quality
Systems	***Montane forest***	Indigenous forest subjected to a lot of pressure from illegal uses and elephant damage. It is an important habitat for primates and the leopards	▸ Bamboo forest ▸ Giant forest hog ▸ black fronted duiker ▸ Forest primates ▸ Forest dependent Birds ▸ Elephants ▸ Leopards ▸ Cider	▸ vegetation structure and composition ▸ Forest size and distribution ▸ Population structure and distribution of forest dependent species
	River Systems and Lake Ol Bolossat	The only lake found in Central Province and a habitat for the threatened Sharpe's Long claw. It is an important stopover for migratory birds. The lake's riparian zone is threatened by human encroachment, wild fires, overgrazing, invasive plant species and grass harvesting.	▸ Swamps ▸ Riverine vegetation ▸ Sharpe's long claw	▸ Lake size ▸ River regime (flow and pattern) ▸ Water quality and quantity ▸ Riparian habitat

	Conserva-tion target	*Rationale for selection*	*Important subsidiary targets*	*Key ecological attributes*
	Moorland grasslands	▸ Highly fragile ▸ Important habitat for endemic species ▸ Has range restricted species such as Mabuya lizards ▸ Low disturbance levels	▸ Montane viper ▸ Water bogs ▸ Aberdare Mole Shrew	▸ Vegetation structure and composition ▸ Micro-habitat size and distribution ▸ Water quantity and quality ▸ Climate (temperature, humidity, rainfall)

Table 18.Threats to AE Conservation Targets

TARGETS / THREATS	Montane forest	Moorland grasslands	River systems and Lake Ol Bolossat	Camphor and Podo forests	Corridors and forest patches	High altitude grasslands	Elephant	Rhino	Bongo
Poaching	High			Very high	High		Low	Very High	Medium
Inbreeding								Low	Low
Diseases and pests								Medium	Medium
Predation								Low	High
Alien and invasive species			Low		Low	Low		Medium	Low
Herbivore browsing pressure				High	Low			Low	
Poor natural recruitment				High				Medium	Low
Elephant impact	Low			Low	High			Medium	High
Over-grazing of livestock			High		Medium	High		Low	Low
Charcoal burning	High		Low		High				
Land use conversion			High		Very High	High	High		
Human settlement			Low		High	High			
Infrastructure development		Low	Low		High	High			
Wild Fire	High	Medium		High	High	High	Low	High	High
Riparian cultivation			High		High				
Illegal logging	High			High	Very High		Low		Low
Pollution			High						
Swamp drainage			High				Low		
Siltation or rivers and dams			High				High		
Soil erosion			High						
Illegal water abstraction			High				High		Low
Human-Wildlife Conflict			High				Low		
Weak legislation			High		Very High		Low		
Climate change	Low	Low	Low	Low	Low				

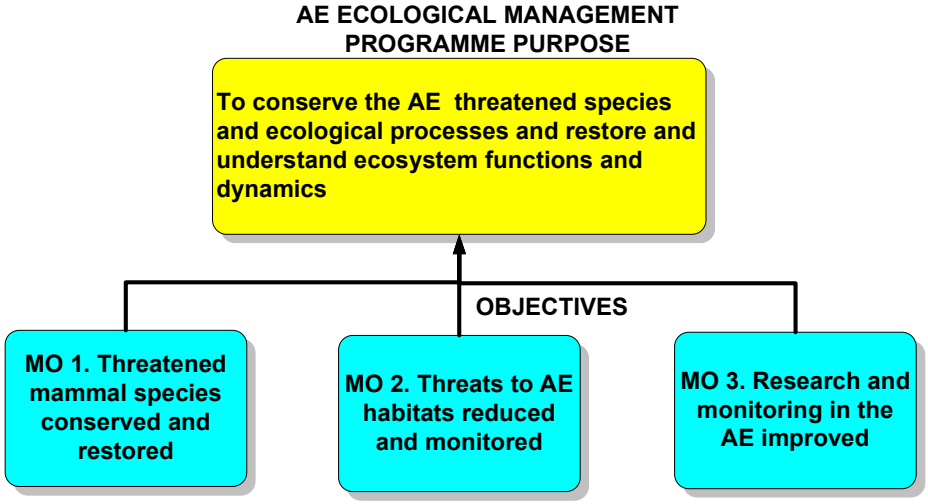
Ecological management objectives and actions

Three objectives have been developed addressing threats to AE's threatened large mammals (covering conservation targets: Elephant, Black rhino, and Mountain Bongo); addressing key threats to the AE's critical habitats; and addressing cross cutting threats which threaten all conservation targets and require long-term monitoring. The objectives developed for the AE Ecological Management Programme are:

MO 1. Threatened mammal species conserved and restored
MO 2. Threats to AE habitats reduced and monitored
MO 3. Research and monitoring in the AE improved

These management objectives and actions developed to achieve them are described in detail in the sections that follow. 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. 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, timeframe and milestones necessary for the completion of each of the management actions in the first 3-year timeframe of the management plan. Figure 6 below shows the overall objectives tree for the AE Ecological Management Programme.

Figure 6. Ecological Management Programme Objectives Tree



Objective 1: Threatened mammal species conserved and restored

The future desired state for threatened mammal species is to have stable and growing populations whose interaction with the habitat and the physical environment is sustainable. This desired condition is currently hampered by several human-induced factors that threaten the populations of threatened species in the AE. For instance the elephant population is threatened by loss of range and possible future loss of genetic diversity as a result of confinement by the ring fence; and the Mountain Bongo and the Black Rhino are threatened principally by poaching, but genetic depression could be a major factor in future. This objective has therefore been designed to prevent continued loss of threatened species. The management actions that will be implemented to achieve this objective focus on: carrying out a feasibility study for elephant corridors; strengthening existing monitoring systems and carrying out priority research to provide information for adaptive management and protection of elephants and critical habitats; investigating impacts of predators on Black rhino; monitoring and protecting the status of the Black rhino population in the AE; collaborating with other stakeholders to enhance Bongo surveillance; evaluating the impacts of bushmeat poaching on ungulate species; establishing the population status of carnivores in the ecosystem; and carrying out a study on hyena-prey relationships. These actions are elaborated in the following sections.

Action 1.1 Carry out a feasibility study for elephant corridors

In situations where elephants are completely unable to disperse from a given habitat area (e.g. AE) they modify habitats through destruction of woody vegetation opening up woodlands and forests. One of the primary goals of management at the AE should therefore be to maintain the mobility of populations through preservation of corridors in the greater AE. Genetically too, confined elephants are disadvantaged, as they are condemned to inbreeding and to the potential health problems that inbreeding entails. In view of this, it is therefore necessary to ensure that AE elephant migratory corridors are known and management prescriptions put in place to secure viable the ones.

The only potential elephant migratory in the AE is the “Aberdare-Ndaragwa elephant migratory corridor” which links Aberdare National Park to Laikipia plains through Ndaragwa forest. This corridor is characterised by a mix of land uses, including small scale farming which is incompatible with elephant conservation and hence might hinder corridor establishment efforts. As such, a corridor feasibility study will be carried out to assess the viability of the corridor. This study will include a landuse and tenure study, animal movement monitoring using satellite GPS, and human-wildlife conflict analysis. The corridor will be mapped, and its ecological attributes established to give guidelines on the need for protecting it. The feasibility study will also consider the economic and social impacts of establishing the corridor.

Action 1.2 Strengthen existing monitoring systems and conduct priority research to provide information for adaptive management and protection of elephants and critical habitats

Research and monitoring is necessary to provide scientific and management information to support protection and management of elephants and their habitats. Elephant and habitat monitoring systems are already in place in the AE. Line transects have been established in the AE for systematic collection of elephant population data based on recording and

analysing elephant dung density and distribution. This indirect method of assessing the number and distribution of elephants needs to be maintained and strengthened using new innovative techniques e.g. genetic/molecular analysis of elephant dung.

There is also a need to ensure that research provides information to management in a timely manner so that intervention measures that are required to mitigate adverse impacts on elephants can be implemented at the appropriate time. In regard to this an assessment of elephant numbers and density will be carried out every 4 years. Meanwhile a standardised ranger based monitoring system will be initiated to provide data on opportunistic sighting of elephants and elephant carcasses. This information will be useful in assessing impacts of poaching on AE elephants.

Action 1.3 Investigate impacts of predators on Black rhino

The population of black rhinos in Aberdare has continuously declined over the years. In the late 1990s, the population was estimated to be about 60 Rhinos which were found in the Salient, and Shamata, in the Northern Aberdare. The northern population is believed to either have disappeared or is in the process of disappearing altogether while the Salient population is now less than 10 individuals. Several factors, including predation by carnivores and poaching have been blamed for the decline, but there is no empirical evidence to suggest that these two factors are responsible for the decline in rhino Population. Hence, to uphold or refute the hypotheses, modern technology like genetic/molecular mapping, camera traps and playback systems will be used to determine the population status of lions and hyena, their movement and behaviour patterns, and the impact on rhino. This will be assessed and appropriate actions taken to safe guard the survival of the Rhino.

Action 1.4 Monitor and protect the status of the Black rhino population in the AE

Establishing and maintaining a good knowledge of rhino population is essential for their conservation and protection. This knowledge is the first line of defence against poaching since early detection of poaching is likely in populations that are closely monitored. Monitoring few black rhinos in an expansive forested habitat like Aberdare is a big challenge. However, the KWS Rhino program has devised a cost-effective method of monitoring black rhino in difficult to sight areas such as the AE. This method employs stealth cameras which provide adequate information to fully understand individual animals in terms of their identification marks and movement thereby documenting the population performance over time. Management interventions can therefore be based on the findings from this method. To make effective long term decisions on their conservation and management, camera traps will be used to confirm the rhino population in the Salient area. And to counter the problems of poaching, a Rhino Intensive Protection Zone (IPZ) will be established in the Salient Sector of the AE. The IPZ is an area where law enforcement staff are deployed at a moderate to high density specifically to protect rhinos. The key principle behind the IPZ is the concentration of anti-poaching effort in specific areas rather than spreading available resources inadequately over vast areas (see action 1.9 of the Security Management Programme).

Action 1.5 Collaborate with other stakeholders to enhance Bongo surveillance

The future of the Mountain Bongos in the Aberdare hinges on a sustained predator management programme. It has been noted that reduction of lions in the AE results in an increase in the Bongo population. Hence, considering that the Bongo population is isolated

and as such has a limited gene pool; and appreciating the tourism value of Bongos, the on-going Bongo surveillance, which is a collaboration between KWS and the Bongo surveillance team, will be supported and its capacity in terms of resources enhanced. The aim of this surveillance will be to determine the number and distribution patterns of Bongos, and detect threats that could hamper their conservation.

Action 1.6 Evaluate the impacts of bushmeat poaching on ungulate species

Snaring of herbivores for meat has been a major problem in the Aberdare. Indeed several studies have come to a conclusion that strongly supports the view that the situation is precarious. As such, a study will be initiated to analyse bushmeat extraction levels and establish the overall impact of subsistence poaching on Aberdare herbivore population, and particularly the threatened species. The results of this analysis will be used to design strategies to minimise poaching including awareness creation among community members on the need to conserve wild fauna for the benefit of present and future generations.

Action 1.7 Establish the population status of carnivores in the ecosystem

The population of various species of carnivores (e.g. Lions and Hyena) in the Aberdare is not well understood. Hence, a study will be carried out to determine the status of key carnivore species, their distribution and movement patterns in the Aberdare. The study will entail use of playbacks, camera traps and baits in order to determine the density of the various species in each management sector. Relevant information on all carnivores will be collected, analysed and stored in a database to facilitate monitoring.

Action 1.8 Carry out a study on hyena-prey relationships

Spotted hyenas have been blamed for paucity of ungulate species in the AE. It is alleged that the populations of Bongos, Giant Forest Hog and Black Rhinos have been suppressed by hyenas. However, there is no concrete scientific evidence linking hyenas to the population decline of these species. In view of this, a study will be carried out to shed light on hyena-prey interactions in the Aberdare. Research on hyenas will also be promoted among ecology scholars while public outreach programmes will be initiated to endear the animal to the general public who despise it for a variety of social and cultural taboos and myths.

Objective 2: AE habitats are restored and monitored

The future desired state of the AE in regard to habitats is to have all degraded habitats restored and monitored in order to support the natural faunal species and communities and sustain the water catchment qualities of the ecosystem.

While existing laws and programs protect or encourage preservation of many natural resources and landscapes, there is still a clear need to go beyond protection and preservation to restoration of critical natural habitats. This involves returning a degraded or former habitat to a healthy, self-sustaining condition that resembles as closely as possible its pre-disturbed state. This management objective has therefore been designed to address habitat degrading factors and implementation of habitat improvement measures. The management actions that have been developed to achieve this objective are: carry out a survey of the distribution and mineral composition of salt licks in the ecosystem; map and restore degraded forest patches

and wetlands; harvest eucalyptus plantations and replace them with indigenous trees; col-collaborate with other stakeholders to minimize siltation of Lake Ol Bolossat and dams; establish livestock stocking rates; monitor fire impacts; rehabilitate and maintain fire breaks; monitor and control alien and invasive species; carry out Environmental Audits of existing facilities; nominate AE as a UNESCO Man and Biosphere Reserve; and carry out surveillance of plant and animal diseases. These management actions are elaborated in the following sections.

Action 2.1 Carry out a survey of the distribution and mineral composition of salt licks in the ecosystem

Due to inaccessibility of the salt licks located outside the AE adjacent farms, elephants can only use the artificial salt licks established at TreeTops, Rhino retreat and The Ark lodges and other natural licks distributed in the forest. The adequacy of these natural salt licks is, however, not known as no study has been carried out to shed light on their number, distribution and level of use by elephants. Anecdotal information indicates that these salt licks are deficient in minerals, such as sodium and phosphorus. To establish the status of salt licks, a study will be carried out to identify and map the natural salt licks within the forest, analyse their mineral content and, based on the outcome of the study, develop guidelines on establishment of artificial salts in the AE.

Action 2.2 Map and restore degraded forest patches and wetlands

The AE contains many degraded patches that have resulted from past illegal activities and particularly illegal logging. The spatial extent and distribution of these patches has however, not been assessed for purposes of informing forest restoration strategies. In view of this, a mapping survey of the degraded areas will be carried out to have insight on the nature and extent of the degraded areas. This will be important in prioritizing forest restoration activities and in the selection and adoption of restoration approaches. The existing tree nurseries will be expanded and improved to produce more tree species for use in the rehabilitation exercise. More staff will be recruited and trained on new innovations to attend to the nurseries while relevant research projects will be initiated to address the restoration needs within the Aberdare.

As regards wetlands, some of the key wetlands (Lake Ol Bolossat and Manguo Swamp) in the greater AE have been encroached by human activities threatening vulnerable species such as the Hippopotamus. To protect the ecological integrity of these wetlands, AE management will liaise with Nyandarua County authorities and NEMA in the implementation of the Lake Ol Bolossat management plan which prescribes eviction of those who have encroached on the Lake's riparian zone. AE management will also collaborate with Nyandarua County in establishing and gazetting Manguo wildlife sanctuary to protect biodiversity and diversify tourism attractions around Nyahururu town.

Action 2.3 Harvest eucalyptus plantations and replace them with indigenous trees

The impact of Eucalyptus in the AE is not significant since few stands of this species exist. The impact is however felt in the AE-adjacent farms where eucalyptus species are planted in wetlands and riparian zones. This species is known for draining water in wetlands and it is used elsewhere (e.g. Australia) for this purpose. To mitigate impacts of eucalyptus trees, an inventory of existing eucalyptus trees will be done and thereafter the eucalyptus will be

harvested. The harvested areas will then be planted with indigenous trees and herbaceous plant species or left to regenerate naturally.

Action 2.4 Collaborate with other stakeholders to minimize siltation of Lake Ol Bolossat and AE downstream dams

Road run-off has been identified as a major cause of siltation in Sasumua dam and other dams as well. Siltation is also a major threat to Lake Ol Bolossat. Therefore, under this management action, erosion prone areas will be identified and check dams installed. Communities will also be sensitized by WRMA on good farming methods and practices to reduce surface run-offs and wastage of water. In addition, NEMA will promote use of Vativa grass to check surface run-off along roads under construction to minimise siltation of downstream dams.

On the other hand, there are several artificial dams in the salient that currently hold little water as they are silted after many years of neglect. These dams will be desilted to enhance their water holding capacity.

Action 2.5 Monitor fire impacts

Wild fires are frequent in the AE during the dry seasons. The impacts of these fires on wildlife species that can not out run the fire, such as snakes and fish can be devastating to their populations. While natural fires can be tolerated as they are uncommon and the ecological processes have evolved with them, human caused fires cause severe ecological disruptions in a forested habitat which are less resilient than grasslands that have adapted to and evolved with fire. Unlike grass, trees once burnt take very long time to regenerate which undermines the catchment function of the area.

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, AE management will develop and implement procedures for reporting wildfire. For each wildfire, whether major or minor, a fire report will be prepared and shared among KWS and KFS managers both at the field and headquarters levels.

On the other hand, impacts of fire on the ecosystem are not well understood as fire monitoring systems are not well coordinated. In view of this, a fire monitoring system entailing mapping and documentation of impacts immediately after the fire will be established.

Action 2.6 Rehabilitate and maintain fire breaks

Effective fire management is constrained by inadequate fire preparedness, and particularly lack of adequate facilities, inadequate trained personnel and lack of maintenance of firebreaks. In the fire prone areas, most roads established to act as fire breaks have been abandoned or even neglected. The most fire prone areas are the central moorlands where fires spread from adjacent farms. Therefore, to enhance fire preparedness, all established firebreaks and fire towers will be mapped and maintained especially during the dry season when fires are anticipated. The fence road will also be cleared to act as an effective firebreak.

Action 2.7 Monitor and control alien and invasive species

Alien and invasive species have been recorded in the National Park especially in the Salient area, Mutubio and the northern Aberdare. Invasive species have also spread in the exotic plantations and could inhibit recovery of reforested sites. Over the years, several exotic tree species have also been introduced under the forest plantation programme and it is essential that an assessment of introduced species be carried out to find out whether these species are spreading and whether they are likely to become invasive. The spread of invasive species is a serious management problem which portrays a bad conservation image, especially to visitors. The KWS corporate strategy calls for eradication of all alien and invasive species in protected areas. Currently the management is mapping out sites with invasive species and manually eradicating some species. During the plan period, AE management will continue to manage invasive species using eco-friendly methods of species removal.

Action 2.8 Carry out Environmental Audits of existing facilities

Waste disposal is not a major challenge in Aberdare since there are only two major lodges which have a very environmentally friendly waste handling mechanism. Liquid waste is disposed in septic tanks which are emptied whenever necessary, while solid waste is taken out of the park. Wastes from tourist bandas and campsites are equally well managed through disposal of solid waste outside the park. In order to ensure that both Park management and hoteliers are adhering to environmentally friendly waste disposal methods, environmental audits of tourist facilities in the park will be carried out annually.

Electric fences and other barriers that prevent movement of elephants onto arable land are becoming increasingly important conservation tools in Kenya and the world in general. In AE, the longest electric fence covering over 400 Km has been completed and in the process, elephants and other wildlife populations have become isolated within the ecosystem and no longer migrate to the lower altitude areas of Laikipia County. The fence is intended to act as a wildlife barrier and therefore control elephant and other large herbivore movement and hence manage human-wildlife conflict in the region. However, the fence is expected to impact heavily on the socio-economic status of the local communities living in the adjacent areas while at the same time impacting on the ecology of animal species within the ecosystem. During the plan period, an audit study aimed at evaluating and assessing the effect of the fence on the ecosystem in reference to the ecology of the wild animals, park habitat and the economic status of the proximate communities will be carried out in accordance with NEMA regulations. Long-term monitoring protocols will also be developed to guide management of the fence and future policy on fencing of forested park and reserves. This will entail establishment of permanent ecological and socio-economic monitoring transects and sampling sites both within the ecosystem boundary and the surrounding communities.

Action 2.9 Nominate AE as a UNESCO Man and Biosphere Reserve

The AE is an important ecosystem where the beneficial interaction between communities and the protected areas can be aptly demonstrated. The ecosystem fulfils the UNESCO biosphere Reserve zonation criteria that require a biosphere reserve to have a core zone whose management objective is conservation, a buffer zone which supports activities that are compatible to conservation and a transition zone that supports development. At the AE, the Aberdare National Park can be zoned as the Core Zone, the Aberdare Forest Reserve can be zoned as the buffer zone while the forest–adjacent land can fall in the Transition Zone.

To enhance the protection of the AE and gain support for conservation from the local and international public, the AE will be nominated for designation by UNESCO MAB programme as a biosphere reserve. Towards this, AE management will liaise with the KWS Conventions Department in filling the nomination forms and in carrying out requisite community sensitization on the importance of including the AE in the world network of biosphere reserves.

Action 2.10 Carry out surveillance of plant and animal diseases

Insect pests, such as pine woolly aphid and the cypress aphid are a major problem in exotic tree plantations of *Pinus patula* and *Cupresus lusitanica* respectively. Hence, to ensure timely and appropriate management interventions are implemented to prevent catastrophic impacts of plant and animals diseases on AE biological values, the on going wildlife disease surveillance and monitoring programme will be enhanced. The AE disease surveillance team 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 and advice on appropriate control measures when tree infestation is detected. 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.

Objective 3: Research and Monitoring in the AE improved

The future desired state of the AE in regard to ecological research and monitoring is where key ecosystem components such as wildlife, vegetation, hydrology and climate are monitored to detect habitat changes so that timely and appropriate management interventions can be taken by AE management. Although there have been long term research and monitoring programs at the AE, their impact on ecosystem management has been minimal. This is because ecological research and monitoring at the AE face many challenges including lack of databases, inadequate capacity to conduct research, and poor dissemination of research outputs. 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 station at King'ong'o. These management actions are elaborated in the following sections.

Action 3.1 Establish a long-term ecological monitoring programme

Although AE management has been carrying out ecological monitoring, the activities, have not been consistent. This therefore calls for establishment of a well designed ecological monitoring programme that facilitates monitoring of the AE ecological systems to better understand their functioning and allow data comparison over time. Establishing and maintaining a functional and effective ecological monitoring program requires major investments in terms of human capital, scientific equipment and infrastructure, transportation and other logistics etc. 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.

To enhance ecological monitoring in the AE, a long-term monitoring program will be established in collaboration with expert researchers from NMK, University of Nairobi, and KEFRI. 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 and stored in the ecological monitoring database that will be developed. 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, 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. Georeferenced transects which have been established by KWS researchers in various vegetation strata to document biodiversity status will continue to be used focusing on assessing the abundance and distribution of vertebrate and invertebrate species, and plant species that can be used as indicators of ecosystem change.

Action 3.2 Carry out biodiversity surveys

Natural resource inventories (NRI) and analyses are the basis for any natural resource management programme and planning. Several surveys of mammals, birds, reptiles and vegetation have been carried out in the AE 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 AE has adequate knowledge of the natural resources under its charge, AE 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 3.3 of this programme for easy retrieval and sharing of information.

Action 3.3 Establish an ecological monitoring database

A database is an essential tool for effective monitoring of long-term ecological processes. An effective database enables data analysis and sharing. The main issues of ecological interest to be monitored at the AE include loss of biodiversity, climate change, change in water quality and water availability.

A lot of ecological data on the AE 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. As such, under this management action, an automated ecological monitoring database will be designed and implemented at King'on'go Research Station. This database will contain historical as well as current environmental data that will be analysed regularly to discern environmental trends.

Action 3.4 Carry out a biodiversity valuation study

Biodiversity is valuable, as recognised by the Convention on Biological Diversity yet partly because much of the value is implicit rather than explicit, biodiversity continues to be lost at

unprecedented rates. For biodiversity and many biological resources the absence of apparent value combined with absent or poorly defined property rights creates a problem of over exploitation and unregulated use.

Aberdare Ecosystem should be appreciated and a value be attached to its goods and services to enable proper allocation of resources to manage it. To shed light on the value of the ecosystem, 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) will be carried out. Further, a carbon sequestration assessment study will be initiated to establish the state of representative carbon stocks both below and above ground cover.

As regards the water catchment value, KWS has initiated the valuation process which aims to determine the actual volume of water flowing from the Aberdare forest and the amount abstracted within the fenced area. Towards this, the KWS Biodiversity Research and Monitoring Division has sought expert opinion on the way forward from WRMA, which in turn has advised that some of the relevant hydrological information that can be used to value the water resources is not available. In view of this, during the plan period, a water assessment study will be carried out to generate information required to model the amount of water flowing out of the ecosystem. This study will collect and collate existing hydrological data and collect new data to fill information gaps.

Action 3.5 Support climate change monitoring

The climate change phenomenon is regarded as one of the most serious long-term threats to the ecosystem values of AE. It is therefore vital that the effects of climate change be monitored and understood. In regard to this, AE management will collaborate with Kenya Meteorological Department (KMD) to acquire climatic information on the Aberdare region. In addition, AE management will support development of models to show the contribution of AE in carbon fixing. This will first involve a baseline study to assess current carbon stocks of AE 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 3.6 Disseminate research findings

Inadequate dissemination of research outputs is regarded as one of the key challenges facing the AE research programme. This has led to inconsistent support for research activities by natural resource managers and the local communities. As such, under this management action, AE researchers will develop, organize, and make available natural resource data and facilitate transformation of data into information through analysis, synthesis, and modelling. To realize this, a comprehensive Geographic Information Systems (GIS) based natural resource database management system will be implemented at the King'ong'o Research Station. This will require provision of adequate information technology infrastructure to support database establishment and procedures and ensure that relevant natural resource data collected by various stakeholders such as KWS, KFS, KEFRI, WRMA and individual researchers 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 Aberdare National Park headquarters and offices of the KFS Head of Central Conservancy in Nyeri. These resource centers will consist of published and unpublished research reports both in analogue and digital media for easy access to ecosystem managers.

Action 3.7 Carry out priority management-driven research

Research and monitoring are critical to achieving the AE's primary goal of protecting and conserving biodiversity. The AE is diverse and complex, and many of its processes and their interrelationships are not well known. Also, while many resource impacts are obvious and severe, they are often not documented or quantified, and their causes may be even less clear or completely unknown. Hence, there is need to establish baseline information on the resources and the various components of the ecosystem, and how they interact. In this way, research and monitoring can ensure the effective implementation of management actions using the best available scientific information. In light of this, AE managers and researchers have developed a list of priority research topics that stakeholders should focus on (see Box 2 below).

Box 2. Preliminary priority research identified for the AE

1. Ecological and environmental monitoring
2. Water quality and quantity monitoring
3. Plant species dynamics
4. Wildlife population monitoring
5. Catchment environmental processes
6. Impacts of Management interventions
7. Land use changes and socio-economic trends in the areas adjoining the ecosystem
8. Wildlife census techniques
9. EIA/EA for infrastructure development in the plan area
10. Studies on domestication of forest products
11. Studies on status and stocking levels of Trout fish in the Aberdare
12. Impacts of Aberdare fence on the ecology and community livelihoods
13. Rare and endemic species studies
14. Resource utilisation and species interaction studies

Action 3.8 Develop research Bandas and conference facilities at King'ong'o Research Station offices

King'ong'o Research Station which is located at King'ong'o area of Nyeri, has been giving scientific support to biodiversity conservation and wildlife management (population dynamics, trends) to the KWS Mountain Conservation Area. The station was started in 1980 to handle research issues within Aberdare and the surrounding areas. When KWS became a parastatal, the station was upgraded into a regional research facility to cover the Mountain Conservation Area (Aberdare Forest, Mt. Kenya Forest, Mwea National Reserve, the Laikipia/Samburu/ Isiolo Ecosystem, and Upper Tana River Dam. Since then, the station has continued to provide scientific information addressing wildlife and conservation issues facing the Mountain conservation area (MCA).

The station has several opportunities that can be exploited to generate the much needed funds for ecological research. Its large plot and proximity to Nyeri town makes it ideal for development of research bandas to serve the many non resident researchers who carry out research in this region annually. In light of this, a research Banda and a conference facility will be developed at the Research Station to offer affordable accommodation and a conducive environment for study and research. On the other hand, to increase accommodation for researchers, the existing Olive Research Banda at the Aberdare Salient which is located a few meters from a tourist road and is not well screened to prevent visual intrusion, will be relocated to the Ranger's Camp which is close by.

Plate 1. Olive Research Banda. This Banda is located next to a tourist road.

Natural Forest Management Programme

Programme Purpose and Strategy

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

> Natural forests are sustainably managed for provision of wood and non-wood forest products, and environmental, socio-economic services

The AE 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 which is one of the green house gases contributing to climate change. The forests regulate water cycles, maintain soil quality and reduce the risks of natural disasters such as floods. They also offer diverse resources for consumptive use e.g. firewood, livestock grazing, collection of herbs for medicinal use, water abstraction, fish farming and beekeeping.

However, despite the importance of this forest ecosystem, degradation through illegal logging, over grazing, invasive species, tree diseases and pests, wild fires, charcoal burning, encroachment, and excision threaten the ecological integrity of AE. As regards the latter two issues, encroachment and illegal excisions, this has taken place in areas such as Muruai, Mutonyora, Magumo North, Kijabe Hill and Kabiruini forests. To address these issues holistically, KFS is using a multi-pronged approach including involving communities in Participatory Forest Management (PFM) and seeking reversal and reclamation of encroached and illegally excised forests. 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.

AE Natural Forest Management Programme aims to address the threats that are impacting on the most important ecological features in the ecosystem, and provide a long-term guiding framework for management of natural forests in the area.

Guiding Principles

The following sections set out the guiding principles that are designed to guide AE managers and stakeholders in the implementation of the Natural Forest Management Programme and the achievement of the Programme Purpose. These principles are derived from the following KFS policy documents: Forest policy, 2007; Forest Act, 2005; and Participatory Forest Management Guidelines, 2006.

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*[7]. For a long

[7] Functions of forests include-Conservation of water, soil and biodiversity; riverline 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.

time management of AE 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,[8] which can be developed in combi-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.

The natural forest is providing socio-economic, cultural and environmental services

Functions of forests include conservation of water, soil and biodiversity; riverine protection; cultural use and heritage; recreation and tourism; sustainable production of wood and non-wood products; carbon sequestration and other environmental services; and education and research purposes. Under this programme, AE management will implement management actions to ensure that all these forest functions among others not listed are maintained.

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 activate 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, register a Community Forest Association (CFA) 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.

Under 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.

Restoration of degraded forest areas

In the 1990s, AE 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 AE but they are regenerating, albeit slowly. To hasten the regeneration, 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. This is in line with one of the Vision 2030 medium Term Plan (2008-2013) flagship projects for the environment "*The Water Catchment Management Initiative" which calls for rehabilitation of the 5 water towers (i.e. Mau Escarpment, Mt. Kenya, Aberdares Range, Cherangani Hills and Mt. Elgon)".* Artificial and natural regeneration will therefore, help rehabilitate the fragile and degraded areas that are prone to erosion and excessive water run off while phase IV(zaina area) of the electric fence will also be reviewed inorder to fence in indigenous forest stretching from Ruhuruini to Kabage forest.

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

The two objectives developed for AE Natural Forest Management Programme are:

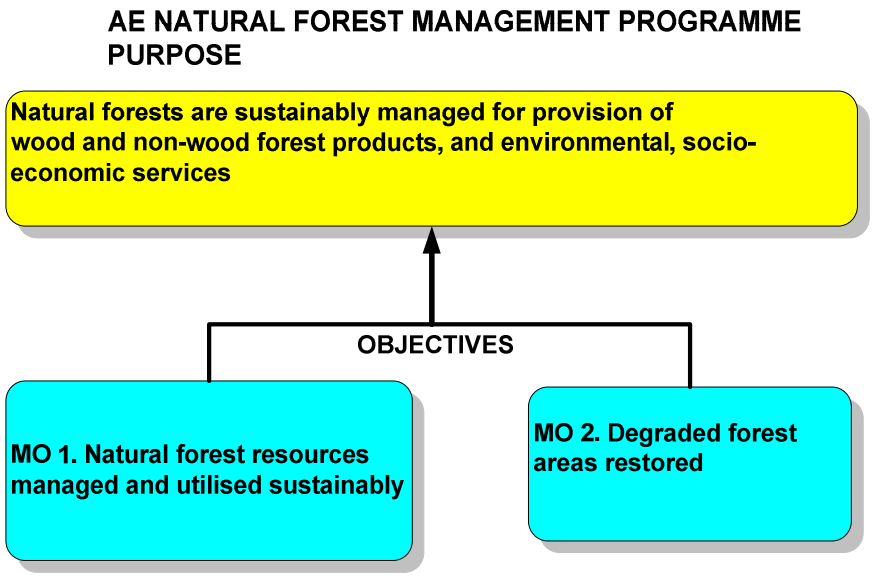
MO 1. Natural forest resources managed and utilized sustainably
MO 2. Degraded forest areas restored

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

Figure 7 below shows the overall objectives tree for AE Natural Forest Management Programme.

Figure 7. Natural Forest Management Programme objectives tree



Objective 1: Natural forest resources managed and utilised sustainably

The future desired state of AE is where natural forests are sustainably managed to fulfill social, economic, ecological, cultural and spiritual needs of the present and future generations. Currently, the AE 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 is no longer comparable to the situation in the 1990s when the AE experienced indiscriminate and uncontrolled wanton destruction of the forest through

logging. It is vital that forest destruction be minimised and degraded areas are rehabilitated as destruction of the natural forest erodes AE'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 suppress tree regeneration and limit food requirements for wild herbivores. 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; regulating utilisation of non wood forest products; establishing livestock carrying capacity; and controlling charcoal burning and illegal logging. These management actions are elaborated in the following sections.

Action 1.1 Develop comprehensive management plans for all AE forest stations

The Forest Act (2005) requires that KFS 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 AE stations[10] and they are in various stages of development with some planning processes having been completed and launched (e.g. Geta, Ol Bolossat, Ndaragwa and North Kinangop) while others are at the drafting stage (e.g. Kimakia, Gatare, South Kinangop, Wanjerere and Kiriita). However, the rest are yet to start preparing PFM plans for their forest management units. As such, under this management action, KFS will support development of management plans for the remaining forest stations in line with the Forest Act 2005 and PFM guidelines.

Action 1.2 Carry out Natural Resource Assessment (NRA)

Degradation of forest cover in the AE is having serious effects on the production of forest goods and services necessitating the need of NRA to ascertain the forest status. As such, under this management action, AE management will carry out a Natural Resource Assessment to establish the status of biodiversity and its socio-economic importance to the local community. In order to conduct this assessment all relevant reports and publications regarding natural resources in the AE will be identified by searching in KWS and KFS libraries and archives, meeting with resource managers, and directly contacting researchers who have conducted projects pertinent to natural resources in the ecosystem. After an initial review of natural resource literature and meeting with resource managers, general natural resource topics of relevance to AE will be identified and these will form topics for further discussion in workshops that will be organised for resource managers and researchers from various institutions to identify all past and ongoing natural resource studies, recognize gaps in knowledge about the resources, and suggest desired conditions and management prescriptions for the AE's natural resources.

[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] AE Forest stations – Ndaragwa, Geta, South Kinangop, North Kinangop, Gatare, Kimakia, Wanjerere, Kamae, Kieni, Ragia, Kinale, uplands, Keriita, Zuti, Kabage, Kiandongoro, Zaina and Muringato,

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

Although harvesting of forest products is going on in the Forest Reserve, information on the needs of the community and the level of available forest resources is scanty. As such, AE forest management will carry out a study to determine the growth, yield and extraction levels of wood and non-wood products in AE 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.

Action 1.4 Establish a mechanism for regulating livestock grazing in the forest reserves

Over grazing has been identified as one of the threats to forest conservation in the AE. It results from forest grazing pastures hosting livestock that are beyond the carrying capacity of the land. Consequently, pastures are degraded resulting in insufficient forage for both livestock and wild grazers. To mitigate over grazing, KFS will carry out a study to establish allowable livestock stocking levels per forest station. Once this is established, measures will be put in place to ensure that the permitted stocking levels are adhered to. Meanwhile, before appropriate stocking levels are determined, KFS will use adaptive management as in current management, to adjust management tactics as informed by habitat monitoring information. Adaptive management will be used to regulate grazing periods and pasture use.

In order to harmonise conflicting water and forest conservation policies, the plan implementers will negotiate with the community forest users associations (CFAs) to stop grazing in the natural forests and communities in return will get economic returns from programmes such as carbon credits for use in putting up zero grazing facilities.

Plate 2. Livestock grazing in the Multiple Use Zone

Action 1.5 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 Geta (Wanjohi, Kipipiri), Kabiruini, Tanyai and Ndaragwa forests.

To minimize illegal charcoal burning in the forest, several approaches will be applied. First AE management will collaborate with Rhino Ark and other conservation NGOs in promoting use of carbon dioxide balance stoves and energy saving *jikos* among AE adjacent communities and education institutions. This will be carried out through community education and outreach programmes implemented by both KFS and KWS. 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, AE 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 AE and the adjacent Laikipia County.

On the other hand, although logging was 'banned' in 1999, illegal harvesting of tree species has persisted in the ecosystem but at low levels. Some of the most targeted tree species are cedar (*Juniperus procera)*, Podo (*Podocarpus spp)*, camphor (*Ocotea usambarensis), Prunus Africana,* and *Olea spp*. To control illegal logging AE management will increasingly use CFAs in identifying the culprits and patrolling the forest to minimize illegal activities. Towards this, AE 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 1.6 Review and align phase IV(zaina area) of the electric fence in order to fence in indigenous forest stretching from Ruhuruini to Kabage forest

The intention of the electric fence in Aberdare was to fence in most of the indigenous forests especially those that are critical water catchments in the ecosystem. During the fencing of the area, a huge area of the indigenous forest was fenced out contrary to the fence management plan. It is the intention of the fence management team to review the alignment and correct the anomally.

Objective 2: Degraded forest areas restored

The future desired state of the AE is where degraded forest patches are restored to maintain ecological integrity. Degraded forest patches are a result of previous wanton destruction of the forest reserves through illegal extraction of trees mainly for charcoal production and timber. This management objective has therefore been developed to ensure that the degraded forest patches are identified and restored. Two management actions focusing on *development and implementation of a forest restoration action plan* and carrying *out enrichment planting* have been designed to achieve this objective. These actions are expanded upon in the following sections.

Action 2.1 Develop and implement a forest restoration action plan

Since the countrywide ban on logging was effected in 1999, natural regeneration of indigenous forest in Aberdare ecosystem 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, AE forest management will carry out a study to map degraded forest patches using remote

sensing techniques. AE 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 AE forest management will thereafter prepare and implement a forest rehabilitation action plan involving multiple stakeholders.

Action 2.2 Carry out enrichment planting in degraded forest patches

Overexploitation of selected indigenous tree species[11] of commercial value in the Aberdare ecosystem has resulted in some of these trees becoming rare requiring active management to prevent further depletion and eventual extinction in AE. As such, KFS will use enrichment planting to ensure continued availability of commercially important indigenous tree species. During enrichment planting, care will be taken to use good planting stock to ensure viability of planted seedlings. In addition, weeds and over-storey cover will be controlled to increase seedling survival. The enrichment planting programme however, will be preceded by initial forest assessments of the target enrichment areas to gain sufficient knowledge on environmental factors that may influence success of enrichment planting.

[11] *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

Plantation Forest Establishment and Management Programme

Programme Purpose and Strategy

The purpose of the Plantation Forest Management Programme is:

> To maintain and enhance productivity of industrial forest plantations and increase efficiency in wood utilization for wealth and employment creation

The area of natural forests in the AE has declined over the years mainly because of land conversion from forest to agriculture, and forest degrading activities, such as illegal logging and charcoal burning. With the decline of the natural forest, the main alternative for meeting the present and future needs for wood at the regional and national level are trees grown on forest plantations and/or through on-farm forestry. With the expanding population and economy, the demand for industrial forest products, timber, and fuel wood is growing creating a gap that is often met through illegal logging or on-farm forestry as currently logging in government forests is banned. Appropriate measures are therefore needed to bridge the gap between demand and sustainable supply of wood products. This calls for establishment and management of intensively managed forest plantations in designated forest land to stabilize the wood market in the future.

Forest plantations have been established mainly using exotic species due to their faster growth rates over the indigenous species. The faster growth rate helps to take away pressure from natural forests by providing timber within a short period of time. Forest inventory to establish the existing quality and value of forests resources has been completed. Currently, the AE has approximately 30,396 hectares of industrial forest plantations composed mainly of Cypress, Pines and Eucalyptus. These plantations are expected to be a major revenue earner for KFS when fully operational. Forest plantations in the AE will therefore be established using mainly exotic species and managed on sustainable basis with the primary objective being the production of wood and other forest products and services for commercial purposes. Sustained planting will be done through Plantation Establishment and Livelihood Improvement Scheme (PELIS), which currently covers approximately 878 hectares distributed as follows: Geta-200 Ha; Ol Bolossat-200 Ha; Kieni-80 Ha; Kamae-340 Ha; and Thogoto-58 Ha.

Guiding Principles

In implementing the AE's Plantation Forest Management Programme, AE Management and stakeholders will be guided by the following principles: sustainable commercial production of wood and other forest products; and support for improvement of community livelihoods. These guiding principles are discussed in the following sections.

Sustainable commercial production of wood and other forest products

Plantation forests in AE 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 sink. AE plantation

forests will therefore be developed and managed to meet these demands. This is line with the Forest Act 2005, which states that "*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".*

Supporting improvement of community livelihoods

KFS is piloting Plantation Establishment Livelihood Improvement Scheme (PELIS) in several forests spread out throughout the country e.g. AE, Mt. Kenya, Bahati, and Dundori forests. The aim of this scheme is to enhance survival of saplings at a lower establishment cost and enhance food security as well as income generation by the communities. It entails identifying areas to be established, subdividing it to CFA members who cultivate the land for the first year and KFS establishes trees in the course of the second year. The CFA members cultivate crops while tending to the trees for the next two years after which they abandon it for new allocation if more space is available. At the AE, plantation establishment through PELIS is being experimented at Geta, Ol Bolossat, Kireita and Kamae. Under this management programme, PELIS will be expanded to other forest stations.

The two objectives developed for AE Plantation Forest Management Programme are:

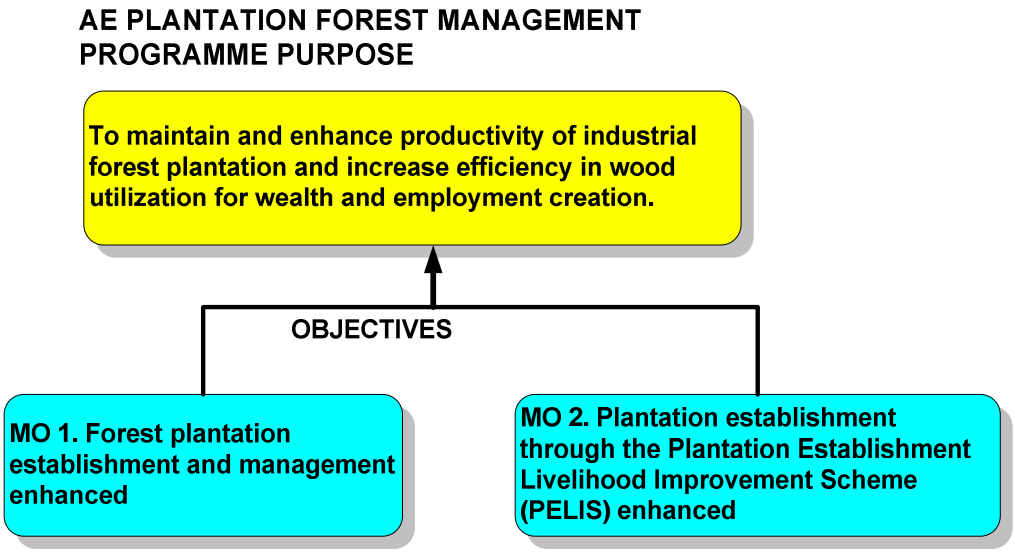
MO 1. Forest plantation establishment and management enhanced
MO 2. Plantation establishment through the Plantation Establishment Livelihood Improvement Scheme (PELIS) enhanced

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

Figure 8 below shows the overall objectives tree for AE Plantation Forest Management Programme.

Figure 8.Plantation Forest Management Programme objectives tree



Objective 1: Forest plantation establishment and management enhanced

This management objective has been developed to address issues affecting plantation establishment and management in the AE. These issues range from planting backlogs which has resulted from the previous ban on residential cultivation of forests and the government ban on timber harvesting which is still in force. Also, illegal logging of plantation forests is another challenge to the management of plantation forests in the AE.

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 increasing output from KFS tree nurseries to meet the demand for plantation backlog; supporting establishment of tree nurseries in community adjacent areas; and converting fenced-in exotic plantations to natural forest. These actions are elaborated in the following sections.

Action 1.1 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 planting backlog areas. However, there is need to ensure timely availability of adequate and quality tree seedlings not only for exotic plantation establishment but also for rehabilitation of natural forest and farm forestry programmes in the forest-adjacent areas. As such, to meet the tree seedling demand, AE management will establish and maintain its own tree nurseries and at the same time support establishment of community or private tree nurseries (see action 1.2 below). 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 South Kinangop, Kamae, Uplands and Kiandongoro forests will be used for harvesting seeds for commercial plantation establishment. KFS will 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, reafforestation and community farm forestry programmes. It will also adopt new technologies e.g. green houses and tissue culture in seedling production. 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 AE 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 1.2 Support establishment of tree nurseries in community adjacent areas

To increase tree seedling production for natural forest rehabilitation and on-farm forestry, 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. 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. Secondly, KFS will liaise with 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 1.3 Convert fenced-in exotic plantations to natural forest

There are a few scattered pockets of exotic plantations that have been fenced in. These plantations will be harvested on maturity and the harvested patches rehabilitated through enrichment planting or allowed to regenerate naturally.

Objective 2: Plantation establishment through the Plantation Establishment Livelihood Improvement Scheme (PELIS) enhanced

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, poor plantation establishment and losses from game damage.

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. KFS on its part identifies and zones off the forest areas available for cultivation, marks individual plots, prepares a sketch map of all the plots displaying them prominently at the forest stations responsible for the forest areas and allocates the plots using a balloting system organized through the CFAs. KFS also raises the planting material and replants the opened up areas with trees. It also maintains a register with details of all cultivators in a forest station. On their part, cultivators assist in beating up or replanting (whichever may be appropriate) in cases of low survival of seedlings, control illegal forest activities, prevent or fight forest fires and participate in any other activity that may be beneficial to the forest.

This objective has therefore been designed to address issues relating to plantation establishment through PELIS. Management actions to achieve this objective focus on: supporting plantation establishment through PELIS; protecting PELIS sites from game damage; developing detailed operational plans for forest plantations; establishing forest plantations based on market demands; carrying out scheduled silvicultural activities in the plantations; monitoring tree pests and diseases; and demarcating forest boundaries to prevent encroachment. These actions are expanded upon in the following sections.

Action 2.1 Support plantation establishment through PELIS

To ensure that the PELIS experiment is a success in the AE, AE management will adopt several approaches aimed at strengthening the CFAs and giving incentives to farmers. First, AE management will provide each PELIS farmer the PELIS guidelines to ensure that all farmers are familiar with the expectations of KFS. Second, AE 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 AE 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 thinning and pruning. Finally, the PELIS programme in AE will be evaluated annually to find out whether the objectives of the programme are being realised.

Action 2.2 Protect PELIS sites from game damage

A 400 km ring fence has been constructed around AE to minimise human-wildlife conflicts in the area and in so doing gain community support for conservation of the ecosystem. However, pockets of conflict still exist in areas where wildlife has been fenced out. To prevent crop raiding wildlife from destroying crops and young plantations in the PELIS sites, appropriate and effective wildlife barriers, such as electric fences or game moats will be constructed to hem in these sites. In this regard, the proponent of the project will bear the burden.

Action 2.3 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 the Natural Forest Management Programme, detailed operational plans will be prepared to guide the day to day management of forest plantations. The operational plans will specify areas to be opened for plantation establishment through PELIS, tree planting needs, silvicultural requirements, and felling plans.

Action 2.4 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. Production and utilisation of species like bamboo can also be explored to reduce pressure on species that are traditionally over-utilized. In view of this then, under this management action, AE 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 AE wood markets.

Action 2.5 Carry out scheduled silvicultural activities in the plantations

There is a huge backlog in silvicultural operations in AE, which is attributed to the moratorium imposed on timber harvesting in 1999 and poor funding, resulting in poor quality plantations. To ensure that forest plantations are producing the envisaged quality and quantity of wood products, AE Foresters will carry out silvicultural activities in accordance with plantation operational plans that will be prepared through the implementation of action 2.3 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 AE foresters.

Plate 3. Pruned trees in one of the AE forest plantations

Action 2.6 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, *Omiida ghani* and eucalyptus chalcid. The ecosystem has suffered from major pest and pathogen attacks due to delayed silvicultural operations, game damages and delayed rotational period. To ensure that plantations are not lost to controllable diseases and pests, AE 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.

Farm Forestry Management Programme

Programme Purpose and Strategy

The purpose of the Farm Forestry Management Programme is:

> To promote farm forestry to increase tree cover for sustained timber, wood fuel, non-wood forest products and environmental conservation

Trees are an essential part of diversified farm production, providing both subsistence products and incomes while contributing to soil and water conservation and soil fertility. Products such as fuel wood or fodder from trees, shrubs or grass contribute significantly to the economies of the rural population. Given the growing population, it is not possible to meet all the demands of forest products from state forests. The alternative source of these products is expected to come from farmlands. To promote production of forest products from private and communal land, KFS has established a farm forestry programme. The main objective of this programme is to support and facilitate farmers to raise trees and forest products in their farms in order to ease pressure on gazetted forests and also manage the woodland forestry resources in the ASALs. This is in line with the Forest policy and legislation as well as the country's constitution which under article 69 1(b) states that" *the state shall work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya.*

At the AE, the farm forestry management programme focuses mainly on provision of farm forestry extension services in the influence zone located within a 5 km distance from the forest boundary. The activities undertaken include; providing technical assistance to communities on nursery establishment, advising on suitable species for farm forestry, tree planting techniques and tree husbandly. However, implementation of this programme is hampered by inadequate resources such as transport, funding and personnel. This management programme will seek to address these problems to realise the programme purpose.

Guiding Principles

In implementing the AE's Farm Forestry management Programme, AE Management and stakeholders will be guided by the following principle: promoting farm forestry and supporting effective forest extension. This guiding principle is expanded upon in the following section.

Promoting farm forestry and supporting effective forest extension

According to vision 2030 and the new constitution of Kenya, the nation is aiming at attaining and maintaining a national tree cover of 10% of the country's land area. The medium term plan (2008- 2012) of Vision 2030 aims to achieve at least 4% national tree cover by 2012. Further, the Agricultural Act stipulates that 10% of individually or communally owned land parcels should be planted with trees. This programme aims to contribute to the achievement of the national objectives by supporting and expanding forest extension services in the AE adjacent areas. This is expected to result in a significant increase in tree cover relieving pressure on the natural forest. Farm forestry will be expanded through a well thought-out coordinated strategy that addresses the financial, environmental, and agricultural and personal needs of the land owners. This will involve planting trees through agroforestry and

establishing small forests patches in ways that increase and diversify farm and forest produc-production while also conserving natural resources.

The objectives that have been developed for AE Farm Forestry Management Programme are:

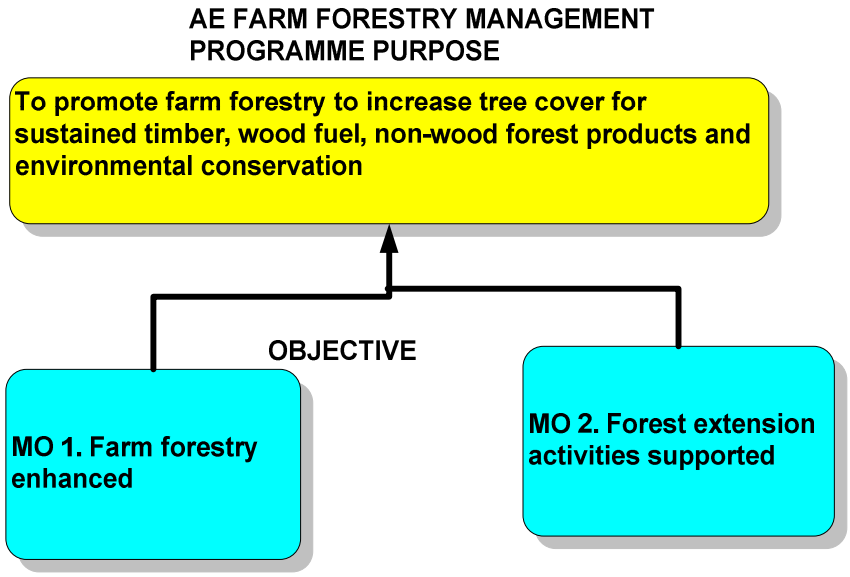
MO 1. Farm forestry enhanced
MO 2. Forest extension activities supported

These management objectives and their corresponding management actions are described in detail in the sections below.

Management Objectives

Figure 9 below shows the overall objectives tree for AE Farm Forestry Management Programme.

Figure 9. Farm Forestry Management Programme objectives tree



Objective 1: Farm forestry enhanced

The future desired state for the AE is where farm forestry is meeting the forest product needs of the local communities. Currently majority of the community members adjacent to the forest are overly dependent on the forest for products such as fuel wood and building materials. This is exerting a lot of pressure to the forest and also encouraging illegal extraction of forest resources that are in high demand. Consequently, this management objective has been designed to promote farm forestry in AE adjacent areas to reduce pressure on the forest. The management actions that have been developed to achieve this objective focus on; supporting production of wood products through farm forestry; supporting establishment of farm forestry related income generating activities; and collaborating with stakeholders in promoting farm forestry.

Action 1.1 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 remove pressure on the forest and at the same time generate income to farmers. The demand for 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. To encourage farmers to adopt farm forestry, KFS will provide incentives such as seedlings, tree nursery establishment materials and space for nursery establishment to farmers.

Action 1.2 Support establishment of farm forestry related income generating activities

For the AE-adjacent communities 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. To ensure that the communities are reaping from conservation and returns from their efforts are appreciable, AE management will support establishment of farm forestry income generating activities including planting of commercial trees in line with KFS guidelines. However, the funding support will be based on well researched project feasibility studies and business plans to ensure viability.

Action 1.3 Collaborate with stakeholders in promoting farm forestry

To effectively conserve the natural resources of the AE, 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 AE stakeholders in promoting farm forestry by building the capacity of these associations. Support will be sought from stakeholders, like Rhino Ark, Greenbelt Movement, KWS, Tree is Life, Nature Kenya, KENGEN, Hoteliers and Nairobi

Water and Sewerage Company who are already involved in afforestation and reafforestation initiatives in the AE.

Objective 2: Forest extension activities supported

The future desired state of the AE is where forest extension services are effective in increasing tree cover in areas adjacent to the AE. The farm forestry sector faces many challenges including lack of skills among farmers to produce trees for commercial purposes. Under this objective, forest extension activities will be supported and expanded through use of diverse extension approaches and tools to help land owners to develop sustainable farm forestry ventures on their farms. The management actions developed to achieve this objective include; carrying out Participatory Rural Appraisals (PRAs); establishing on-farm forestry demonstration plots; training community members in on-farm forestry best practices; and developing and disseminating farm forestry extension information.

Action 2.1 Carry out Participatory Rural Appraisals (PRAs)

To develop a holistic farm forestry strategy, there is need to carry out a community appraisal to understand the problems hindering adoption of farm forestry in AE adjacent areas. Such an appraisal should adopt a multi-sectoral approach in order to develop a holistic and comprehensive community action plan. Under this management action, KFS farm forestry extension officers at the AE will liaise with KFS headquarters in carrying out PRAs for the AE adjacent communities. The PRAs will identify community needs related to farm forestry, prioritize these needs and develop action plans to meet the needs. KFS, on its part, will support implementation of these action plans.

Action 2.2 Establish on-farm forestry demonstration plots

On-farm tree planting demonstration plots are usually established in forests adjacent to the farms and used as focal points for technology dissemination at the farm level. Several demonstration farms have already been established in the AE but they are not adequate to provide the required services to all AE-adjacent farmers. To address this short-fall in demonstration plots, AE management will establish additional demonstration plots in suitably located open homes. The plots will also be evenly distributed to cover the entire AE.

Action 2.3 Train community members in On-Farm forestry best practices

Majority of community members lack essential skills and knowledge to effectively engage in commercial farm forestry. In order to build this capacity among community members, KFS has been training community members in on-farm forestry best practices. However, only a small proportion of community members have so far been trained. In view of this, training in farm forestry will be increased and exchange visits will be organized to areas with successful On-farm forestry programmes.

Action 2.4 Develop and disseminate farm forestry extension information

To reach a wide audience with farm forestry messages requires use of a wide array of communication methods including dissemination of new farm forestry techniques through the

electronic and print media. In view of this, KFS will develop education materials targeted at different social strata (small-scale and large-scale farmers) in the community. These materials will include; pamphlets, brochures, posters, farm forestry manuals, and nursery management manuals. These materials will be produced in liaison with KFS Corporate Communication department. In addition, AE forest extension will seek opportunities from the local FM radio stations to educate the community on farm forestry issues.

Water Resource Management Programme

Programme Purpose and Strategy

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

> Water resources in Aberdare ecosystem are protected, conserved and utilized judiciously, to meet domestic, agricultural, and industrial needs of the present and future generations

The Aberdare ecosystem (AE) water resources management programme is formulated in accordance with the Integrated Water Resources Management (IWRM) guidelines developed by Water Resources Management Authority (WRMA) in accordance with Section 15 of the Water Act 2002. The guidelines appreciate the spatial heterogeneity of natural and social systems within AE catchment, but focuses in creating pockets of homogeneity based on Hydrological Similar Units (HSU), ecology, local community livelihood and sub-catchment commercial viability. The programme addresses issues affecting water resources in the protected area and the surrounding five kilometre influence zone.

AE has a unique and critical geomorphologic character that feeds four out of the six catchment areas[12] in Kenya. The moorlands and the afro-alpine zones of the AE contain numerous water bogs and are the main source of streams and rivers that dot the slopes. In addition, there are numerous tributaries that flow from all sides of the Aberdare increasing the downstream volume of the main rivers. WRMA has already developed robust 5-year catchment management strategies for each of the four catchment areas that drain AE. These documents were key reference materials in the development of the AE water resources management programme.

Guiding Principles

In implementing the AE's Water Resources Management Programme, AE Management will be guided by the following principles: water catchments and systems are conserved and protected to secure continuous availability of water in the AE and beyond; exploitation of water resources is carried out equitably among water users; and maintaining optimum production of quality water from AE in collaboration with responsible agencies. These principles are elaborated in the following sections.

Water catchments and systems are conserved and protected to secure continuous availability of water in the AE and beyond

The AE is a key water tower in Kenya and its ecological integrity is of local and international concern and interest. However, it faces a host of major challenges that undermine its water catchment value unless urgent steps are taken. These include activities such as charcoal burning and illegal harvesting of wood and non wood forest products. Through this pro-

[12] These are the Rift Valley Catchment Area, mainly drained by Malewa River that feeds Lake Naivasha; the Athi River Catchment Area, mainly drained by Athi River; Tana River Catchment Area, mainly drained by Tana River; and Ewaso Ng'iro North Catchment Area mainly drained by the semi-permanent Ewaso Ng'iro River that feeds into Lorian Swamp in northern Kenya.

gramme, WRMA will extend its support to KWS and KFS to enhance their capacity to minimise catchment degradation.

Exploitation of water resources is carried out equitably among water users

While the water sources in AE have the potential to be a strong and sustainable source of revenue to support conservation and management activities of the area, skewed apportionment is a serious source of conflict especially from down stream residents. There is evidence that the volume of water in the rivers has reduced due to over-abstraction, extended dry spells and destruction or reduction in AE forest cover. During the dry spells abstractors tend to move further upstream to fetch untapped water. This tends to substantially affect the volume of water available for downstream users. Creation of storage facilities inside and outside the AE would greatly reduce this movement.

On the other hand, irrigation is not supposed to be carried out from normal flow, but from flood water harvested during the rainy season. As such, irrigation abstractors need to adhere to the basic requirements set out by WRMA of having adequate storage from flood flows to cater for irrigation needs during dry periods. All in all, balanced apportionment and allocation will ensure long-term protection and conservation of AE which will contribute to overall national economic development.

Maintain optimum production of quality water from AE in collaboration with responsible agencies

The quality of water in key rivers within AE is key to continued conservation of habitats and wildlife within and outside the ecosystem. The potential impacts of poor water quality on the health of the huge population that depends on the AE is too serious and far-reaching necessitating constant monitoring of water quality. This requires establishing and/or strengthening collaborations with key stakeholders in the area to ensure that water coming from the ecosystem meets local standards for domestic use.

These guiding principles have been taken into consideration while designing the Water Resource Management Programme's three management objectives that, when taken together, will achieve the Programme Purpose. The three management objectives are:

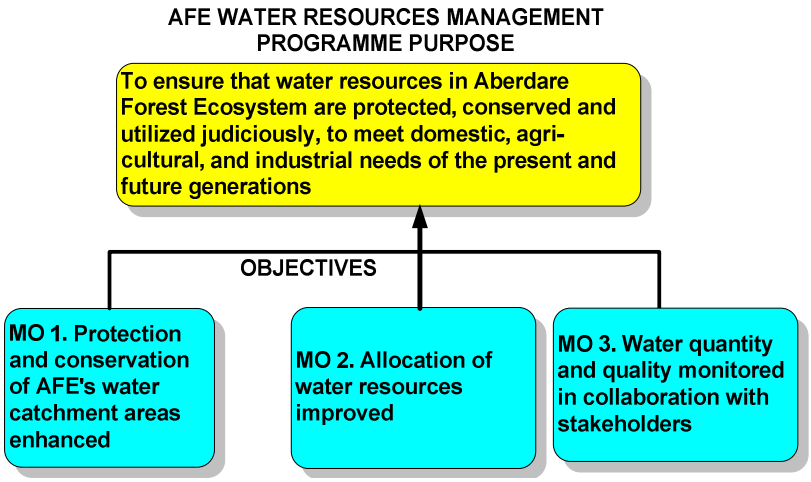
MO 1. Protection and conservation of AE's water catchment areas enhanced
MO 2. Allocation of water resources improved
MO 3. Water quantity and quality monitored in collaboration with stakeholders

These management objectives and their corresponding actions are described in the following sections. 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 Water Resources Management Programme, and details the activities, responsibilities, timeframe and milestones necessary for the delivery of each management action over the first 3-year timeframe of this management plan.

Management Objectives

Figure 10 below shows the overall objectives tree for the AE Water Resources Management Programme.

Figure 10.Water Resources Management Programme objectives tree



Objective 1: Protection and conservation of AE's water catchment areas enhanced

Habitat degradation in the AE compromises substantially the quantity and quality of both surface and ground water resources. In fact, several surface water bodies in AE e.g. Waithaka dam, Kahogi's dam, Mahigaini dam etc, are already heavily silted leading to reduction of their water holding capacity. The impacts of siltation were manifested in August 2008 when river Tana changed course at Kibusu, seven kilometres north of Garsen town adversely affecting 35,000 residents in nine locations of Tana River County.

To protect and conserve water production capacity, WRMA has designated four catchment regions in AE depending on their drainage pattern similarities. They include the Tana Catchment, Rift Valley Catchment, Athi Catchment and Ewaso Ng'iro Catchment. Within each catchment region, WRMA has also identified water system specific sub-catchments and has begun building capacity in local communities to form localised Water Resource Users Associations (WRUAs) that are charged with protecting and conserving specific water systems. WRMA assists the WRUAs to develop sub-catchment management plans (SCMP) for funding by Water Services Trust Fund in line with the WRUA Development Cycle (WDC). Successful SCMPs developed and funded so far include Chania 4AC, LANAWRUA, Lower Malewa, Mukungi-Kitiri, upper Turasha, Karati, and Lower Ruiru. Under this management objective therefore, a series of management actions have been developed to strengthen existing catchment protection strategies. These actions are set out in the following sections.

Action 1.1 Eliminate destruction of riparian vegetation

Deforestation and clearance of indigenous vegetation in the riparian zones reduces the ecological integrity of catchments and substantially hampers their ability to store water.

WRMA in conjunction with local WRUAs is demarcating the catchment buffer zones and other riparian zones. This process will be enhanced in this plan to ensure that farmers do not cultivate in the riparian zones. Other measures that will be taken to rehabilitate and conserve the water sources include planting of water friendly plants and creating awareness in the local community on the role of riparian zones in conserving water resources.

Action 1.2 Establish additional WRUAs and facilitate WRMA to access funds from the Water Services Trust Fund

The aim of establishing a WRUA is basically to put in place a forum for all beneficiaries of a water body to discuss and agree on the best strategies of sustainablly managing and utilizing the water body. A functionally sound association requires participation of all the beneficiaries and support groups in a carefully structured process that is within the legal framework and ensures sustained interest by the stakeholders. WRMA has “bottom up” guidelines that stipulate clearly the mechanisms to be followed in the formation of WRUAs within a sub basin catchment. Already several WRUAs have been formed in the AE and are actively involved in management of water resources. Several catchment rehabilitation projects have also been funded by WSTF. However, AE is a large ecosystem and therefore not all river systems have WRUAs. Under this management action therefore, river basins without WRUAs will be identified. WRMA will thereafter facilitate formation of new WRUAs and build their capacity to effectively develop catchment conservation and protection proposals for funding by WSTF. WRMA will also collaborate with other institutions and especially KWS, NEMA and KFS to develop the water management capacity of WRUAs.

Action 1.3 Create community awareness on the water sector reforms

In 2002, major reforms were initiated in the water sector with the revision of the Water Act, which decentralized water management through an institutional framework that separates policy formulation from regulation and services provision. Local communities therefore need to understand the current approach the government has taken in mitigating their water needs and take advantage of the changes contained in this law to improve their current water and sanitation service levels. To achieve this, WRMA will conduct civil education on the current Water Sector Reforms and the existing policies and opportunities on water resource management through public meetings, seminars and workshops. As a start, WRMA will focus on the sub-catchments of the major rivers in each main catchment, and later roll out the awareness programme to all the sub-catchment basins within AE.

Objective 2: Allocation of water resources improved

In order to promote social harmony and economic production, it is very important to ensure that water resources are apportioned in an efficient, transparent and equitable manner among all users. WRMA is required to develop Water Allocation Plans (WAPs) for various sub-catchments in AE in collaboration with stakeholders. The WAPs capture the priorities, procedures, and management controls that relate to sharing of water resources. The WAPS are expected to address water allocation problems in the AE including excessive water abstraction and non payment for water services.

A series of management actions have been developed to achieve this management objective and are set out in the following sections.

Action 2.1 Prepare Water Allocation Plans (WAPs) for every river system

Ineffective water allocation systems are responsible for discontent and mistrust between water managers and farmers in the AE. Illegal water abstraction, over abstraction, and wasteful use of water through use of inefficient irrigation systems such as sprinklers and open irrigation furrows have been identified as key sources of conflicts. To address these problems WRMA will therefore carry out comprehensive abstraction surveys for each river system. During the surveys, water abstraction levels will be recorded and water allocation plans prepared. The WAP will be used to correct, reduce or close any over abstraction activity that will be established. In addition, WRMA will identify major sub-basin catchments and start serious metering pilot programmes that will be rolled out to all catchments to enhance water use.

Action 2.2 Collaborate with KFS and KWS in monitoring river water levels in the AE

WRMA has installed several Regular Gauging Stations (RGSs) in the main rivers for monitoring water quantity. However, data from some of these RGSs are not collected regularly because WRMA lacks capacity to do so. In addition, some rivers do not have RGSs. To rectify this, WRMA, in collaboration with KFS and KWS will undertake an inventory of RGSs within AE. 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 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 2.3 Collaborate with KFS and KWS in monitoring water abstraction in the AE

Issuance of water abstraction permits has been decentralized to the WRMA's regional catchment area offices in line with the Water Act 2002. Hence, 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, WRMA will create a comprehensive database of water abstractors within AE and will update it regularly. This information will be shared with the other stakeholders, and particularly KFS and KWS, who are involved in the management of the AE. In addition, WRMA will collaborate with both KFS and KWS in carrying out inspections of water abstraction points inside the AE to ensure that illegal water abstraction is stopped.

Action 2.4 Cluster intakes to regulate 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 AE 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 monitor water demand and supply in AE (see action 2.1 of this programme). In addition, all water abstractors will be required to install water meters to facilitate monitoring water utilisation and levying of appropriate fees to water users.

Action 2.5 Monitor ground water abstraction

Several boreholes have been developed in AE, especially in areas where 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, WRMA will commission ground water assessment studies that will involve carrying out detailed hydro-geological surveys and development of hydro-geological maps to determine 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. In addition, to enhance collection of ground water data, WRMA will involve ground water users in data collection.

Objective 3: Water quantity and quality monitored in collaboration with stakeholders

Water quality and allocation are fundamental issues in the AE, resulting in discontent and mistrust between water managers and farmers. The current frameworks of policy and legislation have not been successful in resolving conflicting interests between those living in the watershed and those consuming water in far away towns. Water resources are prone to pollution from point and non-point sources. Surface waters are polluted from effluent discharges originating from point sources and surface runoff gathering pollutants from non-point sources. In the upper catchment areas, soil erosion is the main source of pollution. In middle catchment, industries, municipalities, agricultural chemicals are major causes of pollution. In lowland areas, pollution originates from flooding, sedimentation, municipal and industrial effluents.

AE represents the upper and middle basin catchment zones that have point and non-point source pollutants, implying that this objective will focus on water quality deterioration resulting from soil erosion and agricultural, settlement and development associated pollutants. The approach to control pollution will involve identification of pollutants, classifying them and identifying their sources in a participatory way under the coordination of WRMA and NEMA. This objective will also address measures that need to be put in place to regulate flooding and ensure optimum production of quality water. A series of management actions have been developed under this management objective and are set out in the following sections.

Action 3.1 Control farmland nutrient, sediment and pollution discharge into water bodies

Intense farming in the upper arable water catchment land is a major point source of water pollution in many 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 such as planting of crops that do not cover the ground against erosion, and removal of vegetation cover for agricultural use also enhance water pollution.
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 en-

couraged to adopt Integrated Pest Management (IPM) techniques to minimise pesticide usage and thereby avert contamination of water bodies.

Action 3.2 Carry out regular water quality monitoring

Water quality studies in the AE have shown that water within the ecosystem meets local standards for domestic water. However, it is paramount that regular monitoring of water sources is carried out so that timely corrective intervention measures can be instituted if a change in water quality is detected. In view of this, WRMA will carry out regular water sampling from the AE rivers and water reservoirs for testing at the regional WRMA water quality testing laboratories.

Action 3.3 Construct water storage dams

With rapid increase in human population within the AE, water demand is likely to outstrip supply and scarcity is likely to become a very common phenomenon. To mitigate water scarcity, WRMA will construct dams along river systems to regulate floods and increase water storage capacity for specific water systems. Earth dams and water pans will be constructed to check flood runoff.

Action 3.4 Create inter basin water transfer

Increasing demand for irrigation and domestic use necessitates transfer of 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 availability in the four catchment basins in AE. The benefits of such transfers are many including, flood control, drought mitigation, increased irrigation, additional food production and electricity generation. 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 assess appropriateness of these projects. In this regard, a feasibility study will be carried out for the targeted inter basin water transfer project i.e. from Chania River to Sasumua River. In this regard, the water deficit in each basin will be calculated, taking into consideration 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 3.5 Support farmers to harvest run-off and/or flood water for irrigation

Rainwater harvesting for agriculture by local farmers within AE can immensely augment surface water use in agricultural production and address environmental problems such as soil erosion. Harvesting rainwater for 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. Hence, WRMA will provide training and extension services to farmers to facilitate adoption of rain water harvesting. In addition, WRMA will promote roof catchment water harvesting systems to supplement river water.

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Tourism Development and Management Programme

Programme Purpose and Strategy

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

> The AE is providing a wide range of unique, sustainable tourism experiences capitalizing on the areas special wilderness values, opportunities for solitude, and unique history

The Aberdare ecosystem (AE) has a very high variety of attractive sceneries and biodiversity resources of great national value and also highly appreciated by tourists. It attracts both domestic and international visitors, including mountain hikers, birdwatchers, game viewers and sport fishermen. Wildlife tops the list of attractions and constitute of diverse animals including the 'big five' of Kenya's Safari tourism i.e. the elephant, buffalo, rhino, lion (population should be managed to minimal) and leopard. The park is also endowed with fascinating sceneries which include majestic waterfalls, caves, and ravines, besides rich historical and cultural heritage.

Tourism development in this ecosystem is faced with various challenges which include poor infrastructure, uncontrolled entry into the ecosystem, visitor security and lack of equitable benefit sharing among all the stakeholders in this sector. This plan proposes management interventions that will address the problems facing the tourism sector in the AE including low visitation, poor diversity of visitor facilities, poor visitor management, and inadequate tourism benefit sharing mechanisms. This programme sets out a series of management objectives and actions that the AE 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 AE Tourism Development and Management Programme. These principles will guide AE management in the implementation of the programme and thereby realise the programme purpose.

Guiding Principles

The principles that will guide implementation of the Tourism development and management programme are: diversifying the tourism product to enhance visitor experience; improving tourism management to enhance visitor satisfaction; and providing high quality tourist facilities.

Diversifying the tourism product to enhance visitor experience

Diversification of the tourism product is critical especially in ushering in numerous socio-economic benefits to a tourist destination. Additional activities create the much needed employment for the local community through provision of goods and services to visitors. In view of this, tourism potential at the AE will be exploited fully through establishment of new tourist activities and facilities that capitalise on the wide array of attractions in the area. AE management will however, evaluate tourist activities so that only those that have minimum adverse impacts on the environment will be allowed.

Improving tourism management to enhance visitor satisfaction

While tourism can be a source of benefits for protected areas, it can also be a major source of ecological degradation if sufficient mechanisms are not put in place to monitor, control and manage tourism impacts. The ability of a protected area to manage tourism depends on the scale of demand for visits to the site, the staff and resources available for management of tourism. Hence, under this programme, management will aim to control tourism impacts through implementation of the zoning scheme, implementing impact management measures, and promoting responsible behaviours by tourists visiting the AE. Consequently, visitor education will be a key strategy that will be followed to ensure responsible tourism in this fragile environment.

Providing high quality tourist facilities

Tourism growth depends on visitor satisfaction which is achieved through provision of good quality facilities and services. Under this programme, the AE will offer diverse, reliable and quality tourist accommodation facilities that meet visitor expectations.

The above discussed guiding principles have been taken into consideration while designing the Tourism Development and management Programme's three management objectives that, when taken together, will achieve the Programme Purpose. The three management objectives are**:**

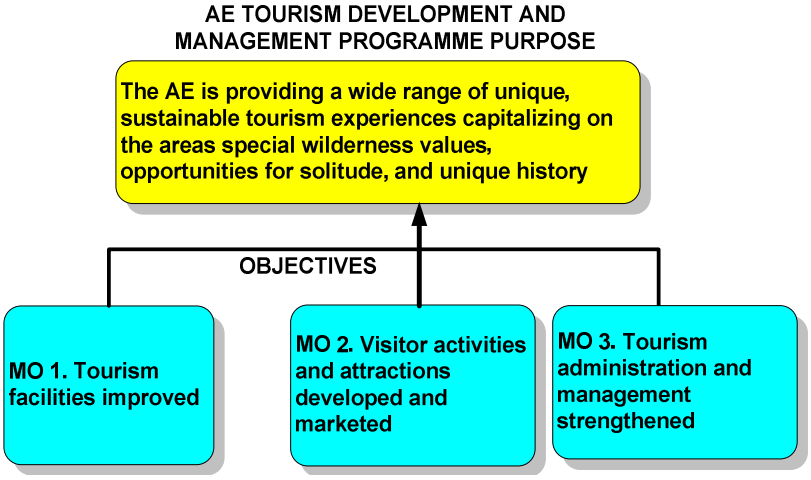
MO 1. Tourism facilities improved
MO 2. Visitor activities and attractions developed and marketed
MO 3. Tourism administration and management strengthened

These management objectives and their corresponding actions are described in the following sections. The final section of the programme however, contains the 3 - Year Activity Plan for the Tourism Development and Management Programme which will be implemented in the first three years of this plan.

Management Objectives

Figure 11 below shows the overall objectives tree for the AE Community Partnership and Management Programme.

Figure 11.Tourism Development and Management Programme objectives tree



Objective 1: Tourism facilities improved

The future desired state at the AE is where high quality tourism facilities that are in harmony with the mountain environment are provided. Currently, tourist accommodation facilities are limited to two lodges and two Bandas implying that the ecosystem could be earning more from visitation if adequate accommodation facilities were available. This management objective therefore seeks to develop high quality tourist accommodation facilities and associated infrastructure to boost tourism in the area. The management actions that have been designed to realize this objective include: identifying tourist facility concession sites; preparing a tourist facility prospectus and advertising identified sites; rehabilitating Bandas; establishing special campsites; upgrading public campsites; upgrading and maintaining tourist roads; and minimizing visual intrusion of tourist facilities. These actions are elaborated in the following sections.

Action 1.1 Identify tourist facility concession sites

The AE is currently generating low revenues from tourism partly because the area has few tourist accommodation facilities. Locating tourist accommodation facilities in the protected area or in areas abutting the protected area leads to enhanced marketing from the concessionaires leading to increased visitation and revenue from park entry and bed occupancy royalties.

Several potential sites for development of tourism accommodation facilities have been identified in the Aberdare National Park and adjacent Forest Reserves (see annex 2). But to select the most suitable facility sites, a site selection team comprising of representatives from KWS,

KFS, KTF, NEMA, Rhino Ark, and Ministry of Tourism and coordinated by the Senior Warden-Aberdare National Park, will be formed. This team will assess the sites according to the criteria set out in Box 3 and in line with the zoning prescriptions. The selected sites will be geo-referenced and photographs of key features at the site will be taken for use in the development of a site prospectus (see action 1.2)

Box 3: Criteria for modelling areas suitable for development of tourist accommodation facilities

1) The facility should be located at least 100 m from a water source and not more than 2 kilometres from the water source
2) The distance from another accommodation facility should not be less than 6 Kilometres
3) The facility should not be more than 2 Kilometres from a tourist attraction (river, cave, water falls, water hole)
4) The facility should not be more than 500 meters from a road or airstrip

Action 1.2 Prepare a tourist facility prospectus and advertise identified sites

The sites selected under see action 1.1 above will thereafter be subjected to the KFS and KWS site award processes. In this regard a map showing the actual location of each site will be produced. This map together with photographs taken at each site will be used to prepare site descriptions which will be compiled into a site development prospectus. The prospectus will be designed to stimulate the interest of tourism investors, particularly those inclined to develop low impact, high quality ecotourism facilities. Once the prospectus is produced, potential investors will bid for the sites through expression of interest. Those who qualify at this stage will be requested to submit their development and management proposals. Then the sites will be awarded to successful bidders who will be required to develop accommodation facilities whose design character is in keeping with a mountain protected area.

Action 1.3 Rehabilitate Bandas

KWS has three functional Bandas in the AE: Sapper Hut, which has two beds and an external bathroom; Tusk Camp, which has two bandas with eight beds; and Fishing Lodge which has a capacity for 14 guests. Although these Bandas are popular with visitors, there are many complaints regarding poor maintenance. For instance, Sapper Hut is currently not in use because it is awaiting rehabilitation. To increase visitor satisfaction therefore, all the Bandas will be rehabilitated and thereafter a program of regular maintenance will be implemented. In addition Tusk Camp will be remodelled to improve aesthetics and provide adequate space in the living room and sleeping areas.

Action 1.4 Establish special campsites

Special campsites are needed to cater for visitors who require privacy and solitude that can not be guaranteed at a public campsite. As such, additional special campsites will be identified in the Northern and Southern Sectors to enhance visitor use of these management sectors. Each special camping site will be designed to accommodate six persons in two vehicles, to avoid overcrowding and enhance the quality of the experience to be enjoyed by visitors. And to guarantee exclusive use of the camp site, visitors or tour operators will be required to book the camp sites in advance.

Action 1.5 Upgrade public campsites

Currently, public campsites are lacking basic facilities that would enhance visitor comfort and experience. Toilets at the campsites are of the long drop type and sheltered barbecue areas are lacking in some of the public campsites. The campsites will be upgraded by providing flush toilets, solar lighting, showers, sheltered barbecue areas, piped water, separate areas for groups and for single or family camping, picnic tables, and firewood for sale. In addition, to avoid overcrowding in the public campsites, visitor carrying capacity for each campsite will be determined and the information disseminated to potential campers through pamphlets and brochures.

Action 1.6 Upgrade and maintain tourist roads

Most tourist roads in the AE, both in the Park and Forest Reserve, are impassable during the wet season. This translates into low park visitation and low bed occupancy of popular and high potential tourist Bandas, such as the Fishing lodge. To ensure uninterrupted visitation and high bed occupancy is realised at the KWS and KFS operated tourist facilities, roads to popular tourist attractions and facilities will be upgraded to all weather loose surface. The most difficult road sections will be paved to ensure that the roads are passable by vehicles under all conditions and at the same time minimise maintenance costs. Crossings will be installed at water courses and erosion control devices installed on moderate and steep slopes as necessary. In addition, culverts will be provided as appropriate to maintain surface drainage across the road allowance.

Action 1.7 Minimize visual intrusion of Bandas

Fishing lodge and Sapper Hut are presenting visual intrusion. As such these facilities will be redesigned to ensure their appearance and character is in harmony with the natural surroundings. In addition, where appropriate, trees will be planted to blend the facilities with their surroundings.

Objective 2: Visitor activities and attractions developed and marketed

Visitor activities at the AE include wildlife viewing, hiking, scenery viewing, bird watching, sport fishing and picnicking. Some of these activities (e.g. hiking) have high potential to attract a lot of visitors but they are not currently well developed and they are poorly coordinated. The AE is also poorly marketed as only attractions that are in the National Park, and particularly in the salient and central moorland, are well known with the forest reserves, northern and southern Aberdare National receiving little marketing. This management objective is therefore designed to develop tourist activities and attractions and by so doing increase visitation and enhance visitor enjoyment. It seeks to enhance sustenance of tourism through rigorous marketing of the AE as a unique destination offering a distinct tourism product based on the mountain environment and associated wildlife and geomorphological features of scenic beauty. The management actions that will be implemented to achieve this objective focus on: establishing and maintaining nature trails; establishing hiking routes; establishing Wanjohi Via ferrata; establishing Horse Safaris; promoting paragliding in the AE; enhancing sport fishing; marketing Aberdare locally and internationally; developing an AE tourist map and guidebook; establishing a visitor centre; promoting domestic tourism; and

promoting and marketing cultural tourism. These actions are elaborated in the following sections.

Action 2.1 Establish and maintain nature trails

Trails are the principal means used by visitors to have close experience of nature in recreation areas such as protected areas. In mountain protected areas where the steep terrain discourages road construction, visitors can enjoy the diverse visitor attractions through use of a well designed trail network. The AE has several nature trails that are popular with visitors. These include the 3KM-Kiadongoro nature trail located at the Kiadongoro Gate, and the Satima Walking trail which spans from the moorlands to the Oldonyo Lesatima Peak. These diverse trails are used for many types of recreation, from backcountry hiking to short walks and bird watching. The AE has great potential for developing additional interesting-to-walk trails that capitalise on the diverse landscapes, their rich biodiversity and scenic features. Landscapes features range from vast moorlands, majestic peaks, and natural forest with rivers characterized by scenic waterfalls. The trails can be made even richer by exploiting the culture of the forest adjacent communities by extending the trails to the forest-adjacent land.

Hence, to enhance visitor enjoyment of the natural resources at the AE, short nature trails will be established at key tourist attractions and at the entry gates. In regard to this, nature trails will be established at Kimathi Post Office, Shamata Gate, and Mutubio Gate. Appropriate interpretive signage will be installed along the trails to enhance visitor experience. And to ensure that trails are usable throughout the year, they will be regularly maintained through clearing of vegetation and removal of any trail obstructing materials such as fallen trees. In addition, to increase use of these trails each trail will be mapped and key features of the trail described. This information will be availed to visitors in form of a trail brochure and maps that will be available at the entry gates.

Action 2.2 Establish hiking routes

For many years the local community has used the Gatare trail to access the Elephant Hill, which is part of the hills associated with the Kinangop Peak. There is also an established hiking trail that starts in the central moorlands and ends at the Oldonyo Lesatima Peak, which is popular with hikers. To provide diverse hiking trails that offer varying visitor experiences, two additional hiking trails (Wanjohi-Satima-Wandare and South Kinangop or Gatare-Elephant Hill-Kinangop Peak) will be established. The establishment of these trails will entail clearing a trail of 1 meter width in the forested section, but in the moorland and alpine areas, the trail will be marked by signs and rock cairns instead. The Wanjohi-Lesatima-Wandare hiking trail will start at Wanjohi in the West, pass through the extensive moorland, then pass through Aberdare's highest peak, the Ol Doinyo Lesatima (4000m), to Wandare Gate in the East. This trail combines views of the most magnificent section of the Great Rift Valley to the west with the awe-inspiring horizon view of the majestic Mount Kenya 40 kms to the East. The South Kinangop or Gatare-Elephant Hill-Kinangop peak trail will start at South Kinangop or Gatare, pass through the natural forest and elephant hill, and end at the Kinangop Peak. This trail will also be linked to the Wanjohi-Lesatima trail and Kiandongoro Gate to form a trail network that can be accessed from several entry points. And to enhance visitor experience along these hiking routes, a simple trekking guide and map will be produced highlighting all the visitor attractions along the trails. Visitor facilities like resting sheds or huts and ecotoilets will be contructed at appropriate intervals along the hiking routes.

Action 2.3 Establish Wanjohi *Via ferrata*

Via ferrata is an Italian word for "iron road". It is a mountain route which is equipped with fixed cables, 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 *via ferratas* without needing to use their own ropes and belays, and without the risks associated with unprotected climbing. This is a new activity that will be introduced in the forest reserve (at Kipipiri escarpment) through a public private partnership investment approach.

Action 2.4 Establish Horse Safaris

A horse safari is a unique experience for visitors who wish to experience wildlife, scenery and culture at close quarters. A horse safari in the AE will allow the visitor to enjoy the varying habitats; from the natural montane forests, the bamboo forest, the moorlands to the salient bush land.

To enhance horse safaris in the AE therefore, three horse riding trails will be established in the following areas: Cedar Forest, Central Moorlands, and at the escarpment overlooking the Ol Kalou salient and Lake Ol Bolossat. This activity will be operated mainly by private entrepreneurs under concession from KWS. In addition, the KWS horses at Aberdare National Park will be trained to tolerate wild animals and upon training, they will be used for KWS operated Horseback Safaris. And to further ensure quality horse safaris are provided at Aberdare, KWS and KFS will work closely with the African Horse Safari Association (AHSA) in developing and implementing horse safari guidelines not only in the AE, but also in other areas in the country. In addition, standards of professionalism in equine care, guiding and accommodation, protecting the environment, set by AHSA will be adhered to by Horse Safari operators in the AE.

Action 2.5 Promote paragliding in the AE

Currently, a private entrepreneur operates gliding services, including training at Mweiga Airstrip in the eastern outskirts of the AE. The AE has many hills and cliffs which offer excellent launching sites for paragliding. To diversify tourism activities in the AE, paragliding will be promoted as an alternative tourist activity for the adventurous visitor. In regard to this, sites that are ideal for launching paragliding will be identified in collaboration with experienced paragliders. Once identified, these sites will be offered on concession basis to tour operators wishing to provide paragliding services in the AE.

Action 2.6 Enhance sport fishing

Trout fishing upstream of most rivers in the AE is a popular activity for many visiting anglers. Many rivers such as Mathioya River, Thika River, Chania River, and Gura River are continuously stocked with both brown and rainbow trout by the Fisheries Department which also issues fishing permits to anglers. To ensure that sport fishing continues to be an alternative activity in the AE, KWS will continue its collaboration with the Fisheries Department in line with the KWS/Fisheries Department MOU that promotes collaboration between the two institutions. In addition, KWS will provide logistic support required by the Fisheries Department to monitor and restock fish in the rivers.

Action 2.7 Market Aberdare locally and internationally

Marketing is essential and a critical first step for the AE's tourism potential to be known both locally and internationally. Marketing the AE will ensure that visitors have the information they need to enrich their experience when visiting the area. Good marketing will also serve to sensitize the local people to recognize and appreciate the AE's significance prompting them to provide stewardship in sAEguarding the AE's natural resources.

Currently, only a few facilities and attractions have been marketed widely. Hence, to increase tourism at the AE, high quality marketing and communication materials covering the entire ecosystem will be developed and disseminated through the electronic media, such as the internet, Television and Radio and print media, such as newspapers and magazines. In addition, appropriate ecosystem interpretive materials will be adopted to build a greater awareness of the AE and improve the visitor's experience. In regard to this, communications programs will be developed to address specific niche markets and audiences, such as media, schools and colleges, the internet etc.

Action 2.8 Develop an AE tourist map and guidebook

A visitor map of the AE is available but it leaves out many features of tourist interest, especially those found in the forest Reserve. To encourage visitors to explore the AE and sample the various attractions it offers, an updated visitor map presenting tourist attractions, road network and facilities is essential. Through this management action, AE management will liaise with KWS marketing section and KFS tourism section in updating the visitor map. As a starting point, AE management will carry out a comprehensive spatial inventory of all tourist attractions and facilities in AE. 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 AE 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 leading safari shops in the country, the AE Gates and in KWS shops nationwide.

Similarly, a tourist guidebook covering Aberdare National Park is available but one covering the entire ecosystem has not been produced. Under this management action therefore, an updated tourist guide book will be produced for the entire AE. KFS and KWS will collaborate in generating essential ecosystem-wide tourist information for inclusion into the guidebook. Once adequate and relevant tourist information has been gathered and compiled, the documentation will be forwarded to a publisher for mass production of the tourist guidebook which will be available for sale at the AE Gates and other KWS and KFS outlets in the country.

Action 2.9 Establish a visitor centre

A visitor centre is a very essential component of any destination. It enhances appreciation of the destination by highlighting the chief environmental and social-cultural aspects that a visitor might not have a chance to know or experience within a short visit or stay. Hence, a Visitor Centre will be constructed at the Mweiga Park Headquarters to offer visitor information and interpretive services to enhance visitor experience. The Centre will aim to engage visitors by telling the Aberdare story, using text, images and interpretive devices based on broad environmental and cultural themes that best describe the AE. The exhibits to be developed will use firsthand experience, graphic illustrations, and activities to help the visitors, understand, appreciate and care for the natural, historical and cultural environment. KWS will

collaborate closely with the tourism sector stakeholders in all the project phases (design, construction and operation) to ensure success of the project.

Action 2.10 Promote domestic tourism

It is important that domestic tourism is promoted to ensure that citizens are more aware of their environment and they appreciate it more. This is considering that international tourism is highly fragile and subject to many external factors that are sometimes beyond control of the country. Also international tourism is mostly seasonal with a long lull between short peak seasons. Traditionally, the annual low season in Kenya commences in early April, or the week after Easter, and then runs up to the end of June, at times even until the middle or end of July. Usually the tourism industry has to devise ways to survive in the low season months with little revenue. The domestic tourist could provide this much needed alternative that will keep tourism industry vibrant till the next peak season. As such, KWS and KFS management will promote domestic tourism among the local people to increase their visitation and patronage. In regard to this, public bus tours of the AE will continue to be offered by KWS to help local residents to access the AE.

Action 2.11 Promote and market cultural tourism

Tourists have an interest in people of the places they visit. They want to familiarize with their culture, their lifestyle and their practices. Hence, diversification of the tourism product to include cultural experiences enhances visitor satisfaction as the visitor has a wide range of attractions to choose from and gets a better insight of the area and its people.

In the AE, individual entrepreneurs have initiated cultural related projects to tap into the tourism market. These include the Thunguma Museum near Nyeri town, which exhibits Kikuyu cultural artefacts such as traditional clothing, implements and cooking utensils. Another enterprise based at Mweiga focuses on conservation of the Mackinder's Owl and offers guiding and interpretive services to visitors who are interested in Mackinder's Owl and the cultural beliefs of the Kikuyu people regarding Owls as harbinger of death.

In view of the high potential for cultural tourism in the AE, and given that cultural tourism development is currently uncoordinated, AE management, through its Community Wildlife Service and Tourism Programmes, will identify entrepreneurs (individuals and organised groups) interested in cultural tourism and organise for them study tours to sites where cultural tourism is a success e.g. Samburu, Amboseli and Mara ecosystems. These entrepreneurs will thereafter be supported to establish facilities showcasing the traditions of the local Kikuyu Community, their values and lifestyle. In regard to this, a feasibility study will be carried out to find out what type of facilities (cultural centres, cultural museums) are viable, where they can be established, and how they can be operated. Based on the outcome of the feasibility study, entrepreneurs will be supported in establishing and marketing the cultural facilities.

Objective 3: Tourism administration and management strengthened

Tourism and recreation activities in protected areas may lead to environmental and social impacts. These impacts are either as a result of developments or by visitors themselves. Development impacts, usually related to infrastructure, can be widely felt and can be severe, for example, during the construction phase, and through pollution generated by various

facilities e.g. lodges and camping sites. It is essential therefore, to control and monitor all developments and tourists activities in protected areas to mitigate visitor related impacts.

The future desired state at the AE is therefore where tourism is not causing impacts that are injurious to the environment and tourism is managed in line with limits of acceptable use outlined in the zoning scheme. The management actions that have been designed to realize this objective focus on: supporting establishment of community based tourism enterprises; deploying tourism officers to the AE; developing tourist facility environmental management standards; building the capacity of Community Forest Associations (CFAs) and other nature based Community Based Organisations (CBOs) in tourism development and management; establishing new entry gates and relocate existing ones to the forest reserve boundary; and establishing a tourism investors' and operators' forum. These actions are expanded upon in the following sections.

Action 3.1 Support establishment of community based tourism enterprises

Community tourism offers considerable potential for the AE as an area of tourism product diversification. Endowed with a community in rural setting with outstanding natural, heritage, and cultural resources, AE offers significant opportunities for the tourism sector. Successfully introducing and strengthening community tourism will yield benefits in diversification of the local economy. As such, tourism development in the Multiple Use Zones has been prioritized in the AE. Towards this, KFS is working closely with legally established Community Forest Associations in identifying and subsequently developing viable tourism enterprises in the forest areas to generate additional income for local communities while providing incentives for sustainable natural resource management at the AE. However, to ensure that the community based tourism enterprises that are identified for development are viable, KFS in collaboration with other tourism stakeholders such as NGOs and donors, who are promoting community enterprises, will carry out a market analysis which will seek to identify potential enterprises, their markets and means of marketing. In regard to this, a list of possible products based on detailed feasibility studies will be developed. Based on the feasibility studies business plans will be developed and implemented.

Action 3.2 Deploy tourism officers to the AE

Tourism officers deployed in conservation areas are responsible for developing and promoting tourism in order to attract visitors and produce significant economic benefits for a particular area. Their roles include marketing, visitor management and facilitating development of the tourism product, services and facilities. In the case of the AE, qualified Tourist officers are lacking and instead tourism related work is performed by Wardens and Foresters who are also assigned other priority administrative duties meaning tourism matters are not given the emphasis they deserve. Hence, to facilitate tourism development and management in the AE, both KWS and KFS will deploy qualified Tourism Officers to the AE. The Officers will be responsible for communication with tourists, tourism investors and tourism companies, ensuring that tourism issues are addressed promptly.

Action 3.3 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 key feature of these standards will involve creating 'buy-in' for the adoption of a sense of ownership of the AE among stakeholders. 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 2.9 of the ecology programme. In addition, AE 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 3.4 Build the capacity of Community Forest Associations (CFAs) and other nature based Community Based Organisations (CBOs) in tourism development and management

Tour guides are the central pillar of any travel experience. Tour guides can promote tourism by their knowledge and expertise in handling visitors and, conversely, they can also bring down the tourism business through poor visitor handling skills and inadequate knowledge. In view of this, tour guides from the CFAs and tourism CBOs will be trained in tour guiding. KWS and KFS will collaborate with other stakeholders in organising training courses for tour guides in the AE, who will then be guided to seek certification and registration with the Kenya Professional Safari Guides Association (KPSGA). Further, to ensure that the tourism enterprises operated by community groups are managed professionally, management committees will be trained in tourism best practices, management, accounting, and marketing.

Action 3.5 Establish new entry gates and relocate existing ones to the forest reserve boundary

One of the key aims of this plan is to manage the AE as a single ecological unit. This can partly be achieved by strategically developing and managing tourism-support infrastructures in the ecosystem in a coordinated manner. For instance, there is need for infrastructure to control entry into the ecosystem. This is important as establishing official KWS and KFS approved and manned entry points will reduce illegal entry by visitors into the ecosystem thereby curbing revenue leakage. As such, KFS and KWS will work closely in identifying suitable entry points into the AE. Some of the proposed new entry points include Gatare to control access to the southern sector, and Njabini to control access to the Central Moorlands. The latter will require relocation of Mutubio Gate to Njabini. Kiandogoro Gate will be relocated to the forest boundary to control access of the AE by visitors coming from Nyeri. These gates will be jointly manned by KFS and KWS.

Action 3.6 Establish a tourism investors' and operators' forum

Tourism investors and operators can play a major role in enhancing tourism development and management in the AE. As tourism investors market their facilities locally and internationally they also market the AE as a tourism destination. It is therefore critical that this segment of stakeholders is increasingly involved in the management of the AE to have a more coordinated marketing and tourism development in the AE. In view of this, AE management will establish an *AE Tourism Committee* which will aim to lobby for sustainable tourism development in the AE. As a start, AE 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 AE.

Community Partnership and Education Management Programme

Programme Purpose and Strategy

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

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

The AE contains many natural resources that are of benefit to local communities and the country at large. Communities extract a variety of resources from the ecosystem including firewood, building materials, medicinal plants, water, honey and fodder for livestock. These natural resource uses require an elaborate management system, including community participation, to ensure sustainable conservation. Involving local communities in conserving biodiversity and management of natural resources lowers management costs and sustains outcomes over time as when communities buy into conservation goals, they bring knowledge and local resources, including surveillance and social controls that forestall natural resource degradation. However, for communities to be fully committed to conservation, tangible benefits that match community input in conservation are needed. Currently such benefits are available to the community through a natural resource permitting system that is controlled by KFS.

On the other hand, a lack of developed community capacity to effectively implement conservation-linked programmes and projects can lead to conservation failures; hence an important factor in ensuring success of community participation in conservation is to build requisite community capacity to manage collaborative community conservation projects. Therefore, to ensure that natural resources at the AE are sustainably managed for both the present and future generations, this management programme seeks to involve communities and other stakeholders in conservation, improve the effects of wildlife on community livelihoods and create awareness on the importance of the AE.

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.

Guiding Principles

The principles underpinning the implementation of the AE's Community Partnership and Education Programme are: community-protected area communications are improved; human-wildlife conflicts are minimised in the AE adjacent areas; communities and other stakeholders are aware of the AE's values and importance; and communities are benefiting from natural resources in the AE. These principles are elaborated in the following sections.

Community-protected area communications are improved

To stimulate positive communication between local communities and the AE management and thereby strengthen community participation in conservation and management of natural resources, a communication mechanism to bridge the gap between the community and AE

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.

Human-Wildlife conflicts are minimised in the AE adjacent areas

A fundamental goal of wildlife conservation efforts at the AE is minimizing human-wildlife conflicts which can adversely affect local economic and social development. The construction of the 400 Km electric fence encompassing majority of the protected areas and their wildlife has reduced human-wildlife conflicts to manageable levels. However, problem animal incidents caused by wildlife that are not contained by the fence such as primates and predators are still reported. To address this problem, this management programme will ensure that the fence is maintained and problem-animal incidents are dealt with promptly.

Communities and other stakeholders are aware of the AE'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 non governmental environmental agencies in the country and in the AE 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, policy 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 AE

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 AE. The AE 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 management within the AE.

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:

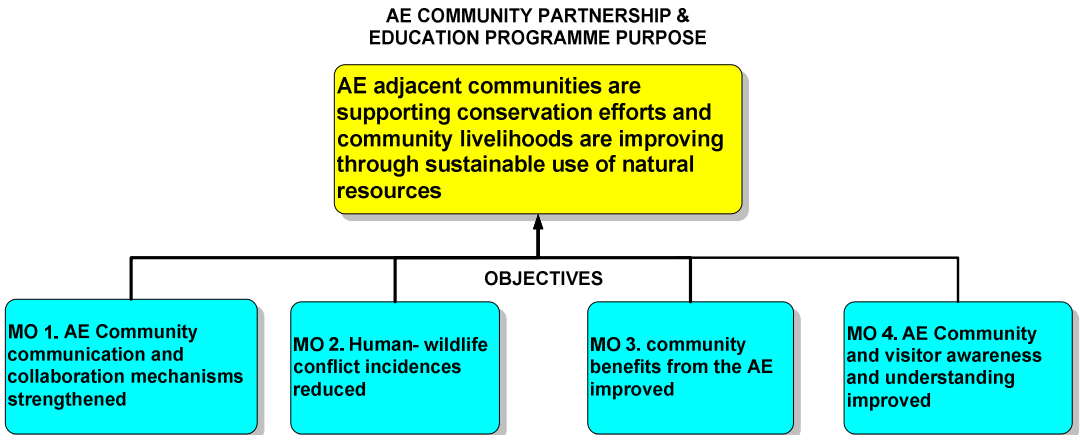
MO 1. Human- wildlife conflict incidences reduced
MO 2. Community benefits from the AE improved
MO 3. AE Community conservation awareness and PA-community communication improved

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 input requirements necessary for the delivery of each management action over the first 3-year timeframe of this management plan.

Management Objectives

Figure 12 below shows the overall objectives tree for the AE Community Partnership and Management Programme.

Figure 12.Community Partnership and Education Programme objectives tree



Objective 1: Human- wildlife conflict incidences reduced

The desired future state at the AE is where human-wildlife conflicts are controlled to ensure that PA-adjacent communities do not incur economic losses due to human-wildlife interactions. Human-wildlife conflict in the AE is manifested in form of human injury or death; livestock predation; crop and property damage; destruction of plantations by elephants; and vandalism of the fence. KWS and its partners, KFS, Rhino ARK and the local community, have jointly constructed an electric fence encompassing most of the protected areas with the aim of containing crop raiding by wildlife. This fence is expected to prevent majority of the conflicts arising from large herbivores such as elephants, which are the main cause of crop damage. However, although large wildlife will be contained, conflicts are still expected from primates and carnivores that are not restrained by the fence. This objective has therefore

been designed to mitigate human-wildlife conflicts by applying feasible methods and tactics of controlling problem animals. By controlling human-wildlife conflicts, support for conservation efforts is expected to increase substantially as farmers will be assured of returns from their agricultural investments. The management actions that will be implemented to realize this objective are: create awareness on the importance of the electric fence; maintain the electric fence; carry out a fence-gate analysis; and construct fence guard posts. These actions are expanded upon in the following sections.

Action 1.1 Create awareness on the importance of the electric fence

The Aberdare fence has been very effective in reducing human-wildlife conflicts in areas that were previously conflict hotspots. In such areas local communities have a high regard for the fence as they can correlate their returns from farming to the fence. The value of land in these areas has also appreciated substantially as crop farming has become economical with exclusion of crop raiding by elephants. However, despite these positive gains, some members of the community do not appreciate the fence partly because either they are outside the wildlife-community interaction zone, or they feel that the fence hampers them from uncontrolled access to forest resources. In light of this, the fence is prone to frequent vandalism. Therefore, to ensure that threats to the fence are minimised, AE management in collaboration with Rhino Ark and CFAs have been conducting workshops and seminars to sensitize the communities on the importance of the fence. This awareness creation will continue during the plan period to ensure that the fence is supported by the community unreservedly.

Action 1.2 Maintain the electric fence

A ten (10) meter swathe along the fence line experiences rapid growth of vegetation which occasionally causes electric short circuits that result in malfunctioning of the fence. Cases of vandalism of fence materials and fence damage by wildlife are reported regularly and require prompt repair to ensure that problem animals do not invade PA-adjacent farms. Some of the fence materials (e.g. wooden fence posts) have a short effective period and need to be replaced with the more durable plastics ones. Consequently, to ensure that the fence is effectively containing problem animals, fence maintenance will be a priority programme for AE management. In this regard, KWS and KFS will collaborate with Rhino Ark and the local community to ensure that fence maintenance labour, equipment and materials are always available. The current level of deployment of fence maintenance staff (one-man per 4Km of the fence) will be maintained to ensure that the entire 400 KM fence is always functional. Security staff will be trained on monitoring electric power along the fence to enable them detect malfunctioning sections during their routine fence patrols. Foresters will also be incorporated in the fence management and maintenance committee to ensure full participation of KFS in fence management.

In addition, according to Aberdare Fence Management Plan, the fence annual running cost is estimated at Ksh.39, 337,430 which includes cost of supporting fence maintenance workforce, maintenance of vehicles, radios and accessories, buildings, access roads to fence line, and office administration and training. In order to sustainably manage the fence, a Trust will be registered to mobilise funds for fence maintenance as well as supporting other conservation actions at the AE (see action 1.8 of the Protected Areas Operations Management Programme.

Plate 4. A section of the Aberdare Electic Fence. Regular maitenance will be carried out to ensure that the fence remains effective in containing problem animals.

Action 1.3 Carry out an assessment of the fence-gates

The AE electric fence has over 100 gates to allow the community and its livestock to access forest resources. However, some of the gates are misplaced and therefore they are rarely used. Also, some fence sections require new gates for community to access the forest. Hence, to determine the appropriately located gates, those that should be closed, and those to be constructed, AE management and its fence management partners will carry out a participatory gate assessment. This assessment will make recommendations on the appropriate locations of fence gates based on the social as well as economic needs of the community.

Action 1.4 Construct fence guard posts

About 15 fence guard posts are expected to be constructed along the fence to house the fence maintenance staff. Six of these guard posts have been constructed and construction work for another four (i.e. Ruhuruini, Mitero, Tree Tops and Kipipiri) has been tendered and awarded to contractors. To ensure that the entire fence line is adequately covered, AE management will liaise with KWS Headquarters Fence Section to ensure that the other five fence guard posts are constructed during the plan period.

Action 1.5 Review phase IV of the Aberdare fence alignment

During construction of the Aberdare fence phase IV, a huge indigenous forest was left out of the electric fence contrary to the agreed fence alignment protocols. It is therefore recommended that the fence alignment along this section be reviewed to protect this important indigenous forest which was left out.

Objective 2: Community benefits from the AE improved

Local communities living adjacent to conservation areas are central to successful conservation of a protected area's natural resources. This is because such communities can benefit directly from harvesting a PAs resources, or indirectly through interactions with visitors. Such benefits can influence members of the community to support conservation activities including controlling illegal activities that are detrimental to the integrity of ecological systems of a protected area. At the AE, PA-adjacent communities are benefiting from the AE through harvesting of natural resources, non residential cultivation, livestock grazing and tourism. This management objective therefore seeks to ensure that communities continue to reap tangible benefits from the AE. Consequently, the management actions that have been developed to realize this objective focus on: supporting establishment of viable tourism related community projects; supporting establishment of a Guides and Porters Association; providing employment opportunities to PA-adjacent communities; supporting community conservation and social projects to improve livelihoods; promoting the carbon credit programme; and establishing wind farms to produce electric power. These actions are elaborated further in the following sections.

Action 2.1 Support establishment of viable tourism related community projects

The exceptional resource values at the AE present diverse ecotourism opportunities that can be exploited by the PA-adjacent communities to improve their livelihoods. The vast wilderness areas in the PA support hiking and adventure related activities which the community can exploit by providing guiding and porter services to visitors. Visitor accommodation facilities can also be established in PA-adjacent areas to cater for visitors' accommodation needs. In addition, legally established Community Forest Associations (CFAs) have an opportunity to develop tourism facilities and activities in the AE's Multiple Use Zone. Consequently, to ensure that the AE community is benefiting from tourism, AE management will support establishment of viable tourism projects. In regard to this AE management will partner with CFAs in identifying, developing and marketing tourism ventures in the Multiple Use Zone. And to aid coordinated planning of ecotourism both in the PA-adjacent land and the PA's Multiple Use Zone, a detailed participatory inventory of tourist attractions will be carried out.

Action 2.2 Support establishment of a Guides and Porters Association

Compared to Mt. Kenya, hiking in the AE is not as developed. Although visitors hike to various destinations in the AE, hiking routes and associated facilities have not been appropriately designed and officially established. To ensure that hiking activities are developed and coordinated, designated hiking will be established in the AE (see Action 2.2 of the Tourism Development and Management Programme). AE management will also support the establishment of an AE Guides and Porters Association to ensure that guiding and porter services are in line with recommended international best practices. Guides and Porters will be assisted in the Association registration process and training of its members in tour guiding and customer care. This Association will be responsible for liaising with other stakeholders to train guides and porters to ensure quality service is offered to visitors. It will also develop a code of conduct for its members and vet those offering guiding and porter services in the AE.

Action 2.3 Provide employment opportunities to PA-adjacent communities

One way of ensuring that PA-adjacent communities benefit from the AE is through employment of community members. AE management requires a large unskilled workforce to successfully execute its mandate. Currently, unskilled permanent staff are not adequate to carry out the required management tasks effectively. In view of this, AE management will liaise with stakeholders to establish a viable community employment programme for the PA-adjacent communities. This programme will target the many jobless youth in the community offering them casual labour opportunities arising from silvicultural operations, road maintenance, fence maintenance and other construction and routine maintenance works that will be carried out in the AE. The programme will be in the line of the current government funded *Kazi kwa Vijana* programme which is currently providing employment to many jobless youth in the area. Funds to support this programme will come from the Corporate Social Responsibility kitties of KWS, KFS and other stakeholders.

Action 2.4 Support community conservation and social projects to improve livelihoods

Conservation of biodiversity at the AE can only succeed when PA-adjacent communities who cause most of the threats to the ecological integrity of the ecosystem are involved in the management of the ecosystem and receive tangible benefits from the ecosystem. It is therefore critical that community projects that are linked to conservation are designed and implemented to win community support and ensure active participation of the communities in conservation efforts. For maximum positive effects of such projects, it is essential to consider designing projects that focus on community social stratification and organisation such as men, women or youth groups as the needs of these social groups are different due to their social roles and responsibilities.

Therefore, to improve community benefits from the AE, community conservation based groups will be supported to establish viable enterprise projects such as fish farming, bee keeping, butterfly farming, and ecotourism. Also, social projects such as water supply, school development, and tree nursery establishment will be supported. These community projects will be supported by AE management and stakeholders individually or in collaboration with others. And to maximize success of these community initiatives and projects, community members will be trained in technical and management skills needed to effectively manage these projects.

Action 2.5 Promote the carbon credit programme

The Kyoto Protocol which came into force in 2005 and has been ratified by majority of the developed countries sets legally binding targets for each ratifying country's emissions of the six major greenhouse gases(GHG) with the aim of reducing the overall emissions by 5.2% from their 1990 levels by the end of 2012. Article 3.3 of the Kyoto Protocol, states that parties that have ratified the protocol may use GHG removals, from afforestation and reforestation (forest sinks) and deforestation (sources) since 1990, to meet their emission reduction commitments and thereby mitigate global warming. These countries can therefore sponsor carbon projects that reduce greenhouse gas emissions in other countries through the Clean Development Mechanism (CDM) and Joint Implementation (JI) provided by the protocol. These projects generate tradable carbon credits that can be used by developed countries in meeting their caps.

Opportunities to gain from carbon credit projects have not been fully exploited in AE. *The Green Belt Movement* has started a few carbon sites in Ragia and Geta forest stations while Rhino Ark has initiated a Carbon dioxide balance stove project at Kimende and Kamiruri. AE management will liaise with *The Green Belt Movement* and local communities to identify and establish more carbon credit sites within the forests while Rhino Ark and other NGOS will expand production and use of carbon dioxide balance stoves and energy saving *Jikos*.

Action 2.6 Support establishment of wind farms to produce electric power

The AE and adjacent areas has a high potential for wind power production. Wind power generation is advantageous as it is compatible with many land uses including agriculture. It also has minor negative environmental impacts when compared to other alternative power generation sources such as fossil fuel, which cause air pollution from the gasses emitted. However, it has environmental effects including threat to birds and bats, and it causes noise pollution from the many turbines installed at a wind farm.

Opportunities exist within AE to generate electricity by use of wind power. Currently two sites, which have the required wind resource to sustain a wind farm have been identified at Ragia and South Kinangop. Since building a commercially viable wind farm requires a huge initial capital investment, KFS and CFA's will concession wind power production sites in the Forest to investors who will be identified in accordance with the Public Procurement procedures. In addition, suitable sites will be identified on private land and similarly concessioned to private investors. Thereafter, the bulk power that will be produced by these wind farms will be sold to KENGEN for retailing. However, these wind farms will be subjected to Environmental Impact Assessments (EIAs) in line with the Environmental Management and Coordination Act (EMCA), 2000 to ensure that adverse impacts are identified and mitigation measures put in place.

Objective 3: AE Community conservation awareness and PA-community communication improved

The future desired state of the AE is where local communities are communicating effectively with AE management to minimize conflicts and by so doing improve PA-community relations. Increased collaboration with the PA-adjacent communities is crucial if threats to ecological integrity of the AE are to be sAEguarded. Threats like charcoal burning, illegal logging, illegal grazing, can be addressed successfully if sound mechanisms of involving communities in the management of the AE are designed.

Most community members and visitors to AE are not well informed of the rules and regulations governing the protected areas, their exceptional resource values and tourism attractions. This has resulted in infringement of set PA rules and regulations, visitor dissatisfaction, negative ecological impacts, low revenue and inadequate support by the communities. This objective has therefore been designed to establish and strengthen effective community collaboration mechanisms in the AE to win the much needed community support for conservation of the ecosystem's natural resources. It also seeks to ensure that the community is appreciating the natural resources in the AE and the management policies applied in the area. Conservation awareness also helps to build a strong knowledgeable conservation constituency, both at the local and national level, to champion AE conservation issues, en-

suring that the protected area and its conservation values are available to posterity. The management actions that have been developed to realise this objective are: establish a conservation education centre with hostels at Bondeni; establish and equip a mobile outreach unit; organise an annual AE conservation awareness event; participate in local and national environmental awareness events; and establish a forum for community based organisations in the conservation sector. These actions are elaborated in the following sections.

Action 3.1 Establish a conservation education centre with hostels at Bondeni

Conservation education is the first step toward ensuring that natural resources are sustainably managed and conserved for the present and future generations. One of the most effective tools for promoting conservation education is through establishment and operation of a focal conservation education center for purposes of imparting conservation knowledge to visitors, and particularly organised groups. Currently such a center is lacking at the AE. Hence, to create a community that understands, appreciates, and participates in natural resource conservation, a fully equipped education center will be established at Bondeni area of the Aberdare Forest Reserve. The Education Center will offer conservation lectures, and guided tours of the ecosystem to organised groups to educate them on conservation issues.

Action 3.2 Establish and equip a mobile outreach unit

Majority of the threats to the ecosystem are caused by activities of forest-adjacent communities who destroy forest resources through logging, poaching and wild forest fires among others. These illegal activities are driven by economic gains and also ignorance of the consequent adverse ecological impacts resulting from these activities. Closing the knowledge gap and thereby influencing behaviour change in support of conservation is therefore increasingly important to minimise forest degradation.

Presently, KFS has no mobile outreach programme while KWS's unit is not adequately equipped. To improve the outreach programme, KFS will establish a unit that will be based at Head of Conservancy's office in Nyeri, while KWS will equip the existing one based at Park Headquarters. And to ensure that the outreach programmes of the two institutions are focused and effective in changing negative behaviours, outreach activities will identify and target specific behaviours of target audiences that need to change in order to minimise ecosystem threats. This will be carried out through a community knowledge, attitudes and practices (KAP) study that will shed light on factors informing community-forest interactions. The outcome of the KAP will assist in developing a robust and effective communication strategy to drive change in community attitudes and practices.

In addition, AE management will create conservation awareness through both the print and electronic media. In this regard, AE management will write conservation awareness articles for publication in the local print media and use FM radio stations to give conservation talks.

Action 3.3 Organise an annual AE conservation awareness event

Organising an event is a very effective way to raise awareness about issues of concern facing management of exceptional natural resources in a protected area both amongst the local community and the general public. The annual *Rhino Charge* event has for many years kept Aberdare Conservation Area in the limelight and considerable awareness has been created both nationally and internationally through this AE-related annual event. However,

not many members of the public are able to participate in the Rhino charge because it requires substantial investments in terms of an appropriate vehicle and fundraising power to qualify for to participate in the event. In light of this, AE management will liaise with other stakeholders to identify and organise an appropriate conservation awareness event that will be held annually to raise the national profile of the AE. Such an event could involve hiking, mountain biking, a marathon run, or any other innovative activity that will draw participation from ordinary people.

Action 3.4 Participate in local and national environmental awareness events

A lack of conservation awareness means less public support for the conservation and sustainable use of biodiversity. It is therefore prudent that every opportunity is exploited to educate the general Kenyan public on the role of conservation in supporting community livelihoods. Therefore, to further enhance public awareness of conservation issues at the AE, AE management will participate in national events such as Agricultural Society of Kenya Shows and international conservation events such as the World Wetlands Day, World Environment Day, and the International Day for Biological Diversity amongst other conservation events that are marked world wide. At these events, AE officers will appraise the public on conservation efforts at the AE and educate them on how they can contribute to the conservation of the ecosystem.

Action 3.5 Establish a forum for community based organisations (CBO) in the conservation sector

The number and status of the existing conservation leaning community based organisations is not well understood by AE management. This leads to duplication of efforts by well meaning CBOs as activities are not coordinated. To address this problem, AE management will carry out an inventory and a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of all active CBOs in the AE. Based on the outcome of this exercise, a forum will be established to facilitate coordination of conservation CBOs in the AE.

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Security Management Programme

Programme Purpose and Strategy

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

> The AE and surrounding community areas are sAE and secure 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.

Guiding principles

In implementing the AE's Security Management Programme, AE Management will be guided by the following principles: security presence is extended across AE; operational effectiveness is improved; and collaboration with key stakeholders is strengthened. The following sections expand upon these guiding principles.

Security presence is extended across AE

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 AE. In addition, to ensure that illegal activities are deterred, AE 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 AE. This will be achieved through increased collaboration between KFS and KWS security forces in the AE.

Operational effectiveness is improved

The operations of AE security team can be enhanced if there is a system of gathering and sharing 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 security information system to support security operations in the AE.

Collaboration with key stakeholders is strengthened

Success of security operations in a vast ecosystem such as the AE 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 AE will remain essential to improve security responses, strengthen deterrence against illegal activities in the area, and improve the overall effective-

ness of security operations. As such, and in particular to ensure a sAE 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:

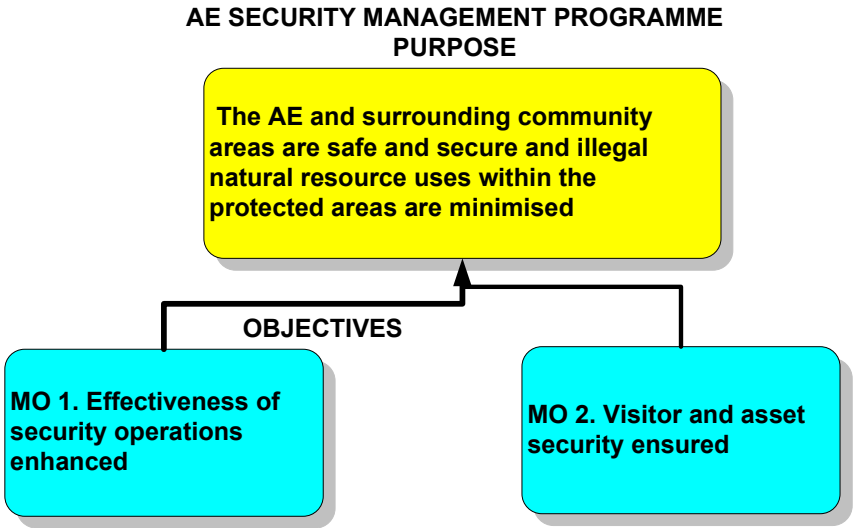
MO 1. Effectiveness of security operations enhanced
MO 2. Visitor and asset security ensured

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 Management Programme, and details the activities, responsibilities, timeframe and input requirements necessary for the delivery of each management action over the first 3-year timeframe of this management plan.

Management Objectives

Figure 13 shows the overall objectives tree for the AE Security Programme.

Figure 13. Security Management Programme objectives tree



Objective1: Effectiveness of security operations enhanced

The AE has several key security challenges arising from illegal activities taking place in the area. These include poaching (subsistence and commercial), illegal charcoal burning and

illegal logging of selected timber trees. Wild fires that are started accidentally, or by arsonists are also a security issue in the area. Therefore, the future desired state of the AE is where these security threats are significantly reduced to maintain ecosystem integrity. The management actions that have been designed to achieve this objective focus on carrying out Joint patrols; developing a security database; procuring modern security equipment; carrying out a strategic re-organization of stations and sectors to cover the AE effectively; training staff in emerging conservation concepts and technologies; creating awareness among members of the judiciary and police on the importance of the ecosystem; establishing a Joint fire station; establishing an Intensive Protection Zone (IPZ) for rhinos; improving fence security; and carrying out regular de-snaring operations. These management actions are elaborated in the following sections. . .

Action 1.1 Carry out Joint patrols

As mentioned above, the AE is experiencing various types of illegal activities which are increasingly degrading natural resources and affecting the integrity of the ecosystem. These activities can be minimized substantially through increased collaboration between KFS and KWS in security operations. As such, the two institutions will enhance joint patrols in the AE ensuring that all the illegal activity hotspots, particularly in the forest reserve, are adequately covered. In regard to this, each KWS Platoon Commander at the AE and the KFS counterpart will jointly draw a joint patrol schedule which will be implemented in each patrol sector. The two institutions will also carry out regular and scheduled joint aerial surveillance, to collect intelligence information, inspect the fence and detect fire occurrence. They will also carry out horse patrols, individually or jointly, particularly in areas which are difficult to access by road. In addition, the KFS and KWS security officers will share intelligence information to increase success of arrests and prosecution processes.

Action 1.2 Develop a security database

Security information is essential in facilitating effective patrols and in designing security strategies that can pre-empt conservation crimes. Information is required on types of conservation crimes, criminals and crime hotspots. In view of this, it is vital that security information is organized in a manner that facilitates easy retrieval, analysis and dissemination. This information should also be shareable among other users. As such, AE management will establish compatible security databases that will contain data on all security related incidents in the AE. Each institution, KWS and KFS, will establish its own security database and security offices will be sharing information when need arise.

Action 1.3 Procure modern security equipment

An appropriately equipped security force is critical in ensuring that security breaches are minimized in a protected area. A well equipped force has a high morale which is vital for any effective security force. Hence, to ensure that the security forces at the AE are effective in combating conservation crime, KFS and KWS will provide their respective security forces with modern security equipment including up to date navigation equipment, night vision equipment, weapons, transport, cameras and computers. In addition, they will be provided with adequate mobile accommodation gear, such as tents.

Action 1.4 Carry out a strategic re-organization of stations and sectors to cover the AE effectively

KFS and KWS have deployed a substantial number of security staff in the AE. However, since currently the AE security strategy has not been harmonized between the two institutions, there is no synergy and often there is duplication of efforts. KFS is deploying inspectors in each of its six AE management zones and a sergeant in each of its 18 stations. Similarly, KWS has Platoon Commanders in each management sector and sergeants who head security sections. It is therefore important that the security staff from the two institutions are deployed appropriately to ensure even coverage of the AE as the two institutions are aiming at the same primary objective i.e. conservation of biodiversity in the AE. In order to ensure even distribution of security staff, KWS and KFS will jointly carry out a strategic re- organization of stations and sectors. Each officer in charge of a station or sector will be assigned a specific area of operation where the officer will be responsible for patrols, controlling entry through the gates and inspecting official documents that are issued to stakeholders by the two institutions e.g. visitor entry tickets, livestock grazing and firewood permits.

Action 1.5 Procure modern surveillance technology and train staff in their use

Given the vastness of the AE, which makes security a daunting task in the area, new advanced surveillance technology is needed to support security operations and prevent illegal activities. In view of this, modern surveillance technology will be procured and used to assist in monitoring illegal activities in the AE. Such technology will include infrared cameras, trap cameras, and Global Positioning Systems amongst others. KWS and KFS management will also train security staff in the use of this technology to enhance effectiveness of security operations.

Action 1.6 Collaborate with law enforcement agencies and other stakeholders to enhance security in the AE

Collaboration amongst law enforcement agencies in security issues is critical to curbing conservation crime in the AE. Therefore, KWS and KFS will work closely with other agencies such as Kenya Police, Administration Police, Kenya Army and Air force, amongst other forces in addressing AE security issues. For instance, since the AE is prone to frequent wild fires, AE management will liaise with other security agencies during fire fighting operations. AE management will also liaise with the Tourist Police to ensure maximum security of visitors in the AE is realized. Further, assistance will be sought from the administration police to stem forest encroachment and other illegal activities in the forest.

In addition, Non Governmental Organisations (NGOs) and Community Forest Associations (CFAs) can also support security operations as they interact with the local communities some of who are responsible for majority of the illegal activities. These NGOs and CFAs will be incorporated in the design and implementation of security strategies aimed at pre-empting conservation crime.

Action 1.7 Create awareness among members of the judiciary and police on the importance of the ecosystem

Lack of awareness amongst the judiciary and the police force on the seriousness of long term effects of illegal activities on conservation of natural resources is blamed for lenient and non deterrent sentences meted on culprits of conservation crimes. As such, it is prudent that awareness is created to these stakeholders on the impacts of illegal activities in the forest so that punitive measures can be meted on culprits. As such, AE management will liaise with the judiciary in organizing study tours to the AE for purposes of creating awareness on the importance of AE as a water catchment area and demonstrating the negative effects of illegal activities, such as charcoal burning, illegal logging, marijuana cultivation and illegal livestock grazing.

Action 1.8 Establish a Joint fire station

The AE is prone to frequent wild fires that are devastating to the ecosystem. Such fires can lead to suppression of fire intolerant species and encourage invasion of fire resistant species bringing about imbalances in the ecosystem. Several measures have been put in place to address fire management issues including establishment of fire breaks and construction of fire towers. However, these have not been effective in controlling fires necessitating adoption of other new measures. Hence, under this management action, KFS and KWS will jointly establish a fully equipped fire station in the AE. In regard to this, a strategically located site will be identified and funds provided for construction of the station. The station will be equipped with fire fighting equipment and staff trained in fire fighting techniques will be deployed to the station. The station will educate AE stakeholders on the impacts of fire using strategically located posters and fire rating boards. Fire messages will also be relayed to communities using local FM radio stations.

Plate 5. A fire rating board at South Kinangop Forest Station

Action 1.9 Establish an Intensive Protection Zone (IPZ) for rhinos

The AE's Black Rhino population has been declining over the years mainly because of poaching. The management of this species requires close monitoring in specific habitats under intensive surveillance if a viable population is to be maintained in the area. Hence, an IPZ will be established in the Salient area to curb the Rhino population decline. Security in

the IPZ will be intensified aiming at close monitoring and surveillance of rhinos to enhance their survival.

Action 1.10 Carry out regular de-snaring operations

Poaching for bushmeat and trophies (e.g. Rhino horn) through snaring is one of the key challenges facing AE management. Many ungulates, including the rare mountain Bongo, are being lost through snaring. Hence, to curb snaring of animals, AE management will organise regular scheduled desnaring operations aimed at detecting and removing snares in bushmeat poaching hotspots.

Objective 2: Visitor and asset security ensured

Visitor security and sAEty is a priority concern in the AE. Any visitor security related incident, no matter how insignificant, can injure the image of the AE which is regarded as a secure area irreparably. Hence, with the planned tourism expansion, visitor security should be enhanced to maintain a positive image both locally and internationally. In addition, both KFS and KWS have invested heavily in various assets based at their respective administrative stations. It is vital that such assets are secure to ensure that the government does not incur theft related losses.

The future desired state of the AE is therefore where visitors are secure and assets are sAEguarded. To achieve this future desired condition several management actions have been designed. These relate to improving visitor and asset security in remoter parts of the AE; establishing camera based surveillance system; updating and maintaining the asset inventories; securing all KFS and KWS plots in the AE; improving the fraud control system; and enhancing intelligence systems. These management actions are expanded upon in the following sections.

Action 2.1 Improve visitor and asset security in remoter parts of the AE

The AE is vast and some areas are remote because of poor access and/ or lack of communication. Some of the tourist facilities that are envisaged in this plan are expected to be constructed in remote parts of the AE where security is a challenge. Some stations are based in remote areas necessitating heightened security to sAEguard government assets. In view of this, under this management action, a security survey will be carried out for every new facility that will be constructed in the AE to ensure that security of visitors is considered before construction. Further, all tourist facilities in the AE will be linked to the AE radio communication system to enhance security in these facilities. Appropriate signage with geographic coordinates will be provided in the AE to ensure that visitors do not get lost. And to ensure that weaponry in all stations is sAE, secure armories will be provided where they are needed.

Action 2.2 Establish a camera based surveillance system

Measures that will be put in place under management action 2.1 of this programme will largely address boosting of the security issues in the AE including visitor security. However, to boost security further, AE management will carry out routine security checks at the entrance and exit points. A surveillance network of infra-red cameras will also be installed at strategic points to monitor illegal entry into the forest and vandalism on the fence.

Action 2.3 Update and maintain asset inventories

An updated asset inventory is vital in tracking institutional assets. Lack of inventories encourages theft of assets as it is hard to detect missing assets. Inventories promote accountable handling of assets during handing over of a station from one officer to another. Therefore, to sAEguard institutional assets, both KFS and KWS will continuously update their respective AE inventories. Obsolete assets will be recorded annually and those that can be sold will be auctioned in line with the Public Procurement Act. The assets that are serviceable will be recommended for servicing to support implementation of management programmes at the AE. And to ensure that staff are handling assets responsibly, awareness will be created on the Public Officers Ethics Act and asset management training will be offered.

Action 2.4 Secure all KFS and KWS plots in the AE

Both KWS and KFS have land that is yet to be surveyed and title deeds issued. Such land is vulnerable to encroachment from land speculators. As such, to secure all government land under the jurisdiction of the two institutions, AE management will liaise with the relevant Lands departments at the KFS and KWS headquarters to carry out an inventory of all plots allocated to the two institutions. The plots will be surveyed and thereafter title deeds sought from the Commissioner of Lands.

Action 2.5 Improve fraud control systems

An effective fraud control mechanism is essential in any institution for checks and balances regarding finances. This aims at preventing misuse of funds and to ensure that all funds are directed to the intended purposes with transparency and accountability. To prevent fraud, KWS and KFS will liaise with the national telephone network operators to provide a network infrastructure support which will facilitate detection of fraud cases in the two institutions. AE management will also liaise with the national intelligence agencies to acquire intelligence information related to fraud in the two institutions.

Action 2.6 Enhance intelligence systems

Intelligence information is key to preventing conservation related crimes. This information informs and focuses patrols making them effective in combating conservation crimes. To ensure that the intelligence systems of KWS and KFS are effectively reducing crime, AE management will expand the intelligence system to cover the entire ecosystem. The intelligence units of the two institutions will also collaborate by sharing information that can be used to pre-empt crime.

Protected Area Operations Management Programme

Programme Purpose and Strategy

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

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

Institutional collaboration is a critical element of conservation success at the AE. This is because the AE is managed by two government agencies and if they are not working in tadem, duplication of efforts and conflicts may arise. It is therefore paramount that the working relationship between KWS and KFS is strengthened to ensure effective conservation of the environment. In addition, there are other strong non governmental environmental players who have invested heavily in conservation endeavours at the AE. Collaboration beween these stakeholders and government agencies mandated to conserve the AE is critical for conservation success.

The AE requires adequate infrastructures to support its operations. Staff houses, offices, transport and communication systems are required for effective delivery of this plan. This programme therefore aims to ensure that management systems, support infrastructure and equipment are adequate to achieve the prorgamme purpose.

Guiding Principles

In implementing the AE's Protected Area Operations Management Programme, AE Management will be guided by the following principles: stakeholder collaboration in AE management strengthened; staff welfare and motivation enhanced; effective and efficient management infrastructure provided. These principles are expand upon in the following sections.

Stakeholder collaboration in AE management strengthened

A key element underpinning management programmes in this plan is that the AE 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 AE are implemented. As the majority of the AE falls under different management jurisdictions (KWS and KFS) 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 AE components, cooperation and coordination is critical to success. In addition, other stakeholders e.g. Rhino Ark and the local community have invested heavily in the management PA-community conflicts. Relations with these actors require nurturing and strengthening to ensure that benefits arising from collaborative activities e.g. fence maintenance are sustained. As such, this programme will aim to ensure that agreements and mechanisms to enable the effective management of the AE are put in place.

Staff welfare and motivation enhanced

Employees are a critical component of AE 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 AE management will provide training opportunities to staff in line with identified training needs.

Effective and efficient management infrastructure provided

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 and tourism development in the AE. It is therefore essential that priority be given to providing adequate infrastructure in the AE 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:

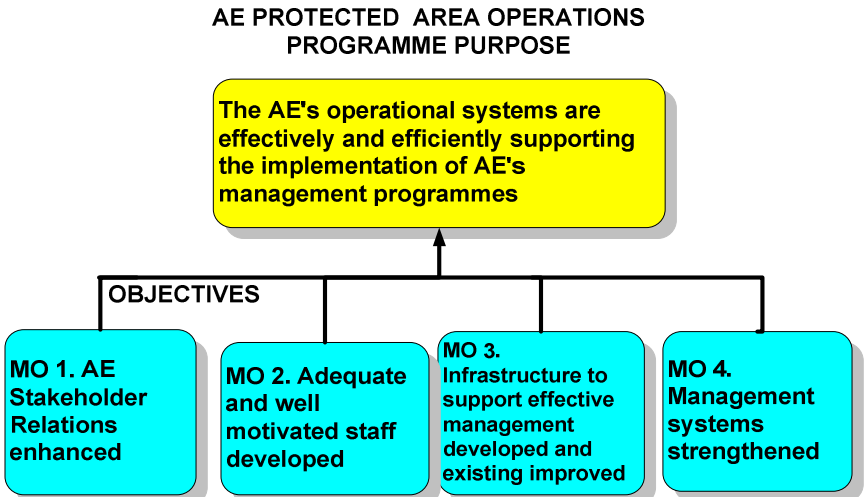
MO 1. AE Stakeholder relations enhanced
MO 2. Adequate and well motivated staff developed
MO 3. Infrastructure to support effective management developed and existing improved
MO 4. Management systems strengthened

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 Management Programme, and details the activities, responsibilities, timeframe and input requirements necessary for the delivery of each management action over the first 3-year timeframe of this management plan.

Management Objectives

Figure 14 below shows the overall objectives tree for the AE Protected Area Operations Management Programme.

Figure 14. Protected Area Operations Management Programme objectives tree



Objective 1: AE Stakeholder Relations enhanced

To enhance successful management of AE, communication among the key stakeholders need to be strengthened. Previously this has been hampered by unclear interpretation of policies and lack of awareness which sometimes leads to mistrust between institutions. Lack of collaboration with district authorities within AE has been blamed for duplication of duties and inefficient utilization of scarce resources. There have also been concerns that the lease agreements between KWS and investors have not been comprehensive and binding leading to management conflicts. This objective has therefore been designed to address issues arising from stakeholder relationships. The management actions that have been developed to realize this objective focus on: establishing effective communication between KWS and KFS; reviewing existing KWS/ KFS MoU; sharing management resources to enhance AE management; organising workshops and seminars between KWS and KFS; developing and implementing MoUs with Rhino Ark and other NGOs; collaborating with County authorities in the management of AE; developing and reviewing existing concessions and agreements; and establishing the Aberdare Trust. These actions are elaborated in the following sections

Action 1.1 Establish effective communication between KWS and KFS

Lack of joint proper awareness, communication radio network, and interpretation leads to institutional mistrust and conflicts. For effective communication between KWS and KFS,

frequent joint meetings and operations will be carried out and radio integration between the two institutions instituted. Joint policy interpretations will also be carried out to minimize conflicting policy interpretation.

Action 1.2 Review existing KWS/ KFS MoU

The current MoU between KWS and KFS is not widely understood and is too general as it addresses relationship between the two institutions at the national level. As such, to increase collaboration between the two institutions, AE management will liaise with the KFS and KWS Headquarters to have the existing MoU between KWS and KFS reviewed. In addition, a local level MoU for the AE will also be developed to address the specific management challenges like implementation of the zoning scheme, tourism development and management, and security management.

Action 1.3 Share management resources to enhance AE management

Management resources currently available are not shared between the two institutions while others are too old to cope with modern technology and management challenges. As such, modern equipment and technology will be provided and joint management encouraged. There will also be joint sharing of human capital to enhance joint operations for effective management of AE.

Action 1.4 Organise workshops and seminars between KWS and KFS

The policies of both KWS and KFS are not well understood even by the staff at both institutions which fosters conflict. Community projects in the AE are also implemented by individual institutions with minimal consultation which means there is little team work spirit between the institutions.

To ensure close collaboration among AE staff from KWS and KFS, joint sensitization workshops and seminars for all cadres of staff in both institutions will be carried out regularly. The MOU principles will be disseminated in these workshops and seminars to ensure staff understand areas of cooperation between the two institutions. Further, joint social projects that are acceptable to both institutions will be carried out to minimize mutual mistrust between the two institutions and also endear the two institutions to the communities.

In addition, joint team building activities will be carried out regularly to bond and promote team work spirit between staff in both institutions. And to ensure effective coordination of implementation of management activities, a management committee will be established from the stakeholders to oversee the implementation of the AE management plan.

Action 1.5 Develop and implement MoUs with Rhino Ark and other NGOs

There has been concern that in spite of its very useful support to the park and the wider ecosystem, the mandate of Rhino Ark is not very clearly spelt out and avenues of consultation not clearly stipulated. Also the management of the AE grand fence is not equally owned by both KWS and KFS. To address this, an MOU will be developed with Rhino Ark and other NGOs working in the AE to clearly state their mandates to avoid duplication of responsibilities and resources. Also, the strategic plan on fence maintenance will be reviewed and implemented.

Action 1.6 Collaborate with County Authorities in the management of AE

There is little representation in the relevant government administrative committees leading to poor coordination and duplication of duties and resources. As such, the Field Assistant Director –Mountain Conservation Area and Head of Conservancy-Central Highlands will designate officers who will be attending County level meetings and liaise with County administration in all matters affecting management of AE. In particular the Warden, Nyahururu Station will ensure integrity of Lake Ol Bolossat is sAE-guarded in liaison with relevant government offices and Nyandarua County Government.

Action 1.7 Develop and review existing concessions and agreements

The lease agreement between Rhino ark and KWS over Rhino Retreat is not clear. Also some tourism facilities in the park erect barriers that hinder free movement of tourists in the park without consultation with park authorities. This inconveniences visitors and hampers full marketability of the ecosystem. Artificial addition of salts at the salt licks next to the lodges also increases degradation. On the other hand, the Logging ban on exotic tree species is negatively impacting on the local economy which undermines relationship with communities and also encourages illegal logging.

To address the foregoing issues, existing concessions and agreements will be reviewed and new ones drawn for upcoming developers to ensure clear and abiding structures. An internal Tourism Forum from the key stakeholders will be constituted to address tourism management challenges (see action 3.6 of the Tourism Development and Management Programme). And to enhance management of the AE joint programmes e.g. Bongo surveillance, rehabilitation of graded areas, and fisheries management, MoUs will be initiated.

Action 1.8 Establish Aberdare Trust

AE generates several environmental goods and services to a wide range of beneficiaries who earn enormous financial returns. Yet these beneficiaries have no forum through which they can directly support protection and conservation of AE. Even when they are willing to support specific conservation activities, there is currently no legal body through which they can channel their resources with requisite guarantee that their contribution will be used exclusively for the intended purpose. Therefore, under this management action, AE management and other stakeholders will establish an AE trust as a legal and competent agency to expressly solicit support for AE conservation. The Trust will in turn establish a trust fund where solicited funds will be invested. Through this kitty, it will be possible to access funding from treasury and other major users of environmental goods and services, such as KenGen, KPLC, all the water services boards, hotels etc. that get water from AE. This funding will be crucial in supporting maintenance of AE infrastructure, including the fence and road network.

Objective 2: Adequate and well motivated staff developed

The future desired state at the AE is where well trained and motivated staff at all cadres of administration are available to preside management operations. Such staff will need adequate housing in different stations within the AE. This will imply rehabilitation of old houses and establishment of new ones where they exist. Staff will also require continuous training to

equip them with modern skills that will make them more effective. Staff welfare issues need to be addressed to ensure they are well motivated. Welfare facilities and associations will therefore be established to increase staff motivation.

The management actions that have been designed to realize this objective focus on: liaising with Human Capital departments from KWS/KFS in the implementation of optimum staffing levels; carrying out Training Needs Assessments; carrying out Training of Trainers (TOT); carrying out Joint training Programmes and establishing a Resource Centre; constructing and rehabilitating AE buildings; providing and maintaining staff social amenities; and establishing staff Welfare Associations. These actions are expanded upon in the following sections.

Action 2.1 Liaise with Human Capital departments from KWS/ KFS in the implementation of optimum staffing levels

Staff are a core component of any effective management system as they ensure that planned activities are successfully implemented. Optimum staffing levels in both institutions is already known but has not been harmonized and implemented. These optimum levels will be reviewed continuously by zonal managers and wardens in conjunction with the Headquarters in both institutions to ensure that an adequate workforce is available to deliver the AE's conservation goals.

Action 2.2 Carry out Training Needs Assessments

A well trained workforce that is equipped with diverse management skills is needed to implement the management actions contained in this plan. Training needs of all staff in all cadres has not been established. The training needs assessment will be done through interviews and questionnaires by the park and zonal managers and based on the outcome of this exercise a staff training strategy will be developed and implemented in liaison with KWS and KFS Headquarters Human Capital Departments.

Action 2.3 Carry out Training of Trainers

Due to frequent staff changes, there are always training gaps among the staff which would be filled by training the staff internally. In view of this, resourceful staff will be identified among the staff and trained as trainers in essential skills that can easily be imparted internally.

Action 2.4 Carry out Joint training Programmes and establish a Resource Centre

Staff in both institutions do not clearly understand each others policies leading to misunderstanding and lack of team work. Rapid advances in technology also imply that staff in both institutions lag behind in modern skills and knowledge which may hamper their effectiveness. This is further complicated by lack of a resource centre that can act as a training facility within AE. As such, joint training programmes will be initiated internally and externally to inter marry the skills across both institutions. Staff will be exposed to advances in technology and changes in management systems. KWS and KFS will seek funds for training and also liaise with other stakeholders to establish a resource centre at King'ong'o Research Station.

Action 2.5 Construct and rehabilitate AE buildings

Residential houses and offices within AE are either inadequate while existing ones are poorly maintained. Provision of quality housing and office space is essential to boost staff morale and enhance performance. In the forest reserves most of the forest guard posts have no housing and where they exist they are inhabitable. In the National Park residential houses, offices, and rangers out posts are inadequate. Both KWS and KFS have already carried out assessments of the building requirements and recommendations have been made on the required residential and non-residential buildings. In view of this, KWS and KFS will strive to meet the demand for housing and office space by constructing new buildings and rehabilitating existing ones.

Action 2.6 Provide and maintain staff social amenities

Majority of staff within AE have no access to social amenities which undermines staff morale and motivation and also denies them exposure to events and activities going on in the external environment outside their stations. To address this, Field managers will carry out amenity needs assessment in their stations and liaise with their respective Headquarters to fund such social amenities like power, TVs, DSTVs, welfare canteens, sports equipment, and first- aid kits.

Action 2.7 Establish staff Welfare Associations

There are few active welfare associations in the AE which staff can join to meet their social needs. As such, AE management will encourage staff to form additional Welfare Associations, enlighten them on the economical benefits of membership, and train them on management of the associations.

Objective 3: Infrastructure to support effective management developed and existing improved

Like other ecosystems, effective management of AE cannot be possible without a good and strong infrastructure network. Currently access to some areas is impossible during the rains which put a big constraint on management activities. There are also several airstrips in the AE most of which are abandoned and will need to be rehabilitated both for management and tourism. Telecommunication network will also need to be upgraded to link different sectors and also enhance communication between management and the communities and other stakeholders. Other management infrastructures include guard posts and fire towers which need to be established. This management objective has therefore been designed to address infrastructure issues in the AE. The management actions that have been developed to achieve this objective focus on: constructing and maintaining the AE road network; rehabilitating and maintaining airstrips; improving the telecommunication network; constructing and rehabilitating AE buildings; rehabilitating fire towers; establishing a fire and rescue centre at Mweiga to serve other areas; and procuring and maintaining plants, vehicles and equipment. These management actions are elaborated in the following sections.

Action 3.1 Construct and maintain the AE road network

Inadequate road network restricts visitors within a small circuit, at the Salient and Central Moorland, which constrains optimum development of tourism in the AE because some scenic features cannot be accessed. It also poses management challenges due to lack of adequate and serviceable firebreaks and patrol roads. Majority of the road network in the northern Aberdare National Park and the Forest Reserve has been neglected and would require major rehabilitation for it to support tourism. Some of the park roads that have been abandoned include: Shamata–Muhiriga–Wiyumiririe; Shamata–Wambuku–Chebuswa; Shamata–Malewa; Shamata–Gathanji circuit; Shamata Airstrip circuit; Shamata gate–Rhino gate; and Gatare–Njabini road.

To improve the road network and by so doing enhance management of the AE, strategic roads will be developed where they don't exist while existing ones will be rehabilitated and maintained. This also applies to firebreaks which will be opened and maintained. In particular Mutubio-Malewa-Shamata road will be developed and maintained to all weather to open tourism. However, to ensure a coordinated road development in the area, a road network design study will be carried out to establish linkages between administrative and tourist facilities in the National Park and Forest Reserves.

Action 3.2 Rehabilitate and maintain airstrips

Existing airstrips in the AE are Mutubio, Kiandongoro, Shamata and Mweiga (private). There is no airstrip in the forest reserve making it difficult for visitors or even managers to easily access some parts of the AE during emergencies like fire outbreaks or security operations. Hence, all existing airstrips will be rehabilitated and a study conducted to explore potential of establishment of a new airstrip at Kieni or Geta, in the forest reserve, for tourism and management purposes.

Plate 6. Shamata Airstrip. This airstrip is overgrown with vegetation. It will be rehabilitated to facilitate tourism development and security operations in the Northern Aberdare.

Action 3.3 Improve the telecommunication network

Communication within AE and between AE and stakeholders is very inefficient and unreliable. Visitors also have difficulties communicating with management in event of problems or emergencies. Communication with AE is also a problem because not all vehicles are fitted with VHF radios. In view of this, radio communication between KWS and KFS will be integrated and all vehicles fitted with radios. Outposts will be installed with radios and power back up. Telephone receptors will be modernized to receive calls from a wide range of sources and telephone boosters will be strategically placed within the ecosystem to enhance reception in areas with remote terrain.

Action 3.4 Construct and rehabilitate AE buildings

There are currently not enough staff houses at all the KWS gates, while all KFS stations require new houses to ease hardship. Most fence guard posts have no permanent houses which makes life very hard for the staff. Some stations also lack office facilities. To address the buildings shortfall, all offices will be rehabilitated and permanent houses built for fence guard posts and other stations where they are required. Offices will be constructed at the Central Moorland and Northern Aberdare sectors, while all forest offices will be rehabilitated. On the other hand the KWS outpost at Ndunyu Njeru is located at a plot owned by the police who have already constructed an office building to support their operations. To minimize congestion at this site the KWS outpost will be relocated to Geta fence guard post.

Action 3.5 Rehabilitate fire towers

Existing fire towers have been neglected for a while and some are even inaccessible making it hard to locate and fight fires on time. These fires towers will be rehabilitated and new ones constructed at strategic locations within AE.

Action 3.6 Establish a fire and rescue centre at Mweiga to serve other areas

There is currently no fire or rescue centre within AE and response to fires and disasters is extremely poor. A fire and rescue centre will be constructed at Mweiga and linkages with other institutions like Armed forces (e.g. armed forces at Nanyuki) established to ensure that a strong fire fighting team is readily available in the Mountain Conservation Area. The fire centre will be headed by a qualified fire officer and will be equipped with adequate fire fighting equipment, fire fighters and fire engines. It will also be linked to the sector/zonal Headquarters through radio communication.

Action 3.7 Procure and maintain plants, vehicles and other equipment

The current plants, machinery, lorries, tippers and water bowser are old, some have mechanical breakdown and are not enough to carry out road maintenance. KFS vehicles are not adequate to support forest management and extension services. To address this gap, plants, vehicles and machinery will be assessed to establish whether they can be repaired or boarded and new ones will be procured to meet the demand. Each Forest station 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. The extension staff in the four Counties bordering the ecosystem will

require a motorcycle each for transport during forest extension activities. A KFS minibus will be required for ferrying staff and members of the community to training venues; and each Forest Zone will require a lorry for ferrying people during fire fighting operations. For effective road maintenance in the ecosystem, three graders will be procured for routine road maintenance, but major construction and rehabilitation works will be contracted out. In addition, fire fighting and office equipment will be procured to supplement the existing ones.

Objective 4: Management systems strengthened

There is need for the development and strengthening of management systems that are essential for effective management of AE. Management systems designed to facilitate the decentralization of management to the sectoral and station level, harmonize KWS and KFS spatial administrative zones, harmonize the gate management between KWS and KFS and establish an effective communication system are required to ensure coordinated and efficient delivery of the management programmes outlined in this plan. This management objective has therefore been designed to address issues that might hinder management coordination in the AE. The management actions that are meant to deliver this objective are discussed in the following sections.

Action 4.1 Harmonize KWS and KFS spatial administrative zones

The existing KFS and KWS management systems at the AE do not allow quick decision making and easy management operations. Lack of harmony also means resources are not efficiently utilized leading to poor delivery of services. In view of this, management will increasingly be decentralized to sectors and stations to facilitate quick decision making. Sector Wardens and Zonal Foresters will be expected to collaborate in implementation of the conservation agenda in their areas of jurisdiction. And to facilitate this collaboration, Zonal and Sector boundaries will be reviewed and harmonized to improve collaboration amongst AE managers.

Action 4.2 Harmonize the gate management system

The current system of gate management creates a management overlap because the two institutions operate individual gates independent of the other. Gate operations of the two will be harmonized to eliminate overlap and optimize resource use. In light of this, the Kiandongoro, Ruhuruini and Mutubio KWS gates will be relocated to the fence line to improve tourism management in the ecosystem.

Action 4.3 Establish an effective communication system

Communication between KWS and KFS is poor due to lack of systems harmony. This makes it difficult to exchange useful management information like intelligence. There is also no established data base that can be shared between the two institutions. To address these problems, radio communication will be harmonized and modern IT infrastructures installed to enable communication across the two institutions and improve service delivery. There will also be regular joint meetings and the two institutions will produce joint materials for stakeholder education. This will enhance customer services, build trust to the community and increase revenue collection. In addition joint operations using modern technology like GPS, data collection devises, night vision equipment will be carried out and intelligence informa-

tion will be shared between the two institutions to curb threats to the ecosystem. Further to this, appropriate information management systems e.g. Management Information System (MIST) and Human Resource Management Information System (HRMIS) will be established.

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 nine 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 19. 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 Rhino and Bongo populations in the AE are increasing**	**Population size and recruitment rates of Rhino and Bongo**	**Rhino and Bongo census reports**
Objective 2: Threats to AE habitats reduced and monitored	**The forest reserve's ecological integrity maintained**	**Forest size and species composition**	**Land cover mapping and vegetation survey reports**
	Habitat connectivity between the AE and surrounding natural habitats is maintained	**Extent of conservation compatible land uses in AE wildlife dispersal areas**	**AE landscape land cover change analysis study**
	Elephants and other key species are able to continue moving between the AE and dispersal areas	**Elephant movements in the greater AE**	**Tracking of GPS or Radio collared elephants**
Objective 3: Research and Monitoring in the AE improved	**Research is supporting AE management**	**Management oriented research carried out**	**Research papers and reports that are influencing management decisions**

Table 20. Natural Forest 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	**Communities are benefiting from the natural forest resources**	**Harvested natural forest resources**	**CFA reports**
Objective 2: Degraded forest areas restored	**Degraded forest patches are rehabilitated**	**Extent of natural forest**	**Satellite imagery and reports on forest restoration**

Table 21. Plantation Forest Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Forest plantation establishment and management enhanced	Tree nurseries are producing quality seedlings of diverse species	Number of viable seedlings available for planting	Tree nursery reports
	Silvicultural operations are carried out	Quantity and quality of products from silvicultural operations	Plantation management reports
Objective 2: Plantation establishment through the Plantation Establishment Liv elihood Improvement Scheme (PELIS) 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 22. Farm Forestry Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Farm forestry enhanced	There is increase in tree establishment in the farm plots in the greater AE	Percentage of farm plot under trees	Farm forestry survey reports
Objective 2: Forest extension activities supported	There is increased adoption of tree husbandry technologies in the greater AE	Percentage of community who have adopted new tree raising technologies	Farm forestry survey reports

Table 23. Water Resource Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Protection and conservation of AE's water catchment areas enhanced	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: Allocation of water resources improved	Water ensuing from the AE is sufficient for all target uses	Water allocation quotas	Water allocation reports
Objective 3: Water quantity and quality monitored in collaboration with stakeholders	Water ensuing from the AE is of acceptable quality for all target uses	Water quantity and quality	Water flow and quality analysis reports

Table 24.Tourism Development and Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: AE Tourism facilities improved	Improved visitor satisfaction	Visitor satisfaction index	Visitor survey reports
	New developments impact on the AE's wilderness characteristics	Visitor and investor satisfaction index	Feedback from AE investors
Objective 2: The AE visitor activities and attractions developed and marketed	Increased number of visitors to the AE	Visitor statistics	KWS HQ visitor database and concession holder records
	Increase in tourism revenue	Annual revenue statistics	KWS HQ revenue reports
	Increase in visitor satisfaction	Visitor satisfaction index	Visitor survey reports
	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 AE staff
Objective 3: Tourism Administration and management strengthened	Increased collaboration between KWS and KFS and other stakeholders regarding tourism issues at the AE	Evidence of collaboration between stakeholders in the management of AE tourism	AE tourism management records

Table 25. Community Partnership and Education Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: Human-wildlife conflict incidences reduced	Reduction of wildlife related costs to AE adjacent communities	Incidents of human-wildlife conflict around the AE	AE Community Wildlife Service records (monthly reports and occurrence books)
	Enhanced PA-community relations	Community attitude	Community Knowledge, Attitude and Practices (KAP) surveys
Objective 2: Community benefits from the AE improved	Increased value and importance of the AE to surrounding communities	Income from activities linked to the conservation of the AE	CWS and Conservation CBOs reports
Objective 3: AE Community conservation awareness and PA-community communication improved	Enhanced relationships between AE management and surrounding communities	Incidences of AE - community conflict	AE Community Wildlife Service records
	Improved understanding of the AE's conservation importance	Number of conservation related activities in AE adjacent areas	AE Community Wildlife Service records
	Increased community awareness of and respect for AE rules and regulations	Number of local community members arrested for illegal activities in the AE	Security Section Records
	Reduced illegal natural resource use in the AE	Number of local community members arrested for illegal natural resource use the in AE	Security Section Records

Table 26. Security Management Programme Monitoring Plan

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

Table 27. Protected Area Operations Management Programme Monitoring Plan

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
Objective 1: AE Stakeholder relations enhanced	Enhanced management collaboration between KWS, KFS, Rhino Ark, tour operators, hotel owners and CFAs	Percentage of joint responsibility 3-year activity plan milestones achieved	AE annual reports
	Increased stakeholder support for management of the AE	Number of AE advisory meetings or other stakeholder collaboration events held	Meeting minutes or AE management records
Objective 3: Adequate and well motivated staff developed	Improved efficiency of AE staff	Staff performance against 3-Year Activity Plan "milestones"	AE annual reports
	Improved morale of AE staff	Number of poor morale related incidences	AE annual reports
Objective 3: Infrastructure to support effective management developed and existing improved	Improved visitor and management access across the AE	Kilometres of roads rehabilitated	AE management records and KWS/KFS HQ GIS database
	Environmental disturbance and pollution during infrastructure construction	Evidence of litter, pollution or excessive environmental damage	Targeted inspections by AE staff
	Improved efficiency in management operations	Ratio of operational to non-operational vehicles	AE management records and/or periodic surveys

Objective	*Potential Impacts (Positive and Negative)*	*Verifiable Indicator*	*Sources and means of verification*
	Enhanced ability of AE management to implement the plan	Percentage of 3-Year Activity Plan milestones achieved	AE annual reports
	Increased external financial support for AE management	AE revenue sources	AE annual budget reports
Objective 4: AE management systems strengthened	Improved management collaboration between KWS and KFS at the AE	Linked and effective telecommunication system	AE management records and/or periodic surveys
	Enhanced ability of AE management to implement the plan	Percentage of 3-Year Activity Plan joint milestones achieved	AE annual reports

Plan Annexes

Annex 1: Stakeholder participation in plan development

Participation in the Core Planning Team and Expert Working Group Meetings

Name	*Organisation*	*Core Planning Team*	*Working Groups*				
			Ecology	*Tourism*	*Community*	*Security*	*PA Ops*
1. Anne Kahihia	KWS	X					
2. Apollo Kariuki	KWS	X	X	X	X	X	X
3. Mungumi Bakari	KWS	X	X	X			
4. Barasa Otunga	KWS	X					
5. Bernard Kaaria	KWS		X	X			
6. Bernard Ngoru	KWS	X	X	X	X	X	X
7. C. Karugu	WRMA-Ewaso Nyiro	X					
8. Catherine Wambani	KWS	X					
9. Colin Church	Rhino Ark			X			
10. Daniel Kariuki	Out span Hotel			X			
11. Daniel Njaga	KTF			X	X	X	X
12. Dickson Lesimirdana	KWS				X	X	X
13. D.K. Kahuthia	KEFRI		X				
14. Elizabeth Wambugu	KFS	X					
15. Elizabeth Wangui	KFS				X	X	X
16. Ephraim Karani	KFS				X	X	X
17. Eric Adunda	KWS				X	X	X
18. F.D. Ngunjiri	KFS	X					
19. F.K Waweru	Chuka University		X				
20. Erustus Kanga	KWS	X	X				
21. Francis Irungu	KWS				X	X	X
22. Fred Barasa	Nature Kenya		X				
23. Fred Ogombe	KFS	X					
24. Fredrick Ashiono	KFS				X	X	X
25. J. M. Githui	Rhino Ark				X	X	X
26. Hewson Kabugi	KWS	X					
27. Israel Makau	KWS	X					

Name	*Organisation*	*Core Planning Team*	*Working Groups*				
28. J.B. Okello	KFS	X					
29. Jacinta Wainaina	WRMA-Tana	X	X				
30. James K. Ndufa	KEFRI		X				
31. James kandungu	KWS		X				
32. James Magena	KWS		X		X	X	X
33. James Mathenge	KWS	X					
34. James Mwang'ombe	KFS	X					
35. John Githaiga	UON		X				
36. John Itugi	KWS				X	X	X
37. John Ngoyanae	KFS				X	X	X
38. John Macharia	KFS		X				
39. Joram Kagombe	KEFRI	X					
40. Joseph Kimani	KFS				X	X	X
41. Joseph Mbugua	MKEPP	X	X	X	X	X	X
42. Judy Kigamba	WRMA	X					
43. Judith Nyunja	KWS		X				
44. Kefa Wamichwe	KFS			X			
45. Linus Kariuki	KWS		X				
46. Lucy Kobia	KWS			X			
47. Lucy Tissa	KWS			X			
48. Mbogo Wachira	KWS				X	X	X
49. Peter Maina	KWS				X	X	X
50. Peter Muturi	KFS				X	X	X
51. Peter Murimi	KWS		X	X			
52. Peter Njoroge	NMK		X				
53. Robert Chira	UON		X				
54. Robert Njue	KWS			X	X	X	X
55. Shadrack Muya	JKUAT		X				
56. Simon Wachiuri	KWS		X		X	X	X
57. Stephen Maingi	Ministry of Water	X					
58. Stephen Manegene	KWS	X					
59. Wachira Bore	NEMA	X					
60. Wilson Ole Leboo	KFS				X	X	X

List of Participants: Aberdare ecosystem Management Plan Stakeholders Workshop, Out span Hotel, Nyeri, 21-24 July 2004

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Aberdare ecosystem Integrated Management Planning Workshop Held at Green Hills Hotel Nyeri, on 10th March 2005

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16	Peter Kanyara Njogu	Asst. Chief North Kinangop	14 Kinangop	0725434736
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21	Magdaline W. Kariuki	Chief – Engineer	14 North Kinangop	0724353255
22	Joseph M. Ngure	Tiamura Water Project	39 North Kinangop	
23	Eunice W. Burugu	Mkungi/mekaro tree nursery	45 North Kinangop	0723302692
24	Reuben Muigai	Forester North Kinangop	40 North Kinangop	0734772639
25	James Nguyo	KWS Nyahururu	178 Nyahururu	0722902670
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11	David M. Mbatia	Tulaga Self Help Group	294 S.Kinangop	0720923830
12	David Kirubi	Sasumua Saw Mills	163 S.Kinangop	0721462586
13	Clement Atei	Nairobi City Water Company	18 S. Kinangop	0722109887
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16	Maigwa G. N.	Chief's Office	256 S.Kinangop	0723231413
17	Samuel G. Kihia	Aic Njabini	143 S.Kinangop	0720901219
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21	Bernard Kihonge	CDA	42 N. Kinangop	0720539909
22	Grace Wanjiru	Kahuruko Tree Nursery	26 N .Kinangop	0724162861
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27	Isaac K. Muraguri	Upper Chania Water Project	102 S.Kinangop	0721599483
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20	Jane Njeri	Kinyaiti Women Group	40, Mweiga	
21	Harun M. Mundia	Mwihoko Tree Nursery	58, Mweiga	0611016
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27	Samuel M. Kiboi	Kenfap Farmers	234, Nyeri	0725704939
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Annex 2: Existing Tourist Accommodation Facilities in Aberdare National Park

Facility name	Facility Type	Number of beds
1. The Ark	Lodge	120
2. Tree tops	Lodge	220
3. Tusk Camp	Banda	8
4. Olive	Banda	2
5. Fishing lodge	Banda	7
6. Sapper hut	Banda	2
7. Rhino retreat	Banda	
8. Queen Beatrice	Special campsite	
9. Prince Charles	Special campsite	
10. Muringato	Special campsite	
11. Nyati	Special campsite	
12. Bongo	Special campsite	
13. Kifaru	Special campsite	
14. Al haji	Special Campsite	
15. Kiguru	Special Campsite	
16. Ruhuruini	Public campsite	
17. Reedbuck	Public campsite	
18. Rhino	Public campsite	
19. Shamata	Public campsite	
20. Gikururu	Public Campsite	
21. Honi	Public campsite	
22. Mutubio	Public campsite	
23. Chania	Public campsite	
24. Hagenia	Public campsite	

Annex 3: Proposed tourist accommodation facility sites in the AE

Tourist Facility Sites in the AE

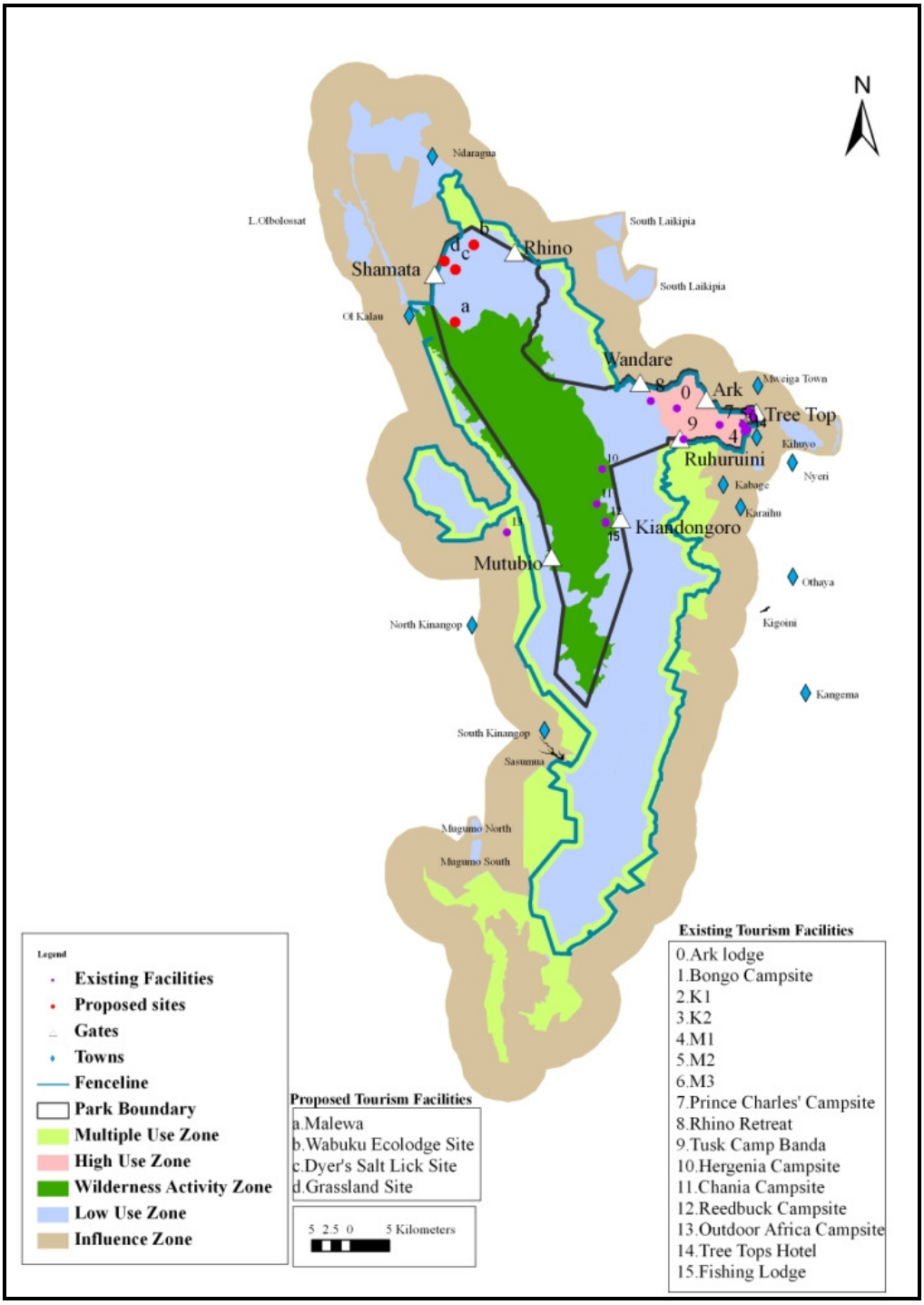
Site	Station/Sector	Facility to be developed
Aberdare National Park		
Rhino Gate	Northern	Satellite Tree House
Shamata Gate	Northern	Ecolodge
Malewa river	Northern	Ecolodge
Dyer's Salt Lick	Northern	Tree House
Wambuku	Northern	Ecolodge
Aberdare Forest Reserves		
Uaso Narok River	South Marmanet	Eco-Lodge
Pesi River Site	Ndaragwa	Camp site
Karima Falls and Caves Site	Ndaragwa	Eco-Lodge
Northern Aberdares Wilderness Retreat	Ndaragwa	Eco-Lodge
Sasumua Dam	South Kinangop/ Ragia	Eco-lodge
Kikuyu Escarpment Forest	Uplands	Eco-Lodge
Thaba Falls / Gatamaiyu River site	Kereita	Eco-Lodge
Mataara	Kieni	Eco-Lodge
The Old Kimakia Forest Station	Kimakia	Eco-Lodge
Old Gatare Station	Gatare	Eco-Lodge
Karurome Site	Wanjerere	Eco-Lodge
Dunlop – Kwa Joni Camp Tuthu	Wanjerere	Eco-Lodge
Kiambicho	Kiambicho	Tented lodge
Kigomo-Gura River site	Kiandogoro	Eco-Lodge
Tusha/Kagumo site	Kiandongoro	Eco-Lodge
Kathoriani Site	Zaina	Eco-Lodge
Kabiruini Site	Muringato	Tented Camp
Tanyai Caves	South Laikipia Forest Block (Muringato)	Tented Camp
Tango River Falls	Zuti	Eco-Lodge
The South Marmanet – DFO'S House	South Marmanet	Guest House
Ndaragwa Forest Station - The Forester's House	Ndaragwa	**Guest House**
Geta-Forester's House	Geta	Guest House
North Kinangop-Forester's House-	North Kinangop	Guest House
South Kinangop -Forester's House	South Kinangop	Guest House
Uplands- Forester's House	Uplands	Guest House
Kieni Forest station	Kieni	Guest House
Muringato Former DFO's House	Muringato	Guest House
South Marmanet former DFO's	South Marmanet	Guest House

Site	Station/Sector	Facility to be developed
House		

Advertised AE Tourist facility sites

	Facility name and type	Location
1.	Hagenia ecolodge	Central Moorland
2.	Northern Aberdares Wilderness Retreat	Ndaragua- Nyandarua
3.	Sasumua Dam eco-lodge	South Kinangop/ Ragia
4.	Kikuyu Escarpment Forest Eco-Lodge	Uplands Forest - Kiambu
5.	Kimakia Forest Eco-lodge	Kimakia Forest Eco-lodge-Thika
6.	Thaba Falls Luxury Tented Camp and Eco-lodge	Kereita Forest - Kiambu
7.	Kwa-Joni Tuthus Eco-lodge	Wanjerere Forest – Murang'a North
8.	Tucha/Kagumo Eco-lodge	Kiandogoro Forest - Nyeri
9.	Geta Guest House	Geta Forest- Nyandarua
10.	North Kinangop Guest house	North Kinangop Forest-Nyandarua
11.	Muringato Guest house	Kabiruini- Nyeri

Annex 3: Location of the existing and some of the proposed visitor accommodation facilities



Annex 4: Tourist Facility Site Assessment Field Visit: Aberdare National Park, 19 June 2010

The tourist facility site assessment was carried out by a team comprising of representatives from KWS, Rhino Ark and the tourism industry (see list of participants). The purpose of the assessment was to carry out a ground inspection of the sites (i.e. Rhino Gate, Shamata Gate, Malewa, Dyer's Salt Lick and Wambuku) identified by Aberdare National Park managers and make recommendations on the suitability of the sites for tourist facility development. The team visited the five sites that had been proposed by park management and assessed the sites based on several factors, including the AE zoning scheme and zone prescriptions, fragility of the site, proximity to utilities and tourist attractions, and site gradient.

The team's observations and recommendations are summarized in the following site assessment tables. In addition, photographs of interesting attractions taken from each site are also provided.

Site 1: Rhino Gate

Recommended use: Tree House can be offered together with the close by KFS Ecolodge site

Special feature of interest: Spectacular view of Mt. Kenya and Ol Donyo Satima

Criterion	Excellent-4	Good-3	Poor-2	Bad -1	Comment
Visitor Numbers			X		
On popular itinerary			X		
Accessibility of site		X			
Existing development		None			
Access to services					Nyahururu 40Km
• Labour		X			
• Medical		X			
• Power				X	
• Water		X			
• Supplies		X			
• Firewood		X			
• Road		X			
• Airstrip					
Ease of drainage		X			
Suitability of ground		X			
Scenic	X				Exposed view point
Attraction (e.g. River)	X				
Proximity of animals	X				
Distance from other site or facility	X				None

Criterion	Excellent-4	Good-3	Poor-2	Bad -1	Comment
Trees		X			
Climate			X		
Health risk (e.g. insects	X				
Security	X				
Other factors					
Visitor use zone	Low Use Zone				
Is the site on an animal breeding site, corridor, waterhole, or dry season ref-uge?	No				
Is the gradient <7% or >7%	<7%				
Is the distance from a water body >100m or <100m	Ngobit River 5Km away				

Picturesque valleys and hills from Rhino Gate site

Site 2: Shamata Gate

Recommended use: Ecolodge

Special feature of interest: Site overlooks a natural scenic forest and has a good view of distant peaks

Criterion	Excellent-4	Good-3	Poor-2	Bad -1	Comment
Visitor Numbers			X		
On popular itinerary			X		
Accessibility of site		X			Nyahururu 30km
Existing development		None			
Access to services					
• Labour		X			
• Medical		X			
• Power				X	
• Water		X			Water pipe-line close by
• Supplies		X			
• Firewood		X			
• Road		X			
• Airstrip		X			
Ease of drainage		X			
Suitability of ground		X			
Scenic		X			
Attraction (e.g. River)			X		
Proximity of animals			X		
Distance from other site or facility	X				
Trees		X			
Climate			X		Cold, frosty nights
Health risk (e.g. insects	X				
Security	X				
Other factors					
Visitor use zone	Low Use Zone				
Is the site on an animal breeding site, corridor, waterhole, or dry season ref-uge?	No				
Is the gradient <7% or >7%	<7%				
Is the distance from a water body >100m or <100m	>100m				

Scenic views of distant peaks

Scenic forest next to Shamata site

Site 3: Malewa

Recommended use: Ecolodge

Special feature of interest: Malewa gorge, Kaheho falls, and Chebuswa hill

Criterion	Excellent-4	Good-3	Poor-2	Bad -1	Comment
Visitor Numbers			X		
On popular itinerary			X		
Accessibility of site			X		
Existing development					
Access to services		None			Nyahururu 30Km
• Labour		X			
• Medical		X			
• Power				X	
• Water		X			Kaheho river is 300 meters away
• Supplies		X			
• Firewood		X			
• Road		X			
• Airstrip		X			
Ease of drainage		X			
Suitability of ground		X			
Scenic		X			
Attraction (e.g. River)		X			
Proximity of animals		X			
Distance from other site or facility	X				
Trees			X		
Climate			X		Cold frosty nights
Health risk (e.g. insects	X				
Security	X				
Other factors					
Visitor use zone	Low Use Zone				
Is the site on an animal breeding site, corridor, waterhole, or dry season ref-uge?	No				
Is the gradient <7% or >7%	<7%				
Is the distance from a water body >100m or <100m	>100m				

Scenic moorlands, valleys and peaks

Kaheho water falls at Malewa site

Site 4: Dyer's Salt Lick

Recommended use: Tree house (6 beds) and special campsite to be offered as a satellite camp of one of the other three sites that are near (i.e. Malewa, Shamata, or Wambuku)

Special feature of interest: Wildlife Viewing/Natural Salt Lick, Njangiri Hill, tributary of Pesi river

Criterion	Excellent-4	Good-3	Poor-2	Bad -1	Comment
Visitor Numbers			X		
On popular itinerary			X		
Accessibility of site		X			Nyahururu 30Km
Existing development		None			
Access to services					
• Labour		X			
• Medical		X			
• Power				X	
• Water		X			
• Supplies		X			
• Firewood		X			
• Road		X			
• Airstrip					
Ease of drainage		X			
Suitability of ground		X			
Scenic		X			
Attraction (e.g. River)			X		
Proximity of animals		X			
Distance from other site or facility	X				
Trees		X			
Climate			X		Cold frosty nights
Health risk (e.g. insects	X				
Security	X				
Other factors					
Visitor use zone	Low Use Zone				
Is the site on an animal breeding site, corridor, waterhole, or dry season ref-uge?	The site is next to a swamp that is frequented by wildlife				
Is the gradient <7% or >7%	<7%				
Is the distance from a water body >100m or <100m	>100m				

Dyers Salt Lick site

Dyer's salt lick with Njangiri hill in the foreground

Swamp at Dyer's Salt Lick

Derelict Tree house/viewing platform at Dyer's Salt Lick

Site 5: Wambuku

Recommended use: Ecolodge

Special feature of interest: Quiet scenic forest overlooking valleys and hills

Criterion	Excellent-4	Good-3	Poor-2	Bad -1	Comment
Visitor Numbers			X		
On popular itinerary			X		
Accessibility of site		X			Nyahururu 30Km
Existing development		None			
Access to services					
• Labour		X			
• Medical		X			
• Power				X	
• Water		X			
• Supplies		X			
• Firewood		X			
• Road		X			
• Airstrip		X			
Ease of drainage		X			
Suitability of ground		X			
Scenic		X			
Attraction (e.g. River)		X			
Proximity of animals		X			
Distance from other site or facility	X				
Trees		X			
Climate			X		Cold frosty nights
Health risk (e.g. insects	X				
Security	X				
Other factors					
Visitor use zone	Low Use Zone				
Is the site on an animal breeding site, corridor, waterhole, or dry season ref-uge?	No				
Is the gradient <7% or >7%	<7%				
Is the distance from a water body >100m or <100m	>100m				

Scenic forest at Wambuku ecolodge site

List of participants in the tourist facility site assessment field visit

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