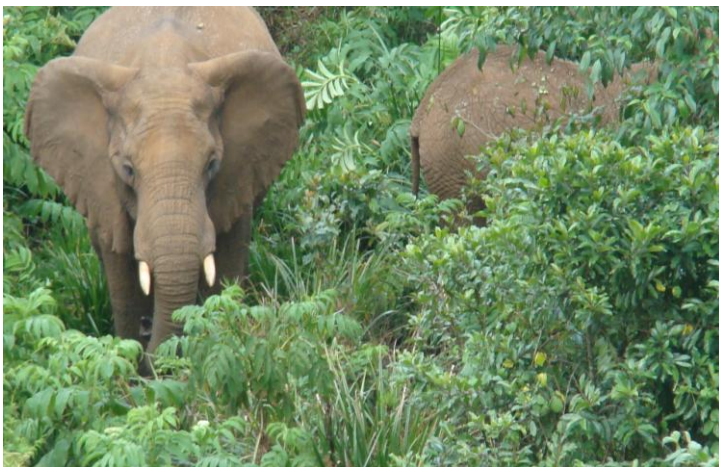




Aberdare Forest Reserve Management Plan



2010 - 2019

FOREWORD

The Aberdare Forest Reserve management plan was developed to guide the establishment, development and sustainable management, including conservation and rational utilization of the forest and allied resources for socio-economic development. . The plan is prepared in compliance with the legal requirement of the Forests Act, 2005 under section 35 which provides a mandatory legal requirement for preparation of management plans for management of all State, Local Authority and provisional forests. The plan also takes cognizance of various documents which include the draft Forest Policy No. 9 of 2005; KFS Strategic Plan 2009/10 - 2013/14; the Environmental Management and Coordination Act (EMCA), 1999; the Wildlife (Conservation and Management) Act, Cap. 376; and the Water Act, 2002 among other policies and legislative frameworks whose objectives have a direct impact on sustainable conservation, management and utilization of Aberdare Forest Reserve.

The process of developing the plan started in 2004 at a Scoping Meeting held at Out Span Hotel, Nyeri by key stakeholders with an aim of developing an integrated management plan. The planning process embraced consultative and participatory approaches in conservation and management of natural resources that will lead to ownership of the initiatives by the stakeholders. During the planning process, several consultative workshops and meetings were held culminating with the development of the Draft Aberdare Forest Ecosystem Integrated management Plan. Due to the time involved in the consultative process of refining the Integrated Ecosystem Management Plan and the legal requirement under the Forests Act 2005 that all forests are managed on the basis of an approved management plan, KFS started a parallel process to develop a management plan for Aberdare Forest Reserve. This plan is informed by reports developed during the consultative process.

The plan will be reviewed after 5 years and amendments undertaken as needs arise. Both Review and amendments will be carried out in conformity with the plan objectives by KFS in consultation with other stakeholders.

EXECUTIVE SUMMARY

This plan covers the Aberdare Forest Reserve, Kipipiri Escarpment, Kikuyu Escarpment, South Laikipia, Ol-Bollosat, Kirima-Muruai, Nyamweru, Nyeri Hill, Nyeri forest, Kijabe hill, Mugumo South, Mugumo North and Kingatua forest all referred to as Aberdare Forest Reserve (AFR) in this document. The whole forest reserve is gazetted as central government forests vide various legal notices as per individual blocks indicated above.

Aberdare Forest Reserve which is part of the Aberdare ecosystem plays a critical role in water catchment functions for the country and is one of the five main “water towers” in Kenya. Eastern of the mountain is the catchment for Tana and Athi River while north eastern slopes form the catchment area for Ewaso Nyiro River which transverses through the dry areas of Laikipia and Isiolo as it drain into the Lorian Swamp. Malewa River on the western side of the mountain range drains into Lake Naivasha. Aberdare range supplies all the water to Nairobi through Sasumua and Ndakaini dam. Together with Mt Kenya, the bulk of the country’s hydroelectric schemes along the Tana River rely on water from these catchments. Many small weirs have been installed in the forest to supply water to the forest adjacent communities.

The plan is prepared in compliance with the legal requirement under section 35 of the Forests Act, 2005 which provides a mandatory legal requirement for preparation of management plans.

It embraces collaborative and participatory approaches in conservation and management of natural resources that will lead to ownership of the initiatives by the stakeholders. The plan supports sustainable utilization of natural resources by promoting environmental friendly activities, while enhancing biodiversity conservation. The plan addresses the constraints and challenges that pose great threat to the sustainability of Aberdare Forest reserve which include:- illegal logging, encroachment, over exploitation of plantations that is not matched with replanting, fire, bhanga growing, plantation development and wildlife conflicts. Aberdare is recognized as potential tourist destination and measures to enhance the development of ecotourism facilities have been addressed.

The purpose of this management plan is to enhance conservation and management of biodiversity, water catchment and economic values of Aberdare Forest Reserve. This will be achieved through implementation of twelve development programmes addressing priority thematic areas. The development programmes include natural forest management, forest plantation development, bamboo development, watershed management, Tourism development, farm forestry development, community participation, protection and security, infrastructure development, research and monitoring, human resource development and Aberdare fence management programme. In addition an implementation programme has been included to provide the means of resource mobilization and plan implementation organization structure.

APPROVAL PAGE

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

.....
Director,
KENYA FOREST SERVICE

Date

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CHAPTER I:

1. INTRODUCTION

This management plan is for Aberdare Forest Reserve aimed at providing the road map towards sustainable management, improved livelihood of adjacent communities and maximization of revenue.

The Vision of this plan is therefore; a sustainably conserved forest that provides all environmental services and socio-economic benefits.

1.1 GOAL AND PUPORSE

Goal

The overall goal of this management plan is to enhance the contribution of the Aberdare Forest Reserve in the provision of economic, social and environmental goods and services for the present and future generations.

Purpose

The purpose of this management plan is to guide the establishment, development and sustainable management, including conservation and rational utilization of the forest and allied resources for socio-economic development by stakeholders.

1.2 JUSTIFICATION OF THE PLAN

This plan is referred to as the Aberdare Forest Reserve Management Plan. The plan covers the Aberdare Forest Reserve, Kipipiri Forest Reserve, Kikuyu Escarpment and Kirima-Muruai. The plan is prepared in compliance with the legal requirement under section 35 of the Forests Act, 2005 which provides a mandatory legal requirement for preparation of management plans for all State, Local Authority and provisional forests. The plan also takes cognizance of the Constitution of Kenya, Vision 2030, Millennium Development Goals (MDGs), relevant international obligations, the Draft Forest Policy No. 1 of 2007 and KFS Strategic Plan 2009/10 – 2013/14.

It embraces collaborative and participatory approaches in conservation and management of natural resources that will lead to ownership of the initiatives by the stakeholders. The plan supports sustainable utilization of natural resources by promoting environmental friendly activities, while enhancing biodiversity conservation.

This is the first plan covering the whole of Aberdare Forest Reserve. Previously the Forest Reserve was managed on plans developed based on forest stations.

1.3 APPROACH TO PLAN DEVELOPMENT

The Aberdare Forest Reserve management plan has borrowed heavily on the Integrated Ecosystem Management Plan draft which was initiated in the year 2004. A stakeholders' workshop held at Outspan Hotel, Nyeri identified potential stakeholders and proposed the formation of Core Planning Team (CPT) composed of Forest Department (FD), currently Kenya Forest Service (KFS), Kenya wildlife Service (KWS) and Ministry of Water and Irrigation (MWI). Later the core planning team was expanded to include NEMA while the Ministry of Water and Irrigation was represented by Water Resources Management Authority and Irrigation Department following the water sector reforms of 2002. In 2005, a one day stakeholders' workshop was held at Green Hills Hotel, Nyeri which identified 13 thematic areas to guide the core planning team in data collection. The CPT further sub-divided the ecosystem into six Agro-ecological zones to enhance data collection in the identified thematic areas.

In order to enhance community participation, nine consultative workshops were held at Kangema, Othaya, Kimende, Mweiga, Ndaragwa, Engineer, Njabini, Kipipiri and Thika to collect their views. The subsequent proceedings were compiled and circulated to the stakeholders for comments. The proceedings of the consultative workshops were presented to stakeholders during the three cluster workshops held at Nyeri, OlKalou and Thika. The collected data were analysed and a draft Aberdare forest ecosystem integrated management plan was developed.

Due to the time involved in the consultative process of refining the Integrated Ecosystem Management Plan and the legal requirement under the Forests Act 2005, that all forests be managed on the basis of an approved management plan, KFS has complied by developing this management plan for Aberdare Forest Reserve. The plan is based on the draft Integrated Ecosystem Management Plan, the Constitution of Kenya, Vision 2030, KFS strategic plan 2010/11 - 2013/14 and other relevant documents

1.4 IMPLEMENTATION OF THE PLAN

The success of this plan lies in its being implemented through actualizing of the management programmes and activities. This calls for resource commitment on the part of KFS and other stakeholders. The roles and responsibilities of the stakeholders have been identified for the smooth implementation of the management actions. The activities in each programme have been prioritized and resources identified for mobilization. This plan will be implemented for 10 years (2010 - 2019) through Annual Work Plans (AWP) and with support from other sectoral plans. Monitoring and evaluation during the implementation phase will be done periodically.

The plan will be reviewed after 5 years and amendments undertaken as need arise. Both Review and amendments will be carried out in conformity with the plan objectives by KFS in consultation with other stakeholders.

1.5 FUNDING OF THE MANAGEMENT PLAN

The funding of this plan will comprise of direct budgetary allocation from KFS, Forest Conservation and Management Fund and support from key stakeholders and Development Partners. Additional resources will also be raised from the users/beneficiaries of the Forest Reserve.

CHAPTER II

2 LEGAL STATUS GEOGRAPHIC LOCATION AND BIOPHYSICAL DESCRIPTION

2.1 LEGAL AND ADMINISTRATIVE STATUS

This management plan covers Aberdare, Kipipiri, Kirima-Muruai and Kikuyu Escarpment Forest Reserves. The plan also covers a buffer zone of 10 Kilometers of the forest adjacent areas.

Aberdare Forest Reserve and the adjoining forest, (see Table 1 below) were gazetted under Forest Department (currently Kenya Forest Service) with the aim of forest and water conservation and socio-economic development. All the forest blocks are hereby in this plan referred to as Aberdare Forest Reserve. The forest reserve is administered under 19 forest stations spread throughout the forest reserve. The forest stations are administered through 6 Forest Zones managed by Zonal Forest Managers within Central Highlands Conservancy

Table 1: Analysis of Forest Area of the Aberdare Forest Reserve

Type of Reserve	Initial Gazetted Area (Ha)	Formal Excisions	Informal Excisions	Additions	Total Area in Ha (Current)
Aberdare Forest	184,788.34	82,051.70	4,900*	285.5	98,122.14
Kikuyu Escarpment	42,372.44	4933.44	1104		36335
Kipipiri Forest	5,019.00	1119			3900
South Laikipia	3,554.10	156.2		74.5	3472.4
Ol-Bollossat	3,899.30	682.3			3217
Muruai	733				733
Nyamweru	797.2				797.2
Nyeri Hill	192.2	0.08			192.12
Kirima	527				527
Nyeri Forest	1,251.70	120.4		4	1135.3
Kijabe Hill	706.4				706.4
Mugumo South	368.9				368.9
Kingatua	74.07				74.07
Mugumo North	241.5				241.5
Total	244,525.15	89,063.12	6,004.00	364.00	149,822.03

Aberdare forest was first gazetted as a forest reserve under legal notice No 7 of 1943 and covered an area of 181,594.3 ha. The first degazettement of the Forest Reserve was the creation of the Aberdare National Park in 1950 covering an area of 57,220 ha. And later an additional area of 19,364 ha was degazetted from the Forest Reserve vide legal notice No. 171 of 1968 and gazetted under the National Park vide legal notice No. 172 of 1968. Thus total area converted to Park is 76,700 ha and represent over 86% of total area degazetted.

Table 2: Aberdare Forest Reserve Vegetation types

Station	Natural forest	Plantation	bamboo	Glades	bush	Moor-land	Tea zone	Others	Total
Gatare	1,911.00	1,145.40	4,659.40	30.00	653.60	-	43.00	-	8,442.40
Kimakia	6,941.10	1,130.70	4,852.40	50.00			23.00		12,997.20
Kieni	2,603.60	1,408.30	3,589.20	159.00	170.60		22.90		7,953.60
Wanjerere	3,802.80	1,562.80	6,350.40	25.00	1,030.00	-			12,771.00
Ndaragwa	935.30	1,525.20	-	2,386.10	5,041.60			141.60	10,029.80
Olbolossat	9,335.00	1,774.10	-	867.90	196.40				12,173.40
Geta	704.80	2,714.90	1,947.30	682.90	1,596.50				7,646.40
N. Kinangop	2,686.80	1,352.20	1,748.50	200.00	1,912.00				7,899.50
S.Kinangop	1,970.00	2,113.90	2,856.90	330.00	89.00				7,359.80
Kamae	530.60	1,254.90	-	120.00	1,776.60				3,682.10
Ragia	1,706.60	775.00	-	124.00					2,605.60
Uplands	837.50	1,562.80	1,489.70	45.00	1.20	35.10	90.00		4,061.30
Kinale	696.00	1,754.30	792.70	27.00	2,591.90	431.30	259.60		6,552.80
Kereita	487.50	1,200.70	68.80	34.00	20.20	40.40	10.00	40.50	1,902.10
Muguga	46.00	127.40	61.10	5.00	20.00				259.50
Muringato	6,529.60	94.20	2,428.50	755.00	1,836.00	-	50.00		11,693.30
Kabage	757.10	855.60	1,568.30	2,787.00	342.60	30.00	-		6,340.60
Zaina	3,338.70	1,107.20	1,531.00	3,323.40	1,428.70	25.00	-		10,754.00
Kiandongoro	1,506.00	861.70	302.60	4,003.50	96.60	85.00	4.00		6,859.40
Zuti	3,654.10	452.30	419.10	2,700.00	527.30	85.40	-		7,838.20
TOTAL	50,980.10	24,773.60	34,665.90	18,654.80	19,330.80	732.20	502.50	182.10	149,822.00

2.2 GEOGRAPHICAL LOCATION

The Aberdare Forest Reserve is located to the east of the Great Rift Valley, between 36° 30' E, 0° 05' S and 36° 55' E, 0° 45' S. The Forest Reserve is situated within Central Kenya in four (4) Counties. These are Kiambu, Murang'a, Nyeri and Nyandarua

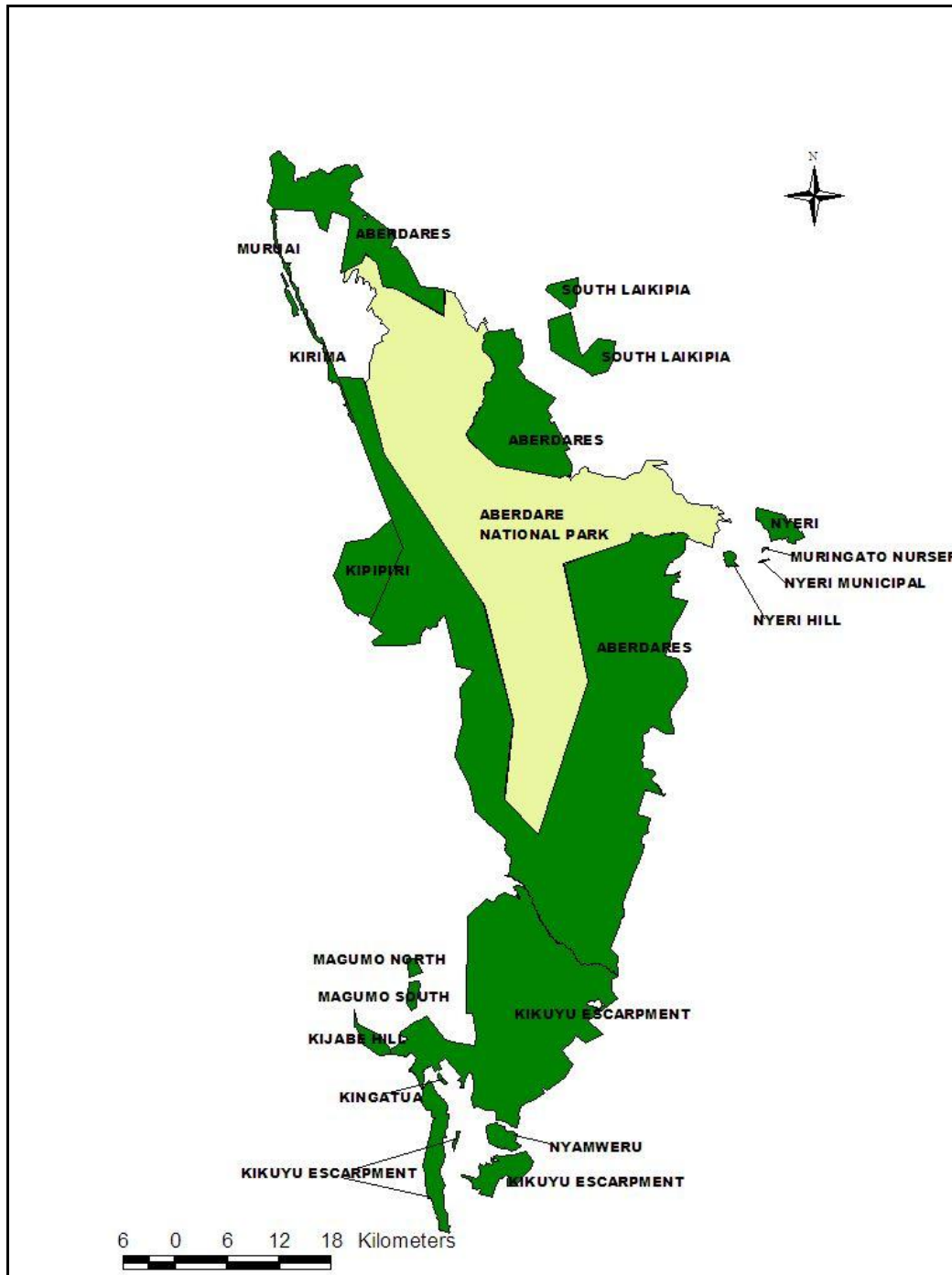


Figure 1: Map showing the Forest blocks within Aberdare Forest reserve

2.3 BIOPHYSICAL DESCRIPTION

Topography

The Aberdare Forest Reserve is located on the Aberdare Ranges. Aberdare Ranges together with the Kikuyu Escarpment runs 120 kms northwards from Nairobi and about 40 Kms at its widest point. The perimeter boundary of Aberdare Ranges is

about 565 kms. The altitude varies from 2,000 meters on eastern forest boundary to 4,001 meters at the peak of Ol donyo Lesatima towards the northern edge of the Range.

On the northern side the land descends gradually from the Oldonyo Lesatima peak towards Nyahururu with numerous steep valleys, high peaks and isolated hills. It can be generally described as a flat ramp slightly tilted to the East. The Oldonyo Lesatima is characterised by undulating hills, deep incised river valleys and remnants of volcanic vents and sheets.

On the southern side the land descends steeply southwards from IL Kinangop peak towards the Northern part of Murang'a North District. IL Kinangop is a steep hoist with faults in the North, East and West.

The moorlands of the Aberdare range comprise of undulating hills, bogs, clear mountain streams, numerous waterfalls and magnificent views. Several rivers originate from the slightly sloping ground in the water bogs.

Generally the topography is diverse as would be expected of any mountain range. From the highest points canyon like V-shaped valleys give way to the gentler river valleys separated by steep hills and rocky outcrops. The forest zone slopes further down gently to the undulating plains of the northern side and parts of the lower salient.

Climate

The climate of Aberdare Ranges is largely determined by altitude. The eastern side falls within the tropically moderately cool regime of the Aberdare. The mean maximum temperature is 25.80 C. The mean minimum temperature is 10.30 C. The lowest temperatures are experienced in July and August.

The rainfall distribution is greatly influenced by movement of inter-tropical convergence zones of air masses of southern and northern hemisphere. The eastern Aberdare has an equatorial type of climate, being wet and humid with reliable rainfall of 1,400-2,200 mm and extended wet seasons. On the western side, rainfall reduces sharply from about 1,400 mm at the forest border to less than 700 mm in the valley of the Malewa River only 50 km from the forest boundary.

The northern end of the range has 3-4 dry months each year with the seasonal distribution showing three rainfall peaks: march-may (long rains), July -August and November. Elsewhere the rainfall distribution is bimodal with peaks in April-may and October-November and only 1-2 dry months each year.

The Aberdare moorland experiences a mean minimum daily temperature of -2 °C and a mean maximum daily temperature of 27°C. Temperature decreases with increase in altitude and rainfall also succumbs to the same.

Geology

The volcanic formations in eastern sides are the Laikipia series (non-porphyrific basalts) and the satima series (phonolites, olivine alkali-trachytes, mugearites and fissile basalts) with pockets of lavas and tuffs of vents. The area has been subjected to intensive tectonic disturbances and subsequent volcanic activity, which were associated with the formation of the Eastern Rift Valley. These are believed to have been formed between the middle pleistocene to pliocene.

The Aberdare ranges are essentially the product of fissure volcanic eruptions but with their inner halves having been incorporated into the downthrown sides of the faulting activities that formed the Rift Valley in this area. The volcanics are mainly of alkaline type including basalts, rhyolites and their proclastic equivalents.

The moorlands are composed of volcanic lavas mostly phonolites, olivine-alkali trachytes, mugearites and fissile basalts - which were laid on a very uneven surface. Non-porphyrific basalts were also deposited.

The present slope of the Northern Aberdare ramp is almost entirely the result of tilting only. The course of rivers across this ramp shows that it was gently tilted towards the East while it was uplifted.

The volcanic formations in this area are the Laikipian, Satima, Simbara and Kinangop tuff series. The Simbara series are the oldest exposed rocks of the Aberdare. It is composed of basalts, mainly basaltic agglomerates and autobreccia exposed in the valleys and some ridges. This series is believed to be of miocene age.

Light coloured trachytic pumice tuffs (Kinangop tuff series) are exposed to the North East. These are believed to be of upper middle pleistocene age.

Terraces formed by the erosion of the IL Kinangop, numerous basalt dykes and extensive occurrence of subnivial soil forms mainly solifluction terraces, are features particular to the Southern Aberdare. The fault line of the Eastern arm of the rift valley passes through the Southern Aberdare. The volcanic formations in this region and the Simbara series composed of basaltic agglomerates and autobreccias believed to be of miocene age.

Soils

Soils on the upper eastern slopes of the Aberdare Ranges have inherent high fertility, being of basaltic origin. They are well drained, normally very deep, dark reddish brown, friable clays with a humid top- soil layer. Soils on the western boundary of the Ranges are also of medium to high inherent fertility, but are more variable and interspersed with poorer draining soils and lower fertility.

The soils of the moorlands are umbric andosols. They are derived from volcanic glass. They have a high content of organic matter and are very porous. The clay

fraction is composed of allophones. The structure, drainage and water retention capacity are good for plant production.

The soils of the Northern Aberdare are rich in clay content (82.7%) and consist almost exclusively of kaolinite. Red kaolinite soils are found on slopes and dark grey, swelling montmorillonitic (black cotton) soils are found in areas of impeded drainage.

The soils of the southern area are characterised by dark surface horizons and are rich in organic matter. Their bulk density is low and include Leptosols which are characterised by continuous coherent hard rock at very shallow depth, strong brown loams, eutrophic brown soils on volcanic ash and Gleysols which show hydromorphic properties within 50 cm of the surface and are found in valley bottoms.

Hydrology

The Aberdare Ranges encompasses one of the five important water catchment zones in Kenya. It provides water to feed four out of Kenya's six drainage basins. The major rivers from the Aberdare Forest are Tana and Athi which flow into the Indian Ocean, the semi-permanent Ewaso Nyiro which drains into Lorian swamp in northern Kenya and River Malewa that drains into Lake Naivasha. In addition numerous tributaries flow from all sides of the Aberdare increasing their volume downstream. Higher up the moorlands and afro-alpine zones, numerous water bogs marking the source of streams and rivers dot the slopes.

Aberdare range supplies all the water to Nairobi through Sasumua and Ndakaini dam. It also supplies water to the major towns in the neighbouring Counties. Together with Mt Kenya, they contribute 70% of the country's hydro-power produced by Tana River. Many water intakes have been constructed in the forest to supply water to the forest adjacent communities for irrigation and for domestic purposes.

Aberdare Forest Reserve drains into four main river basins of Kenya. These are Tana, Athi, Ewaso Nyiro and Lake Naivasha. Rivers flowing to Ewaso North. Basin include Engare ongibit and Ewaso Narok. The rivers draining to Lake Naivasha Basin include Malewa, Wanjohi, Kitiri, Turasha, Kaheho, Sugurui and Pesi. The rivers draining into Tana basin include Chania, Gura, Magura, Gikururu, Karuru, Thika, Karimu, North Mathioya, South Mathioya, Maragua and Amboni (Honi). The rivers draining to Athi river include Thika, Chania and Ruiru river.

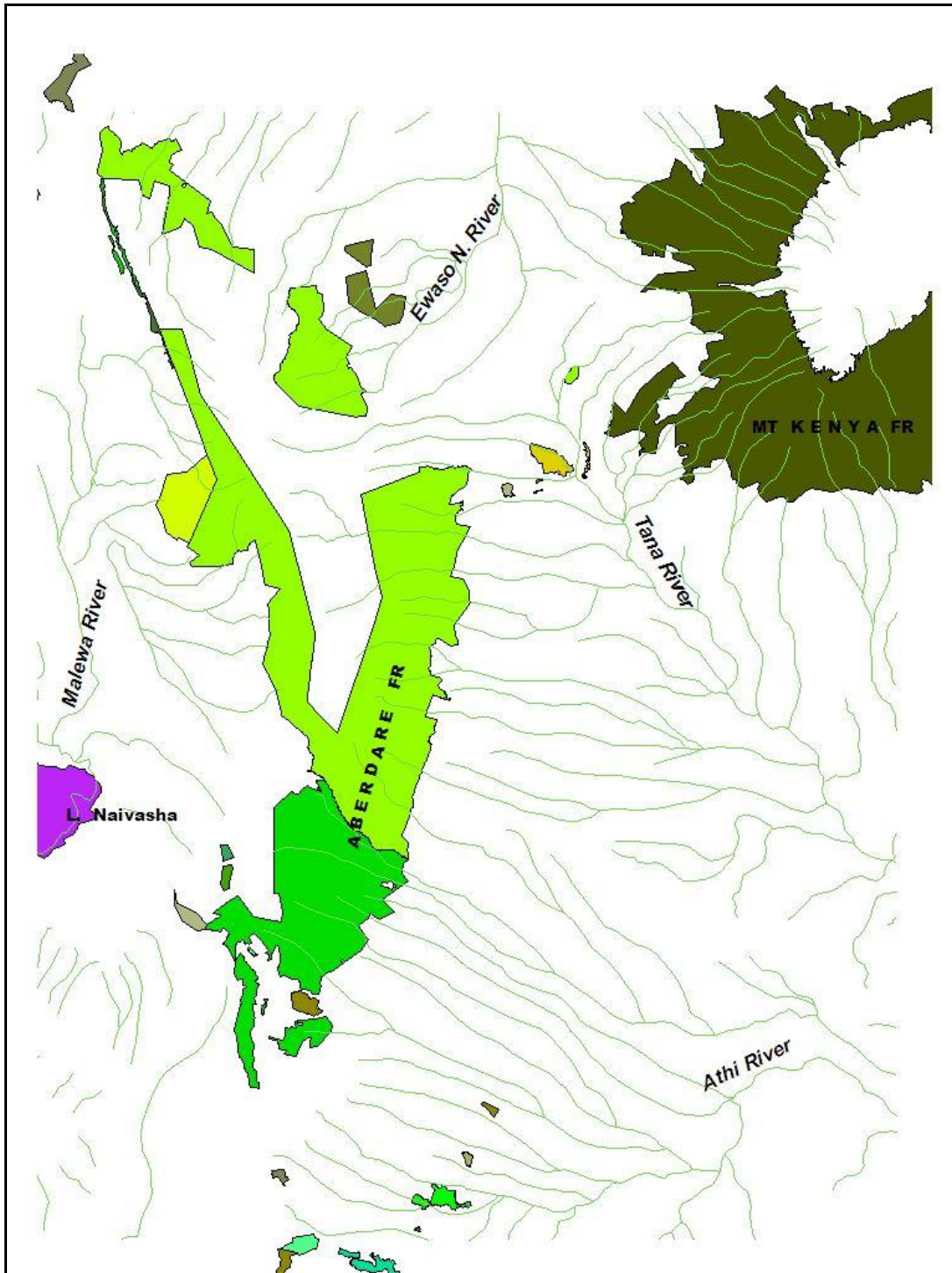


Figure 2: Showing the drainage system of Aberdare Forest Reserve

Flora

Vegetation zones and species distribution are distinguished according to the different climatic zones and altitudes, mostly through variation in vegetation structure, cover and composition. A total of 778 species, sub-species and varieties of vascular plants belonging to 421 genera and 128 families, have been documented in the Aberdare. Plants endemic to Aberdare include *Lobelia deckenii* ssp *sattimae*, *Helichrysum gloria-dei* and *Alchemilla hageniae*. There are four vegetation zones

namely Sub alpine vegetation, Montane humid forest, Xeromorphic evergreen forest, and Sub-montane forest.

Sub alpine vegetation

This is mainly found in the moorlands at an altitude of 3,300 m and above. The vegetation mainly consists of alpine grass (*Deschampsia*), distinguished by Giant Groundsell (*Senecio Johnstonii*), *Lobelia deckenii*, and heath (*Erica exelsa*) moorland communities. Between 3,000m and 3300 m there is a shrub community characterized by *Hebenstretia angolensis* and *Erica arborea*. Between 2,400 m and 3,300 m there is a belt of bamboo covering about 35,000 ha.

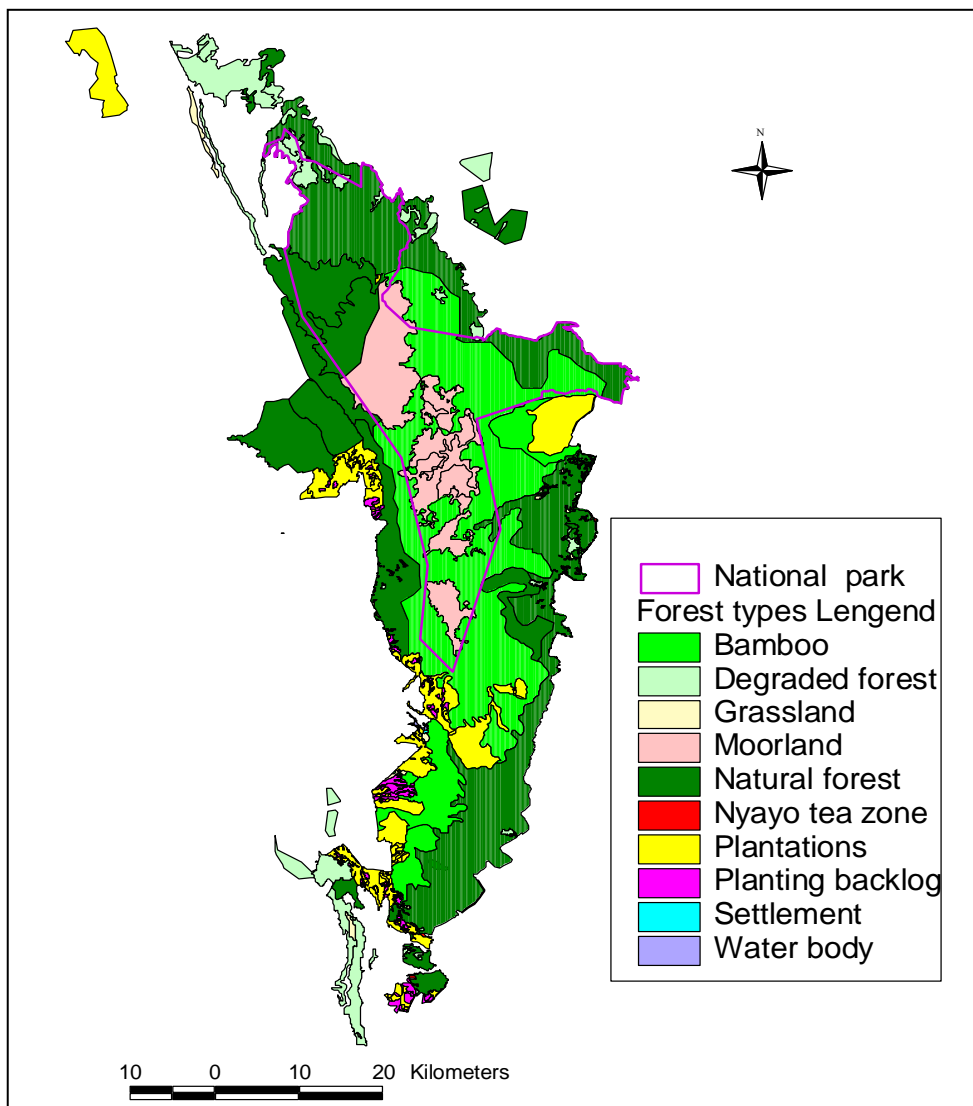


Figure 3: Showing the major forest types in the Aberdare Forest

Montane humid forest

This is a belt running down to the east side of the range now dominated by the pioneer species *Newbutonia macrocalyx* and *Macaranga capensis*. The zone also has valuable commercial species such *Ocotea usambarensis*, *Aningeria adolfi friendrici*, *syzygium guineese*. This forest type is most conspicuous in the Kikuyu escarpment.

Xeromorphic evergreen forest

This is found in the dry northern and western slopes of the range. The most notable species in this forest type are cedar (*Juniperous procera*), Podo (*Podocarpus latifolius*) and the Olives (*Olea europea*, *Olea capensis*, *Olea hochstetteri*).

Sub-montane forest

This is a seasonal forest cover on the north-east slopes. The dominant plant species are *Calondendrum capense* (cape chestnut) *Ekerbergia capensis*, *Cassipourea malossana*, *Nuxia congesta*.

Fauna

The African elephant (*Loxodonta africana*) lives all over the Forest Reserve and National Park and make localized movements through the whole mountain range as there no physical barriers between the two areas. The number of elephants in the forest reserve and adjacent park is estimated to about 3 000 individuals (Ref). The Elephants and the black rhinos (*Diceros bicornis*) are endangered species found in the Forest Reserve and listed in Appendix I of CITES. The number of rhinos have declined from 600 in the mid 1970's, to an estimated 10 individuals.

The number of bongos (*Tragelaphas eryceros*) and the giant forest hog (*Hylochoerus meinertzhageni*) had declined by 83% from 1975 to 1996. However, reports from KWS indicate there has been a slight increase in numbers of bongos, warthogs and giant forest hog from reduction of the number of lions.

The predators found in the Forest Reserve include Lion, leopard, serval cat, golden cat, civet and genet. Three species of mongoose, the African wild cat and spotted hyena are also present. The side-striped jackal and ant bear are mainly found in the montane forest. Black leopard and serval cat are present in the moorlands.

The bushbuck, waterbuck, reedbuck, eland, duiker, and suni are found in the forest upto the moorlands. However, reedbucks are more common in the moorlands. The Burchell's zebra is only found in the grasslands of the northern Aberdare whereas buffaloes live all over the forest.

Black and white Columbus monkeys are mainly found in the primary forests whereas Sykes Monkeys and bush babies are mainly found in the montane forest. Baboons are numerous in the forest and are found all over except in the bamboo and moorland areas.

The montane or Hinde's viper (*Vipera hindii*) is found in the tussock grasses of the moorlands and occurs only in Aberdare and Mount Kenya. The Aberdare holds several amphibians that are endemic to central Kenya including *Hyperolius montanus*, *Hyperolius cystocandicans*, *Rana wittei* and *Phrynobatrachus kinangopensis*.

Over 290 species of birds have been recorded in the forest and the park. Of these the Jackson's francolin is categorized as being regionally endemic whereas the Aberdare cisticola is rated as being globally threatened. Black river ducks, forest and moorland francolins, white napped ravens, streaky seed eaters, hill chats, alpine swifts and four species of sunbirds including the scarlet – tufted malachite sunbird which is found in the moorlands. Birds of prey are common which include the mountain augur buzzard, crowned eagle, hawk eagle and African goshawk.

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. Globally threatened bird species found in the mountain range are Sharpe's Longclaw, Abbott's Starling, Aberdare Cisticola and Jackson's Widowbird. 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. Various sites within and around the Aberdare are listed as Important Bird Areas (IBA) by Nature Kenya. These include Ol bolossat, Kinangop, Kimakia, Gatare and Kikuyu escarpment.

Earth mounds of Aberdare mole rats (*Tachyoryctes splendens*) are a common feature in the moorlands. The Aberdare mole shrew, *Surdisorex polulus*, and tree and rock hyrax are also found in the moorlands and parts of the primary forest. Both moles are endemic to the Aberdare.

Three hundred and three (303) species of moths belonging to 19 families have been identified in the forest. The butterfly *Neptis kikuyuensis* is endemic to the forests of Aberdare while *Charaxes nandina* endemic to central Kenya has also been recorded in Aberdare.

The forest areas have various species of fish which include the brown and rainbow trout fish that were introduced in the moorland streams in 1905 and 1915 respectively. Other types of animals include hippopotamus which are found in northern Aberdare at Lake Ol Bolossat and along River Ewaso Narok. The porcupines are found all over the forest and adjacent areas.

2.4 SOCIO - ECONOMIC STATUS

Forest Adjacent Communities

The central part of Kenya was once densely forested and inhabited only by Gumba hunters and by the Athi and Digiri sub-tribes of the Ogiek/Ndorobo communities (Dundas, 1908); (Huntingford, 1929); (Muriuki, 1974) and (Blackburn, 1974)). Around 1650, the Kikuyu arrived in the Murang'a and Kiambu area and by clearing the land ridge by ridge they reached Nyeri region around 1730. The original inhabitants were driven deeper into the forest.

Currently communities living adjacent to Aberdare forest Reserve are mainly agriculturists. The Kikuyu communities occupy the entire area around the forest. Other tribes who are pastoralists frequent the area during extended dry spells.

Cultural and Historical Importance

The Aberdare Mountain Range was so named by the explorer Joseph Thomson in 1884 after the then President of the Royal Geographical Society, the Lord Aberdare. The Aberdare Forest Reserve and national Park are profoundly associated historically with the United Kingdom Royal family. The present Queen Elizabeth II ascended to the throne while spending a night at the Treetops Lodge in 1952 hence, the Treetops generates a special interest to some particular individuals or groups.

Over the years, Aberdare Ranges has held spiritual and religious importance for local communities living adjacent to the ecosystem. Many tree species of the ecosystem including the *Ficus sycomore* (Mukuyu), *Ficus thonningii* (Mugumo), *Indogofera erecta* (Muthaara) among others are considered sacred and are used during performance of traditional rituals and ceremonies.

The forest served as hideout for Mau Mau freedom fighters waging war against British colonial masters in the 1950s and also provided a camping site for the runaway Italian Prisoners Of War (POW) during the Second World War.

Land Tenure

Land ownership within the area falls under different categories of land tenure. The agricultural lands - both large-scale (horticulture and floriculture) and small scale are held under leasehold and freehold. Other types of land tenures include public lands and trust land.

Land use

The area around the forest reserve has very high agricultural potential due to the fertile soils and reliable rainfall. Farming is thus the main stay of the economy of the forest adjacent communities around the ecosystem. Other land uses include, livestock, wildlife, tourism, forestry, fishing, urbanization, settlements

(a) Agriculture

The type of agriculture practiced and the potential of productivity depend mainly on altitude, which in turn determines the temperatures and amount of rainfall. Agriculture is mainly rain-fed though small-scale irrigation is practiced in some areas. The farming practices are both large-scale and small scale where the land ownership is mainly under freehold (Private ownership). The main cash crops include tea, coffee, wheat, horticulture and floriculture. A large proportion of the households adjacent to the forest reserve have a history of engaging in farming in the forest in the practice previously referred to as shamba system, non-residential cultivation (NRC) and recently introduced as Plantation Establishment and Livelihood Improvement Scheme (PELIS) in some stations within Aberdare Forest Reserve.

Small-scale cash crop and subsistence farming increase with elevation because of better soils and rainfall availability at the higher altitudes. On the Southern and eastern side the land parcels are of different sizes with tea and coffee bushes covering an important share of the available land, except for small plots on valley bottoms where vegetables such as kales, carrots, cabbages, tomatoes and other horticultural crops are grown. Small plots near the homesteads are used for subsistence crops such as maize, onions, bananas, sugar cane, Irish potatoes and beans with farm forest trees planted along the boundaries of the plots. On the North and western side horticultural crops like potatoes, garden peas, cabbages and carrots are grown as cash crops and the area has become the bread basket for Nairobi city.

(b) Livestock

Dairy farming also forms an important livelihood activity in the area. Most farm families keep cows for milk production for commercial and domestic purposes. Other important livestock kept include sheep, goats, poultry, rabbits, donkeys and oxen. The latter are mainly used to plough and as a means of transportation of farm produce and provide other household services.

(c) Tourism

Aberdare ecosystem has attractive sceneries and great potential for tourism development, which is yet to be fully harnessed. The ecosystem is endowed with unique geomorphologic features, cultural and historical sites that are of great tourism attraction. In addition there is a diversity of wildlife populations which include elephants, buffalos, reptiles and birds, which attract visitors. The ecosystem supports tourism in the region by offering a diversity of activities such as bird watching, trout fishing, walking and wilderness trails.

(d) Forestry

Agro-forestry and farm forestry are also practiced within the area. Trees are planted around homesteads and along farm boundaries. In agro-forestry and farm forestry systems, tree mix consist of both indigenous and exotic tree species but faster growing exotics dominate. Such species include silky oak (*Grevillea robusta*), blue

gum (*Eucalyptus spp*), Black wattle (*Acacia mearnsii*) and cypress (*Cypressus lusitanica*). Agro-forestry and farm forestry has been an important livelihood activity. In the last 10 years commercial tree farming of fast growing species particularly the eucalyptus for pole, fuelwood and timber production has been adopted in the region. Farm forestry has been the main source of wood for small scale industries since the ban on harvesting of trees in state forests.

Forest adjacent communities rely heavily on the use of wood and non-wood forest products from the forest reserve. Households' reliance on the forest depends on distance from the forest, socio-economic status, land size and number of trees on their farm. Forest uses include firewood, building materials, grass harvesting for animal fodder, livestock grazing, beekeeping and water collection for domestic purposes.

(e) Fishing and Fish farming

The ecosystem has high potential of fishing and commercial fish farming due to the numerous rivers draining from the forest. However, a few small-scale farmers and self-help groups have initiated fish farming to tap the growing market. Many ponds have been established in the wetlands in farmlands mainly for tilapia.

(f) Settlements / urbanization

The fertile soils attracted agriculturists who settled in the lower slopes of the mountain. Subsequent population increase has led to gradual encroachments into upper slopes, resulting to continuous land subdivision up to very small land parcels. In the densely populated windward side, these range between 1-2 acres of land.

Other Local economic activities

A large number of people in the area operate small business enterprises. These include shops, kiosks, selling milk, other farm products, timber and wood products. Additional livelihood activities in the area are quarrying and ballast making. Many people also derive their livelihood from providing casual labour on the farms while some are in formal employment.

2.5 STAKEHOLDERS, ROLES AND RESPONSIBILITIES

Individuals, groups and institutions who are directly or indirectly affected by decisions made on the conservation and management of the Forest Reserve form the list of stakeholders. They are classified into the following categories:-

- (a) Public institutions: - MOF&W, MEMR, KFS, KWS, NEMA, NMK, WRMA, KEFRI, MOA, MWI, MOLD, OP, KTB, KENGEN, TARDA, KTDA, KARI, KPLC, WSB, MOE, NTZDC, MOFD, MOR, ENNDA and MoLG
- (b) NGOs: Nature Kenya, ICRAF, IUCN, KFWG, FSK, FAN, CEF/CDTF, Wildlife Clubs of Kenya, Tree is Life, MARECOF, KENVO, WWF, AWF, Rhino Ark, GBM and CARE Kenya

- (c) Community Based Organizations (CBOs): *CFA, WRUAs, IWUAs, NDEKA, KEKKA*
- (d) Development Partners/donors (Current): *{WB, AfDB, MOFA (Finland), IFAD}*
- (e) Educational Institutions: *Universities, Colleges, Schools and Institutes*
- (f) Industrialists/business groups: *Sawmillers, horticulture industry, mineral water companies, hotels and tour operators*
- (g) Faith based organizations

The roles and responsibilities for different stakeholders will be based on institutional mandate, agreements, MoUs, influence and interests, and other contributions in conservation and management of the Forest.



Figure 4: Photo showing spring

2.5 THREATS AND CONSTRAINTS

There are various threats to the conservation of Aberdare Forest Reserve that have been identified which include:

(a) Illegal Logging

Since the early 1970s, the indigenous forests were over exploited due to selective logging of important timber trees, which has 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 African Rosewood (*Hagenia abyssinica*), camphor (*Ocotea usambarensis*), *Podocarpus* spp, *Aningeria aldolfi friendricii* and *Olea capensis*. Although exploitation of indigenous tree species was banned in 1986, illegal harvesting of these tree species affected various forests, particularly in southern Aberdare parts of Njabini, Engineer, Ragia, Kiandongoro, Zuti, Muringato and Ndaragwa. This practice also impacted negatively on watershed stability. However, through time-series analysis of satellite images (Gathara, et al., 1999), it was found that, there was a reduced trend in illegal logging and some of the areas that were degraded have naturally regenerated.

(b) Over-Grazing

Livestock and wildlife grazing is not linked to the carrying capacity of the available forage resource. Further, the increase in population and declining farm units in forest adjacent areas has led to increased demand of grazing in the forests. This has resulted in over grazing in some forest blocks resulting to degradation of some parts of the forest.

During dry season the situation is worsened by the influx of livestock from the neighboring pastoralist communities. This particularly affects Kikuyu Escarpment, Ndaragwa, Ol bolossat and South laikipia Forest Blocks. This has also brought about communities resource use conflict.

The large number of big herbivores particularly the elephants has also impacted negatively to the forest vegetation. This is exacerbated by the confinement of the animals by the electric fence and blockage of migration corridors.

(c) Poaching of Wildlife

Wildlife poaching remains a threat to the unique animal species of Aberdare forest, the rare and commercially valuable species being most vulnerable. Most affected species are the black rhino 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.

Other target species include the smaller antelopes (duiker, bushbuck and waterbuck) and ground birds (francolin and guinea fowl).

(d) Illegal Water Abstraction and over abstraction

Unregulated and excessive water use for irrigation has reduced reliability of downstream water supply particularly in Nyandarua around Kirima Muruai and Geta areas. Small-scale irrigation projects abstracting water from rivers flowing from the forest reserve are many and some without having the necessary water permits.

There are also cases of inefficient water use where some projects use open fallows, use of sprinklers is rampant and leads to water loss, poor management of piping systems with a lot of leakages and poor farming methods where there is excessive irrigation.

(e) Destruction of riparian areas

Cultivation and destruction of vegetation on riparian areas in forest adjacent farms have resulted in soil erosion, siltation and pollution of rivers. This also contributes to increased flash floods and landslides especially in areas within Murang'a County.

(f) Marijuana and tobacco Cultivation

Incidences of the cultivation of marijuana and tobacco have been observed in the bamboo zones of the ecosystem especially Kiandongoro, Zuti, Wanjerere and Kikuyu escarpment areas. The cultivated fields are normally small in size, (0.1 to 0.5 ha) making them extremely difficult to locate, access and eradicate. However there has been a remarkable decrease of marijuana cultivation in the recent years attributed to law enforcement efforts by the concerned Government Departments.

(g) Excisions and Encroachment

The excision of forest area to provide land for other land use like agricultural, settlement, institutional and other infrastructure has led to decline of forest land and therefore reducing the catchment area. The Aberdare forest reserve has been subjected to excisions totalling to 89063.12 ha of which 76,500ha (86.1 %) is a National Park, and 12,363.12 ha is agricultural /settlement/ Institutions/ urban areas.

The creation of Nyayo Tea Zone belt, cleared primary forests and resulted in change of land use leading to loss of forest land. There were also areas of forest not suitable for tea growing that were cleared and have remained open. There is also illegal encroachment of forest areas in various parts of the forest reserve.

Table 3: Forest Fires incidences within Aberdare forest reserve

Zone	Station	Total Area Burnt (ha)				
		2005	2006	2007	2008	2009
Thika	Kimakia	0	0	0	0	0
	Kieni	0	4	0	0	0
Nyeri	Muringato	40	0	0	0.05	0
Nyandarua	S. Kinagop	0	0	0	0	14.75
	Ol Borosat	0	0	0	0	3.5
	Geta	1631	1200	0	69	888.1
	Ndaragwa	0	0	0	0	63.8
	N. Kinagop	0	136	0	0	2
Kiambu	Uplands	33	0	58	0	15
	Kinale	223	0	9	0	59
TOTAL		1927	1340	67	69.05	1046.15

Fire plays a significant role in the ecology of the Aberdare forest reserve. Records of fire incidence in the area date as far back as 1912 and have been alarmingly consistent to date. An analysis of the fire outbreaks over the last 5 years shows that over 85% of all fires occurred in Geta forest station. There is need for an elaborate fire management plan for this station.

(h) Illegal Charcoal Production

This practice of charcoal making has been observed in some parts of the forest reserve. These incidences are mainly reportedly in the western and northern side of the forest reserve. Nevertheless, charcoal production sites decreased over time due to the law enforcement by KFS.

(i) Pests and Diseases

Insect pests (pine woolly 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 and rodents are a menace to tree seedlings, they feed on the roots and cause ring barking in abandoned shamba areas.

(j) Invasive plants

Invasive species have been reported in some forest areas particularly in open areas from forest fires and plantation backlogs. The common species include Lantana, Mauritius thorn, *Acacia melanoxylon*, *Acacia meansii* and *Rubus stendineri* species.

(k) Game damage to forest plantations

Game damage to exotic forest plantations have been reported in Kimakia, Kieni, Gatare, Kereita, Kamae, Kinale, Geta, North Kinangop and South Kinangop. This is mainly caused by elephants, buffaloes, monkeys and moles. These have been a menace

Livestock where there are not attended causes destruction to young plantations. The plantations are destroyed through trampling, debarking and browsing.



Figure 5: Photo showing Nyayo Tea Zone as a forest buffer

Chapter 3

3 PLANNING CONSIDERATIONS

3.1 POLICY AND LEGAL FRAMEWORK

The preparation, planning and implementation process of the Aberdare Forest Reserve Management plan is based on Constitution of Kenya, Vision 2030, MDGs, the Draft Forest Policy (Sessional Paper No. 1 of 2007), the Forests Act, 2005 and the KFS Strategic Plan (2009/10 -2013/14). It also takes into cognizance relevant international obligations, the Environmental Management and Coordination Act (EMCA), 1999, the Wildlife (Conservation and Management) Act, Cap.376, the Water Act, 2002 and the National Land Policy, 2009 among other policies and legislative frameworks. These have objectives that directly impact on sustainable conservation, management and utilization of the Forest Reserve.

3.1.1 The Constitution of Kenya

The Constitution of Kenya emphasizes the need for the people of Kenya to be respectful to the environment, which is their heritage, and to sustain it for the benefit of future generations. Article 42 under the Bill of Rights grants every Kenyan the right to a clean and healthy environment, which includes the right to have (a) the environment protected for the benefit of present and future generations through legislative and other measures and (b) obligations relating to the environment. On the other hand as stated in Article 69 (2), every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Article 69 (1) on “obligations in respect to environment” compels the state to:-

1. Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure equitable sharing of the accruing benefits;
2. Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
3. Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
4. Encourage public participation in the management, protection and conservation of the environment;
5. Protect genetic resources and biological diversity;
6. Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;

7. Eliminate processes and activities that are likely to endanger the environment; and
8. Utilize the environment and natural resources for the benefit of the people of Kenya.

To ensure enforcement of environmental rights, Article 70 makes provision for any person to apply to a court of law for redress if he/she alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be denied, violated, infringed or threatened. On application, the court may make any order, or give any directions, it considers appropriate (a) to prevent, stop or discontinue any act or omission that is harmful to the environment; (b) to compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or (c) to provide compensation for any victim of a violation of the right to a clean and healthy environment.

3.1.2 Forest Policy and Legislation

The Forests Act 2005 and draft Policy have their origins in the Kenya Forestry Master Plan, 1994 which called for reforms in forestry sector to facilitate development of the sector over the next 25 years.

Broadly, the reforms aimed at improving efficiency in the forestry sector's contribution to socio-economic development and environmental sustainability. This included new institutional arrangements for forest sector regulation and forest management, greater involvement of local government and local communities in forest management, and provisions for forest industry involvement in timber production. The revised policy integrates the forestry sector with other sectors, as well as addressing new concerns and realities in forestry and natural resource management.

The objectives of the Draft forest policy are to:-

- (a) Contribute to poverty reduction, employment creation and improvement of livelihoods through sustainable use, conservation and management of forests and trees;
- (b) Contribute to sustainable land use through soil, water and biodiversity conservation, and tree planting through the sustainable management of forests and trees;
- (c) Promote the participation of the private sector, communities and other stakeholders in forest management to conserve water catchment areas, create employment, reduce poverty and ensure the sustainability of the forest sector;
- (d) Promote farm forestry to produce timber, woodfuel and other forest products;
- (e) Promote dryland forestry to produce woodfuel and to supply wood and non-wood forest products;
- (f) Promote forest extension to enable farmers and other forest stakeholders to benefit from forest management approaches and technologies; and

- (g) Promote forest research, training and education to ensure a vibrant forest sector.

The Forests Act, 2005 was formulated to implement the revised Forest Policy. The Act provides for the establishment, development, sustainable management, utilization as well as conservation of forest resources for the socio-economic development of the country while taking into account that:-

- (a) forests play a vital role in the stabilisation of soils and ground water, thereby supporting the conduct of reliable agricultural activity, and that they play a crucial role in protecting water catchments in Kenya and moderating climate by absorbing green house gases;
- (b) forests provide the main loci of Kenya's biological diversity and a major habitat for wildlife;
- (c) forests are the main source of domestic fuel wood for the Kenyan people, and that they provide essential raw materials for wood based industries and a variety of non-wood forest products;
- (d) Kenya is committed to the inter-sectoral development and sustainable use of forestry resources; and
- (e) Kenya is committed under international conventions and other agreements to promote the sustainable management, conservation and utilization of forests and biological diversity.

Under the Act, Kenya Forest Service was established to spearhead forestry development in the country. The Service collaborates with other agencies in promoting sustainable forest management and enforcing forest-related laws, rules and regulations in the country. Forest conservation and management has been opened up to wider participation of stakeholders. These new arrangements require active participation of communities and the private sector in management of state forests.

The Forests Act provides for stakeholder participation in forest management. It recognizes Community Forest Associations (CFAs) as major stakeholders in the management and conservation of forests and provides for their participation through joint management agreements, as well as representation in Forest Conservation Committees. Joint management arrangements will be developed to ensure communities benefit, while protecting the forest estate for purposes of water, soil and biodiversity conservation, carbon sequestration and sustainable production of wood and non-wood forest products.

3.1.3 Timber Act

The Timber Act, Cap 386 was enacted on 24th May 1971 to provide for effective control of the sale and export of timber; for the grading inspection and marking of timber; for control of the handling of timber in transit; and for matters incidental to

and connected with the foregoing. The Timber Act was however not reviewed together with the Forests Act, Cap. 385 but is now scheduled for revision. The main focus of the Act includes timber grading (authorization of graders, grading of timber, and grade marks) and sale and export of timber (restriction on use of grade names, restriction on export of timber, cancellation of export permits and export returns).

3.1.4 The Wildlife Policy and Legislation

The Wildlife Policy, Sessional Paper No. 3 of 1975 governs conservation of wildlife within and outside protected areas. It also supports community initiatives towards conservation and plays an advisory role to the local communities by providing regulations that enable the generation of optimum returns from wildlife. The Policy, however, does not allow consumptive utilization of wildlife resources within the parks, only non-consumptive uses such as recreation and tourism. The Wildlife (Conservation and Management) Act Cap. 376 of 1976 provides for the protection, conservation and management of wildlife in Kenya.

The Wildlife Policy and Legislation are now under review, with an aim of bringing them in line with the current thinking and approaches to conservation. The goal of the draft Wildlife Policy (2007) is to provide a framework for conserving in perpetuity, Kenya's rich diversity of species, habitats and ecosystems for the well being of its people and the global community. The policy focuses on conservation and management of wildlife inside and outside protected areas, sustainable management of wildlife resources and resolution of human wildlife conflict.

3.1.5 Environmental Management and Coordination, Act

The Environmental Management and Coordination Act (EMCA) No. 8 of 1999, embraces all environmental management issues in the country. The Act has been a great boost in addressing the environmental concerns and safeguarding against environmental degradation within and outside forest reserves.

The Act provides the legal framework for the implementation of National Environmental Action Plan (NEAP). It also provides that every person in Kenya is entitled to a clean and healthy environment and has a duty to safeguard and enhance the environment. It emphasizes maximum participation by stakeholders in the development and implementation of policies, plans and processes for the management of the environment.

3.1.6 Trust Land Act

The Trust Land Act, Cap. 288 of 1962 (revised 1970), sets out regulations for all land that is Trust land (land held by local authorities on behalf of the people resident in that area). The Act sets rules for setting apart of land, for utilization of timber and other forest products, and for other forms of utilization. Section 65 of the Act deals with forests and forest produce. This section stipulates that the Minister for Local Government may, with the approval of the council concerned, make rules for the

protection of trees and forest produce on land not within a forest area within the meaning of the Forest Act and for regulating the felling or removal of such trees or forest produce. However, section 38 of the Forests Act 2005, provides for management of Local Authority forests on sustainable basis and section 34 provides for management plans for Local Authority forests.

3.1.7 Water Policy and legislation

Sessional Paper No. 1 of 1999 on National Water Policy provides policy direction for the water sector which include, preservation, conservation and protection of available water resources; sustainable, rational and economical allocation of water resources; supplying adequate amounts of water meeting acceptable standards for the various needs; ensuring safe wastewater disposal for environmental protection; and developing a sound and sustainable financial system for effective water resources management, water supply and water borne sewage collection, treatment and disposal.

The Water Act 2002 forms the principal legislation governing protection and management of water resources in Kenya and provides diverse safeguards to regulate water development. In an effort to control abuse and irrational allocation, the Act vests the national water resources to the State, which then authorizes utilization. Abstraction is regulated by the Water Resource Management Authority (WRMA) through issuance of water permits. Decisions on the granting of water permits takes into account other existing lawful uses, efficient and beneficial use of water in the public interest, requisite catchment management strategies, potential impact of abstraction on the water resource and other uses, quality considerations, and strategic importance of the proposed water use among other factors.

In furtherance to the Water Act 2002, the Ministry of Water and Irrigation and Water Resources Management Authority (WRMA) in collaboration with other stakeholders prepared a set of regulations referred to as Water Rules, 2007 to give guidelines on water permit acquisition and adherence to specified conditions and enforcement of user fee charges.

3.1.8 Agricultural Policies and Legislation

The Agriculture Act Cap 318 of the Laws of Kenya seeks to promote and maintain a stable agriculture, to provide for the conservation of the soil and its fertility and to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry.

The Act provides legislative control over soil conservation and land management. Any activities that may destabilize river beds are prohibited and the Ministry of Agriculture can impose land conservation orders to control cultivation, grazing and clearing of vegetation. The recently gazetted Farm Forestry Rules, 2009 aims at promoting and maintaining farm forest cover of at least 10 per cent of every agricultural land holding and to preserve and sustain the environment in combating climate change and global warming.

The agricultural sector remains at the heart of the environmental management discourse in Kenya. Activities in the sector impact most directly on the health of the environment and are indeed the source of direct environmental damage by way of land-based pollution, Greenhouse gas emissions and ultimately the modification of the overall hydro-meteorological cycle. Specifically, agricultural activities are often responsible for the reduction of biodiversity, destruction of soils, pollution of water sources and pollution of wetlands through siltation and adverse landscape changes.

The Strategy for Revitalizing Agriculture (SRA; 2004–2014) presents strategic interventions, which will transform agriculture into a competitive and commercially oriented enterprise. The Aberdare Forest Reserve Management Plan aims to play its part in supporting the fulfilment of the SRA.

3.1.9 The Energy Act

The Energy Act, No. 12 of 2006 empowers the Minister responsible for energy to promote the development and use of renewable energy including (i) providing an enabling framework for efficient and sustainable production, distribution and marketing of biomass, solar, wind, small hydros, geothermal and charcoal; (ii) promoting the use of fast maturing trees for energy production including biofuels and the establishment of commercial woodlots including peri-urban plantations; (iii) promoting international cooperation on programmes focusing on renewable energy; (iv) harnessing opportunities offered under clean development mechanism and other mechanisms including, carbon credit trading to promote development and exploitation of renewable energy; (v) promoting the utilization of renewable energy sources for power generation and transportation; and (vi) promoting the production and use of gasohol and biodiesel.

In order to regulate production, transportation and marketing of charcoal, the Forests (Charcoal) Rules, 2009 have been gazetted under the Forests Act, 2005.

3.1.10 The National Land Policy

The Sessional Paper No. 3 of 2009 on National Land Policy was formulated to address the critical issues of land administration, access to land, land use planning and environmental degradation. It also addresses restitution of historical injustices, conflicts, unplanned proliferation of informal urban settlements and information management. It recognizes the need for security of tenure for all Kenyans. The overall objective of the National Land Policy is to secure rights over land and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. Among others, the Policy shall offer a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide efficient and effective utilisation of land and land based resources.

The Policy designates all land in Kenya as public, community and private land. Most significantly, the Policy establishes a mechanism for securing the tenure of public land by placing all public land under the National land Commission to hold and manage the land in trust for the people of Kenya. The Policy has provisions aimed at

protecting forest reserves and water catchment areas through establishment of mechanisms for repossession of any public land acquired illegally or irregularly and establishment of an appropriate system for registering public institutional land. Through the Policy, the Government will ensure that all land is put into productive use on a sustainable basis by facilitating the implementation of key principles on land use, productivity targets and guidelines as well as conservation.

3.1.11 Natural Resources Data and Information Management Policy

The draft National Policy on Natural Resources Data and Information Management (2007) aims at enhancing and coordinating generation and handling of harmonised natural resource information for sound management and monitoring of natural resources and sustainable development. A draft Bill aimed at implementing the Policy is also in place awaiting Parliamentary approval. The draft policy and Bill are important to the forestry sector as we engage in investments including carbon credit which demand higher precision data sets to ensure optimal returns for the investments.

3.1.12 Grass Fires Act

The Grass Fires Act, Cap 327 provides for protection of vegetation by regulating burning of bushes, shrubs, grass, crops and stubble through issuance of permits to carry out planned burning processes within protected areas, trust land and in private lands. Grass burning as a natural resource conservation management tool helps in controlling pests and invasive plant species.

3.1.13 Fisheries Act

The Fisheries Act Cap 378 of 1989 of the Laws of Kenya provides for development, utilization and conservation of fisheries and other connected purposes. It supports promotion for development of traditional and industrial fisheries, fish culture and related industries through extension service, research and surveys, infrastructure development, restocking, exploring marketing opportunities as well as enhancing community participation in fisheries management. Some of these activities like trout farming and re-stocking can be undertaken in Aberdare Forest Reserve and within the forest adjacent areas.

3.2 LINKS TO MULTILATERAL ENVIRONMENTAL AGREEMENTS (MEAS)

Kenya has ratified the following international agreements, protocols and Conventions that impact on forestry.

3.2.1 Millennium Development Goals

Millennium Development Goals (MDGs) aim at enhancing livelihood security, reducing health risk and reducing vulnerability through eight development goals. This plan addresses MDG No. 7 on ensuring environmental sustainability and Goal

No. 1 on eradicating extreme poverty and hunger through improved forest management and conservation and support to community livelihood programmes.

3.2.2 Convention on Biological Diversity (CBD)

The Convention on Biological Diversity stipulates that it is the responsibility of national states to conserve their biological diversity and to use their biological resources in a sustainable manner. Kenya is developing a national strategy for the conservation of biological diversity which will establish a system of protected areas. This management plan proposes strategies to mitigate loss of biological diversity in the forest reserve.

3.2.3 United Nations Framework Convention on Climate Change (UNFCCC)

The primary purpose of this Convention is to establish methods to minimize global warming and in particular the emission of green-house gases. This convention is implemented through Kyoto Protocol which requires signatories to reduce their green-house gas emission levels to 5% below 1990 levels by the year 2012. Kenya falls under Non-Annex I countries which have no green-house gas emission reduction obligations but may participate in the Clean Development Mechanism (CDM). Under this arrangement, Communities within the forest reserve have developed CDM Project through GBM with support from World Bank. The management plan addresses this convention through rehabilitation of degraded areas, which will serve as important carbon sinks to minimize green house gases in the atmosphere. The plan also targets the development of demonstration plots for Reducing Emissions through Deforestation and Forest Degradation including improved management of remaining forest resources and enhancing carbon stock (REDD+).

3.2.3 Convention on International Trade in Endangered Species (CITES)

The Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The plan provides for protection and continuous monitoring of rare and endangered plant species within the forest reserve.

3.2.4 Convention on Wetlands: Ramsar Convention

The Convention on Wetlands is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Kenya being a signatory to this convention is required to promote sustainable use of wetlands and to take measures for their conservation by establishing nature reserves in wetlands. It is expected that activities in the forest reserve will strictly adhere to the Ramsar Convention's principles of wise use of wetlands.

3.3 LINKS TO THE COUNTRY'S PLANNING PROCESS

3.3.1 Links to Vision 2030

Vision 2030 aims at ensuring a clean, secure and sustainable environment by 2030, and promoting environmental conservation to support the aspirations of the economic pillar. Under the economic pillar, tourism will be promoted through development of niche products such as eco-tourism in forest areas.

The specific strategies will involve among others, promoting environmental conservation for better support to the economic pillar flagship projects and for purposes of achieving the millennium development goals.

The specific strategies to address flagship environment projects for year 2012 include the water catchment management aimed at rehabilitating the five water towers. The flagship projects relevant to Aberdare Forest reserve include:-

- (a) Conservation and management of Aberdare water tower for the supply of environmental goods and services to support the energy, agriculture, tourism and water sectors. It will also contribute to increased carbon sequestration to mitigate climate change.
- (b) Increasing forest cover through reforestation of degraded natural forest areas and replanting of plantation backlogs. The plan will also target tree growing and management in the farmlands within the forest adjacent areas.
- (c) Conservation and management of approximately hectares of bamboo for environmental conservation and promotion of bamboo cottage industry for poverty alleviation.
- (d) Control of invasive species and restore degraded areas.

3.3.2 Links to KFS Strategic Plan 2009/10 - 2013/14

The Kenya Forest service has developed a strategic plan informed by the desire for application of best practices, promotion of good governance through articulation of policy goals and objectives, provision of forests Act, 2005 and other relevant laws and policies. The Strategic Plan sets out KFS vision, mission, goals and objective for the period 2009/10 - 2013/14 to ensure achievement of the forestry sector policy objectives. The objectives of the strategic plan and the specific strategies to address the objectives are as follows:-

- (a) *To intensify conservation and sustainable management of strategic forest resources for environmental protection and economic growth:* This will be achieved through rehabilitation of all degraded areas in the forest reserve and promotion of community income generating activities (IGAs).
- (b) *To maintain and enhance productivity of industrial forest plantations and increase efficiency in wood utilization for wealth and employment creation:* This will be achieved through improved management of plantations and increase efficiency on utilization to maximize revenue generation.

- (c) *To promote forest extension on farm to increase tree cover for sustained timber, wood fuel, non-wood forest products and environmental conservation. This will be done through promotion of farm forestry and protection of catchment and riparian areas outside forest reserves.*
- (d) *To develop and disseminate technologies in forest management, on-farm tree planting, forest utilization and forest information system. This will be done through research and dissemination of information on tree establishment management and utilization to improve livelihoods.*
- (e) *To enhance revenue generation through sustainable forest based industries, ecotourism and payment for environmental services. This plan promotes adoption of integrated harvesting, improved conversion, efficiency, promotion of nature based income generating activities such as eco-tourism, carbon trade, sale of non-wood forest products and payment for environmental services.*
- (f) *To improve institutional capacity and infrastructure through collaboration, training and development. The plan promotes the improvement of forest management infrastructure, improved information management, capacity building and skills development.*

3.4 PARTNERSHIP ARRANGEMENTS

The Kenya Forest Service (then Forest Department) and the Kenya Wildlife Service signed a Memorandum of Understanding (MoU) for joint management of selected forests on 5th December 1991. In 1996, the KFS/KWS MoU was expanded to include National Museums of Kenya (NMK) through an addendum. The MOU has however expired and the institutions are currently collaborating through mutual understanding.

In 1986, KEFRI and KFS signed a Memorandum of Consultative Collaboration (MOCC) on research. The Nyayo Tea Zones Development Corporation (NTZDC) and Kenya Forest Service have also signed an MOU, which enjoins the two agencies to collaborate in the management of the 100 metres buffer strip established in tea growing areas. The corporation is mandated to grow tea and establish fuel wood plantations for curing their tea.

Chapter 4

4 RATIONALE FOR ABERDARE FOREST RESERVE MANAGEMENT PLANNING

3.5 VALUE OF THE FOREST RESERVE

This planning process is driven by the desire to apply best practices to sustainably manage the Aberdare Forest Reserve due to its unique values, threats towards its conservation and the need to address various management constraints. There are also considerable environmental and economic values that support the livelihood of the communities adjacent to the forest reserve and beyond.

3.5.1 Watershed

Aberdare forest reserve plays a critical role in water catchment functions for the country and is one of the five main “water towers” in Kenya. The forest reserve is a ‘critical watershed’ where rainfall is able to support a perennial stream flow. The ‘closed canopy’ montane forest reduces the erosive forces of intense rainfall because the foliage reduces the velocity of the raindrops. Likewise on the ground, a deep layer of organic matter creates a highly absorptive and retentive soil environment. This results in most of the rain infiltrating into the soil and water is then slowly released into rivers throughout the year by soil seepage and spring lines.

The Eastern and Southern part of the range form the catchment for Tana and Athi River basins while north eastern slopes is the catchment area for Ewaso Nyiro River basin which traverses through the dry areas of Laikipia and Isiolo as it drains into the Lorian Swamp. Malewa River basin on the western side of the range drains into Lake Naivasha.

Aberdare range supplies about 80% of the water to Nairobi through Sasumua and Ndakaini dams. Together with Mt Kenya, 70% of the country’s hydro power production schemes along the Tana River rely on water from these catchments. Many small water intakes have been installed in the forest to supply water to the forest adjacent communities.

3.5.2 Wood and Non-Wood Forest Products

Aberdare Forest Reserve provides both wood and non-wood forest products. The wood products include posts, poles, timber and fuelwood and are mainly harvested from forest plantations. These products support the wood industry important not only to the local community but also to national economy. The natural forest has potential to supply timber and wood products, but there is need to undertake natural resource assessment in order to establish annual allowable cut.

The Forest Reserve offers diverse resources for consumptive use, and local people are allowed to access these products through permit and licensing system. The common forest products and services accessed by the local communities include firewood, livestock grazing, and collection of medicinal herbs, water abstraction, fishing and beekeeping. The forest adjacent communities are benefiting from the increased agricultural produce by participating in Plantation Establishment and Livelihood Improvement Scheme (PELIS) in stations where the system is applicable.

3.5.3 Biodiversity reservoir

Aberdare forest reserve has rich biological diversity in terms of both plant and animal species. A total of 778 species, sub-species and varieties of vascular plants belonging to 421 genera and 128 families have been recorded in the Aberdare forest ecosystem. Fifty eight (58) species of lichens, Five (5) species of hepatica and 42 species of musci have been identified to date. Plants endemic to Aberdare include *Lobelia deckenii sattimae*, *Helichrysum gloria-dei* and *Alchemilla hageniae*. The most common tree species include the *Casipourea malosana*, *Juniperus procera*, *Podocarpus spp*, *Olea spp*, *Hargenia abyssinica*, *Macaranga kilimadischarica*, *Aningeria aldolfi friedricii*, *Syzygium guinensis*, *Prunus Africana*, *Newbutonia macrocalyx*, *Afrocrania spp*, *Calodendrum capense*, *Ekerbegia capensis*, *Nuxia congesta* and *Ocotea usambararensis*. Vegetation zones and plant species distribution are distinguished according to the different climatic zones and altitudes, most obviously through variation in vegetation structure, cover and composition.

Five rare and threatened species of mammals of international conservation interest which include the rhinos, elephants, bongos, Giant forest hogs and the leopards are found in this ecosystem. The forest reserve is also home to many other animals antelopes and carnivores like the lion, cerval cat, golden cat, civet cat and genet hyena. Aberdare forest reserve is recognized as an Important Bird Area (IBA) by Nature Kenya recording about 290 bird species. Three hundred and three (303) species of moths belonging to 19 families have also been identified in the eastern side.

3.5.4 Tourism

Aberdare forest reserve has attractive sceneries and great potential for tourism development that are yet to be fully harnessed. The area is endowed with unique geomorphologic features, cultural and historical sites that are of great tourism attraction. In addition to this, there are wildlife populations of elephants, buffalos, reptiles and birds which attract visitors.

The area has the potential to offer a wide diversity of tourism activities such as bird watching, trout fishing, walking and wilderness trails. The potential of tourism if fully developed and well regulated revenue will increase.

3.5.5 Historical and Cultural Values

The forest is a valuable heritage to the people who live within its vicinity. The mountain is seen as a source of livelihood. The reserve provides important sites for religious and other traditional functions. During the Second World War, it was used as a camping site for runaway Italian prisoners and as a hideout place for Mau Mau freedom fighters. Many caves used by the Mau Mau during the struggle for independence dot the forest reserve.

3.5.6 Research and Education values

There are numerous research sites that generate valuable information on development, conservation and management issues. Some of these sites are established by Kenya Forestry Research Institute (KEFRI) and KWS (Mweiga station). Research is also being carried out by National Museums of Kenya and Nature Kenya within the Important Bird Areas (IBA). There have been other research and monitoring activities which include ethno-botany, vegetation, animal and social economic surveys. Universities take environmental and natural resource management students periodically on education tours and field attachments to the forest reserve.

Most of the research has been conducted by external researchers with minimal involvement of the local community. Very little information is available at the local level. The community members have a lot of indigenous knowledge, which can be documented. Specialized monitoring activities are ongoing but information flow is grossly inadequate. Endeavours to involve the community in research should contribute to both their welfare and that of the forest reserve.

3.5.7 Climate Amelioration

Owing to its variation in altitude, aspect and vegetation cover, the forest influences the atmospheric temperatures that subsequently regulate the micro-climate. Forests form major carbon sinks by their ability to sequester atmospheric Carbon dioxide (CO₂) required for photosynthesis with resultant production of Carbon that is locked up in tree biomass.

3.6 Constraints to forest Reserve conservation

The conservation of Aberdare forest reserve is hampered by the following factors:

(a) Management constraints

- Inadequate technical staff
- Low staff morale due to poor remuneration and lack of staff welfare programmes
- Inadequate baseline and updated information

- Lack of management plans in Some stations
- Lack of proper tools for development of management plans like updated maps and resource inventory

(b) Resource constraints

- Inadequate forest management personnel
- Inadequate budgetary provision resulting in poor infrastructure, inadequate equipment and under funding of activities
- Undervaluation of forest contribution to GDP resulting to low budgetary allocation
- Forest management and Conservation fund not operationalized

(c) External interference

- Forest exploitation ban negatively impacting on silvicultural activities
- Uncoordinated stakeholders' participation
- Localised politics within the Counties in forest resource disposal and utilization

(d) Inadequate community support

- Inadequate resources for PFMPs development and operationalization
- Some Forest Officers have inadequate skills on development of PFMPs
- Inadequate awareness of importance of PFM
- Inadequate guidelines on cost and benefit sharing mechanism under PFM

(e) Poor utilization of forest produce

- Under valuation of forest resources
- Inefficient and outdated technology
- Inadequate skills

3.7 Problem analysis

Considerable resources and efforts have been invested in improving the management of the protected areas of Aberdare Forest Reserve in the past years. Although some successes have been achieved, tremendous threats and pressures on the Forest Reserve remain. The main source of this pressure arises from the depletion of resources and degradation of the Forest Reserve. The major threats and pressures facing the reserve are as follows:

- (a) Excisions of Forest Reserve and its conversion from forest to agricultural uses to satisfy land use demands for increasing populations. Such de-gazettement has often been highly political in nature;

- (b) Encroachment for human settlements due to population pressure and greed;
- (c) Unsustainable commercial and subsistence resource use within the Forest Reserve.
- (d) Illegal logging of plantation and valuable indigenous species;
- (e) Over grazing by livestock and wild animals
- (f) Wildfires which occur during the dry spell in the forests, grasslands and adjacent farmlands
- (g) Conflicting institutional mandates on management of natural resources;
- (h) Inadequate stakeholders' involvement in forest resource management;
- (i) The ban on forest harvesting has constrained silvicultural operations and forest management; and
- (j) Human/wildlife conflict and game damage on forest plantations.

3.8 Forest Reserve Management Zonation

The current Forest zonation criteria are based on vegetation types namely plantation, natural forest, and Nyayo Tea Belt and Intervention zone. The vegetation type dictate the type of management and conservation interventions put in place.

The plan has categorized the forest area inside the forest reserve into three major zones namely natural forest, plantation forest and Nyayo tea belt. The zones are further subdivided into four sub-zones based on management options. As shown in the table below, the plan has also included the community intervention zone to address the activities being undertaken in the farmlands within 10 kilometres from the forest reserve boundary.

Table 2: Aberdare Forest Reserve zones and sub-zones

Zone	Sub zone	Criteria	Management objective
Natural forest	Protected areas	-Biodiversity hot spots -Wetlands -Moorland	-Protect the ecological integrity of the protected areas -Preservation of the water catchment function -Ecological research and education -Restricted ecotourism
	Conservation	Natural forest, bamboo and glades not zoned as protected area	-restoration of degraded forest areas -Protection of the water catchment function -Development of ecotourism & - Nature based enterprises (NBEs) -Controlled utilization of wood and NWFP -PFM activities

Zone	Sub zone	Criteria	Management objective
			-Ecological research and education -Carbon sequestration sites -Grazing and grass cutting
Plantation	Plantation area	All areas designated for commercial forest production	-Commercial production and extraction of wood and NWFP -PFM -PELIS -Commercial forest management Research -Management of fire breaks -Clearing planting backlogs -Clearing silvicultural backlog - Grazing and grass cutting
Nyayo Tea Belt	Tea zone	100 metres belt in tea growing zones	-Commercial tea growing -Fuel wood plantations for internal consumption -Rehabilitation of water catchment and degraded areas
Community intervention zone	Intervention zone	Farmlands within 10 km from Forest Reserve boundary.	-Promote on-farm tree growing -Promote income generating activities (IGAs) -Support community institutions in forestry programmes -Protection of riparian belt and hilltop afforestation

3.9 Management objectives

In order to attain the plan purpose and contribute to the overall goal, the following management objectives are envisaged:-

- (a) To conserve and protect the biological diversity, ecological services and productivity of the natural forest;
- (b) To ensure adequate and portable water supply for sustainable development;
- (c) To promote bamboo growing and utilization for environmental conservation and livelihood improvement
- (d) To promote sustainable tourism for economic development;

- (e) To maintain and enhance productivity of industrial forest plantations and increase efficiency in wood utilization for wealth and employment creation;
- (f) To ensure that the Forest Reserve is secure for forest operations and ecotourism;
- (g) To promote community participation in natural resource management for improved livelihoods;
- (h) To improve and undertake capacity building for forest management and utilization, infrastructure and equipment; and
- (i) To obtain relevant and timely information on the status of the biodiversity and other parameters and their threats to guide management decisions.



Figure 6: Typical Zonal Forest Office

Chapter 5

4. MANAGEMENT PROGRAMMES

4.1 Natural Forest Management Programme

4.1.1 Background

Aberdare Forest Reserve plays a critical role in water catchment functions for the country and is one of the five “water towers” in Kenya. The North East to the Central eastern slopes of the Aberdare Ranges upto Amboni River is the catchment for Ewaso Nyiro River basin. The eastern slopes between Nyeri and Thika form the water catchment area for Tana River basin, the Western and North Western slopes form the catchment area for Malewa River basin and the southern slopes including Kikuyu escarpment form the water catchment area for Athi River basin. These rivers provide water for hydroelectric power generation and irrigation that are important to the agricultural and industrial sector development and also water supply for domestic use.

The Forest Reserve is also an important national asset for economic, environmental, socio and cultural values. It provides utility products such as timber, fuelwood, and a wide variety of NWFP. The reserve is also important for conservation of biological diversity, carbon sequestration and is a major habitat for wildlife which supports the tourism industry. The forest area is listed as an IBA for many bird species.

The natural forest which covers an area of approximately 89,972 ha has mainly been managed for conservation with controlled exploitation of NWFP. Before mid 1980’s extraction of wood was practiced until the imposition of a Presidential ban on harvesting of indigenous wood in all natural forests in Kenya due to escalation of illegal practices. The management of natural forest has been a challenge due to undervaluation, inadequate information, financial and human resources coupled with institutional weaknesses. However, the trend of forest degradation has recently reduced with the establishment of KFS and increased funding for surveillance and protection.

4.1.2 Challenges

The main challenges of the programme is to balance the extractive uses with the need to conserve the resources for other non-extractive benefits such as conservation of biodiversity, soil and water conservation, ecotourism and carbon sequestration.

4.1.3 Management objectives

- (a) Enhance management of closed canopy forest for continued supply of forest goods and services;
- (b) Rehabilitate all degraded sites in natural forest areas to restore ecological integrity;

- (c) Promote sustainable utilization of resources within the natural forest for socio-economic development;
- (d) Promote conservation of plant species of special concern;
- (e) Assessment and valuation of forest resources to inform decision making; and
- (f) Enhance protection of the natural forest areas for health and vitality.

4.1.4 Management action

The table below provides the summary of management actions required to implement each of the management objectives.



Figure 7: A CFA member putting bee hive on a tree

Table 4: Summary of management actions for Natural Forest Programme

Action	Unit	10 yr targets	Means of verification	budget	Time frame (yrs)											
					1	2	3	4	5	6	7	8	9	10		
Enhance management of closed canopy forest																
Protection of existing closed canopy forest ('000)	ha	95.4	reports		x	x	x	x	x	x	x	x	x	x	x	x
Rehabilitation of all degraded sites in natural forest areas																
Develop a restoration plan	No.	2	Plan		1							1				
Seedlings production (million)	No.		reports													
Reforestation ('000)	Ha	0.2	reports													
Enrichment planting ('000)	Ha	1	reports													
Protection for natural regeneration ('000)	Ha	40.57	reports													
Management of invasive spp	Ha	100	reports													
Reversion of zoned out plantation areas to indigenous forest	Ha		reports													
Promote sustainable utilization of resources within the natural forest																
Conduct study of NWFP products range	No	1	Report			1										
Promote Nature based enterprises	No.	190	Report		19	19	19	19	19	19	19	19	19	19	19	19
Capacity building on promotion of NBE's, REDD+ and fundraising to Forest Officers	No	40														
Establish REDD+ demonstration projects	No.	6	Report			2										
Promote conservation of plant species of special concern																
Identify and map endangered, endemic, rare and threatened species	No.	1	Report/Map			1										
Develop and implement mgmt plan for species of special concern	No.	1	Plan				1									

Action	Unit	10 yr targets	Means of verification	budget	Time frame (yrs)										
					1	2	3	4	5	6	7	8	9	10	
Assessment and valuation of forest resources															
<i>Natural resource assessment and mapping</i>	No.	1	Map			1									
Total Economic Valuation (TEV)	No.	1	Report				1								
Certification of forests	No.	1	Certificate				1								
Management and sales inventory	No.	2	Report			x	x	x	x	x	x	x	x	x	x
Enhance protection of the natural forest areas															
Fire management ('000)	Ha				x	x	x	x	x	x	x	x	x	x	X
Pest and diseases monitoring	No.	10	Report		x	x	x	x	x	x	x	x	x	x	x
Enforcement operations	No.	190	Reports		19	19	19	19	19	19	19	19	19	19	19
Livestock carrying capacity study	No	1	Report			1									
Study on control of invasive spp	No.	1	Report				1								



4.2 Plantation Development Programme

4.2.1 Back ground

The establishment of forest plantations in Aberdare Forest Reserve started in early 1920s with conversion of indigenous forest into fast growing exotic species to meet an increasing demand in wood based products in the country. The main species included *Cupressus lusitanica*, *Pinus patula*, *Pinus radiata* for timber and *Acacia mearnsii* (black wattle) for wattle production mainly in Kimakia and Gatare Forest Stations. *Eucalyptus* species for fuelwood working circle were also planted. The plantations were established through the Shamba system using the resident labour. In 1987 the system was banned due to abuse and all resident labourers evicted from the forests. The absence of resident labour coupled with inadequate allocation of resources led to accumulation of planting and silvicultural backlogs. The system was re-introduced in 1994 on pilot basis as non-resident cultivation which has been transformed to the current Plantation Establishment and Livelihood Improvement Scheme (PELIS) which is being implemented in various forest stations.

Within the Aberdare Forest Reserve, there are 21,118.93 ha of forest plantations in 19 Forest Stations namely Kinale, Kereita, Uplands, Kamae, Ragia, South Kinangop, North Kinangop, Geta, Ol-bollosat, Ndaragwa, Muringato, Kabage, Zaina, Zuti, Kiandongoro, Kieni, Wanjerere, Gatare and Kimakia,. The areas of wrongly sited plantations within water catchments have been zoned out to revert to indigenous forest.

4.2.2 Management challenges

The major challenges in forest plantation management include:

- (a) Game damage to plantations enclosed by the fence
- (b) Poor infrastructure development
- (c) Ban on forest plantation exploitation
- (d) Lack of active felling plans
- (e) Inefficient conversion during processing and outdated conversion technology
- (f) Decentralization of management inventory data
- (g) Planting and silvicultural backlogs
- (h) Forest fires,
- (i) Pests and diseases
- (j) Illegal harvesting

4.2.3 Management Objectives

- (a) Improve plantation establishment and maintenance for sustainable, high quality supply of wood and non wood products
- (b) Develop plantation management plans

- (c) Promote sustainable forest industry for communities and the private sector
- (d) Promote efficient utilization of wood and non-wood forest products and value addition to maximize returns on investments
- (e) Protect forest plantations
- (f) Broaden plantation species base and include high value indigenous species

4.2.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives.

Table5: summary of management actions required to implement Plantation Development programme

Management Objectives	unit	10yr targets	Means of verification	budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Improve plantation establishment and maintenance for sustainable, high quality supply of wood and wood products														
Exotic seedling production (millions)	Nos	16.7	Reports		1.6	2.0	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Indigenous Seedling production (millions)		1.28												
Tree planting ('000) (clear felled areas)	Ha	6.2	Reports		0.8	1.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Tree planting to clear backlogs ('000)	Ha	1.76	Reports											
Beating up ('000)	Ha	2.45	Reports											
Indigenous tree plantations	Ha	0.8	Reports											
Broaden plantation species	Nos	3	Compt reg.			1	2							
Replanting of poles and fuelwood working circle (10% of area available per year) ('000)	Ha	2.1												
Enhance seed stand management	Ha	xx	Reports											
Clear pruning backlog	Ha													
Pruning ('000)	Ha	15.92	Report											
Thinning ('000)	Ha	7.96	Report											
Coppice reduction	Ha	2.1	Report											
Respacing	Ha	300	Report											
Weeding ('000)	Ha	7.4	Report		0.8	1.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Determination of site indices	No.	1	Report			x								
Management inventory	No.	2	Report					1					1	
Develop Plantation management plans														

Management Objectives	unit	10yr targets	Means of verification	budget	Time frame (yrs)										
					1	2	3	4	5	6	7	8	9	10	
Plantation development plans	No.	6	Mgmt plan doc			3	3								
Annual work plan	No.	190	Work plans		19	19	19	19	19	19	19	19	19	19	19
Harvesting plans	No.	190	Plan doc		19	19	19	19	19	19	19	19	19	19	19
Fire management plan	No.	12	Fire plan		6	6	6	6	6	6	6	6	6	6	6
Utilization of forest plantations															
Sales inventory	Ha	7000	Report		700	700	700	700	700	700	700	700	700	700	700
Capacity building on integrated utilization	No.	190	Report		19	19	19	19	19	19	19	19	19	19	19
Marketing survey	No.	10	Report		1	1	1	1	1	1	1	1	1	1	1
Study on plantation cost investment replacement	No.	1	report		1										
Revenue collection (Billion)	Ksh	6.0	Report		0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Protection of forest plantation															
Fire breakmanagement ('000)	Km	1.0	Report		x	x	x	x	x	x	x	x	x	x	x
Pest and diseases monitoring	No.	10	Report		1	1	1	1	1	1	1	1	1	1	1
Enforcement operations	No.	780	Report		78	78	78	78	78	78	78	78	78	78	78
Game control - fence maintenance	Km	400	Report		x	x	x	x	x	x	x	x	x	x	x
Erection of two strands electric fence for plantation protection	km	100	Report												
Livestock carrying capacity study	No	6	Report			6									
Develop strategy and implement on control of invasive spp	No.	1	Report			1									

4.3 Bamboo Development and Management programme

4.3.1 Background

Bamboo in Aberdare Forest Reserve covers approximately 36,462 ha as pure stand or mixed with indigenous trees. The dominant Bamboo species growing in the reserve is *Arudinaria alpina* while *Sambucus africana* grows on openings during transition phase of collapsed bamboo stems. Prior to the ban on exploitation of indigenous trees in mid 1980s, Bamboo stems were exploited for domestic uses mainly as fence and construction.

Currently there is high demand for bamboo stems in the floriculture and cottage industry due to technology transfer from China and other Far East Countries where it is managed as a commercial species. Bamboo dries off after it attains its biological age leading to accumulation of dry material a recipe for forest fires. Due to its high rate of regeneration the controlled exploitation of bamboo has no negative impact on catchment value of the forest.

4.3.2 Management challenges

- (a) There are no management plans for bamboo forest.
- (b) The ban of exploitation of indigenous tree species affects harvesting of bamboo.
- (c) Management of forest fires in bamboo zone due to accumulation of dry bamboo material.
- (d) Inadequate technology on development and utilization
- (e) Inadequate human resource capacity for management and utilization of Bamboo
- (f) Low awareness of potential of Bamboo as an enterprise

4.3.3 Management objectives

- (a) Develop bamboo management plan.
- (b) Promote the establishment and management of bamboo within the forest reserve and farmlands.
- (c) Promote sustainable utilization of bamboo resources, value addition and marketing.
- (d) Create awareness and build capacity on Bamboo establishment, management and utilization to forest managers and communities.

4.3.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives.

Table 6: summary of management actions required to implement Bamboo Development and Management programme

Action	Unit	10 yr targets	Means of verification	budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
<i>Develop bamboo management plans</i>														
Management inventory & mapping	No	2	reports	10M		1				1				
Bamboo development plans	No	2	Plan	4M		1				1				
Harvesting plans	No	19	Plan	2M	x	x	x	x	x	x	x	x	x	x
<i>Promote the management of bamboo</i>														
Introduce suitable bamboo species	No	5	Reports	10M	1	1	1	1	1					
Propagation of bamboo ('000,000')	No	30	Reports	150M	x	x	x	x	x	x	x	x	x	x
Establish commercial bamboo plantations	Ha	1000	Comp registers	400M	100	100	100	100	100	100	100	100	100	100
Promote on farm bamboo growing	Ha	1000	Reports	200M	100	100	100	100	100	100	100	100	100	100
Promote technology transfer through exchange visits	No.	30	Reports											
Capacity building through short courses	No.	300	Report											
<i>Promote sustainable utilization and marketing of bamboo resources</i>														
Conduct study of bamboo products range	Study	1	Reports	2.5M		1								
Promote bamboo based enterprises and value addition	No	100	Reports	10M	x	x	x	x	x	x	x	x	x	x
Establish REDD+ demonstration projects	No	10	Reports	50	x	x	x	x	x	x	x	x	x	x
Promote the development of bamboo processing industry	No	2	Reports	100M	x	x	x	x	x	x	x	x	x	x
Workshop to promote the use of bamboo shoots for dietary purposes	No	10	Reports	3M	x	x	x	x	x	x	x	x	x	x

4.4 Watershed Management Programme

4.4.1 Back ground

The Aberdare watershed contributes water to Tana, Athi, Malewa and Ewaso Ng'iro North water basins. The main uses of water within the catchments are domestic, irrigation, Hydro Power generation, industrial, fisheries, recreation and ecological services. Water use is monitored and regulated through measuring and control devices and enforcement of water rules by the WRMA and WRUAs in collaboration with other relevant stakeholders. Aberdare catchment contributes to over 80% of the water supplied to Nairobi city through Sasumua and Ndaka-ini Dams. The Aberdare and Mt Kenya ecosystem contributes all the water draining to Tana River which is used to generate over 70% of Hydro-power in Kenya. Malewa River drains into Lake Naivasha whose water supports the floriculture and horticultural industry. It also supplies water to major urban areas in the region like Nakuru and Naivasha. Ewaso Ng'iro North is the lifeline for water supply to support livestock industry in Laikipia and Isiolo District. The Athi River support agricultural activities in lower eastern and Coast Province and is the lifeline for the Tsavo East National Park.

The role of KFS regarding water resource management within the Forest Reserve (FR) relates to conservation and protection of watershed area and controlling access to the river resources through the provision of way leaves for water infrastructure development and licensing/permits of water easements. KFS also contributes to water resources assessment studies for water quality and river flow monitoring. KFS is also exploring the Payment of Environment Services (PES) to enhance forest protection and conservation as stipulated in Forest Act, 2005. There is need to develop a watershed management plan to guide restoration and future investments in the forest reserve and adjacent farmlands.

4.4.2 Management challenges

Issues that prevail in this sector within the Aberdare Forest Reserve include:-

- (a) Inadequate flow of water in most rivers especially in the Northern and eastern side due to insufficient rainfall.
- (b) Flash floods and poor infiltration due to catchment degradation leading to low recharge of underground water resources.
- (c) Over-abstraction of water due to inadequate compliance to installation of measuring and control devices and inadequate monitoring.
- (d) Siltation as a result of erosion caused by poor farming and conservation practices along the catchment areas.
- (e) Some of the River Gauging Stations (RGSs) in place are either broken down or are not operational due to dilapidation, vandalism or lack of gauge readers.
- (f) Inadequate information on status, use and development of water resources and wetlands in the ecosystem.

4.4.3 Management objectives

- (a) Rehabilitation, protection and conservation of catchment and riparian areas
- (b) Protection of water resources against pollution
- (c) Undertake water resource assessment studies
- (d) Establishment of surface water monitoring network.
- (e) Promote rational utilization of water resources

4.4.4 Management Actions

The table below provides the summary of management actions required to implement each of these management objectives

Table 7: summary of management actions required to implement Watershed Management programme

Management objectives	unit	10 yr targets	Means of verification	budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Objective 1. Rehabilitation, protection and conservation of catchment and riparian areas														
Inventory and mapping of wetlands and springs	No.	1	Report/map			1								
Rehabilitation of degraded wetlands and springs	No.	60	Report		6	6	6	6	6	6	6	6	6	6
Awareness creation and tree planting on Soil & Water conservation on adjacent farmlands	No.	60	Reports		6	6	6	6	6	6	6	6	6	6
Conservation of riparian areas within the forest reserve	No.	10	Reports		1	1	1	1	1	1	1	1	1	1
Rehabilitation and improvement of quarries and murrum excavation sites	No.	10	Reports		1	1	1	1	1	1	1	1	1	1
Objective 1.2 Protection of water resources against pollution														
Awareness creation on dumping of waste in catchment areas	No.	60	Reports		x	x	x	x	x	x	x	x	x	x
Develop and implement station level grazing/grass cutting management plans in water catchment areas	No.	19	Plans		x	x	x	x	x	x	x	x	x	x
Promote tree planting along riparian areas	Ha	600	Reports		10	10	10	10	10	10	10	10	10	10
Objective 1.3 Establishment of water resources monitoring network														
Establish surface water monitoring stations	No.	20	Reports			4	2	2	2	2	2	2	2	2

Management objectives	unit	10 yr targets	Means of verification	budget	Time frame (yrs)										
					1	2	3	4	5	6	7	8	9	10	
Establishment of weather stations	No.	19	Reports		6	6	7								
Water resources assessment study in each basin	No	4	Reports			1	1	1	1						
Objective 1.4 Promote rational utilization of water resources															
Determine PES and implement	No.	1	Report												
Establish fish farming potential in forest areas	No.	1	Report												
Licensing of way leaves and water storage systems	No.	60	Licenses												

4.5 Tourism Development Programme

4.5.1 Background

Aberdare forest ecosystem has very attractive scenery that is highly appreciated by tourists. It attracts both domestic and international visitors, including mountain hikers, walkers, birdwatchers, game viewers and sport fishermen. The tourist attractions include animals like the elephant, buffalo, waterbuck, Black rhino, giant forest hog and the endangered bongo. Among the primates are black and white Colobus monkeys, sykes monkey and baboon. The carnivores include leopard, spotted hyena, lions, civet and genet cats. Other attraction includes waterfalls, caves, and mountain hiking.

The Kenya Forest Service has identified ecotourism as a major enterprise development activity. In view of this, KFS is in the process of developing an ecotourism master plan which will guide future investments in this sector. KFS has also identified potential ecotourism sites within the Forest Reserve.

The Forest Reserve has high potential for eco-tourism. There are a number of sceneries, cultural and historical sites within the Forest Reserve. The forest cover provides spectacular scenery and sites for recreation, which are suited for bird watching, picnics and camping. There are numerous rivers with eye catching waterfalls. The establishment of eco-tourism ventures in forest reserves would provide opportunities for local communities to participate actively in conservation of the Forest Reserve.

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

4.5.2 Management Challenges

Challenges facing tourism in the Forest Reserve include

- (a) Narrow range of visitor activities,
- (b) Poor infrastructure hence underutilization of some sites,
- (c) Uncontrolled entry into the forest reserve and inequitable benefit sharing among stakeholders.
- (d) Lack of a tourism development plan for Aberdare to guide tourism.

4.5.3 Management Objectives

- (a) Enhance the development of Tourism products
- (b) Develop and improve tourism infrastructure

- (c) Develop marketing strategy and information products
- (d)** Provide adequate security within the FR to ensure safety of all visitors
- (e)** Develop and promote existing tourism facilities

4.5.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives.

Table 8: summary of management actions required to implement tourism development programme

Management ,Objectives	unit	10 yr targets	Means of verification	budget kshs	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Enhance the development of Tourism products														
Develop tourism master plan for Aberdare FR	No	1	Plan			x								
Inventory of Aberdare FR tourism products (services, facilities)	No	2			1					1				
Zonation and Develop visitor use areas	No	1	Map			x								
Capacity building	No	6	Reports			3	3							
Develop code of conduct for responsible tourism	No	1	Report			x								
Mobilize resources for tourism development	Ksh (million)	200	Report			10	10							
Promote public private partnerships	No	12	Licenses			6				6				
Collaborate with key stakeholders	No	10	Reports		4	3	3							
Promote community participation	No	19	Licenses		6	8	5							
Monitoring of tourism activities	No	10	Report		1	1	1	1	1	1	1	0	1	1
Develop and improve tourism infrastructure														
Establish tourism infrastructure plan	No	1	Plan			x								

Table 8: summary of management actions required to implement tourism development programme

Management ,Objectives	unit	10 yr targets	Means of verification	budget kshs	Time frame (yrs)										
					1	2	3	4	5	6	7	8	9	10	
Develop ICT system to promote tourism	<i>No</i>	<i>1</i>	<i>Report</i>			<i>x</i>									
Maintain infrastructure for tourism facilities (roads)	<i>Km</i>	<i>100</i>	<i>Report</i>		<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>
Develop infrastructure for proposed tourism sites	<i>Km</i>	<i>200</i>	<i>Report</i>		<i>100</i>	<i>50</i>	<i>30</i>	<i>20</i>							
Develop marketing strategy and information products															
Develop tourism marketing strategy	<i>No</i>	<i>2</i>	<i>Report</i>		<i>1</i>					<i>1</i>					
Design & produce tourism IEC material	<i>package</i>	<i>1</i>	<i>Report</i>	<i>.05</i>	<i>1</i>										
Local & regional networks	<i>No</i>	<i>6</i>	<i>Report</i>			<i>3</i>	<i>3</i>								
Provide adequate security within the FR to ensure safety of all visitors															
Develop & implement visitor security plan	<i>No</i>	<i>1</i>	<i>plan</i>		<i>1</i>										
Collaborate with other security agencies	<i>Lps</i>		<i>Reports</i>		<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
Collaborate with communities & other stakeholders	<i>Lps</i>		<i>Reports</i>		<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
Develop and promote tourism facilities															
Negotiate the licenses	<i>No</i>	<i>40</i>	<i>Licenses</i>	<i>1.0M</i>	<i>3</i>										

Table 8: summary of management actions required to implement tourism development programme

Management ,Objectives	unit	10 yr targets	Means of verification	budget kshs	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
ISO certification	<i>No</i>	<i>1</i>	<i>Certificates</i>	<i>0.5M</i>	<i>x</i>	<i>x</i>	<i>1</i>							
Promotion of the facilities	<i>No</i>	<i>10</i>	<i>Reports</i>	<i>5M</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>

4.6 Farm Forestry Development Programme

4.6.1 Background

Farm forestry is an intervention that aims at meeting the general wood and non-wood requirements of households and income generation which include fuel wood, poles and timber by promoting tree planting on individual farms. This intervention reduces the pressure on gazetted forests for forest products by local communities thus reducing their reliance from the state forests. The plan proposes to promote farm forestry for commercial and domestic use. The areas adjacent to the Forest Reserve (FR) are primarily cash crop growing areas on the southern and eastern slopes mainly characterized by tea and coffee growing. Food crop growing for commercial and domestic purpose is predominant on the western side. Generally in all the area around the FR, tree growing within the farms has been highly adopted.

4.6.2 Challenges

- (a) Use of low quality planting materials
- (b) Inadequate forest extension services
- (c) Inadequate information and resource for development of alternative livelihood projects
- (d) Inadequate skills for value addition and marketing of forest products
- (e) Weak extension linkages
- (f) Failure to undertake silvicultural operations
- (g) Lack of incentives

4.6.3 Objectives

- (a) Promote tree planting in forest adjacent areas to increase tree cover
- (b) Increase household income from tree products
- (c) Promote adoption of efficient energy technologies
- (d) Undertake farm forestry resource assessment
- (e) Enhance farmers capacity on tree growing
- (f) Promote development of forest based community action plans

4.6.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives.

Table 9: summary of management actions required to implement Farm Forestry Development Programme

Management Objectives	unit	10 yr targets	Means of verification	budget	Time frame (yrs)																	
					1	2	3	4	5	6	7	8	9	10								
Promote tree planting in forest adjacent areas to increase tree cover																						
Promote 10% tree planting on farmlands	Ha (000)	40	Reports		4	4	4	4	4	4	4	4	4	4	4	4						
Promote hilltop afforestation	Ha	300	Reports		30	30	30	30	30	30	30	30	30	30	30	30						
Rehabilitate water catchments/ wetlands	Ha (00)	15	Reports		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5						
Promote tree planting on roadsides & urban areas	No of seedlings (000)	20	Reports		2	2	2	2	2	2	2	2	2	2	2	2						
Promote tree planting in schools & other public/private institutions	Nos (000)	50	Reports		5	5	5	5	5	5	5	5	5	5	5	5						
Promote registration of private forests	No	200	Reports		50	75	75															
Increase household income from tree products																						
Promote use of Improved certified planting germplasm for short rotation tree crops	No of seedlings('000)	30	Reports		3	3	3	3	3	3	3	3	3	3	3	3						
Promote commercial tree farming	Ha	5000	Reports		50	50	50	50	50	50	50	50	50	50	50	50						
Promote commercial seedlings production	No (million)	250	Reports		25	25	25	25	25	25	25	25	25	25	25	25						
Create networks between tree growers, markets and financial institutions.	No	60	Reports	2.2	6	6	6	6	6	6	6	6	6	6	6	6						
Promote nature based IGAs	No	200	Licenses and business plans	10	20	20	20	20	20	20	20	20	20	20	20	20						
Improve conversion and processing of forest products	No	100	Records		10	10	10	10	10	10	10	10	10	10	10	10						
Value addition (products)	No	6	Report			6																
Provide information Centers	No	20	Plans and records				10		10													
Promote adoption of efficient energy technologies																						
Promote use of efficient energy saving appliances	Households	2000	Reports		20	20		20		20		20		20		20						

Management Objectives	unit	10 yr targets	Means of verification	budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Promote use of alternative energy sources	Households	2000	Reports		20		20		20		20		20	
Promote efficient charcoal production technology	No	100	Reports		10	10	10	10	10	10	10	10	10	10
Undertake farm forestry resource assessment														
Conduct farm forestry resource assessment	No	2	Reports		1					1				
Enhance farmers capacity on tree growing														
Training farmers on tree growing and management	No (000)	50	reports		5	5	5	5	5	5	5	5	5	5
Stakeholders forum	No	4	report	4	2				2					
Promote development of forest based community action plan														
Collect revenue from licensing of movement of forest products.	Kshs000,000	300	Reports		20	25	25	30	30	30	35	35	35	35
Develop community action plans	No	190	Reports		19	19	19	19	19	10	10	10	10	10
Implement CAPs	No	190	Reports		19	19	19	10	10	10	10	10	10	10

4.7 Community Participation Programme

4.7.1 Background

The Aberdare FR contains several resources that are beneficial to local communities and the country at large. These resources are in terms of fauna, flora, soil, water and their ecological functions. Communities extract a variety of resources from the FR including firewood, building materials, medicinal plants, fish, water, honey and fodder for livestock. All these entail conservation measures to be put in place by the government in collaboration with stakeholders for posterity. The main conservation initiatives envisaged include wildlife, biodiversity, soil and water conservation. These cannot be realized by government and NGOs working within the ecosystem, without the involvement of the local communities since they are the direct beneficiaries. However, elaborate participatory engagement with communities should be put in place to address differential interpretation and enforcement of regulations, establish community structures and cost and benefit sharing mechanisms.

4.7.2 Management Challenges

- (a) Inadequate community empowerment mechanisms in the FR
- (b) The existing legal framework is not properly enforced.
- (c) Inadequate cost and benefit sharing mechanism
- (d) Low awareness on conservation within the community
- (e) Lack of conflicts resolution mechanism.

4.7.3 Management Objectives

- (a)** Promote community participation in forest management (PFM)
- (b)** Promote community nature based enterprises for livelihood improvement
- (c)** Develop capacity for CFAs engagement in PFM
- (d)** Develop cost-benefit sharing mechanisms
- (e)** Establish conflict resolution mechanisms
- (f)** Weak community institutions

4.7.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives.

Table 10: Summary of management actions required to implement community participation programme

Management Objective	unit	10 yr targets	Means of verification	budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Promote community nature based enterprises for livelihood improvement														
Promote commercial tree nurseries	No.	19	Report		6	8	5							
Develop cost benefit sharing mechanism	No.	1	Report		1									
Awareness creation on Cost/ benefit sharing mechanism	No.	19	Report		6	6	6	1						
Promote NWFP industries	No.	19	Report		6	6	6	1						
Awareness creation on ecotourism opportunities	No.	19	Report		6	8	5							
Promote community participation in forest management														
Develop PFMPs	No.	15	Plans		4	6	5							
Implement PELIS	No.	17	Report		x	x	x	x	x	x	x	x	x	x
Promote community policing and fire control	No.	19	Report		x	x	x	x	x	x	x	x	x	x
Promote community involvement in maintenance of forest plantations	No.	17	Report		x	x	x	x	x	x	x	x	x	x
Involve CFAs in forest development and rehabilitation	No.	19	Report		x	x	x	x	x	x	x	x	x	x
Develop capacity for CFAs engagement and cost-benefit sharing														
Education and exchange tours	No.	190	Report		19	19	19	19	19	19	19	19	19	19
Establish Conflict resolution mechanisms	No.	19	Report		x	x	x	x	x	x	x	x	x	x
Training community scouts on policing and fire control	No.	380	Report		80	100	100	100						

Management Objective	unit	10 yr targets	Means of verification	budget	Time frame (yrs)										
					1	2	3	4	5	6	7	8	9	10	
Strengthen CFA Institutions through Capacity building	No	19													
Establish resource centres	No.	5	Report				2	3							

4.8 Protection and Security Programme

4.8.1 Background

The Aberdare Forest reserve has an external boundary of 400 kilometres of which most of the adjacent areas are densely populated. The high population has caused increased demand of forest resources particularly land and wood and non wood forest products. This has led to illegal extraction of forest produce and encroachment of forest land. Wildlife poaching and hunting for trophies has also led to insecurity of the forest. Protection and Security is therefore an important service for development of all the programmes proposed in this management plan and for the overall resource management.

4.8.2 Protection and Security challenges

Boundary encroachment, illegal water abstractions, marijuana cultivation, incidental forest fires, poaching of wild animals, illegal logging, vandalism of electric fence and solar panel, water pumps pipes and other forms of illegal activities have been major security challenges in the Forest Reserve. The capacity of Enforcement and Compliance Department (ENCOM) in terms of personnel, equipment, communication and surveillance remains inadequate in all forest stations.

4.8.3 Management Objective

- (a) Secure forest boundaries
- (b) Promote participatory forest policing
- (c) Ensure efficient forest health monitoring and reporting system
- (d) Provide and secure wildlife barriers to protect forest plantations
- (e) Enhance liaison with other security forces to improve enforcement
- (f) Enforce Rules, Regulations and Orders,
- (g) Provide security for KFS assets, ecotourism facilities and investments

4.8.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives.

Table 11: summary of management actions required to implement protection and security programme

Management Objectives	unit	10 yr targets	Means of verification	budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Secure forest boundaries														
Surveillance and patrol of forest boundaries	<i>Km</i>	400	<i>Reports</i>	4M	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
Intelligence information gathering	<i>No</i>	60	<i>Reports</i>		6	6	6	6	6	6	6	6	6	6
Develop security surveillance and monitoring plan	<i>No</i>	2	<i>Plan</i>		1					1				
Implement security surveillance and monitoring plan	<i>No</i>	2			<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
Repossess illegally and irregularly acquired forest land	<i>Ha</i>	1500	<i>Reports</i>	2M	<i>X</i>	<i>X</i>	<i>X</i>							
Boundary alignment, replacement of lost beacons and mapping(use GIS to est external border lengths)	<i>Km</i>	400	<i>Reports and maps</i>	4M	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
Enhance security of visitors, workers and revenues collected	<i>ls</i>		<i>Report</i>		<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
Management and security of entry gates	<i>No</i>		<i>Records</i>	320M	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
Promote participatory forest policing														
Promote community policing	<i>Man days</i>	79800	<i>Records</i>	23.9M	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>
Develop community intelligence system	<i>No</i>	19	<i>System</i>	2M	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>	<i>x</i>

Management Objectives	unit	10 yr targets	Means of verification	budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Ensure efficient forest health monitoring and reporting system														
Develop and implement a monitoring system	No	2	System and reports	3M	1						1			
Develop a fire plan	No	2	Plans	1.0M	1						1			
Undertake surveillance	MD	41600	Reports	20,8M	4160	4160	4160	4160	4160	4160	4160	4160	4160	4160
Fire surveillance	MD	41600	Reports	20,8M	4160	4160	4160	4160	4160	4160	4160	4160	4160	4160
Fire breaks	Km	500	Report	50	50	50	50	50	50	50	50	50	50	50
Provide and secure wildlife barriers to protect forest plantations														
Refer to plantation programme														
Liaison with other security forces to improve enforcement														
Liaison meetings	No	40	Minutes	0.4M	x	X	x	x	x	x	x	x	x	x
Enforce Rules, Regulations and Orders														
Routine audit inspections	No	250	Inspection reports	4.4M	x	x	x	x	x	x	x	x	x	x

4.9 Infrastructure and Equipment Programme

4.9.1 Background

Infrastructure is required to support management of Aberdare Forest Reserve ranges from roads, airstrips; telecommunication systems; nature trails; bridges; campsites; bandas; picnic sites; residential and non-residential buildings; outposts, electric fence, game moats etc. The equipments ranges from aircrafts; vehicles, machinery, fire fighting equipment and fire towers; power – generators, electricity, solar, water flow measuring devises, weather instruments, communication equipments, etc. The status of infrastructure are at different conditions and require maintenance through one-time and regular rehabilitation. Some cases require new establishments.

There will be need to house the Foresters, Forest Rangers and core forest staff in Forest Stations.

4.9.2 Management challenges

- (a) Poor roads and bridges maintenance
- (b) Lack of maintenance of residential and non residential buildings
- (c) Inadequate residential and non residential buildings
- (d) Inadequate communication equipment
- (e) Inadequate transport and road maintenance plants and equipments
- (f) Lack of power supply to Forest Stations
- (g) Inadequate resources to facilitate erection of game barriers
- (h) Inadequate fire surveillance and control facilities
- (i) Inadequate ICT infrastructure

4.9.3 Management Objective

- (a) To develop, improve and maintain physical infrastructure
- (b) Procure and maintain equipments and ICT infrastructure

4.9.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives.

Table 12: summary of management actions required to implement infrastructure and equipment programme

Management Objective	unit	10 targets	yr	Means verification	of	budget	Time frame (yrs)									
							1	2	3	4	5	6	7	8	9	10
<i>To develop, improve and maintain physical infrastructure</i>																
Rehabilitate staff houses	No	169		Reports		45M	34	34	34	34	33					
New staff houses	No	120		Certificate		180M	24	24	24	24	24					
New Forest Rangers' Posts	Units	40		Certificate		48M	10	10	10	10						
Rehabilitate Forest Ranger Houses	Units	100		Report		10M	20	20	20	20	20					
Rehabilitate Offices	No	27		Reports		5.4M	6	6	5	5	5					
Construct and equip HOC office	No	1		Certificates		32M	2									
Construct car sheds	No	25		Certificates		2.8M	6	6	6	5	5					
Rehabilitate Stores	No	25		Certificates		8M	4	4								
Construct Armouries	No	25		Certificate		5.4M	10	10	7							
Rehabilitate water supply system	No	25		Report		22M	5	5	4	4	4					
Install ICT facilities	Offices	25		records		5.2M	12	10	10	10	10					
Rehabilitate Fire tower	No	5		Reports		1.0M	5									
Construct Fire towers	No	22		Reports		11M	5	5	4	4	4					
Connect Power supply	No	19		Records		2.2M	5	5	4	4	4					

Management Objective	unit	10 yr targets	Means verification	of budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Rehabilitate Tree Nurseries	No	19	Reports	19M	1	5	13							
Install Weather stations	No	19	Reports	2.2M		5	14							
Develop Nature trails	Km	19	Reports	0.5M		5	14							
Develop picnic/camping sites	No	19	Certificates	33M		5	14							
Establish arboreta	No	6	Reports	6M		3	3							
Maintain Nature trails	Km	19	Reports	0.5M	19	19	19	19	19	19	19	19	19	19
Construct Electric fence (Ref. Plantation programme)	Km	100	Reports											
Maintain Electric fence (Refer to fence programme)	Km	400	Reports											
Construct Air strip (Nyeri, Kamae)	No	2	Certificate	10 M			1				1			
Construct roads	Km	100	Certificate	100M			20	20	30	30				
Maintain Roads	Km	879	Records	87.9M	200	500	879	879	879	879	879	879	879	879
Maintain Bridges	No	57	Reports	6.6M	57	57	57	57	57	57	57	57	57	57
Maintain line culverts	Lines	200	Reports	2.2M	200	200	200	200	200	200	200	200	200	200
Construct Gates and Road Barriers	No	19	Certificates	35M			19							
Construct and refurbish Guest Houses	No	6	Certificate	6M		6								
Procure and maintain equipments and ICT infrastructure														
Vehicles (4x4)	No	30	Records	75M	5	7	8	10						

Management Objective	unit	10 yr targets	Means verification	of budget	Time frame (yrs)										
					1	2	3	4	5	6	7	8	9	10	
Lorries	No	4	Records	24M		1			1						
Tractors/Trailers	No	19	Records	61.6M		19									
Grader	No	2	Records	25M		2									
Grader Shovel	No	1	Records	12M		1									
Bulldozer	No	1	Records	12M		1									
Aircraft	No	1	Records	250M			1								
Firearms and Ammunition	No														
Motor cycles	No	75	Records	30M		25									
Communication equipment	Units	75	Records		13	14									
Fire fighting equipment	Sets	19	Records	10M	10	9									
Water bowser	No	4	Records	10M	1										

4.10 Human Resource Development Programme

4.10.1 Background

Kenya Forest Service manages Aberdare Forest Reserve through Central Highland Conservancy which has 6 Forest Zones and 19 Forest Stations. In addition, the areas adjacent to the Forest Reserve are managed by forest extension officers at District administrative level. The Kenya Forest Service staffing levels are low, mainly composed of the seconded field officers. The staffing levels were greatly affected by the Voluntary Early Retirement (VERS) in 1993 followed by Public Service Reform Programme (PSRP) which retrenched many productive staff. This has greatly affected field operations and policing.

To enhance policing and overall security within the forest areas additional forest rangers and community scouts will be needed while contract labour will be used for undertaking silvicultural operations.

4.10.2 Management challenges

- (a) Inadequate staff at all cadres
- (b) Inadequate technical skills
- (c) Lack of elaborate staff welfare programme

4.10.3 Programme Objective:

- (a) Improve staffing capacity
- (b) Develop and implement staff training programme
- (c) Improve staff welfare programme and facilities

4.10.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives.

Table 13: summary of management actions required to implement human resource development programme

Management Objective	unit	10 yr targets	Means of verification	budget	Time frame (yrs)									
					1	2	3	4	5	6	7	8	9	10
Improve staff capacity														
Conduct workload analysis	No	2	Reports		1					1				
Conduct training needs assessment	No	2	Report		1					1				
Technical Skills improvement courses for forest officers	No	37	Report		2	10	15							
IT training	No.	54	Report		5	20	19							
GIS/GPS training (2 separate) modules	No	54	Report			27	27							
PFM (Forest Rangers and Foresters)	No	250	Report											
Exchange tours	No.	10			1	1	1	1	1	1	1	1	1	1
Paramilitary refresher courses	No	10	Report			1				1				
Improve staff welfare														
Develop staff recreation facilities	No	25	report			10	10	6						
Undertake work environment survey	No.	2			1					1				
Implement recommendations of survey	ls	26	Report		x	x	x	x	x	x	x	x	x	x
Develop a staff improvement programme														
Conduct team building sessions	No	20	Report		2	2	2	2	2	2	2	2	2	2
Conduct end of year staff fora	No	10	Report		1	1	1	1	1	1	1	1	1	1

4.11 Research and Monitoring Programme

4.11.1 Background

Research provides information for planning, implementation and monitoring of programmes. It also fills gaps in knowledge that is required for sustainable management of natural resources. Research entails baseline data collection, development of new and improved technologies, and trend analysis. Monitoring is important for prioritization of activities and identification of new areas that need to be targeted. Research should not only focus on biotic and abiotic environment but should also consider resource users and their impacts and knowledge for the purpose of sustainable management of the FR. Baseline surveys on the socio-economic status of the communities adjacent to the reserves will provide information on the way they use the resources and their impacts on the biodiversity. These surveys will be used to determine the sustainable off-take levels and provide information necessary for monitoring impacts on the ecosystem while proposing mitigation measures.

4.11.2 Management challenges

- (a) Inadequate resources and personnel
- (b) Weak linkage between research institution and forest managers
- (c) Poor dissemination of research findings to potential users

4.11.3 Management objectives

- (a) Conduct study on threats of forest resource and control measures
- (b) Valuation of FR resource
- (c) Establish natural and plantation forest monitoring system
- (d) Improve forest products utilization
- (e) Undertake assessment of forest carbon pools
- (f) Generate and disseminate research Information

4.11.4 Management Actions

The table below provides the summary of management actions required to implement each of the management objectives

Table 14: summary of management actions required to implement

Management Objectives	unit	10 yr targets	Means verification	of budget	Time frame (yrs)																	
					1	2	3	4	5	6	7	8	9	10								
Conduct study on threats of forest resource and control measures																						
Research on fire control measures	No	1	Reports			x																
Disease and pest control	No	1	Report				x															
Management of invasive species	No	1	Report			x																
Undertake a study to establish baseline information of the FR conditions for monitoring purposes	No	1	Report			1																
Assessment of livestock carrying capacity	No	1	Report		x																	
Assessment of wildlife carrying capacity	No	1	Report			x																
Research on unpalatable species for plantation development and rehabilitation in areas prone to game and livestock damage	No	1	Report				x															
Valuation of ecosystem resource																						
Baseline study on forest resources and their ecology	No	2	Report			x								x								
Biodiversity assessment survey	No	2	Report				x							x								
Water quantity and quality analysis	No	1	Report			1																
Study to determine payment for environmental services	No	1	Report			1																
Develop forest plantation and natural forest monitoring indicators	No	1	Report		x																	
Socio-economic study on status of forest adjacent communities	No	2	Report				x							x								
Establish natural and plantation forest monitoring system																						
Establishment of PSPs, TPs, demonstration plots	No	90	Report			30	30	30														

Management Objectives	unit	10 yr targets	Means verification	of budget	Time frame (yrs)															
					1	2	3	4	5	6	7	8	9	10						
Study on catchment restoration	No	1	Report			1														
Plantation spp diversification study	No	1	Report					x												
Develop species growth and yield models for natural and plantation forests	No	10	Report				2	2	2	2	2									
Determine the site indices for various spp	No	10	Report				2	2	2	2	2									
Study on natural regeneration mgt	No	1	Report			x														
Improve forest products utilization																				
Study on efficiency of forest industries	No	2	Report					1												1
Research on integrated utilization	No	2	Report					1												1
Forest products value addition	No	2	Report					1												1
Development of training packages on efficient utilization	No	5	Report												1	1	1	1	1	1
Undertake assessment of forest carbon pools																				
Assessment of carbon stock	No	1	Report					1												
Establishment of carbon demo plots	No	5	Report				2	2	1											
Develop carbon assessment training packages	No	1	Report						1											
Generate and disseminate research Information																				
Develop publication and dissemination strategy																				

4.1 ABERDARE FENCE MANAGEMENT PROGRAMME

4.1.1 Background

The fencing of the Aberdare ecosystem started in 1951 with experimental fence being erected along the eastern boundary to address human wildlife conflict. This started with a two strand electric fence which surrounded the salient area. This was later improved by a seven strand electric fence which was completed in 1988. Since then Rhino Ark with other key stakeholder jointly embarked on fencing the Aberdare to control human wildlife conflict. The fence construction covering 400 Kms was done in eight phases and was completed 2009.

The Aberdare fence cuts across forest reserves that are vital to community in terms of resource sharing and utilization. There are fence gates that have been placed strategically to enable the community to access the forest resources. These fence gates have helped a lot but poor management and uncontrolled access to these areas poses a serious problem both to the community and management

Management challenges

- Inefficient source of power supply
- Weak community participation in maintenance
- Vandalism of wires, energizers and solar panels
- Degradation of vegetation along the fence line
- Inadequate resources to maintain the fence
- Inadequate access gates
- Management of fence gates
- Control of invasive species along the fence line
- Maintenance and reclamation of wildlife migration corridors
- Mainstreaming research on impact of fencing the ecosystem
- Lack of Environmental Audit
- Protection of plantations within the fence from game damage
- Accessibility of forest resources inside the fence for utilization by KFS and other stakeholders

Management objectives

- To ensure the fence is efficient and effective in preventing wildlife out of the forest reserve to reduce human wildlife conflict
- Effective protection and maintenance of the fence to ensure sustainability of its values and protective functions.
- Strengthen Participation of community and other stakeholders in protection and maintenance of the fence

- Resources mobilization for fence management, maintenance and benefit sharing
- Develop Infrastructure to provide adequate accessibility and protect forest plantations enclosed by fence

Table 14: Summary of management actions required to implement Aberdare fence management programme

Management Objectives	unit	10 yr targets	Means of verification	budget	Time frame (yrs)										
					1	2	3	4	5	6	7	8	9	10	
To ensure the fence is efficient and effective in preventing human/wildlife conflict and game damage to plantations															
Develop management and maintenance plan	No.	1	Report		1										
Operationalize Fence Policy Management Team	No.	1	Report		x	x	x	x	x	x	x	x	x	x	x
Support Technical Fence Management Teams (TFMT)	No.	1	Report		x	x	x	x	x	x	x	x	x	x	x
Support Fence Maintenance Teams (FMT)	No.	19	Report		x	x	x	x	x	x	x	x	x	x	x
Strengthen Participation of community and other stakeholders in protection and maintenance of the fences															
Develop strategy to enhance community participation in fence protection and maintenance	No.	1	Report		1										
Build community & other stakeholders capacity to maintain the fence	No.	19	Reports		x	x	x	x	x	x	x	x	x	x	x
Create awareness on fence protection & maintenance	No.	19	Reports		x	x	x	x	x	x	x	x	x	x	x
Implement community fence protection & maintenance strategy	No.	1	Report		x	x	x	x	x	x	x	x	x	x	x
Strengthen community scouts for fence protection and maintenance	No.	1s	Report		x	x	x	x	x	x	x	x	x	x	x
Conflict resolution mechanism	No.	19	Reports												
Resources mobilization for fence management, maintenance and benefit sharing															
Create fence management and maintenance fund	No.	1	Report		x										
Support community income generating activities	No.	19	Report		x	x	x	x	x	x	x	x	x	x	x
Develop Infrastructure to provide adequate accessibility and protect forest plantations enclosed by fence															
Undertake gate need analysis	No.	10	Report		1	1	1	1	1	1	1	1	1	1	1
Construct open and closed gate access as recommended by the analysis	1s		Report		x	x	x								
Ring fence plantation enclosed by the fence and require protection from game damage	Km	100	Report			x	x								

Chapter 6

5. PLAN IMPLEMENTATION

5.1 Costs of implementing the management plan

Substantial funds will be needed to finance this plan which has both recurrent and capital development expenditure. The main sources of finances will come from the consolidated fund. However, noting that KFS is a new institution, it is faced with a big financial challenge and this may necessitate seeking for funds from other sources to support major capital development.

The key sources of funds for financing implementation of the plan will include:-

- (a) **Government funds:** Funds appropriated by the Government to KFS for forestry development.
- (b) **KFS Internal funds:** Revenue generated from plantation forests; levies and royalties imposed on forestry related activities and services; funds generated from investments, PES; and Appropriation in Aid.
- (c) **External sources:** Funds from development partners and other agencies; and funds available at the international level for the sequestration of the Green House Gases, conservation of biological diversity, protection of water catchments and combating desertification.

5.2 Revenue Projections 2010-2019

The projected revenue from Aberdare Forest Reserve over the plan period is expected to be collected from diverse sources of goods and services. The main sources and the projected revenue within the Forest Reserve are as shown in the table below.

Table 153: Revenue Projection

Source	Unit	10 yr Target	Unit price	Projected revenue (millions)/yr										Total revenue
				1	2	3	4	5	6	7	8	9	10	
Timber	M ³ (millions)	1.9	2,800	532	532	600	600	600	600	600	600	750	750	750
Fuelwood	M ³ (millions)	1	1,200	72	72	72	72	72	80	80	80	80	80	80
Transmission poles	No ('000')	600	2,800	168	168	168	168	168	175	175	175	175	175	175
Other poles and posts	No (millions)	3	350	10.5	10.5	10.5	10.5	10.5	12	12	15	15	15	15
Bamboo	Ha	10000	xx	10	25	80	100	140	140	140	140	140	140	140
Tourist facilities	No	50	2,500,000	50	75	125	125	125	125	125	200	200	200	200
Camping fees	No	20,000	1500	30	30	30	30	30	40	40	40	40	40	40

NB: Projection of demand beyond the fifth year uncertain. Fuelwood demand may in fact decline due to discovery of other sources of energy. PES; Carbon trade and water values have not been factored in the revenue projections.

5.3 Environmental Impact Assessment

Planning of conservation and development activities within the ecosystem will follow a holistic approach. Environmental Impact Assessments will be carried out on planned development activities before they are undertaken. Environmental Impact Assessment will be designed to ensure that negative impacts are recognized and mitigated against.

5.4 Monitoring and Evaluation

Monitoring and evaluation (M&E) of the management plan is essential since it provides a basis for observation, adjustment and improvement of the targeted activities, proposed goals and assessment of the achievements. Monitoring and evaluation of this management plan will be based on annual work plans that will be prepared for each forest station.

To ensure that implementation of the management plan is on course, a monitoring and evaluation plan will be formulated and reviewed regularly during the plan period. A mid and end term evaluation will be carried out to assess progress in the implementation of planned activities and achievement of objectives. The evaluation report will also provide essential information that can be used in the revision of the management plan.

5.5 Plan Implementation Organization Structure

As shown below, implementation of the management plan will be done through a Management Committee. The Committee will provide a forum for dialogue, consensus building, priority setting and balancing of the various interests involved. The chairman of the committee will be the HOC Central Highlands Conservancy.

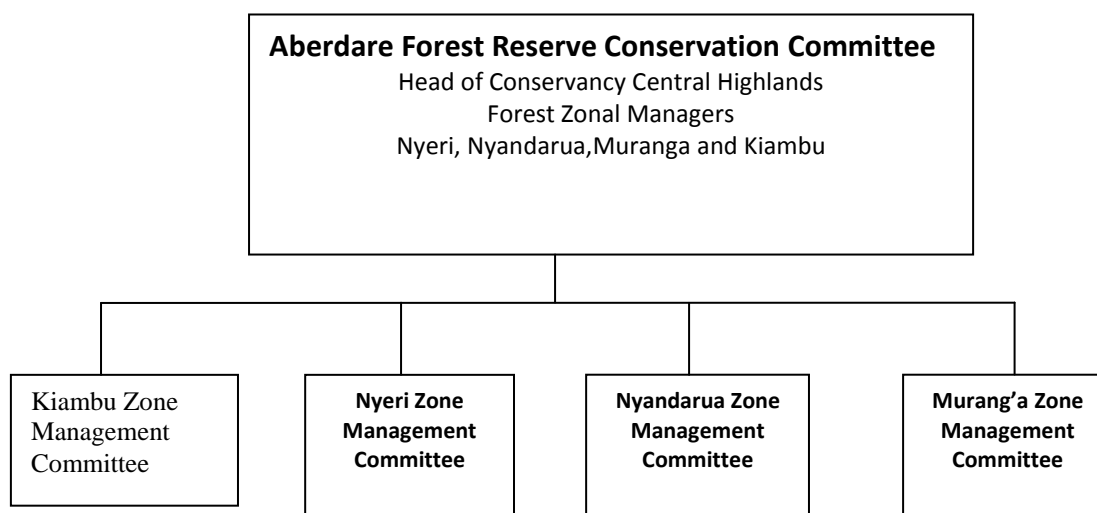


Figure 1: Plan Implementation Organization Structure

The AFCC will determine the membership of the Zonal management Committee depending on the prevailing activities. However these committees will be chaired by the Zonal Managers.

5.6 Guiding principles for the Implementation of the Plan

Planning, implementation, monitoring and evaluation, the plan will be guided by the following principles throughout the plan period: -

- (a) **Gender equity:** Gender considerations shall be integrated at all levels of plan implementation. Equitable representation of women in meetings and decision-making processes will be sought to enhance the role played by them in the conservation of the Aberdare Forest Reserve. Gender balance will be established where possible and all groups (youth, elderly, disadvantaged) will be considered in the various sub-committees and in field activities. Awareness creation among the men will be enhanced to highlight the importance and value of involving all interest groups in conservation and other activities.
- (b) **Transparency:** This will be maintained in all decision-making processes to ensure that key stakeholders are kept informed on the on-going activities and of future envisaged plans. This approach is essential towards developing, maintaining and improving rapport between the institutions/organizations that will be involved in the implementation of the management plan.

5.7 Community participation in plan implementation

Local Forest adjacent communities (FAC) will participate in the plan implementation through CFAs.

Appendixes

Appendix 1: Ecotourism Sites within Aberdares Forest Reserve

No	Site	District	Station	Facility to be developed
1	Uaso Narok River	Laikipia	South Marmanet.	Eco-Lodge
2	Oreteti	Laikipia	Mukogodo.	Eco-lodge.
3	Pesi River Site	Nyandarua	Ndaragua.	Camp site
4	Karima Falls and Caves Site	Nyandarua	Ndaragua.	Eco-Lodge
5	Northern Aberdares Wilderness Retreat	Nyandarua	Ndaragua.	Eco-Lodge
6	Sasumua Dam	Nyandarua	South Kinangop/Ragia.	Eco-lodge
7	Kikuyu Escarpment Forest	Kiambu	Uplands.	Eco-Lodge
8	Thaba Falls / Gatamaiyu River site	Kiambu	Kereita	Eco-Lodge
9	Mataara	Thika	Kieni	Eco-Lodge
10	The Old Kimakia Forest Station	Thika	Kimakia	Eco-Lodge
11	Old Gatare Station	Muranga South	Gatare	Eco-Lodge
12	Karurome Site	Muranga North	Wanjerere	Eco-Lodge
13	Dunlop – Kwa Joni Camp Tuthu	Muranga North	Wanjerere	Eco-Lodge
14	Kiambicho	Muranga North	Kiambicho	Tented lodge
15	Kigumo-Gura River site	Nyeri	Kiandongoro	Eco-Lodge
16	Tusha/Kagumo site	Nyeri	Kiandongoro	Eco-Lodge
17	Kathoriani Site	Nyeri	Zaina	Eco-Lodge
18	Kabiruini Site	Nyeri	Muringato	Tented Camp
19	Tanyai Caves	Nyeri	South Laikipia Forest Block(Muringato)	Tented Camp
20	Tango River Falls	Nyeri	Zuti	Eco-Lodge
21	The South Marmanet - DFO'S House	Laikipia	South Marmanet	Guest House
22	Ndaragwa Forest Station - The Forester's House	Nyandarua	Ndaragua	Guest House
23	Geta-Forester's House	Nyandarua	Geta	Guest House
24	North Kinangop-Forester's House-	Nyandarua	North Kinangop	Guest House

25	South Kinangop -Forester's House	Nyandarua	South Kinangop	Guest House
26	Uplands- Forester's House	Kiambu	Uplands	Guest House
27	Kieni Forest station	Thika	Kieni	Guest House
28	Muringato Former DFO's House	Nyeri	Muringato	Guest House
29	South Marmanet former DFO's House	Laikipia	South Marmanet	Guest House
30	Kipipiri nature trail	Nyandarua	Geta	Nature trail and view point
31	Satima mountain hiking	Nyandarua	Geta	Nature and mountain hiking

Geomorphologic sites	Historical and cultural sites	Sporting sites	Camping Sites	Other interest activities
Uaso Narok River Pesi River Site Karima Falls and Caves Site Kikuyu Escarpment Forest Thaba Falls / Gatamaiyu River site Tanyai Caves Tango River Falls The South Marrmanet - DFO'S House		Kigomo-Gura River site	Northern Aberdares Wilderness Retreat The Old Kimakia Forest Station Old Gatare Station Karurome Site Dunlop - Kwa Joni Camp Tuthu Kiambicho Kathoriani Site Kabiruini Site	Sasumua Dam Mataara Tusha/Kagumo site Ndaragwa Forest Station - The Forester's House Geta-Forester's House North Kinangop-Forester's House- South Kinangop - Forester's House Uplands- Forester's House Kieni Forest station Muringato Former DFO's House South Marmanet former DFO's House

5 Appendix 2: Role of stakeholders in plan implementation

STAKEHOLDER	ROLES AND RESPONSIBILITIES
Kenya Forest Service (KFS)	<ul style="list-style-type: none"> • Management of forests in Mt. Kenya ecosystem and adjacent farmlands. • Revenue collection from sale of forest produce • Licensing and regulation of exploitation of forest products • Farm Forestry promotion through forestry extension services • Clear felled areas re-forestation and rehabilitation of degraded areas • Maintenance of plantation forests • Collaboration with stake holders on ecosystem management • Forest fires prevention and suppression • Liaison with other stakeholders on security and ecosystem management issues
Kenya Wildlife Service (KWS)	<ul style="list-style-type: none"> • Conservation and preservation of fauna in the FR • Human/ wildlife conflict management to reduce threats to human life and property through Problem Animal Control and construction of animal barriers • Liaison with other stakeholders on security and ecosystem management issues • Custodian of CITES / wetland convention
Kenya Forestry Research Institute (KEFRI)	Undertake research issues on trees, and their documentation
Ministry of Agriculture and Rural Development	<ul style="list-style-type: none"> • Implementation of soil and water conservation, agro-forestry and other sustainable agriculture programmes • Advice on improved and appropriate varieties of food and livestock. • Provide technical advice on food production under PELIS
Water Department	<ul style="list-style-type: none"> • Development, control, apportion, conserve and regulation of water resources • Assessment and Monitoring of water resources (quality and levels) • Empowerment of communities in the management of water resources through dissemination of new water policies • Planning, surveying and designing of new water schemes
National Museums of Kenya (NMK)	<ul style="list-style-type: none"> • conservation education programmes preparation and presentation through films, video shows and documentaries • education on cultural practices of the people inhabiting Mt. Kenya ecosystem • research on the past use of cultural sites within Mt. Kenya ecosystem • Taxonomy: herbarium

STAKEHOLDER	ROLES AND RESPONSIBILITIES
National Environmental Management Authority	<ul style="list-style-type: none"> • Environmental management and coordination
Water Resource Management Authority (Tana and Ewaso-nyiro North)	Conserve, manage and develop water resources
Forest Adjacent Communities (FAC)	<ul style="list-style-type: none"> • Participatory forest management • Establish income generating activities (IGA)/projects • Protection of forest reserves through collaborative security patrols. • Indigenous conservation technologies/ knowledge dissemination to the present generation
Wood-based Industries	<ul style="list-style-type: none"> • Sustainable exploitation of forest resources • Support forest conservation programmes and t protection
Tourism Stakeholders	<ul style="list-style-type: none"> • Market and advocate the conservation of the ecosystem • Ecotourism promotion and education of communities on the benefits accruing from ecosystem conservation • Employment opportunities creation to the communities as tour guides and porters • Tourism facilities establishment like hotels and campsites
Provincial Administration and local leaders	<ul style="list-style-type: none"> • Maintain law and order • Disseminate government policies
Kenya Roads Board	<ul style="list-style-type: none"> • Funding for construction and maintenance of classified roads
SAGAs and private sector	<ul style="list-style-type: none"> • Management of Water resource for domestic and industrial use • Wood energy utilization • Management of Tea Belt
NGOs	<ul style="list-style-type: none"> • Advocacy • Community capacity building • Resource mobilization for conservation
Local Authorities (county councils and municipalities)	<ul style="list-style-type: none"> • Resource users
Meteorological department	Essential climatic data
Development partners/donors	<ul style="list-style-type: none"> • Funding conservation projects • Technical support
Education institution	<ul style="list-style-type: none"> • Research • Education
Ministry of Lands	Legal framework, policy on land use
Ministry of Water and Irrigation	Resource user and policy formulation
Irrigation and drainage	Resource users

STAKEHOLDER	ROLES AND RESPONSIBILITIES
department.	
Ministry of energy	Resource users and service provider

Appendix 2: List of some major water sources within the Aberdare ecosystem

District	Scheme	Division	water source	Status	Size (gros) (Ha)	System type	Irrigated area(Ha)	No of house holds
NYERI	Lamuria	Kieni W	Ewaso nyiro	Operational	220	Gravity	60	250
	Ihwa	Tetu	chania	proposed				
	Zukazuka	Kieni west	Thuka thuka	proposed				
	Sub labura	Kieni W	Honi					
	Kamoko	Tetu	Mumwe	proposed	36.4	Gravity	0	182
	Langaka	kieni W	Ewaso nyiro	proposed	10	Gravity	0	25
	GITHIRU	Municipality	chania	proposed				
THIKA	Ndururumo	Ruiru	Ruiru river	Operational	20	Pump fed	10	30
	Kwihota	Ruiru	Ruiru river	Operational	25	Pump fed	15	33
	Kaibere	Kamwangi	Ndarugo	Partially operational	40	Pump fed	6	38
	Gathaite	Kamwangi	Ndarugo	Partially operational	20	Pump fed	15	130
	Komo	Thika	Ndarugo	proposed	64	Gravity	0	80
MARAGUA	Rurigi	Kandara	Ruchu	Operational	15	sprinkler	15	70
	Kianguni	Kandara	Ruchu	Operational	21.1	sprinkler	21.1	106
	Kieni gathugu	Kandara	Ruchu	Non operational	33	Drip/ sprinkler	0	120
	Boboti/ Kiamande	Kandara	Ruchu	Non operational	30	Drip/ sprinkler	0	
	Karathe	Makuyu	Thaara	Partially operational	40	furrow/ sprinkler	10	200
	Punda milia	Makuyu	Mutoho	Operational	15.2	Furrow	15.2	152
	Marura	Makuyu	Mutoho	Non operational	15.2	Furrow	0	152
	Ititu ikundu	Maragua	Maragua	Non operational	60	Drip/ sprinkler	0	200

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