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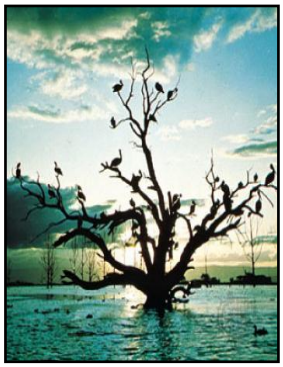

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Lake Naivasha Basin Integrated Management Plan

2012-2022

KENYA WILDLIFE SERVICE

WWF

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FOREWORD

The Lake Naivasha Integrated Management Plan (LNIMP) represents the culmination of tireless work and effort by various Government Institutions, national and international NGOs/Organizations, Local Civil Society Organizations, Private sector organizations , Research Organizations, other interested parties and Naivasha Community residents with common interests in the preservation and development of the Naivasha Lake Basin who have participated in a range of events and forums and in the process provided valuable comments throughout the process leading to this Plan. All contributions from the stakeholders are highly acknowledged.

The Lake Naivasha basin is a complex entity with diverse stakeholder interests. An integrated management plan for the Lake Basin brings together all resource user groups in the development and management of resources, to maximize the resultant economic, social and environmental welfare. This plan proposes the development of joint efforts in promotion of environmental conservation, sustainable development and improved livelihoods for stakeholders in Lake Naivasha Basin. The plan further identifies management zones and proposes management interventions and actions specific to each zone

This plan offers an integrated, equitable and coordinated approach to resource management within the Lake Basin. The objective of the Integrated Management Plan is to serve primarily as a guideline for integrated and proactive ecosystem-based approach to the planning, management and monitoring of developments within the basin; seeking equitable, efficient and environmentally sound solutions for the benefit of the entire community within the basin.

APPROVAL PAGE

ACKNOWLEDGEMENT

ABBREVIATIONS AND ACRONYMS

4K	KUUNGANA – to unite KUFANYA – to do KUSAIDIA – to help KENYA
AEWA	Africa Eurasian Water Bird Agreement
AFC	Agricultural Finance Cooperation
BMU	Beach Management Unit
CAAC	Catchment Area Advisory Committees
CBD	Convention on Biological Diversity
CBOs	Community Based Organizations
CDN	Catholic Diocese of Nakuru
CEPAD	Centre for Pastoralist Development
CFAs	Community Forest Associations
CMS	Convention of Migratory Species of Wild Animals
COLANGO	
CSOs	Civil Society Organizations
DDC	District Development Committee
DECs	District Environment Committees
DRSRS	Department of Resource Surveys and Remote Sensing
EAC	East African Community
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
FD	Fisheries Development
FoKP	Friends of Kinangop Plateau
GBM	Greenbelt Movement
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoK	Government of Kenya
ha	hectares
HCDA	Horticultural Crops Development Authority
HWC	Human Wildlife Conflict
IBA	Important Bird Area
IBECA	Indigenous Biodiversity Environmental Conservation Association
ICRAF	World Agroforestry Centre
IDRC	International development for Research Cooperation (Canada)
IGAD	Intergovernmental Authority on Development
IGAs	Income Generating Activities
IMP	Integrated Management Plan

IPPs	Independent Geothermal Power Producers
IUCN	International Union for Conservation of Nature
KARI	Kenya Agricultural Research Institute
KATO	Kenya Association of Tour Operators
KCC	Kenya Creameries Cooperative
KEBS	Kenya Bureau of Standards
KEDRI	Kenya Dairy Research Institute
KEFRI	Kenya Forestry Research Institute
KEMFRI	Kenya Marine Fisheries Research Institute
KENGEN	Kenya's Electricity Generation Company of Kenya.
KEPHIS	Kenya Plant Health Inspectorate Service
KFS	Kenya Forest Service
KGDC	Kenya Geothermal Development Company
KMC	Kenya Meat Commission
Kshs	Kenya Shillings
KTB	Kenya Tourism Board
KWS	Kenya Wildlife Service
KWSTI	Kenya Wildlife Service Training Institute (Naivasha)
LN	Lake Naivasha
LNCDF	Lake Naivasha Conservation and Development Forum
LNGG	Lake Naivasha Growers Group
LNIMP	Lake Naivasha Integrated Management Plan
LNMIC	Lake Naivasha Management Implementation Committee
LNRA	Lake Naivasha Riparian Association
LNTG	Lake Naivasha Tourism Group
M&E	Monitoring and Evaluation
M.C.N	Municipal Council of Naivasha
masl	Metres above sea level
MEAs	Multilateral Environmental Agreements
mg/l	Milligram/litre
MoA	Ministry of Agriculture
MoCD	Ministry of Cooperative Development
MoE	Ministry of Education
MoEMR	Ministry of Environment and Natural Resources
MoF&W	Ministry of Fisheries and Wildlife
MoGCSD	Ministry of Gender, Children and Social Development
MoH	Ministry of Health
MoL	Ministry of Labour

MoL&S	Ministry of Lands and Settlement
MoLD	Ministry of Livestock Development
MoPH&S	Ministry of Public Health and Sanitation
MoPW	Ministry of Public Works
MoR	Ministry of Roads
MoT	Ministry of Tourism
MoT&I	Ministry of Trade and Industry
MOW&I	Ministry of Water and Irrigation
MoY&G	Ministry of Youth and Gender
MW	Mega watts
NAIVAWASS	Naivasha Water and Sanitation Company
NAPNET	Nature and People Network
NAWACOMP	Naivasha Watershed Conservation and Management Programme
NCPB	National Cereals and Produce Board
NEMA	National environment Management Authority
NGOs	Non-Governmental Organizations
NMK	National Museum of Kenya
NO3-N	Nitrates
NRM	Natural Resource Management
NWC	Nakuru Wildlife Conservancy
PA	Provincial Administration
PAC	Problem Animal Control
PACD	Plan of Action to Combat Desertification
PCPB	Pest Control Products Board
PES	Payment for Ecosystem Services
Ramsar	Convention on Wetlands of International Importance
RECONCILE	Resource Conflict Institute
REDD & REDD+	Reduction of Emissions, Deforestation & Desertification
SACCOs	Savings And Credit Co-operative
SCMP	Sub-Catchment Management Plans
SHDI	Self Help Developmental International
SHGs	Self Help Groups
SME	Small Medium Enterprises
SNV	Stichting Nederlandse Vrijwilligers (Netherlands Development Organization
ssp	Species
UNCOD	United Nations Conference on Desertification
UNEP	United Nation Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change

USA	United States of America
WAP	Water Allocation Plan
WRB	Water Regulatory Board
WRMA	Water Resources Management Authority
WRUAs	Water Resource Users Associations
WSBs	Water Services Boards
WSUP	Water and Sanitation for the Urban Poor
WWF	World Wide Fund for Nature

Chapter

1

INTRODUCTION AND BACKGROUND TO LAKE NAIVASHA BASIN AND THE PLAN

Introduction

The Lake Naivasha basin area is approximately 3,400 km^2 lying in the Eastern Rift or Gregory Rift, and extending into the Mau Escarpment (3048masl) to the west and the Nyandarua or the Aberdare Ranges (4000masl) to the east,. the Eburru hills (2800masl) to the northeast of the Mau Escarpment and forms a surface water divide between the Lake Naivasha and Lake Elementaita basins. Lake Naivasha itself is an endorheic shallow freshwater lake with a water surface elevation of approximately 1890masl. It is situated in the Eastern Rift Valley of Kenya, approximately 90km northwest of Nairobi. Lake Naivasha is one of a series of seven major lakes in the Eastern Rift Valley of Kenya. Listed from north to south, these lakes are Turkana, Baringo, Bogoria, Nakuru, Elementaita, Naivasha and Magadi (Figure 1.1). The Naivasha basin is administratively located in eight districts (Naivasha, Narok North, Gilgil, Mirangini, Kipipiri and Kinangop, Nyandarua Central, Nyandarua South) in the Rift Valley and Central provinces (Fig. 1.2).

The Lake Basin has immense socio-economic and conservational benefits which support over five hundred thousand people. Within this basin is the internationally renowned Lake Naivasha, a Ramsar site. The basin is however under serious threat from a wide range of rapidly intensifying pressures which include; increasing reduction of lake levels, deterioration of lake and river water quality, deforestation in the basin, increased soil erosion and siltation of rivers, increased lake sedimentation, fish mortality and decreasing fish yields, encroachment and transformation of the lakeshore riparian zone, encroachment and transformation of the riverine buffer zones in the catchment areas,

increasing population and unplanned human settlements, poor waste management in the urban environment, inaccessibility to the lake by pastoralists, fishermen and general public and lake infestation by invasive species. Many conflicting demands placed on the basin's natural resources, and increasing human population, economic demands and urbanization has also resulted in increased water abstraction in the Lake Basin and environmental degradation.

Much of the development and operations in Lake Naivasha basin are uncoordinated, resulting in an inequitable resources distribution in the catchment and environmental degradation. There is therefore a need for an integrated, equitable and coordinated approach to resource management within the basin. The objective of the Integrated Management Plan is to serve primarily as a guideline for integrated and proactive ecosystem-based approach to the planning, management and monitoring of developments within the basin; seeking equitable, efficient and environmentally sound solutions for the benefit of the entire community within the basin.

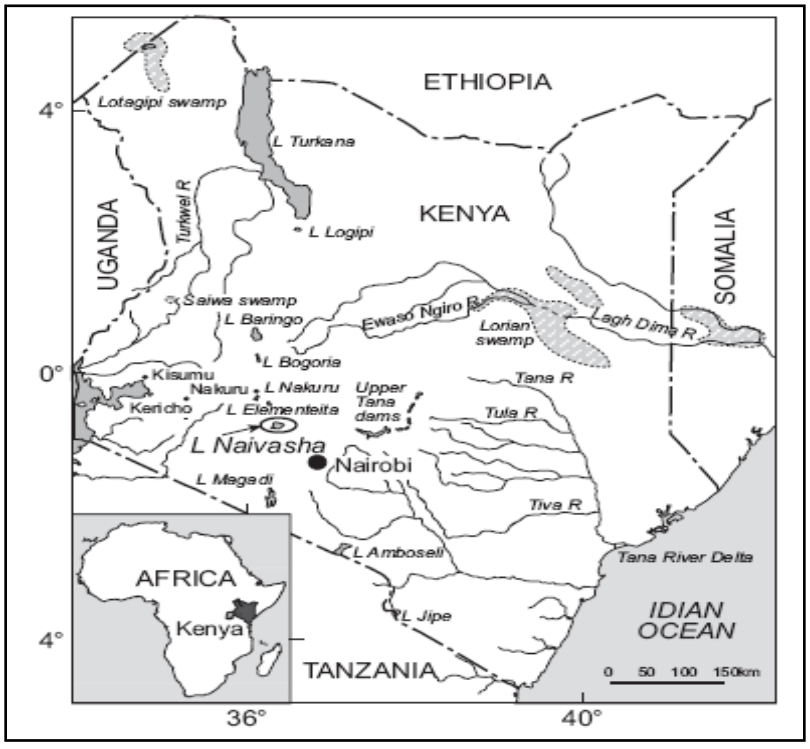


Figure 1.1: Position of Lake Naivasha in relation to other wetland lakes in Kenya (Modified from Otianga-Owiti & Osewe, 2006)

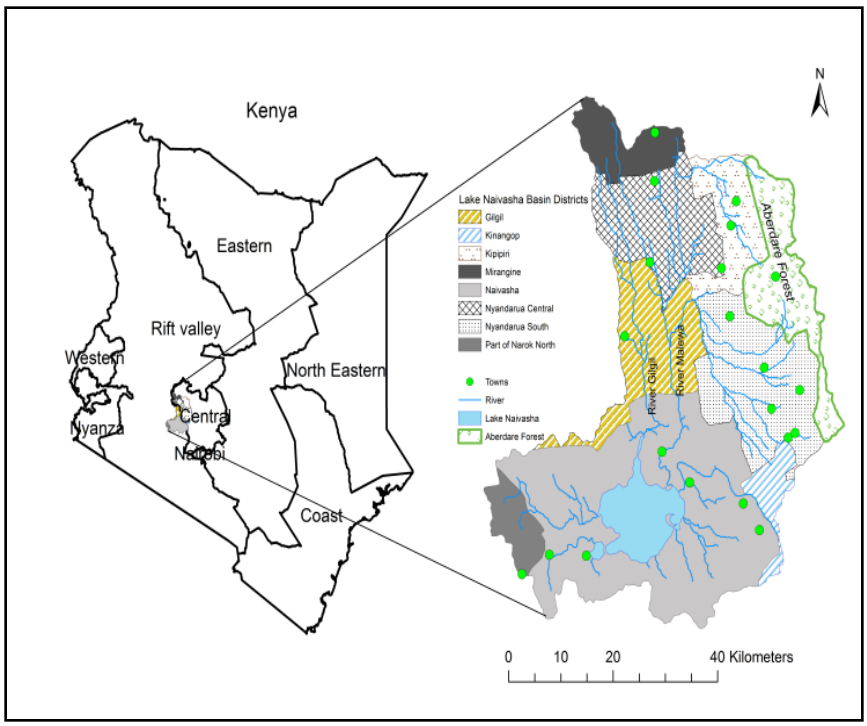


Figure 1.2: Administrative location of the Naivasha Basin is in Kenya

Scope of the Plan

The geographical scope of the Integrated Management Plan considers the entire basin which includes the Lake, lower, middle and upper catchment. The lower is mainly the Rift Valley less than 2000masl, the middle is between 2000masl to 2400mask and covers the Kinanagop and Moi-Ndabi areas and the upper catchment is above 2400masl, extending to the slopes of Aberdares and beyond.

Plan Rationale

Management planning is a process of arriving at goals and objectives for managing a given resource in a defined area. Since Lake Naivasha basin is a complex entity with diverse stakeholder interests, an integrated management plan would bring together all resource user groups in the development and management of resources, to maximize the resultant economic, social and environmental welfare. This plan proposes the development of joint efforts in promotion of environmental conservation, sustainable development and improved livelihoods for stakeholders in Lake Naivasha Basin. The plan further identifies management zones and proposes management interventions and actions specific to each zone. The IMP seeks to:

i). Enhance quality and quantity of water resources within the basin
ii). Enhance ecosystem services and promote financial incentives mechanisms to communities
iii). Ensure equitable access and sustainable utilization of basin resources
iv). Improve and secure livelihoods for local communities including disadvantaged groups
v). Promote participatory resource use and management

Structure of the Plan

This Management Plan is structured into eight parts:

i). Chapter One: Introduction and Background to Lake Naivasha Basin, and the plan.
ii). Chapter Two: Description of the Lake Naivasha Basin and an inventory of the resources and resources values.
iii). Chapter Three: Guiding principles, goals, objectives and strategies
iv). Chapter Four: Policy and legal framework
v). Chapter Five: Stakeholders analysis and involvement
vi). Chapter Six: Zonation
vii). Chapter Seven: Management options implementation strategy, institutional framework,
viii). Chapter Eight: Plan implementation, monitoring and evaluation

Plan Development Process

The preparation of the Lake Naivasha Integrated Management Plan was undertaken through an open and transparent process according to the following roadmap:

1) Situational analysis through an intensive review of relevant documents,
2) Fact finding and views gathering from stakeholder,
3) Stakeholder analysis, covering the entire basin,
4) Multi stakeholder consultative workshops,
5) Synthesis of information gathered,
6) Drafting of the Management plan,
7) Participatory validation and adoption of management plan.

International and National Obligations

Kenya is signatory to various International natural resource-based conventions and treaties, some of which have been domesticated to form national legislation and policies. These provide for the legal and institutional framework for conservation and management of natural resources in the country, upon which this IMP is anchored.

Chapter

2

DESCRIPTION OF THE LAKE NAIVASHA BASIN AND AN INVENTORY OF THE RESOURCES AND RESOURCES VALUES.

Physiography

The physiography of the Naivasha basin is characterized by steep slopes in the Aberdare Ranges and Mau Escarpment and gently undulating land in the Kinangop plateau. The land drops through a series of smaller escarpment to the flat topography of the lacustrine profile around the lake. The regional physiography comprises four topographic zones, namely,

(a) the lacustrine beds,
(b) the Rift Valley floor,
(c) Rift Plateaus, and
(d) Rift Escarpments (Figure 2.1).

The lacustrine beds are dominated by ancient lake sediments deposited from older and much bigger Pleistocene lakes. The zone is prominent in the Mirera-Karagita area to the east of the lake and extends to the north as far as the Ilkek Plain towards Gilgil where the bed is 20 km across, thinning to less than 5 km just south of Gilgil. The western lacustrine margin is bordered by the volcanic hill masses of Kongoni and Maiella-Ndabibi Plain. The eastern lacustrine margin is bordered by the railway line especially, near Naivasha Town opposite the Kihoto area and elsewhere by the Kinangop fault scarp (Figure 2.2). The rift floor extends southwards towards Mount Longonot (2750 masl) south westwards towards the Olkaria hills complex (2400 masl) which are traversed by the Ol Njorowa Gorge (1920 masl). The northern margin of the rift floor is

interrupted by the Eburru Hills (2400m) which are part of the Mau Escarpment. The Eburru hills form the drainage divide between the lake and the Lake Elementaita basin.

The plateaus and plains consist of gently undulating terrain of less than 8% slope and are exemplified by such as the Akira Plains to the south of the lake, Ndabibi Plains to the west and Kinangop Plateau to the east (Figure 2.1). The rift escarpments comprise the highest landforms in the basin with steep foot slopes of up to 30-40% especially in the Aberdares (Nyandarua) Ranges (3600m) to the east and the Mau Escarpment (3000m) to the west. The two landforms are the principal key water towers for Lake Naivasha.

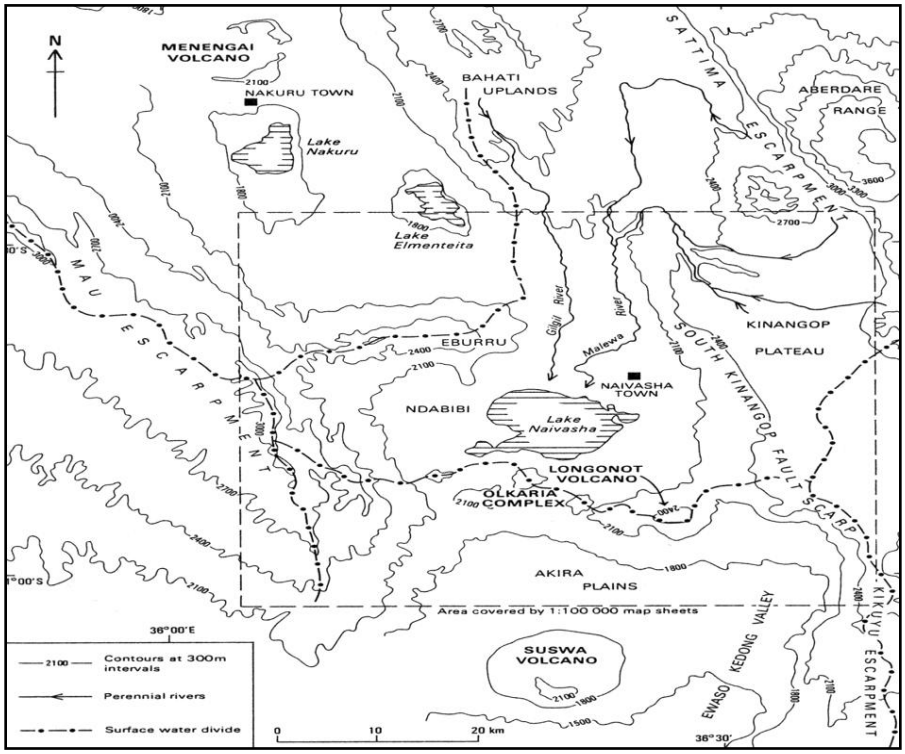


Figure 2.1: Physiographic profile of the Naivasha basin (Clark et al. 1990)

Climate

Lake Naivasha basin is mostly dominated by a semi–arid environment in the lower catchment and has only a narrow semi-humid zone in the upper catchment. The rainfall is bimodal and is distributed between two rainy seasons in April–June (long rains) and October –November (short rains) (Figure 2.2). The rainfall is of considerable variation, with between 1000 and 1500 mm/year in the upper catchment especially the

Aberdare Ranges and less than 800mm/year in the Rift Valley floor. The average rainfall immediately around Lake Naivasha is about 600mm.

The Mean annual temperature in the basin varies with altitude ranging from25°C on the shores of the lake to 16°C in the Aberdare mountains, with daily temperatures ranging from 5°C to 25°C.

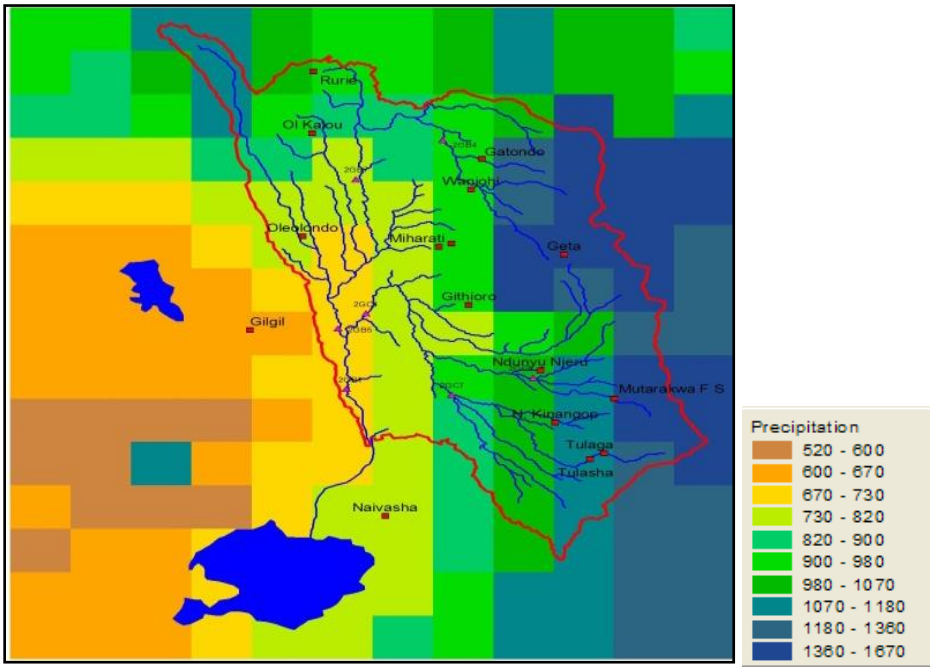


Figure 2.2: Rainfall distribution map for the Naivasha Basin (WWF/CARE, 2007)

Geology

The geology of the Naivasha basin is configured according to the topographic zones as shown in Figure 2.3. The Kinangop-Ol Kalou plateau is underlain by soft pyroclastic rocks, which according to Thompson (1962) is probably of Kamasian age (lower Middle Pleistocene). The most common pyroclastic rocks are soft, light coloured tuffs, which occasionally form very thick deposits. Powdery light grey pumiceous ash is common over much of the southern plateau where it was deposited in the Post-Kanjeran times during the Holocene. The chemical analyses of rocks in the Kinangop area have shown high level oxides he following metals; Silicon, Aluminium, Iron, Calcium and Magnesium (Thompson, 1962). The geology around the Ol Bollossat area to the North of Kinangop is characterized by pyroclastic rocks and sediments, which are underlain by Miocene basalt (Thompson & Dodson 1958). The Moi Ndabi-Maiella and Eburru

region which is part of the Mau escarpment is composed of rocks with largely soft volcanic ashes and tuffs which are highly vulnerable to erosion due to their extremely soft nature. This area is associated with the most recent volcanicity in the region. The Eburru area has the highest concentration of surface geothermal activity.

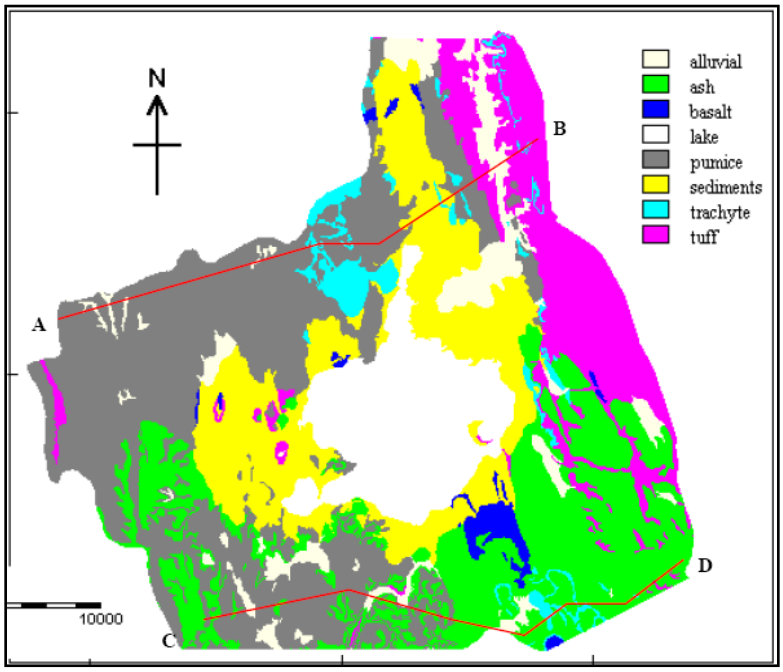


Figure 2.3: A geological map of the Naivasha region (Thompson, 1962)

Within the rift floor, the rocks vary from under saturated tephrites to highly acidic and sodic rhyorites. According to Thompson and Dodson (1958), strongly alkaline lavas including olivine basalt, quartz and kataphorite characterize about 10% of the rift floor. Several places in the rift floor are characterized by lacustrine diatomaceous earth, which is believed to have formed from ancient deposits of much larger lakes, which occupied the rift valley during the Pleistocene. Pumice deposits are also common within the rift floor especially in areas within the vicinity of Mount Longonot.

Soils

The soils in the basin are configured by the geo-pedologic and landscape profile. The rift floor is characterized by lacustrine sediments that accumulated during the ancient Gamblian lakes in the Pleistocene period. These soils are mainly composed of reworked volcanic ash and pyroclastic deposits. They are deep loams of greyish to brown colour which are either slightly saline or sodic and non-calcareous. At the edge of the lake the

soil is less alkaline and more liable to cracking during the dry season and characterized by high levels of exchangeable Sodium and Potassium ions. The Kinangop Plateau is characterized by an assortment of Humic Planosols, Vertisols, Andosols and Phaeozems while steeper areas towards Ol Kalou are dominated by Lithic Leptosols with Nitosols and Luvisols in a few pockets. Hills and minor scarps are dominated by Cambisols while soils in the Eburru area are mainly Andosols, derived from pyroclastic parent material.

Hydrology and Drainage

The lake receives up to 90% surface inflow from various sub-catchments; the Malewa (1730 km^2), Gilgil (527 km^2) and Karati (149 km^2) (Ase et al., 1986), rivers, which originate from the Kinangop-Turasha-Kipipiri area on the leeward side of the Aberdares and the Ol Kalou-Upper Gilgil region respectively. Additional recharge is provided by several ephemeral rivers, with a total catchment size of 1000 km^2, such as Nyamamithi and Marmanet as well as substantial underground seepage from the previously almost permanently waterlogged, meadow and bog environments in the Kinangop plateau which have nowadays been heavily desiccated by the widespread introduction of eucalyptus trees. Figures 1.6 shows the key rivers and drainage zones of Lake Naivasha Basin.

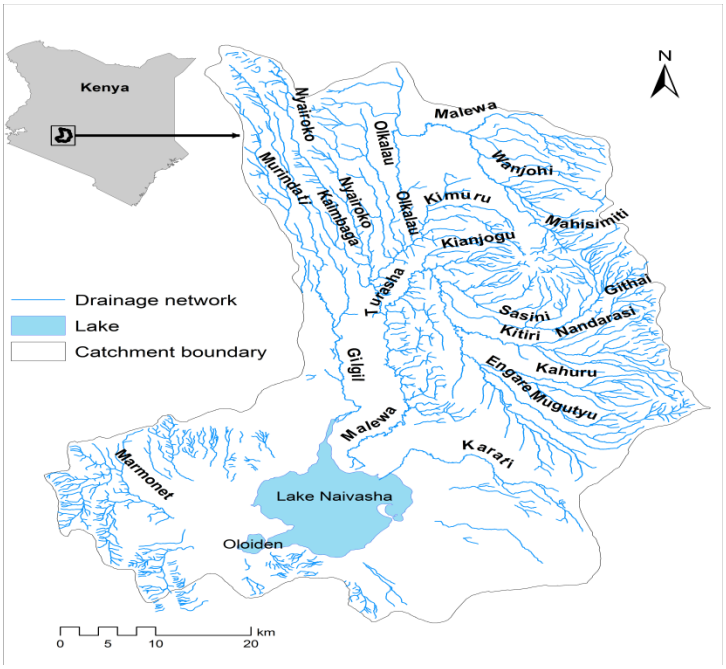


Figure 1.6: Major inflows of Lake Naivasha and catchment boundary

The Malewa River

Malewa River which is the principal inflow into the lake arises on the western slopes of the Nyandarua (Aberdares) Ranges and flows for over 100km with a maximum height drop of 1921m. It is the largest river in the basin and forms from four main tributaries namely, Mkungi-Kitiri, Kinja, Wanjohi and Turasha, all which flow from the North-South. The Malewa and Turasha Rivers have a combined drainage area of about 1,730 km^2. The tributaries of the Turasha River, namely Mkungi and Kitiri deeply incise the Kinangop plateau flowing in a westerly direction and eventually joining the Malewa River. The headwaters of the Malewa River which originate from the high altitude zones of the Nyandarua (Aberdares) Ranges constitute the upper catchment.

The middle catchment consists of several small rivers in the Wanjohi and Lake Ol Bolossat region which lie at an altitude of 2400masl. The middle catchment also contains most of the Turasha sub-catchment with some of the water from the Turasha River being abstracted through the Konoike Dam to supply water to Gilgil and Nakuru towns through the gravity associated with a sharp descent from the middle catchment to the lower catchment. Malewa serves an important ecohydrological function all along its course. However, the river has many environmental challenges including reduced river flow, variable water levels, loss of riparian habitat and associated biodiversity and soil erosion which eventually results in increased sedimentation of Lake Naivasha.

The Gilgil River

The Gilgil River originate from the Ol Kalou Highlands (2740 masl) and flows for about 60 km. The river flows in a narrow basin and southerly direction eventually draining about 420 km^2. It is fed by three headwaters streams, namely, Murindati, Kiriundu and the Little Gilgil whose sub catchments lie at an altitude of between 2400masl and 2700 masl.

Other Rivers

Lake Naivasha is also supplied by several ephemeral streams including Karati, Nyamamithi and Marmanet. Karati River flows from the north in the Kinangop plateau at an altitude of 2620 masl. The Nyamamithi River is relatively shorter and steeper with a source in South Kinangop near the Magumu area. None of the numerous streams that originate from the Eburru hills and Ndabibi plains ever reach Lake

Naivasha directly; however, the most prominent stream is Marmanet which disappears underground around Moi Ndabi.

Biodiversity

The Lake Naivasha basin is well endowed with biodiversity and is one of the important biodiversity hotspots in Kenya with several hundred species of plants and animals.

Vegetation (including forests)

The upper catchment areas of the Naivasha basin have several upland forests which include the Aberdares, Kipipiri, and part of Mau East (Eburru and Ol Turoto). These forests form very special areas providing water that supports diverse habitats, livelihoods and economic sectors.

The Aberdare forest is tropical montane forest and hosts a rich diversity of over 778 plant species including meru oak (*Vitex keniensis)*. The dominant species are cedar*; (Juniperus procera),* stinkwood *(Prunus africana),* rosewood *(Hagenia abyssinica),* podo *(Podocarpus falcatus, P. gracilior; Podocarpus latifolia, Podocarpus milanjianus)* and camphor (*Ocotea usambarensis)* (UNEP 2002). The vegetation descends from the area below the Aberdares National Park consisting of afro-alpine forest, down to the afro-montane forest composed of indigenous bamboo and cedar. The vegetation declines sharply in the densely populated areas.

The Eburru and Ol Turoto forests host indigenous hardwood forests which rise from about 2,400masl to 2,800masl and cover an area of 8,760 ha and 400ha, respectively. The vegetation consists of a wide range of species such as *Acacia sp.*, *Dombeya torrida, Podocarpus latifolia* and bamboo. On the northern side, the vegetation is characterized by open scrubland dominated by *Crotalaria agatifolia, Abutilon mauritianum, Tarconanthus camphoratus, Nuxia congesta* and *Dombeya torrida.* The vegetation is strongly influenced by altitudinal gradient from the hilltops to the valley bottoms, with bamboo and *Podocarpus* at higher elevations, *Prunus africana, Erica spp.* and *Lobelia gibberoa* in exposed sites.

The natural vegetation around the lake is dominated by the 'yellow fever tree' (*Acacia xanthophloea*), *Euphobia candelabrum* and the fire resistant *Acocanthera schimperi* (Trump, 1967). Several other Acacia species are common in the lower catchment including *A. drepanolobium*, *A. seyal* and *A. nilotica* which are often intermixed with the

Leleshwa bush (*Tarconanthus camphoratus*). The common grasses are *Themeda triandra* and *Cynodon plectostachys* (Fanden *et al.,* 1986). The lake edges have a complex vegetation of terrestrial and water tolerant wetland plants, due to frequent changes in water level. The littoral zone is characterized by Papyrus swamps. The sodic crater-lake is dominated by blue-green algae, with soda tolerant *Cyperus laevigatus* around its rim.

Wildlife

The basin has quite a rich and diverse mammalian fauna. The Aberdares National Park has the richest biodiversity base. Some of the animals in the park include; elephant *(Loxodonta africana*), black rhino (*Diceros bicornis*), mountain bongo (*Boocercus melampus*) which are endangered species, the giant forest hog (*Phacochoerus meneitxhageni)*, red duiker (*Cephalophus natalensis*) and various rodent species. Some carnivorous animals in the area include leopard *(Panthera pardus*), civet cat (*Vivera civeta*), genet cat (*Geneta geneta*), hyena (*Crocuta crocuta*) and side-striped jackal (C*anis mesomelas*). In addition, the forest has abundant bushbuck (*Tragelaphus scriptus*), mountain reedbuck, waterbuck (*Kobus defassa*), Cape buffalo (*Syncerus caffer*), and eland (*Taurotragus oryx*). The Park has abundant primates including Black and white colobus-*Colobus guereza* whose ranges extend all the way from Aberdares to Lake Naivasha, especially along river courses like Malewa.

The Aberdare is also an IBA with over 250 species of both endemic and migratory bird species. These include alpine chat, *Cercomela sordid*, crowned eagle, the rufous-breasted sparrow-hawk; african black duck, golden-winged sunbird, silvery-cheeked hornbill, and the White-eyed Slaty Flycatcher with some endangered species like the sparry hawk, Jackson's Francolin (*Francolina jacksoni*), eagles, goshawks, plovers and sunbirds among others (Bennun & Njoroge, 1999).

Some of the threatened species include African green ibis, Ayres's hawk eagle, crowned eagle, African grass owl, cape eagle owl and long-tailed widowbird, Aberdare cisticola (*Cisticola aberdare*), Baillon's crake and the striped fluff-tail. The forest has a number of reptile species and insect life, and also amphibians and fishes in the aquatic environments.

The middle catchment is in form of a Plateau known as Kinangop, that was once rich in plains game but land use changes has led to a decline in wildlife numbers. However, the Plateau is still rich with birdlife and has been identified as an IBA. It is probably the

world stronghold of Sharpe's long-claw (*Macronyx sharpei),* a threatened Kenya endemic bird species (Bennun and Njoroge, 1999; Nature Kenya, 2006). The species is confined to grassland, preferring short-grass fields with tussocks, and in good habitat occurs at densities of 0.8 individuals/ha. The *Cisticola aberdare* is thought to occur in the higher parts of the plateau, close to the Aberdare Mountains. In addition, the grasslands also support distinctive localized species such as the black-winged lapwing (*Vanellus melanopterus),* the wing-snaping *(Cisticola ayresii),* Jackson's widowbird *(Euplectes jacksoni),* a seasonal visitor, nesting in tussock grassland and at times in wheat fields and *Euplectes progne* (a regionally threatened species). Large numbers of Palearctic migrants use the area on passage, notably Pallid harrier *Circus macrourus, Falco subbuteo, Buteo buteo, Ciconia nigra, Apus apus, Merops apiaster, Motacilla flava* and *Oenanthe oenanthe*.

The lake has a wide a variety of water bird species, both resident and migratory and currently holds over 150 species. The key indicator species include the African Fish eagle and the red-knobbed coot. However, endangered and rare species are now hardly ever seen, e.g., great crested grebe, maccoa duck (endangered), African darter, great egret, saddle-billed stork, white-backed duck, Baillon's crake and African skimmer (all vulnerable).

Various wildlife species are found within and around the lakeshore and its riverine entries. *Hippopotamus amphibious* is the largest fauna found in the riparian zone, followed by the ungulates such as antelopes, buffaloes, waterbucks, zebras, giraffes and elands.

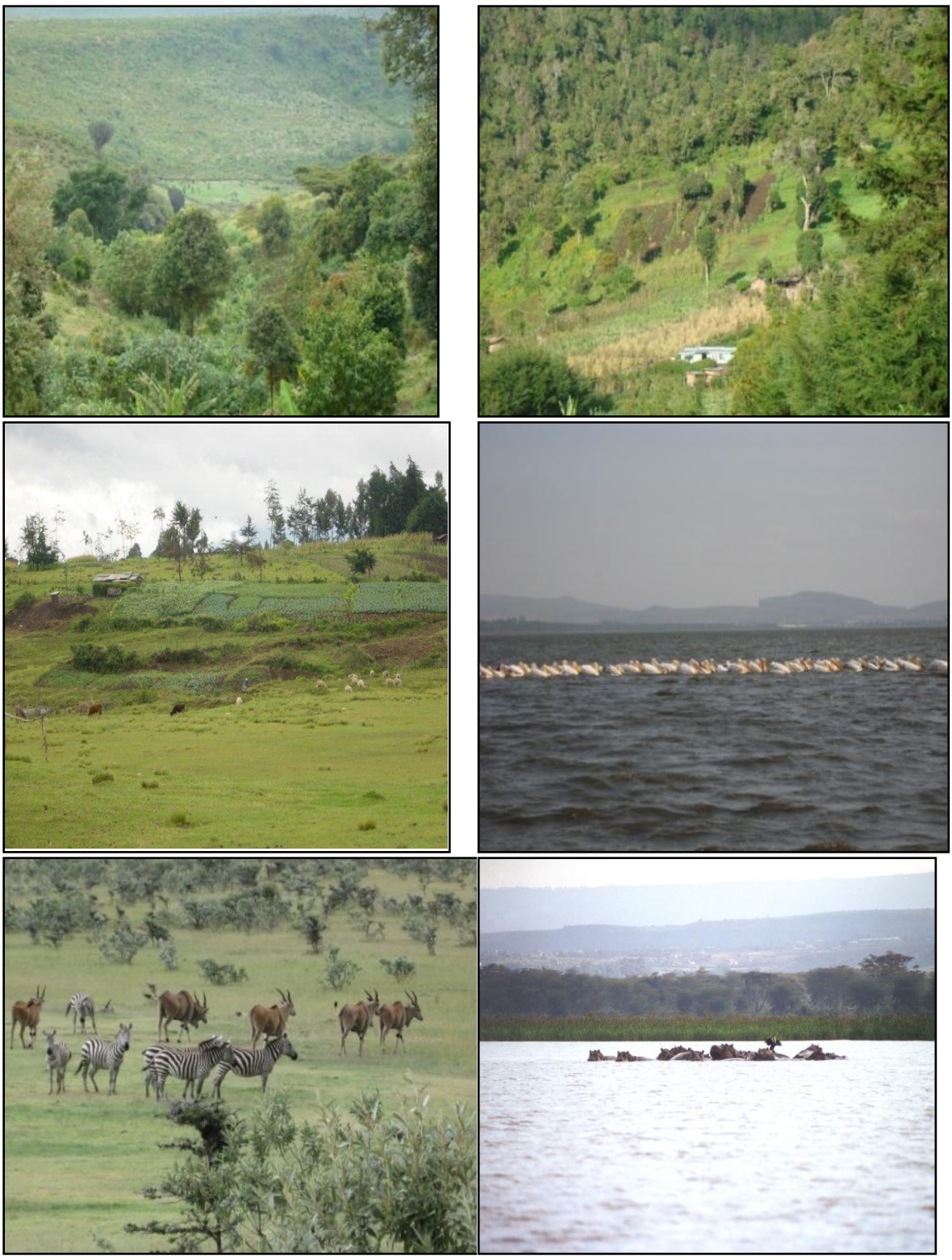


Figure 2.5: Biodiversity in the upper catchment and around the Lake Naivasha

Lake Naivasha originally contained only one endemic fish species, *Aplocheilichihys antinoni,* which was last recorded in 1962. Over 10 fish introductions have been made since 1925, and only 3 have successfully established a fishery in the lake – *Oreochromis leucostictus* (blue spotted tilapia), *Tilapia zillii* (red belly tilapia),*Micropterus salmoides* (black bass) (Muchiri & Hickley, 1991). The three formed the Lake Naivasha commercial fishery as well as sport fishing (KMFRI, 2002). In 2001, the common carp *(Cyprinus carpio)* also invaded the lake and is now the major commercial species being landed with a contribution of over 90% of the total catch. This latest introduction has changed the whole fishery as evidenced by changes in species catch composition (Figure 2.6). It has interfered with the ecosystem and species such as *Micropterus salmoides* have become vulnerable (Hickley et al., 2004). The rainbow trout (*Oncorhynchus mykiss*) fishery occurs in the upper catchment in aquaculture systems and in the rivers.

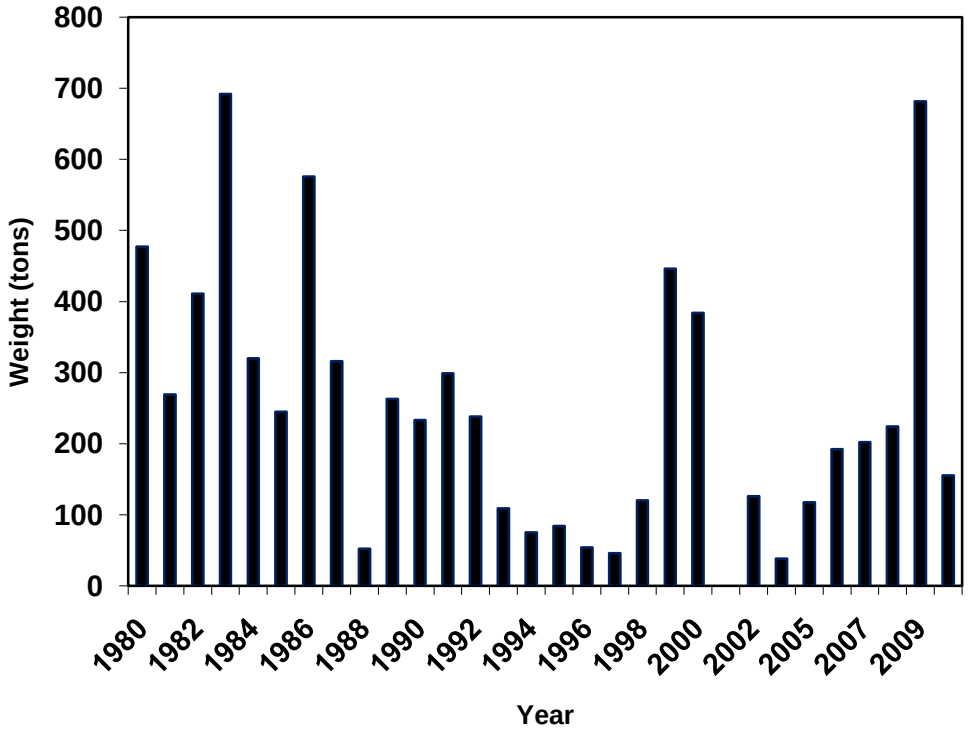


Figure 2.6: Lake Naivasha fish catches 1980-2009

Conservation Status

Lake Naivasha was consequently nominated by the Government of Kenya and designated as Kenya's second Ramsar site (a wetland of international importance) in

1995. This is a unique Ramsar site, which is entirely surrounded by private land. Kenya Wildlife Services (KWS) is the custodian of Kenyan Ramsar sites and as such is an important and influential stakeholder in Lake Naivasha. Birdlife International has also been designated Lake Naivasha as an Important Bird Area (IBA). Lake Naivasha itself in not legally gazetted as protected area under the Laws of Kenya, however, there are other areas within the basin that are legally protected. These areas include the Aberdares National Park, Mau Forest (including Eburru), Hells Gate and Longonot National Parks, Kenya Wildlife Service Training Institute with its sanctuaries. There are also several privately owned game sanctuaries and pro-wildlife establishments including Oserian Wildlife Sanctuary, Kedong Ranch and Kigio Wildlife Conservancy among others.

Most of the lake is surrounded by riparian land defined by the 1906 highest lake level (1810masl) and the water edge. The lake riparian land was previously under the custodianship of Lake Naivasha Riparian Association (LNRA) which is a CBO composed of landowners around the lake formed in 1927. Under the new constitutional dispensation, the custodianship of the riparian land is under the National government.

Human Population

According to the recent 2009 census, the total population of the basin was estimated to be 650 000 people of which approximately 160,000 living around the Lake itself. The basin has experienced significant population growth over the past 30 years growing from a base of approximately 237 902 in 1977 (Figure 2.7). In the decade between 1989 and 1999 (during the boom years of the horticulture industry), the population of the basin grew by 64%.In the past decade this population growth has slowed to approximately 13%. There are 28 urban settlements in the Basin with population ranging between 5 000 and 50 000. The five largest divisions in population size in the basin are Hells Gate (64 000) Gilgil (45 000), Engineer (45 000), Naivasha Town (45 000), Kinangop North (40 000) and Ndundori (35 000) (WWF 2011)

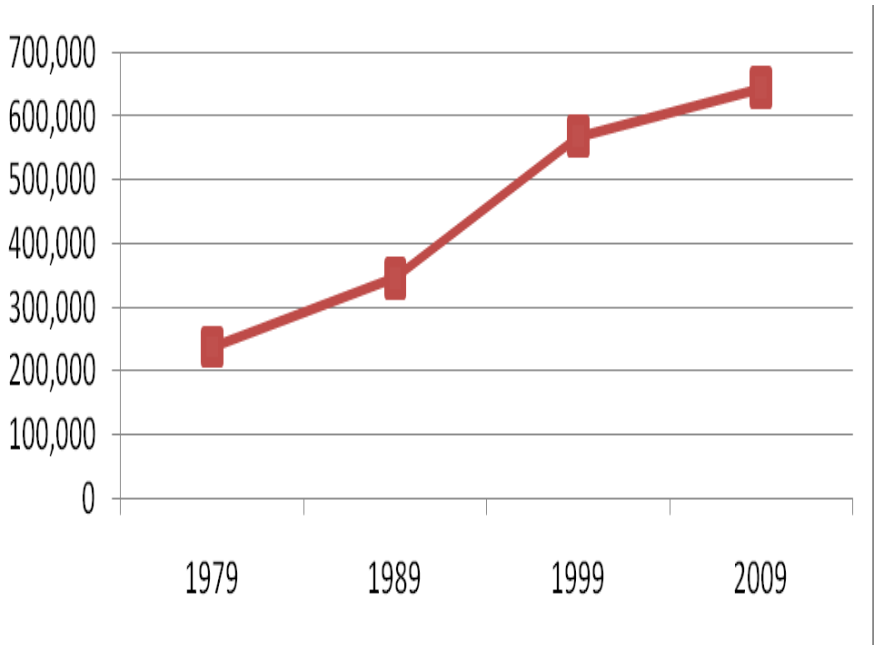


Figure 2.7: Population growth in the Naivasha basin between1979 and 2009. (WWF, 2011)

Resource Utilization

Naivasha basin is recognized for its diverse socio-economic and environmental significance. However, the land tenure and resource utilization patterns vary radically in the upper, middle and lower catchments. There are various land ownership types in the basin which include state, trust and individual freehold land (MFS, 2006). The basin supports both rural and urban land use as shown in Figure 2.8.

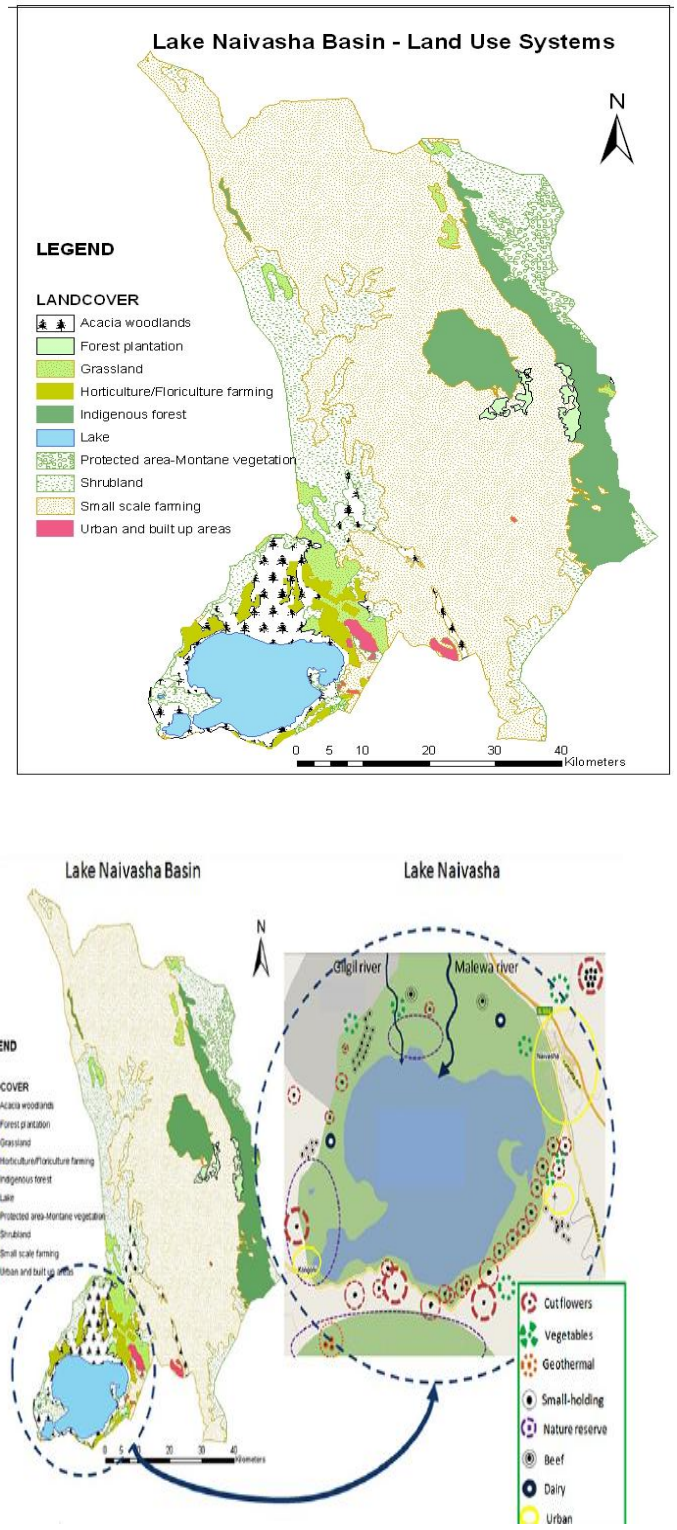


Figure 2.8: A land use map for the Naivasha basin (WWF 2011)

Upper and middle catchments are mainly dominated by small-scale mixed farming (figure 2.9. Communities living in these areas are agriculturalists who grow a variety of crops (maize, cabbages, carrots, peas and fruit crops such as apples). Other livelihood practices include aquaculture, dairy keeping beekeeping and tourism in Aberdare National Park. Urban land use comprise the major centers; Geta, Wanjohi, Ndunyu-Njeru, Njabini, Engineer, Murungaru, Miharati and Ol Kalou.

The lower catchment including the lake is characterized by a wide range of land-uses which include pastoralism, wildlife conservation, horticulture, tourism, fishery, urban settlement and geothermal power generation. The key urban environments include Naivasha and Gilgil towns. Apart from the area being highly cosmopolitan, it is also densely populated, especially because of the horticulture farms that have attracted a lot of migrant workers and other people who either end in business, workers in the flower farms or in industries along the neighborhood of the lake or the fishing industry.

The lake area has many tourist attraction sites that include the Hells Gate National Park, Mount Longonot National Parks, KWS Training Institute sanctuaries, Green Park, the Naivasha Lakes, Geothermal Power Stations, Olkaria Maasai Cultural Centre and private game sanctuaries.

Figure 2.9: Photographs showing farmlands within the upper catchment (Tulaga) and produce being cleaned and packed for local markets.

Management Issues

The Naivasha basin has continued to exhibit signs of widespread environmental degradation. Landscape transformations in the catchment through deforestation and intensive small-scale agriculture have disrupted hydrological flows into all the major tributaries discharging to Lake Naivasha. Rivers and streams in the basin are marked by torrential flows with highly turbid waters during rainy seasons (Kitaka, 2000), which are indicators of degraded catchment. The water levels in the lake have declined in the last couple of years with significant drop being observed in 2009 (Figure 2.10), due to reduced flows and uncontrolled water abstraction.

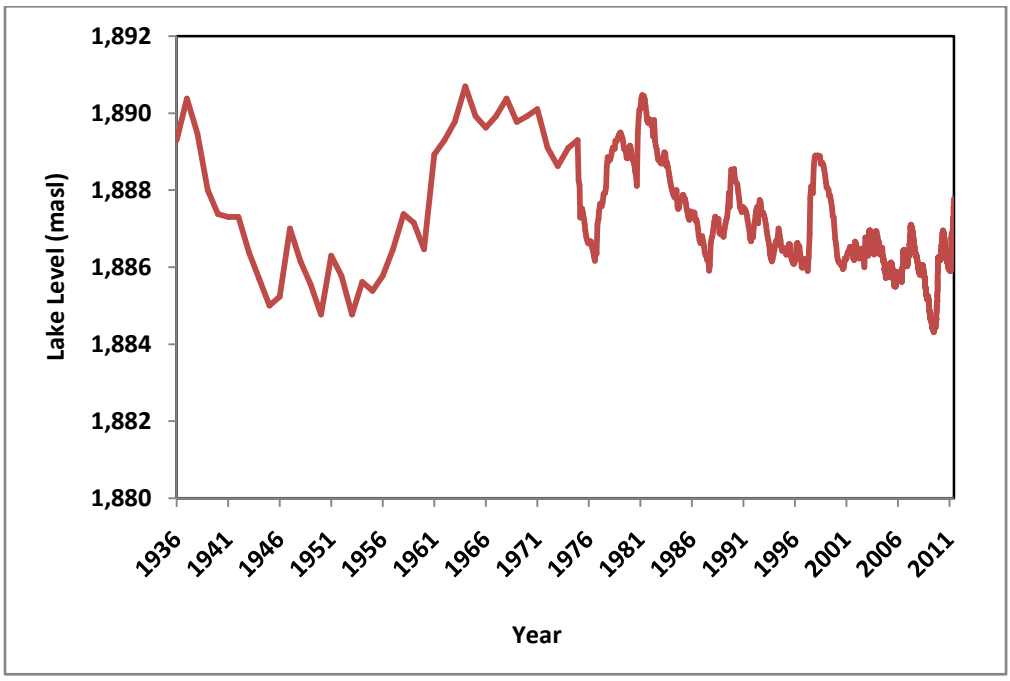


Figure .2.10: Lake Naivasha water level

Agriculture

Intensive fragmentation of agricultural land coupled by poor cultivation practices in the catchment has enhanced soil erosion, accelerated the siltation of rivers and increased the sedimentation of Lake Naivasha (Kitaka, 2001; Becht 2007). Intensive farming has caused destruction of natural habitats. Run- off from farm fields where there is intensive use of agro-chemicals and fertilizers causes pollution in water bodies. Soil erosion is especially rampant in the middle catchment where improper farming is undertaken very close to the rivers. Although soil erosion is not widespread in the

Kinangop Plateau, dams and water bodies in the area have shown evidence of eutrophication (Mwaura, 2003).

Increasing irrigated agriculture has potential to reduce river flows, lake levels and depletion of underground aquifers due to over abstraction (Becht, 2007). The distribution of horticultural farms around Lake Naivasha is shown in Figure 2.8. It is estimated that the total area under commercial irrigation around the lake is between 3000 and 5000ha with farm sizes of over 5ha. There is concern that the horticultural farms have contributed towards the deterioration of water quality in the lake (Kitaka et al., 2002). A large numbers of the flower farms and other land owners around the lake have encroached and transformed the fragile environment in the riparian zone to farm land thereby threatening the future of the lake.

Water Resource

Water Resources Management Issues

Water resources assessment, planning and management ultimately rely on the availability of hydrological and hydro meteorological data. Land use and land cover changes also play a vital part on water resources availability. The Lake Naivasha catchment is a complex hydrological system that comprises of surface water, and groundwater systems. The actual water resources potential of the Lake Naivasha catchment is yet to be established due to lack of critical information on the ground water system. The major issues relating to water resource management within the basin are centred around catchment degradation, encroachment of riparian lands and non-compliance to natural resources management laws which lead to declining water quantities and quality.

Water Quality Issues

Rivers and streams in Naivasha basin are marked by torrential flow with high turbid waters during the rainy seasons (Kitaka, 2000). This means that surface run off from the upper catchment carries a lot of nutrient soils. In addition, the streams pass through areas polluted by high ammonium-N concentration. Overgrazing in the upper catchment has a huge impact on the water quality of the rivers and ultimately the lake. Nutrient analysis of water samples collected by Tiruneh (2003) for a period of nine days

in September and October 2003 along the main River Malewa indicates that the NO3-N levels vary from 2.0 to 3.8 mg/l and the P levels from 0.01 to 0.07 mg/l.

Water Quantity Issues

There is increasing demand for water resources as population grow and demand for agriculture expansion increases. According to the Water Abstraction Survey (WAS 2010) water abstractions in the area around the lake are most dense and also account for ± 2/3 of the total abstraction in the basin. In the catchment area the total river abstraction (77,871 m3/day), according to the WAS results, is in the same order of magnitude as direct abstractions from the lake (73,932m3/day) (Figure 2.11). The *out of the basin transfer* at the Turasha dam accounts for 20% of the total river abstraction in the basin. Compliance on installation of measuring devices on abstraction points is low in the upper catchment area and high in the lake region.

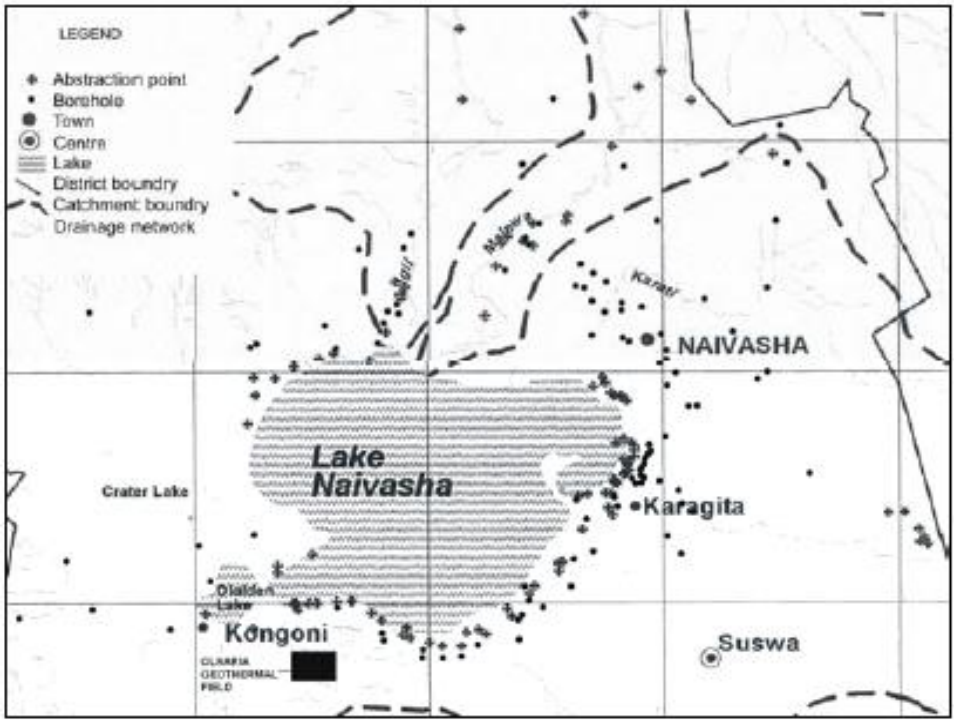


Figure 2.11: Water abstraction points and boreholes in the Naivasha area

Forestry

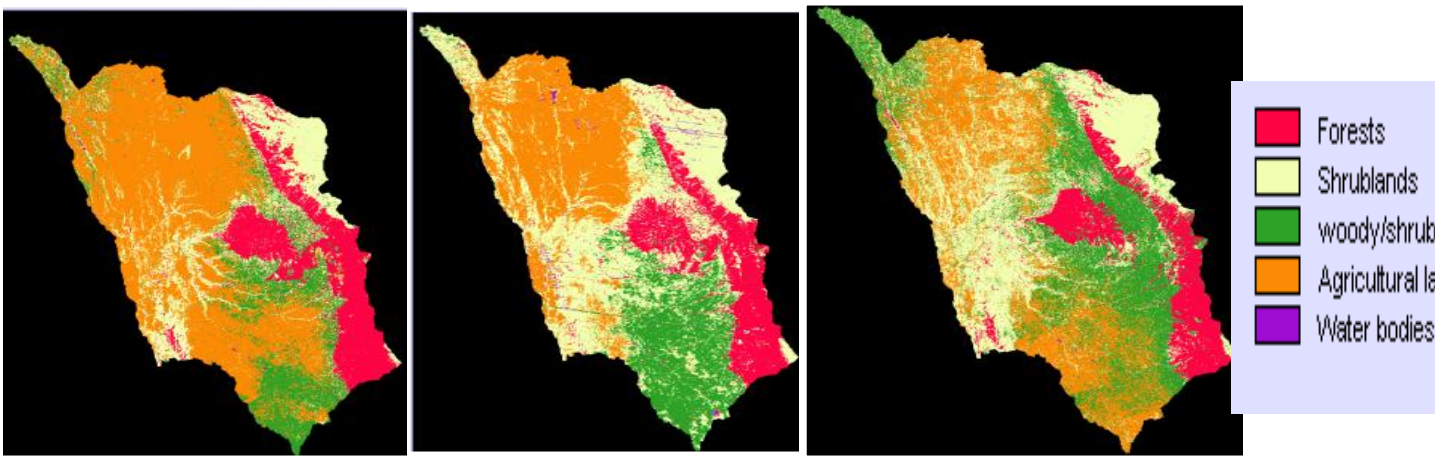
The upper catchment of the basin which has historically consisted of indigenous forest and open woodland has experienced significant changes in land use over the past 50

years as the forest has been converted into rain-fed small holdings. Consequently, the forest cover has decreased significantly as shown in Figures 2.12 and 2.13.

The forest adjacent communities in the basin derive a lot of their subsistence needs from the forest goods and services. Illegal logging, encroachment, illegal grazing and charcoal burning have resulted in widespread depletion of forests within the basin. Forest fires have been a great challenge and are more common in Eburru and Geta block of the Aberdare forest. They are mainly caused by honey harvesters, charcoal producers, arsonists, smokers and grazers particularly during prolonged dry spells.

Species like *wild olive (Olea Africana), African red wood (Hagenia abyssinica)*, and podo (*Podocarpus falcatus)* are threatened due to their valuable wood whereas red stink wood, *Prunus africana* and *Rhamnus Prinoides* for medicinal value. Other tree species which have been decreasing include cedar-*Juniperus procera*, *Dombeya goetzenii* (Mukeu), *Ekebergia capensis* (Mununga), and *Arundinaria alpina* (Bamboo).

Figure 2.12:



(a) 1973 (b) 1987 (c) 2003

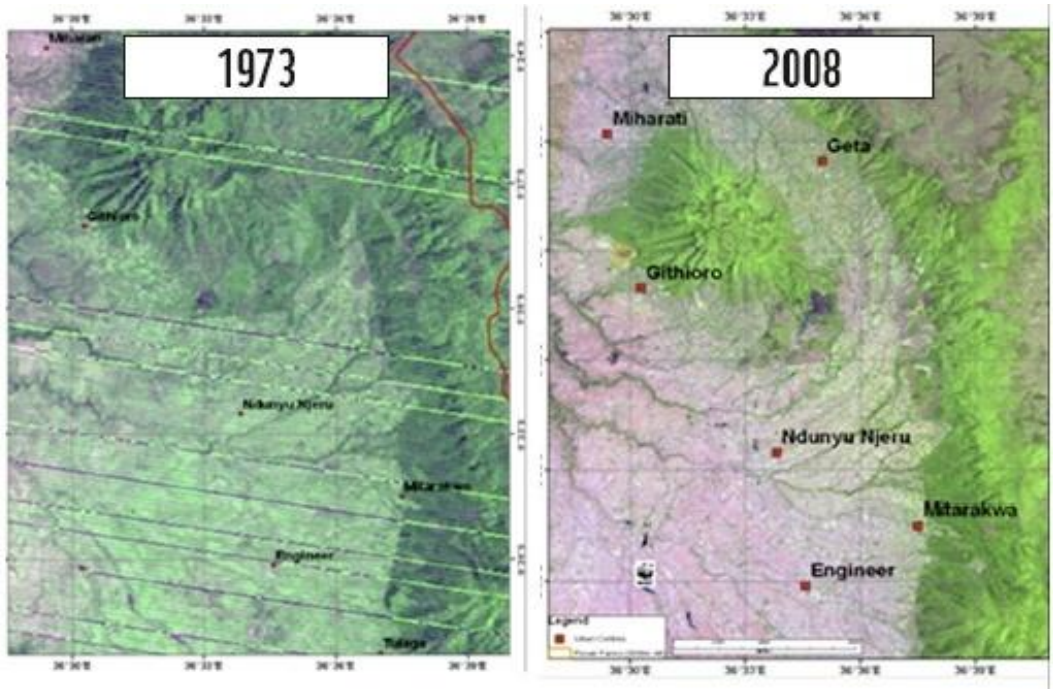


Figure 2.13: Forest cover change in Kipipiri and Aberdare forests

Livestock Development

The livestock industry is a key sector in the economy of the Lake Naivasha basin. In the upper and middle catchment, livestock production is limited to small scale farmers who keep a mixture of livestock. Poor livestock management processes such as poor siting of

cattle dips and livestock overgrazing along the riverine riparian areas in the drainage basin is frequently accompanied by deleterious impacts such as reduced soil infiltration, soil erosion, nutrient enrichment and contamination from dung and urine. In the area around the lake, apart from resident livestock, there is significant population of livestock brought about by pastrolists who still use the traditional pastoral route from Suswa to Gilgil. During the dry season there are over 35 ,000 heads of nomadic livestock in the area between Ndabibi, Suswa and Naivasha town which are taken to the lakeshore for water at least once every day (Beard, 1999). The most affected area is Oloidien Bay opposite Kongoni Police Station (Ouma 2001), since access to the main lake is very limited, because most of the riparian land around it is privately owned.

Increased livestock numbers in this semi-arid area causes overgrazing which results in reduced infiltration and accelerated runoff and soil erosion. Livestock watering directly at the lakeshore is also destructive to the riparian habitat because trampling and feeding on the riparian vegetation by livestock destroys the littoral vegetation and reduces the filtering capacity of the buffer zone. The livestock dung also increases the nutrient levels and enhances the level of eutrophication of the lake. As a result of animal grazing, the papyrus swamps around the lake and the mouth of River Malewa and Gilgil, have shrunk since 2002 (Everard & Harper, 2003). In summary, livestock grazing depending on the numbers has been shown to have the following effects on basin's riparian vegetation:

i). Consumption of plant biomass, including selective grazing of palatable and accessible plant tissues and species, and defoliation.
ii). Trampling of plants, including damage to underground rhizomes.
iii). Purging, compaction, erosion, and re-suspension of lakeshore/river banks substrates.
iv). Nutrient addition and bacterial contamination from dung and urine.
v). Creation of plant invasion micro-sites.
vi). Introduction and dispersal of seeds and other plant propagules.

Figure 2.14: Livestock grazing in the riparian zone

Fishery Development

A commercial fishery established in Lake Naivasha is based on fish species introduced between 1925 and 1970 for different purposes. The introduced species included; the large mouth black bass (*Micropterus salmoides*); *Oreochromis nigra*, a mouth brooding cichlid, and other three tilapiine species (i.e. *Tilapia zillii* and *Oreochromis leucostictus, Oreochromis niloticus).* A crustacean species, *Procambarus clarkii* (Girard) was introduced in the lake in 1970 as food for black bass, but formed a fishery component until the late 1980s. Natural intruders into the lake from the rivers are *Oncorhynchus mykiss* (Rainbow trout) and *Barbus amphigramma* (Palcidinosus). The latter supported a riverine fishery until 1989 with catches of about 69 tons. Invasion of the lake ecosystem by common carp (*Cyprinus carpio*) was reported in 2001/2. This species has established in the lake and transformed the fishery of the lake.

The Lake Naivasha fishery has experienced considerable fluctuations over the past two decades due to fishing pressure, lake level fluctuations and loss of macrophytes (Muchiri and Hickley, 1991; Njiru and Ojuok, 1997). The lake's fish production, which performed at over 500 metric tons per year drastically declined in the late 1990s and nearly collapsed by end of 2000 when a paltry 66 ton of fish were landed. In 2001, the Government of Kenya, through Fisheries Department, imposed a year-long ban on all forms of fishing activities in Lake Naivasha, in order to allow fish stocks recovery. This measure was followed by the reduction of licensed fishing vessels from 113 canoes in

2000 to 50 canoes at present. Each canoe is restricted to deploy only 10 gillnets of over 4 inches mesh size. Additionally three months closed period is imposed annually to allow fish stock replenishment. These control and regulatory measures to some extent resulted into loss of livelihoods of the fishing dependent community around the lake. Although the fish catches have improved to over 200 metric tons at present, the fishery is dominated by a single species, the common carp. Available data show that since 2006, the species accounts for over 95% of the total fish catches of Lake Naivasha while the rest of the species have disappeared. Therefore, further introductions of fish species into the lake basin have been recommended and attempts made to re-introduce *Oreochromis niloticus*. Furthermore, the Lake Naivasha basin has high potential for fishing farming and aquaculture activities in the region are at the trial stages. The associated socio-economic and ecological impacts of the re-introduction and fish farming activities are yet to be reported. .

Tourism

Tourism in the Lake Naivasha basin is centered around the Aberdare National Park and the Lake with Naivasha having several tourist attraction sites; two National parks (Hell's gate and Longonot) and sanctuaries (KWSTI, Marula, Kedong, Oserian, Crater Lake, Mundui, Crescent Island and Sanctuary farm). The aesthetic beauty of the lake Naivasha riparian area, rich wildlife including birds, proximity to Nairobi, and availability of hotels and campsites attract both local and international visitors.

There are approximately 4 000 accommodation beds in Lake Naivasha that cater across a range of markets from international political and business delegations to truck drivers carrying freight to Uganda. (WWF, 2010) It is estimated that about 5% of all international tourists visiting Kenya (1.8 million in 2007) pass through Naivasha either on their way to Lake Nakuru, Abedares National Park, Masai Mara Reserve and the recently marketted Western Circuit. The total value of the tourism sector in Naivasha was estimated to be approximately KSh 600 million a year in 2010, which is relatively small (less than 5%) compared with the horticulture industry (WWF, 2010).

The are several issues affecting tourism industry within Lake Naivasha basin namely:, lack of connectivity to the main tourist circuit, poor marketing, no defined organization structure, poor diversification of products, poor road infrastructure to the upper catchment, invasive species and fluctuation in lake levels affecting boat rides in the lake,

encroachment to the lake riparian zone and changes in the land use affecting biodiversity within the basin.

Urbanization

The urban developments in the Lake Naivasha basin has led to land use transformation, increase in waste water and solid waste management problems, settlement on fragile zones, increasing water demand for domestic use and poor planning of the urban centers. Growth and expansion of the urban centres has many benefits but also puts pressure on the environment and quality of services delivery.

There are 28 urban settlements spread out in the entire basin with population ranging between 5 000 and 50 000 (WWF 2011). High population growth rate is being observed in the basin which is becoming more concentrated in the urban centres due to rural-urban migration as a result of the vibrant economic environment that is fuelled by factors such as thriving horticulture and commercial agriculture (small and large scale), geothermal power generation, fishing and tourism.

The problems of urbanization are more critical in Naivasha town and in the satellite settlements around the lake than in the upper catchment. The municipality of Naivasha is one of the biggest municipal councils in Kenya covering an area of 941 km^2 and with a population of over 250,000 people. Although a large area of the town is within reach of the sewerage infrastructure, only around 10 –15 % of the population is connected to the network (Figure 2.15). The town also lacks comprehensive solid waste management system and plan.

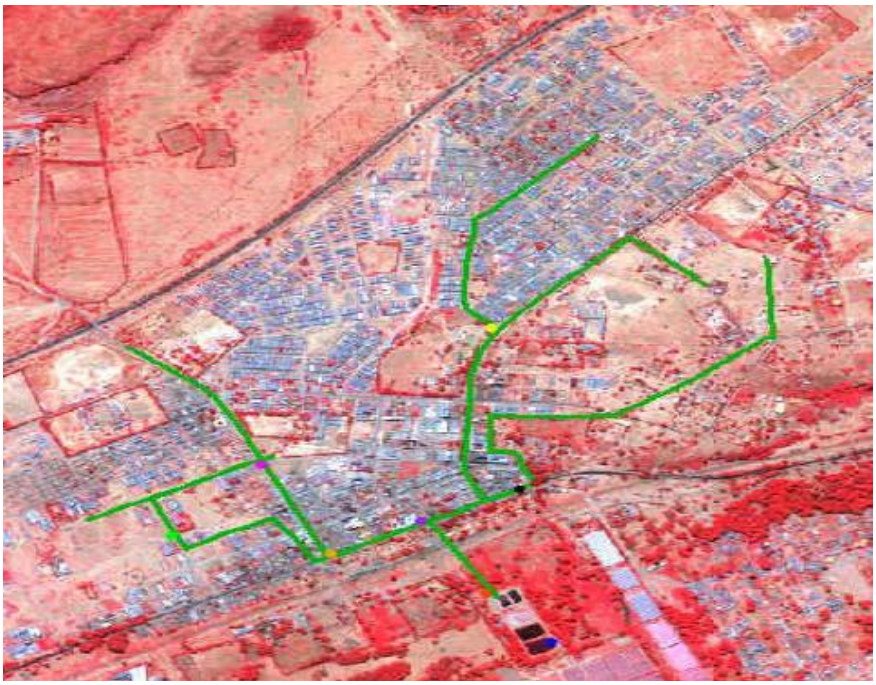


Figure 2.15: Sewage network in Naivasha town

Geothermal Energy

The first geothermal plant in Africa was established in Olkaria in 1981 when a 15 MW Olkaria I station was commissioned 7km south of Lake Naivasha. Currently, 45 MW is generated by Olkaria I and 70 MW by Olkaria II and 12MW by Olkaria III which were established thereafter Oserian Geothermal plant generates 2MW for use in their farm. The production is expected to increase to 576 MW in the next 20 years. KENGEN claims that actual use of lake water for geothermal production does not exceed 59,000 m^3/yr (160m^3/d) except when drilling geothermal boreholes when approximately 100,000 m^3 of water is required to drill a well, however, there are significant uncertainties associated with geothermal water usage over time. In addition, with further exploratory drilling planned for Olkaria Domes area, water demand by the industry is likely to increase in the foreseeable future. Other issues related to the geothermal power production include, air pollution (hydrogen sulfide gas), noise emission/pollution, surface disturbance, thermal effluents, chemical discharge, solid waste, water usage and socioeconomic benefits

Climate Change

Observational evidence within Kenya shows climate change is a reality that is affecting natural ecosystems. In addition the impact of the projected climate change are expected

in many sectors such as, environment, human health food security, economic activities, natural resources and physical infrastructure (GoK 2010). The impacts of climate change are however unpredictable and the following predictions may suffice for the climate change impacts for the Lake Naivasha basin

a) Increased rainfall intensity may lead to increased runoff and river flows; increased intensity of flash floods damaging roads and making them impassable; increased soil erosion with subsequent loss of fertility and increased siltation of water bodies; crop damage; increased incidences of water borne diseases; increases in charcoal prices;

b) Decreased rainfall with increased temperatures may lead to increased crop failure thus affecting food security and livestock production' loss of livelihoods; decreased lake levels increases the concentration of pollutants; lowering of groundwater levels; denudation of soil cover and subsequent soil erosion; increased water scarcity; decline of biodiversity; increase of human wildlife conflict in some areas (Heath et al., 2010).

c) Higher day temperature and very low night temperatures increasing probability of water stress and frost respectively;

d) Change in rainfall regimes resulting in food insecurity.

The adverse impacts of climate change are compounded by local environmental degradation (land use change, unplanned settlement, encroachment, logging, livestock grazing) which have among others further aggravated deforestation and land degradation. In conclusion, climate change will exacerbate the already stressed ecosystem.

Table 2.1: Summary of Land Use and Challenges within the Basin

Area	Land Use	Challenges
Marmanet	• Subsistence cultivation • Plantation farming (Wheat, maize) • Wildlife dispersal area • Livestock production • Settlement	• Human wildlife conflict • Illegal activities (charcoal burning, poaching) • Fragile & friable soils
Lake Naivasha area	• Fishing • Intensive agriculture (horticulture & floriculture) • Pastoralism • Tourism • Geothermal power production • Wildlife conservation • Livestock and dairy production	• Pollution • Water over abstraction • Encroachment of riparian area • Unplanned settlement • Expanding population • Poor waste management • Over fishing • Land conversion • Invasive species
Mkungi/Kitiri/Turasha/Kinja/ Wanjohi , Upper Malewa	• Agriculture (potatoes, cabbages, peas, carrots), • Forests • Settlement • Floriculture • Beekeeping • Livestock production • Mining of stones (quarrying)	• Deforestation • Human wildlife conflict • Soil erosion • Water pollution • River bank degradation
Lower Malewa, Middle Malewa	• Agricultural production • Floriculture • Livestock production • Settlement	• Water abstraction • Inadequate rainfall • Soil erosion
Gilgil (Upper and Lower)/Karati	• Agricultural production • Irrigation farming • Wildlife conservation	• Soil erosion • Land conversion • Conversion of riparian land for agriculture (along

Area	Land Use	Challenges
Marmanet	• Subsistence cultivation • Plantation farming (Wheat, maize) • Wildlife dispersal area • Livestock production • Settlement	• Human wildlife conflict • Illegal activities (charcoal burning, poaching) • Fragile & friable soils
	• Sand mining (quarrying) • Floriculture	Gilgil river) • Charcoal production • Human wildlife conflict • Collapsing quarries
Eburru	• Subsistence agriculture • Livestock production • Bee keeping • Tourism • Settlement	• Deforestation • Charcoal production • Human Wildlife conflict • Soil Erosion • Forest Encroachment
Aberdare Forest Block	• Forestry • Tourism • Beekeeping • Settlements • Livestock production (intensive sheep and dairy production)	• Deforestation • Encroachment • Charcoal production • Collection of forest product • Land fragmentation (Geta) • Human Wildlife conflict • Soil erosion • Siltation of rivers streams and water pans

Natural Resource Conflict in Lake Naivasha Basin

Sustainable management of Lake Naivasha basin is underpinned by complexity which is defined by two related realities; diverse stakeholder groups whose interests and mandates often compete and sometimes conflict. The interests on the lake basin resources are at global, national and local levels and at each level the interests are varied and sometimes in conflict. The glaring conflict issues within Lake Naivasha basin include the following:

1. **Human population pressure and land fragmentation**. Land fragmentation and subdivision from the former large scale white settler farms to very small units of approximately 1- 10 acres per family that is progressively becoming unviable for social and economic sustainability of the people

2. **Land use and natural resources management practices in the catchment**. There is intensive land use in the catchment to meet the social and economic needs of the increasing human population. Issues of conflict include overstocking and over-grazing, clearing of indigenous plant species in the gazetted forests and on the community farms, encroachment and deforestation of the protected forests, blocking of the rivers and water courses, diversion of water from the rivers into the farms for irrigation, loss of land cover, soil fertility and creation of gullies from mining activities, increased soil erosion and sedimentation of watercourses including the main rivers (Malewa, Gilgil and Karate rivers within the Lake Naivasha basin). The high dependence on natural resources for livelihoods and the minimal formal opportunities to participate in sustainable management of the resources exacerbates the conflicts

3. **Encroachment into protected areas i.e. national parks, forest reserves and other conservation areas**. People encroach into the protected areas for the following reasons: logging of timber and collection of fuel wood, cultivation of crops in the forests, settlement, grazing of livestock, harvesting of honey, poaching of game meat and harvesting of medicinal plants among others. These have led to uncontrolled forest fires and indiscriminate felling of indigenous and valuable forest trees with consequent reduction in the forest cover and increased soil erosion and reduced water flow into the lake. . There have also been cases of excision and grabbing of forest land and arbitrary changes in policy by the state.

These conflict issues are common in the Mau forest complex including the Eburru, Satima escarpment, Kinangop forest, Turasha and parts of the Aberdare forest reserve. National parks like Hell's gate and Mt Longonot often encounter increased encroachment from dense human populations in the adjacent areas and illegal grazing by the pastoralists during the dry seasons.

4. **Gazettement of protected areas (National parks, reserves and forest reserves) without free prior consent by the local communities.** Protected areas within the basin include Hell's Gate National Park, Mt. Longonot National Park, Eburru forest reserve, Parts of Aberdare National Park and Kinangop forest reserve. Traditionally, most of the land within the basin belonged to the Maasai community where they depended on the natural resources for their social, cultural and economic sustainability. These have been gazetted without prior consent from the communities creating discontent and conflicts with the managing institutions

5. **Riparian Land tenure.** The conflict here emanates from the fact that some farmers have alienated and acquired titles for some sections of the riparian land which is government or public land. Most of the access corridors on the riparian land to the lake have been closed to the public, effectively denying them access to the lake and use of its natural resources. Some local land owners claim custody of the riparian land on behalf of the state while others—particularly the pastoralists and some local communities feel that they are being denied access and use of natural resources on the riparian land

6. **Water Allocation/Abstraction for commercial horticulture in the Lake Naivasha basin.** –The amount of water abstracted for irrigation is controversial and generates conflicts among stakeholders, especially with respect to the extent it impacts on the water quality and quantity, other water dependent resources like livestock, fisheries, biodiversity, wildlife, tourism, pastoralism, and subsistence agriculture which are the lifeline of the majority of community groups within the basin. Serious conflicts also manifest in the blame game experienced between the upper and lower catchment communities over reduced river flows and water scarcity in the lower zones, especially during drought periods.

7. **Equitable sharing of benefits from natural resources management.** Altogether, the basin generates well over Kshs 350 billion from various income generating activities every year. The extent to which the benefits are equitably shared amongst different stakeholders varies between different sectors and remains a highly contentious subject.

8. **Poor compliance.** –Lack of compliance is a source of conflicts between the resource users and the regulatory authorities, and also between those who seek permits and those who don't bother to obtain permits for use of natural resources

9. **Weak enforcement.** the majority of government institutions have inadequate resources, political will, commitment and the required seriousness to undertake effective enforcement of natural resources policies, laws and regulations

10. **Lack of access to information.** On the state or actual use of natural resources for example water abstraction, estimates from research documents, although varied, provide the only useful information. Most of the information is, however, held by different institutions in formats that are not readily accessible to the majority of stakeholders. Lack of access to data and information has curtailed informed decision making processes and contributed to conflicts among resource users and researchers.

11. **Weak permit data.** All public sectors responsible for the management of natural resources issue permits to control and regulate the utilization of such resources. These sectors include water, forests, wildlife and fisheries; however, there are several instances where resources are exploited without permits from the authorities concerned. There are also many cases where permits are issued but the conditions attached to the permits are not complied with or enforced by the same authorities.

Impacts of Conflict Issues on Resource Use and Management

Conflicts have several potential adverse impacts on natural resources use and management within the Lake Naivasha basin. Potential impacts include; ineffective decision making processes, poor implementation of EIA and Environmental Audit procedures, ineffective inventory of all natural resources within the basin, lack of

Integrated planning and management, ineffective communication and sharing of information, ineffective enforcement and compliance, inadequate technical capacity among stakeholders, ineffective resource mobilization and sharing of available resources, poor local, national and international linkages.

Chapter

3

GUIDING PRINCIPLES, GOALS, OBJECTIVES AND STRATEGIES

Vision

The envisaged vision of the IMP is

"A clean, healthy and productive environment and sustainable livelihoods in the Lake Naivasha basin for the benefit of the present and future generations"

Mission

"To improve environmental, economical and social sustainability of the basin for present and future generations through enhanced governance of natural resources."

The Guiding Principles

The guiding principles of the Lake Naivasha Integrated Management Plan (LNIMP) are

i. **Wise use:** Due to the significant contribution of wetlands to the health and well being of Kenyans, wetlands should be integrated into national economic planning for sustainable development, wealth creation and environmental management.

ii. **Precautionary principle:** Where information is inadequate for decision making, the precautionary principle will apply. Lack of full scientific information should not prevent implementation of measures to minimize/ manage wetland degradation.

iii. **Collaborative and participatory approach:** An integrated approach to wetland conservation and management should involve stakeholders at all levels including; government, local community, civil society and the private sector.

iv. **The global dimension:** the global dimension of environmental impacts of actions and policies should be recognized and considered

v. **Polluter pays principle**: Persons who pollute wetland environments should meet the cost of cleaning them up, and also meet the cost of the pollution to resource users

vi. **Inter-generational and intra-generational Equity**: the present generation needs must be considered without compromising the need of the future generation.

vii. **Cultural and social principles**: traditionally applied by any community in Kenya for the management of the environment or natural resource in so far as the same are relevant and are not repugnant to justice and

Goals and Purpose of the Plan

The goal of Lake Naivasha Basin Integrated Management Plan is to provide a strategy that will guide the protection, maintenance and restoration of Lake Naivasha basin and balance the environmental, social and economic needs of the area.

The purpose of the plan is to harmonize the diverse interests within the Lake Naivasha Basin and reduce natural resource use conflicts. The Integrated Plan aims at achieving the following, in addition to the aims of other existing plans:

i). Identify the scope, goals and objectives and management activities for the next ten years (2012-2022).
ii). Provide a means for stakeholders to make NRM investment decisions;
iii). Build a holistic vision for the sustainability of Lake Naivasha basin;
iv). To participate effectively in environmental and natural resource management and planning in the Lake Naivasha basin.

v). Create new opportunities for dialogue and collaborative problem-solving among government, non-governmental organizations (NGOs), community groups and the private sector.

vi). Improve the management of the Naivasha basin in terms of planning, implementation and monitoring so that it is more transparent, accountable, all inclusive, and empirically based.

Strategic Objective

By 2022, Lake Naivasha basin stakeholders' level of participation in natural resources conservation and management has increased by five percent leading to reduction in natural resources use conflict, enhanced sectoral linkages and improved benefits.

Specific Objectives

1. To enhance public participation in natural resource management
2. To promote sustainable land use practices to secure biodiversity hotspot.
3. To promote alternative livelihood options to reduce pressure on natural resources
4. To improve water use efficiency by promoting appropriate technology
5. To promote sustainable management of fisheries production within the basin
6. To strengthen institutional synergy in the management of natural resources in the basin

Chapter

4

POLICY AND LEGAL FRAMEWORK

A wide range of policy, legal and institutional frameworks are relevant in the management of Lake Naivasha basin.

International Frameworks

Kenya is a party to a wide range of global and regional MEAs including conventions, treaties and protocols, which is a clear indication of a strong commitment towards environmental security. Kenya has international obligations for the domestication of the following international frameworks:

1. Convention on Wetlands of International Importance (Ramsar)

   The aim of the Ramsar Convention is to promote conservation and wise use of wetlands, by national actions and international cooperation as a means to achieving sustainable development throughout the world.

2. Convention on Biological Diversity (CBD)

   The purpose of this convention is to ensure the conservation and sustainable use of biodiversity, both on aquatic and terrestrial ecosystems

3. Convention of Migratory Species of Wild Animals (CMS) or Bonn Convention

   The purpose of this convention is to ensure that migratory species are protected. Lake Naivasha basin is known to sustain a wide range of migratory birds especially from the Paleoarctic region.

4. African Convention on the Conservation of Nature and Natural Resources

The aim of the convention is to ensure measures necessary to ensure conservation, utilization and development of soil, water, flora and faunal resources in accordance with scientific principles and with due regard to the best interests of the people.

5. The 1992 United Nations Framework Convention on Climate Change (UNFCCC)
The primary purpose of the convention is to establish methods to minimize global warming and in particular the emission of the greenhouse gases. This includes the protection and conservation of forests as principal mitigation agents for climate change.

6. Convention international trade in endangered species of wild flora and fauna
Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival

7. Africa Eurasian Water Bird Agreement (AEWA)
This is an international agreement aiming at the conservation of migratory water birds, with Lake Naivasha being a unique waterfowl area.

8. The Convention on the Protection of the World Cultural and Natural Heritage (Paris, 1972),
It aims to ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage in the country,

9. Convention to Combat Desertification
The international community has long recognized that desertification is a major economic, social and environmental problem of concern to many countries in all regions of the world. In 1977, the United Nations Conference on Desertification (UNCOD) adopted a Plan of Action to Combat Desertification (PACD).

10. The Rotterdam Convention
Its objective is to promote shared responsibility and collaborative effort among parties in the international trade of certain hazardous chemicals in order to protect human health and environments from potential harm and to contribute to environmental sound use.

Regional Frameworks

East African Community Treaty

East African Community (EAC) treaty is a regional intergovernmental organization of the United Republic of Tanzania and the Republics of Burundi, Kenya, Rwanda and Uganda. It aims at widening and strengthening co-operation among partners states in, among others, political, economic, social and natural resources areas for the mutual their mutual benefits.

Intergovernmental Authority on Development (IGAD)

The IGAD aims at assisting and complementing the efforts of the Member States to achieve, through increased cooperation, food security, environmental protection, maintenance of peace and security as well as economic cooperation and integration.

National Legal Frameworks

Kenya Acts of parliament which mention environmental and natural resources are numerous and are diffuse in nature with provisions being contained in about seventy seven statutes. The current constitution of Kenya does have a direct provision on the protection of the environment to ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits.

The Legal and institutional frameworks are highlighted in table 4.1

Table 4.1: Legal and Institutional Frameworks:

Legal Framework	Institution (Lead Agency)	Mandate
Environmental Management and Coordination Act (EMCA)1999 and related regulations	National environment Management Authority (NEMA)	Lead Agency in Coordination of Environmental management
Water Act 2002	Water Resources management Authority	Water Resources management
Agricultural Act (Cap 318)	Ministry of Agriculture	Coordinate agro-based activities
Physical Planning Act 1996	Ministry of planning and vision 2030	Land use Planning and development
Penal Code (Cap 63)	Judiciary	Penalties on environmental offences
Forest Act 2005	Kenya Forest Service	Conservation and development of forest resources
Fisheries Act (378) 1999	Ministry of Fisheries development	• Management and conservation of fisheries resources • Conduct fisheries research
Wildlife (Conservation and Management) Act 1976	Kenya Wildlife Service	Wildlife conservation and its habitats
Livestock Act (Cap 321)	Ministry of Livestock	Promote and coordinate sustainable livestock production
Tourism Act 2011	Kenya Tourism Board	Tourism marketing and development
Land planning Act (Cap 303)	Ministry of Lands	Planning the use and development of land
Land Control Act (Cap 302)	Land controls board	Controls transaction of agricultural land
Local Government Act (Cap 265)	Local Authorities	Manage resources within their jurisdiction
National Land policy 2011	National Land Commission	Guide in sustainable and equitable use of land
Public Health Act (Cap 242)	Ministry of Public Health	Regulation on waste management, pollution and human health
Kenya Tourist Development Act Cap 382	Ministry of Tourism	Tourism development in an area

Chapter

5

STAKEHOLDER ANALYSIS AND INVOLVEMENT

Stakeholders Analysis

In the Lake Naivasha Basin there are five categories of stakeholders; government institutions, national and international NGOs/Organizations, Local Civil Society Organizations, Private sector organizations and Research Organizations. Government institutions include Ministries, Departments and Parastatals that have legal mandate and responsibility to manage various components of natural resources. National and international NGOs/Organizations are institutions which operate at both national and international levels and provide capacity support to the local institutions in the management of the natural resources

Local Civil Society Organizations (CSOs) are groups which are registered as Self Help Groups (SHGs), Community Based Organizations (CBOs) and local Non Governmental Organizations (NGOs). There are close to eighty (80) civil society organizations operating within the Lake Naivasha basin. Their areas of concern include natural resources management, development of alternative community livelihood, capacity building, governance and democracy, advocacy, water and sanitation etc. Key CSOs are shown in the table below;

Majority of Private Sector Organizations are using natural resources or products for processing into goods and services which are used for commercial and business purposes. The natural resources range from aesthetic landscape, water, wildlife, bees, butterflies, forests, timber, medicinal herbs, pasture, energy, fisheries and genetic resources. The stakeholders in the table below have been participating in natural resource management within Lake Naivasha basin:

	Government Institutions
	Provincial Administration– together with the DDC and District Environment Committee
	Ministry of Lands and Settlement
	Ministry of Environment and Mineral resources –together with NEMA
	Ministry of Water and Irrigation together with WRMA and WSB
	Ministry of Agriculture–together with KARI
	Ministry of Forests and Wildlife– together with Kenya Forest Service and Kenya Wildlife Service
	Ministry of Fisheries Development—together with KEMFRI
	Ministry of Local Government
	Ministry of Tourism—together with the Tourism Department and Kenya Tourism Board
	Ministry of Energy– together with KenGen and the IPPs
	Ministry of Livestock development
	Ministry of Public Health
	National Museums of Kenya
	Ministry of Industrialization
	National Environment Management Authority (NEMA)
	National and International NGOs/Organizations
	Green Belt Movement
	World Wide Fund for Nature (WWF)
	Wetlands International
	SNV
	World Vision
	Nature Kenya
	Care Kenya
	International Union for Conservation of Nature (IUCN)
	GiZ
	Alliance for Water Stewardship
	RECONCILE
	Elsamere Conservation Trust
	SELF–HELP Africa
	Water and Sanitation for the Urban Poor (WSUP)
	Earth Watch
	UNEP

African Network of Animal Welfare (ANAN)
Local Civil Society Organizations (CSOs)
Naivasha Civil Society Organizations Forum (CSOs Forum)
Lake Naivasha Riparian Association (LNRA)
Naivasha Watershed Conservation and Management Programme (NAWACOMP)
Lake Naivasha Conservation and Development Forum (LNCDF)
Kinangop Birds Conservation center.
Lake Naivasha Friends of Environment
Indigenous Biodiversity Environmental Conservation Association (IBECA)
Nature and People Network (NAPNET)
12 Water Resource Users Associations (WRUAs)
4 Community Forest Associations (CFAs)-
Beach Management Unit (BMU)
Lake Naivasha Tourism Group (LNTG)
Center for Pastoralist Development (CEPAD)
Environmental Clubs/Groups—in local schools and colleges
Wildlife Clubs of Kenya Groups-in local schools and colleges
Environmental Training/Educational Organizations – e.g. Elsamere Education Center
Small scale farmers
Private Sector Organizations
Lake Naivasha Growers Group (LNGG) and Individual Commercial Flower Growers/Horticultural who are not members of LNGG
International horticulture and flower markets (standards and demands) –Holland, Great Britain, Germany, Italy, USA etc
Nakuru Wildlife Conservancy (NWC)
Commercial Livestock Ranchers–Beef and Dairy farmers
Tour Transport Operators
Tourist Hotel operators
Naivasha Water and Sanitation Company (NAIVAWASS)
KenGen and Independent Geothermal Power Producers (IPPs)
Industrialists i.e. Keroche and the units in Naivasha town
Kenya Chamber of Commerce
Kenya Creameries Cooperative (KCC)

Research Organizations
ITC and University of Twente (Netherlands)
Leicester University
Earth Watch
University of West Ontario (Canada)
Egerton University
University of Nairobi
Kenyatta University
Moi University
Kenya Forestry Research Institute (KEFRI)
Kenya Agricultural Research Institute (KARI)
Kenya Marine Fisheries Research Institute (KEMFRI)
Kenya Dairy Research Institute (KEDRI)
Kenya Geothermal Development Company (KGDC)
IDRC–International development for Research Cooperation (Canada)

Roles and Responsibilities of the Stakeholders in the Implementation of This Integrated Management Plan

Ministry of Environment and Mineral Resources

NEMA is the overall management authority mandated to by EMCA 1999 to coordinate, supervises and regulates the management of environment and natural resources. The District Environment committees are the advisory role to NEMA of environmental issues

District Environment Committees DECs/ NEMA

This committee is responsible for proper management of environmental issues in the districts as stipulated in EMCA 1999.

The Role of DEC/NEMA in the IMP

The responsibilities of this committee will be to:

- Ensure and support the IMP implementation.
- Ensure gazettement of the plan and provide its link to NEMA.
- Act as an executive organ to ensure all development projects are environmental friendly
- Ensure compliance to all plan regulations and prescriptions.

Ministry of Forest and Wildlife (Kenya Wildlife Services and Kenya Forest Services)

Kenya Wildlife Services

Kenya Wildlife Service will provide technical advice in accordance with the Wildlife Act and Ramsar Convention

Role of Kenya Wildlife Service in the IMP

- Promote Wildlife Conservation and education in the region
- Reduce poaching and trade in wildlife products
- Reduce and ameliorate Human Wildlife Conflict
- Promote and support initiatives to increase wildlife diversity and density in the region
- Promote community wildlife incentive programmes

Kenya Forest Service (KFS)

The role of KFS

The KFS is responsible for conservation and development of forest resources as stipulated in the forest Act. In respect to this IMP, KFS will be responsible for:

- Rehabilitation and conservation of forested areas within the forest
- Controlling forest excision, fires and encroachment
- Support the implementation of forest management plans
- Undertaking forest related education, awareness and extension services
- Providing a lead in forest research, monitoring and conservation
- Promote development of carbon projects (CDM, REDD & REDD+),

Ministry of Water and Irrigation/WRMA/WSBs

The Role of the Ministry of Water and Irrigation/WRMA/WSBs

This Ministry will be responsible for conservation of water resources as stipulated in the Act.

- Ensure protection of water catchment areas
- Capacity building on water conservation.
- Enhance water supply and distribution in the basin
- Monitor and enforce water quality standards.
- Apportion water resources through permits and licenses.
- Ensure gazettement of water catchment areas within the basin.

- Maintain hydrological data and act as custodians of information and database related to water conservation.

Local Authorities within the Basin

The role of Local Authorities

The Local Authorities have the mandate to manage the resources within their jurisdiction. The roles of the authorities in the IMP will be to:

- Ensure ecological health of urban areas through proper planning and management
- Establish network and collaborative linkages with other stakeholders and government departments for the successful implementation of this IMP
- Develop and put in place disaster response mechanisms

District Development Committee (DDC)

The DDC is responsible for coordinating all development and projects within the District

The Role of the DDC:

- Address poverty reduction issues
- Ensure environmental standards are adhered to in development project.
- Coordinate development programmes in the region.
- Promote peace and create conducive environment for investment
- Promote the agenda for infrastructure development in Lake Naivasha basin
- Coordinate and focus the initiatives of CBOs and NGOs towards the goals of this plan

Local Administration

The Local administration represents the central government within the Districts

The Role of local Administration

- Enforce security and environmental regulations within the basin
- Provide an enabling environment for IMP implementation
- Crisis management

Ministry of state for National Heritage and culture

National Museum of Kenya (NMK)

The Role of NMK

- Identify and secure cultural heritage and monuments within the catchment area
- Coordinate research and monitoring of flora and fauna
- Support stakeholders in the development of natural resources database

Ministries of Agriculture

The Ministry of agriculture will be responsible of enhancing of agricultural lands as per the Agriculture Act

The Role of Ministry of Agriculture

- Coordinate agro- based activities to control soil erosion, pollution and siltation.
- Integrate research findings into applied agriculture
- Promote good farming practices

Ministries of Livestock Development

The Ministries of Livestock Development will be responsible for promotion of livestock production as stipulated in the Livestock Act.

The Role of Ministry of Livestock Development

- Promote and coordinate sustainable Livestock production
- Integrate research findings into applied livestock production

Ministry of Fisheries Development

- Promote research through KMFRI
- Promote sustainable capture and culture fish production within the basin

Ministry of Lands and Settlement (MoL&S)

Responsible for defining boundaries as stipulated in the Land Planning Act **Cap 303**

Role of the MoL&S

- Surveying of land for the purpose of this IMP within the basin

Ministry of Public Health

Provides for provision of healthy environment and gives regulation on human health as stipulated in the Public health Act Cap 242

Ministry of Tourism

Kenya Tourism Board (KTB)/Kenya Association of Tour Operators (KATO)

The Role of KTB/KATO

- Promote Tourism Development in the LNB & C
- Market Tourisms facilities in the catchment
- Support stakeholders in connecting LNB & C to a tourist circuit

Ministry of Energy

Kenya Electricity Generating Company (KenGen)

KenGen is charged with managing all public power generation facilities in the country

Role of KenGen

- Manage electrical energy production in the area
- Manage impacts associated with power production
- Explore alternative source of renewable energy e.g. wind.

Institutions of Higher Learning

The Role of Institutions of Higher Learning

- Collaborate with other stakeholders to develop proposals for funding
- Undertake research activities in collaboration with stakeholders.
- Identify plant species that are potentially harmful to the environment
- Assist in monitoring of trends in the catchment.
- Provide technical support to the committee.
- Undertake Training of resource persons and enhance capacity building for specific stakeholders.

Civil Societies Organizations (CSOs), Non-governmental organizations (NGOs) and Community Based Organization (CBOs).

Non-Governmental Organization (NGOs)

The Role of NGOs

- Support in the implementation of conservation and development initiatives

- Collaborate with the committees in operationalizing the plan
- Encourage formation of Community Based Organizations
- Mobilize resources to support implementation of the plan
- Provide networks and linkages between the implementation committee and the grassroots
- Mobilize community support and participation
- Mobilize resources to undertake capacity building(Institutional, education and awareness)
- Participatory development and implementation of Action plans

Imarisha Naivasha Board

The Role of Imarisha Naivasha Board

- Resources mobilization for the implementation of this management plan
- Coordination of the implementation of this management plan
- Coordination of the monitoring and Evaluation of the plan implementation
- Enhancement of the capacity of the participating institutions
- Participatory development and implementation of Action plans

Water Resources Users Associations (WRUAs)

The Role of WRUAs

- Provide networks and linkages between the implementation committee and the grassroots
- Mobilize community support and participation
- Mobilize Resources and undertake education and awareness
- Participatory development and implementation of Action plans

Community Forest Associations (CFAs)

The Role of CFAs

- Provide networks and linkages between the implementation committee and the grassroots
- Mobilize community support and participation
- Mobilize Resources and undertake education and awareness
- Participatory development and implementation of Action plans

Beach Management Unit (BMUs)

Role of the BMUs,

- Provide networks and linkages between the implementation committee and the grassroots
- Mobilize community support and participation in beach clean-ups
- Mobilize Resources to undertake capacity building(Institutional, education and awareness)
- Participatory development and implementation of Action plans

Chapter

6

ZONATION

Management Zones

Rationale for Selection of Management Zones

The Management plan proposes to use the existing local institutional framework in its implementation. The delineation of the management zones have been guided by

(i) the environmental characteristics
(ii) land use practices
(iii) the need for protection and conservation integrity and habitats
(iv) stakeholder interests

Seven Management Zones seeks to accommodate the stakeholder interests and sustainable land utilization for economic, socio-cultural, scenic and biodiversity benefits.

The proposed management zones are:

i. Open waters (lake, dams and rivers)
ii. Riparian buffer zones (along rivers and around Lakes)
iii. Wetlands areas (marshes/swamps)
iv. Protected Areas zone
v. Sustainable utilisation zone
vi. Intensive agricultural zone
vii. Urban and settlement zones

a) Management Zone I: Open Waters (Lake, Dams and Rivers)

This zone includes all lakes, rivers and reservoirs with an open water surface.

i). Purpose

This area should be strictly protected and preserved in near pristine state and should only be used for domestic use, water conservation, wildlife conservation, fishing, tourism (sports and site seeing), research and any other environmentally sustainable activities.

ii). Extent/Boundaries

This zone includes among others the following; lakes, rivers, dams and other reservoirs distributed across the basin. In this zone strict adherence to the provisions of EMCA (1999), on boundaries and extent will apply. All public access routes and buffer strips to all areas under this zone are to remain clear and open in accordance with the Physical Planning Act, EMCA and Survey Act.

iii). Resource Values

The natural resources in this zone include the large volumes of water mass, very diverse assemblage of waterfowl, high potential for recreational sports, untapped tourism potential and fisheries. This zone has high potential for revenue generation through water use levies, environmental friendly-agriculture, tourism and fishery.

iv). Permitted Activities

In this zone, permitted activities include; fishery, tourism and sport activities, controlled water abstraction, nature trails and other ecologically sustainable revenue generating activities should be encouraged. However, any forms of settlements such as campsites should not be allowed in this zone. No infrastructural development should be allowed here and land use around this zone will be vetted.

b) Management Zone II – Riparian Buffer Zones of Rivers, Lakes and Dams

i). Purpose

This area should be strictly protected and conserved so that it can act as a buffer zone to shield water from pollution and other threats arising from unsustainable land use practices. The integrity of this zone should be protected so that the zone will maintain stability to enhance river flow, water quality and quantity and to

reduce erosion and sediment load. These sites may be used for research and education.

ii). Extent/Boundaries

Riparian strips and buffers including all areas on either side of a river, stream, and water reservoir as described in the EMCA (1999), Water Act 2002 and Agriculture Act (Cap 318). .It includes all the riparian zones of all lakes, rivers and their tributaries, dams and reservoirs within the basin.

iii). Resource Values

Natural riparian habitat provides important ecosystem services and is rich in biodiversity. It acts as filter of nutrient loads, reduces river bank erosion, controls siltation, acts as habitat and corridors for wildlife, and habitat for aquatic animals.

iv). Permitted Activities

The riparian zone should be left in its natural state. No infrastructural developments, agriculture, mining, livestock grazing or prospecting should be allowed. Illegal water abstraction activities should be punishable according to the relevant laws. Degraded riparian areas should be rehabilitated by planting indigenous vegetation including trees, shrubs, herbs and grasses. Permitted activities include; recreation, wildlife conservation, research and education.

c) Management Zone III: Wetland Areas (Marshes and Swamps)

i). Purpose

This area should be strictly protected and preserved in near pristine state and should only be used for water conservation, wildlife conservation, Research and education, tourism, sporting and any other environmentally sustainable activities

ii). Extent/Boundaries

This zone includes among others, all swamps and marshes all other areas containing water and not in zone I or II. All relevant laws and regulations that govern sustainable utilization of such habitats will be applicable. Strict adherence to the provisions of EMCA (1999) on boundaries and extent will apply. All public access routes and buffer strips to all areas under this zone are to remain clear and open in accordance with the Physical Planning Act, EMCA and Survey Act.

iii). Resource Values

Wetlands act as reservoirs for water and as sponges against pollutants and flooding. The natural resources in this zone include the large volumes of water in reservoir state, very diverse assemblage of wildlife including waterfowl, with high potential for recreational tourism. The zone also acts as migratory corridors for waterfowl.

iv). Permitted Activities

No infrastructural developments, reclamation or Irrigation should be allowed here. Recreation, research and education and other ecologically sustainable revenue generating activities should be encouraged. However, any form of settlements should not be allowed in this zone.

d) Zone IV: Protected Area Zone

i). Purpose

This zone should be strictly protected and preserved in near pristine state and should only be used for water conservation, wildlife conservation, research, tourism, legal and regulated cultural activities and any other environmentally sustainable activities within the Laws of Kenya.

ii). Extent/Boundaries

This zone includes all government gazetted areas targeting natural resource conservation such as Forest Reserves, Forest conservancies and National Parks. The zone includes most land upwards from the slopes of the Aberdares above the current electric fence line and all such land that fall under similar categories. The zone also includes Eburru Forest, Hell's Gate and Longonot National Parks and Kenya Wildlife Service Training Institute Game Farm. Other holdings that may be included in this category are Kinangop plateau Nature Reserve.

iii). Resource Values

Gazetted Conservation areas are nationally recognized as refuge for biodiversity, and they also acts as important water catchments areas in the Lake Naivasha basin. The natural resources in this zone include large diversity of flora and fauna, large volumes of water in reservoir state and high potential for recreation and tourism.

iv). Permitted Activities

No developments should be allowed within this zone. All activities carried out here are governed by the Wildlife Conservation and Management Act (CAP 376 of 1976), the Forestry Act (2005), EMCA (1999), and Water Act 2002. Tourism, research and education are permitted in these areas as governed under the above legislations.

e) Zone V: Sustainable Utilization Zone

i). Purpose

To ensure land use in this zone is compatible with environmental conservation because they (i) are large enough to practice extensive agriculture leaving natural patches (ii) have potential to accommodate diversity of natural fauna and flora (iii) practice mixed agriculture and conservation and (iv) practice conservation. These establishments should be supported to maintain the environmental friendly production practices.

ii). Extent/Boundaries

This zone includes all privately owned land in the basin with a holding of greater than 10 acres. This is land that may be practicing large scale non-irrigated agribusiness, ranching, pastoralism or any other form of land use that is deemed friendly to conservation. Land under such zones would have natural habitat patches or remnant indigenous vegetation; act as dispersal areas and corridors for wildlife.

iii). Resource Values

These forms of land use create refuges for biodiversity. Sites that contain stone and sand mines also create a resource base and employment for a significant section of local community. Geothermal power is an important natural resource in this zone.

iv). Permitted Activities

All development must be vetted by the relevant government authorities

f) Management Zone VI: Intensive Agricultural Zone:

i). Purpose

This is the zone that is currently occupied by both small scale and large scale farmers and is important for the provision of food production, employment and foreign exchange promotion through agricultural product exports.

ii). Extent/Boundary

This zone is characterized by intensive subsistence agricultural practices and large scale irrigated agriculture. This zone also includes all the area covered by the large scale holdings (>5ha) around Lake Naivasha and small scale holdings (< 5ha) in the middle and upper catchment that practice intensive irrigated or rain fed horticulture. The zone is in rapid expansion at present due high population growth rate and need to provide financial support for the population within the basin.

iii). Resource Values

This zone is important as a source of food, employment, and generation of export products. The zone is also important for research and education.

iv). Permitted Activities

Sustainable development land use practices are permitted here. Developers are required to abide by all legislation requiring duty of care to the environment and sustainable production.

g) Management Zone VII: Urban and Settlement Zone

i). Purpose

This zone is important for human settlement and to facilitate trade, communication and development. This zone is characterized by high density of housing and human population.

ii). Extent/Boundary

All commercial centers, industrial and settlement areas including towns, workers settlements, schools, market centres and all areas of high concentrations and occupation of human population.

iii). Resource Values

This zone is important for housing, communication, trade and development.

iv). Permitted Development

Sustainable development land use practices are permitted here. Developers are however required by law to abide by all legislation requiring duty of care to the environment.

Chapter

7

MANAGEMENT OPTIONS IMPLEMENTATION STRATEGY, INSTITUTIONAL FRAMEWORK, AND PLAN IMPLEMENTATION,

Previous Conservation Initiatives and Planning Considerations

In 1993 the Lake Naivasha Riparian Association (LNRA), an association of land owners around Lake Naivasha, started the process of drawing up a management plan for the lake which was finalized and adopted in 1995. The plan was subsequently gazetted under EMCA (1999) in 2004 through legal Notice No.108 and legal supplement No.39. However, the plan implementation was not effected due to raised concerns.

The prime objective of that plan was to manage human activities around the lake in a sustainable way and ensure the conservation of the lake ecosystem and associated biodiversity.

The main weaknesses in the 2004 Lake Naivasha Management Plan include; -

a) The plan was prepared with the intention to manage the water resources of the lake with marginal consideration for the other parts of the basin.
b) The plan did not clearly define sustainable levels for water abstractions in the lake.
c) The Lake Naivasha Management Implementation Committee (LNMIC) lacked sufficient legitimacy and plan implementation capacity.
d) The LNMIC lacked support of all the stakeholders within the basin.

A number of sub-catchment management initiatives have emerged in the basin in the recent past as highlighted below

i. The Lake Naivasha Water Resource Users Associations Sub-Catchment Management Plans (SCMP), 2011.
ii. Lake Naivasha Basin Water Allocation Plan 2011 - 2014
iii. North Kinangop (Mutarakwa) participatory Forest management plan (2009-2014)
iv. Geta Participatory Forest Management Plan (2009-2014)
v. South Kinangop Participatory Forest Management Plan (2010-2015)
vi. Eburru Forest Management Plan (2008 -2012)

The Geta, North Kinangop and Eburru Community Forest Associations (CFAs) have signed management agreements with the Kenya Forest Service (KFS) that guides the communities in the co-management of the forests.

Management Options

Land within the Lake Naivasha basin is legally owned by Government, local authorities and individuals and this in some instances limits the scope of conservation regimes that can be applied to the whole basin. There are a number of legal options that can be designated. However with regards to the lake (a Ramsar site) and its riparian areas, the legal option that could be used to manage it would be make it into a Protected Natural Environment that promotes the preservation of specific ecological processes, natural systems, natural beauty and species of indigenous wildlife including the preservation of biotic diversity in general. If it could be managed as a National Reserve, the lakes and the riparian areas would exclude human settlement and allow controlled exploitation of natural resources including water accessibility. The net consequence of this arrangement would entail the eviction of illegal settlement and developments and limiting their access to resources. Furthermore, the land tenure system would favour this designation, which could be under a regulatory authority.

This Management Programme is grouped into nine management sectors as follows:

1. Water resources
2. Agriculture and Irrigation
3. Forestry
4. Livestock development
5. Fisheries development
6. Wildlife management

7. Tourism development
8. Energy production
9. Urban development

In the development of the management programmes, care has been taken to ensure that there are explicit and logical links between the vision statement (which sets out the overall goal of the programme), management objectives, and the management strategies to achieve the objectives. Each management programme is discussed in further detail in the following sections:

Management Programmes and Implementation Strategy

1) Water Resources Management

Issues

The key issues associated with water resources management include

- Excess water abstraction
- Siltation of water bodies
- Eutrophication
- Pollution
- Changes in surface and ground water hydrology
- Loss of biodiversity and vegetation cover
- Alteration of drainage patterns.
- Desiccation of soils and Vegetation

Goals

The overall goals of the management are to:

a) Ensure sustainable management and use of water resources within the basin while promoting equitable sharing of water resources
b) Ensure the conservation of the catchment areas to improve on the water quantity and quality

Objectives

i). To enhance implementation of existing regulations to protect the rights of all users,

ii). To promote water use efficiency that is hydrologically and economically beneficial to domestic, agricultural, and industrial water users and the environment.

iii). To identify funding sources to implement water conservation programs that help to enhance water resources

Implementation Strategy: Water Resource Management

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
1.1 Adopt and implement management strategies for surface water resources													
1.1.1 Regulate water use to improve efficiency	WRMA & WRUAs, NAIVAWASS,	X	X	X	X	X	X	X	X	X	X	X	
1.1.2 Implement the Lake Naivasha Basin water allocation plan	WRMA & WRUAs, WATER CO.,	X	X	X	X	X	X	X	X	X	X	X	X
1.1.3 Regulate water abstraction	WRMA, WRUAs, CAAC, CSOs	X	X	X	X	X	X	X	X	X	X	X	X
1.1.4 Develop codes of conduct for water users	WRUAS & WRMA, WSB, WRB, CSOs	X	X	X	X								
1.1.5 Construction of dams/Dykes/weirs	Community, Relevant Govt. Ministries, NGOs, Dev. Partners, NEMA, WRMA, WRUA,									X	X	X	X
1.2 Adopt and implement management strategies for ground water resources													
1.2.1 Regulate Drilling of boreholes and borehole water use	NEMA, MoW&I, WRMA & WRUAs, CAAC,	X	X	X	X	X	X	X	X	X	X	X	X
1.2.2 Promote ground water recharge through afforestation	KENGEN, WRUA, WRMA, NEMA, MoEMR, KFS, CFAs, MoA	X	X	X	X	X	X	X	X	X	X	X	X
1.2.3 Map out ground water conservation areas	WMRA, WRUAs & Relevant research inst., NEMA,	X	X	X	X								
1.2.4 Undertake a basin Hydrological survey to determine quantity and quality of ground water resources	WRMA, Relevant research Inst.	X	X	X	X								
1.2.5 Gazettement of ground water conservation areas	MOW&I, WRMA, NEMA, WRUAs, MoL&S, KWS, Land Owners,					X	X	X	X				
1.3 Implement and enforce regulations for protecting water resources and their catchments													
1.3.1 Enforce protection of headwaters and other water resources	KFS, CFAs, WRMA & WRUAS, KWS, PA, NEMA, CAAC	X	X	X	X	X	X	X	X	X	X	X	X
1.3.2 Enforce regulations on new and existing water abstractions points (surface and ground water)	WRMA, WRUAs, CAAC, PA	X	X	X	X	X	X	X	X	X	X	X	X
1.4 Monitor water abstraction and use													
1.4.1 Enhance water abstraction monitoring system	WRMA & WRUAs, Research institutions,	X	X	X	X								

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
1.4.2 Support the development of an abstraction and water socio-economic survey to determine abstraction levels and demand	WRUAs, NGOs, WRMA. Research Institutions, KWS, PA					X	X	X	X				
1.4.3 Level of standardized installation of water monitoring	WRMA,WRUAs, NGOs	X	X	X	X	X	X	X	X	X	X	X	X
1.4.4 Water budget estimation	MOW&I, WRMA, WRUAs, Research Inst.						X	X	X	X			
1.4.5 Promote water harvesting	Community, NGOs & WRUAs, WRMA,	X	X	X	X	X	X	X	X	X	X	X	X
1.4.6 Awareness creation on wise use of water, monitoring and compliance	WRUAs, CBOs/NGOs, WRMA ,CFAs, KFS	X	X	X	X	X	X	X	X	X	X	X	X
1.5 Monitor water quantity and quality in lake, rivers and reservoirs													
1.5.1 Harmonize and standardize water levels, flows monitoring & data management program	WRMA, KMFRI, FD, LNRA, WRUAs, research Institutions, KENGEN, LNGG, NARWACSO,	X	X	X	X								
1.5.2 Standardize water quality monitoring protocols & parameters	M.C.N, WRMA, KMFRI, FD, NEMA & MoH, WSPs, KWS, WRUAs, Research Inst., IMARISHA	X	X	X	X								
1.5.3 Installation of monitoring gauges and management of the gauges	WRMA, NGOs, WRUAs,					X	X	X	X				
1.5.4 Training of monitors/Data collectors/Inspectors	WRMA, KMFRI, WRUAs, NGOs					X	X	X	X				
1.5.5 Promote proper treatment of effluents to meet set standards	WRMA, NEMA & MOH, Private sector, WRUA. Other Local Authorities, KMFRI, Research Inst., Water Companies, NGOs/CBOs	X	X	X	X	X	X	X	X	X	X	X	X
1.5.6 Monitor water quality indicators (biological and physical-chemical indicators)	KMFRI, FD, KWS, WRMA, WRUAs, RESEARCH Inst.	X	X	X	X	X	X	X	X	X	X	X	X
1.6 Protect, regulate and monitor surface and ground water pollution													
1.6.1 Data Collection (Monthly/quarterly)	WRUA/WRMA KMFRI, Universities & Local Authorities	X	X	X	X	X	X	X	X	X	X	X	X
1.6.2. Map out potential hot spots	Local Authorities ,WRMA, WRUA	X	X	X	X								
1.6.3 Control waste water discharge/ solid waste disposal	Local Authorities , NEMA, Private sector, MoH	X	X	X	X	X		X	X	X	X	X	X
1.6.4 Waste Water Treatment	WRMA, Local Council, WRUA, Water Service Providers, Fish Farmers, BMU	X	X	X	X	X	X	X	X	X	X	X	X
1.6.5 Control pesticides and fertilizers use	Min of Agr, PCPB/ KEPHIS	X	X	X	X	X	X	X	X	X	X	X	X

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
1.6.6 Afforestation to reduce erosion and storm flow.	KFS, WRUAS, Community & NGOs, KENGEN, IMARISHA, KWS, MoEMR	X	X	X	X	X	X	X	X	X	X	X	X
1.6.7 Promote best farming practices	MoA, Farmers, WRUA, Sectoral Associations	X	X	X	X	X	X	X	X	X	X	X	X
1.6.8 Conserve and protect the riparian land vegetation/buffer zones along lake shores and riverine	MoL&S, CBOs/NGOs, LNRA & WRUAS, MoA , NEMA, KWS, Local Authorities , WRMA, IMARISHA, LNGG	X	X	X	X	X	X	X	X	X	X	X	X
1.6.9 Promote best land use practices	MoA, NEMA, WRUAs, IMARISHA, MoL&S, WRMA, Local Authorities , CBOs/NGOs/CSOs	X	X	X	X	X	X	X	X	X	X	X	X
1.6.10 Rehabilitation of catchments areas	Community, WRUAs, CBOs/CSOs/ NGOs, CFAs, KFS, WRMA, WSB, KWS. M0W&I	X	X	X	X	X	X	X	X	X	X	X	X
1.7 Rehabilitate degraded riparian areas to enhance buffering capacity													
1.7.1 Restoration of degraded riparian areas	PROVINCIAL ADMIN. Min. of agri., WRMA KWS, KFS, LNGG, LNRA	X	X	X	X	X	X	X	X	X	X	X	X
1.7.2 Demarcation of riparian areas	NEMA, WRMA, Provincial Adm, MoA, LNRA, WRUAs, KWS, LNGG	X	X	X	X								
1.7.3 Gazettement of riparian land as conservation area	Min of Env & MoA, WRMA, Local Authorities					X	X	X	X				
1.7.4 Enforcement of Laws relevant to riparian lands	MOW&I, WRMA, NEMA, KWS, MoA	X	X	X	X	X	X	X	X	X	X	X	X
1.7.5 Advocacy for the conservation of riparian areas	MoA, CSOs, NGOs	X	X	X	X	X	X	X	X	X	X	X	X
1.7.6 Repossess grabbed or encroached riparian areas	PA, Judiciary, NEMA, WRUA, KACA, MoA, KWS									X	X	X	X
1.8 Promote and support incentives to conserve riparian vegetation													
1.8.1 Sensitization and Awareness programs	WRUAs, KWS, LNGG, WRUA, MoA, WRMA, NWC, NMC, LNRA, IMARISHA , Local Authorities	X	X	X	X	X	X	X	X	X	X	X	X
1.8.2 Promote sustainable use of riparian products	Dev. Partners, IMARISHA, KWS, LNGG, WRUA, MoA, WRMA, NWC, NMC, LNRA	X	X	X	X								
1.8.3 Promote IGAs to reduce pressure on riparian areas	Min. of Envi., KWS, LNGG, WRUA, MoA, WRMA, NWC, NMC, LNRA, IMARISHA	X	X	X	X	X	X	X	X	X	X	X	X
1.8.4 Provide incentives such as PES for farmers who set aside riparian vegetation for conservation	Min. of Envi., KWS, LNGG, WRUA, MoA, WRMA, NWC, NMC, LNRA, IMARISHA				X	X	X	X					

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				**Y2 (2014/18**				**Y3 2018/22**			
1.8.5 Encourage community participation in the management of riparian areas	Min. of Envi., KWS, LNGG, WRUA, MoA, WRMA, NWC, NMC, LNRA, IMARISHA				X	X	X	X	X	X	X	X	X
1.9 Upscale riparian zone rehabilitation programmes in the LNB													
1.9.1 Replace exotic riparian vegetation with native vegetation	WRUAs, Land Owners, IMARISHA, WRMA					X	X	X	X	X	X	X	X
1.9.2 Demarcate riparian boundaries	GoK/Land Owners, WRUAs, WRMA	X	X	X	X								
1.9.3 promote soil and water conservation measures	WRUAs, MoA, MoW&I,	X	X	X	X	X	X	X	X	X	X	X	X

2) Agriculture and Irrigation

Issues

The key issues associated with agriculture and irrigation include: -

- Soil erosion
- Deforestation
- Pollution of soils and water
- Changes in hydrology
- Loss of vegetation cover and biodiversity
- Destruction of wildlife habitats.
- Eutrophication
- Water use conflicts.
- Increased run-off, siltation of water courses and water bodies,

Overall goal

To develop strategies and management guidelines that promote sustainable agriculture while safe guarding environmental goods and services.

Objectives

i). Develop an Irrigation Master Plan for the basin

ii). Enhance sustainable agricultural practices that promote environmental conservation and food security

iii). Enhance water availability for small and large scale Irrigation by adopting water harvesting and storage technologies

iv). Promote crop diversification and appropriate technologies to increase resilience to climate variation

Implementation Strategy: Irrigation and Agriculture Management

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
2.1 Ensure adequate supplies of irrigation water for agricultural production													
2.1.1 Maintain and improve water quality & quantity for use in irrigation	WRMA, WRUA, Farmers, National water cooperation & pipeline, MOW&I, MoA, WWF, RECONCILE, NWC(relevant in tourism/wildlife), NAIVAWASS, Local Authorities , NEMA	X	X	X	X	X	X	X	X	X	X	X	X
2.1.2 Protection and Improvement of catchment areas to ensure water supply	WRMA, WRUAs , MoA, WWF, KFS, CFAs, NEMA	X	X	X	X	X	X	X	X	X	X	X	X
2.1.3 Training communities in agricultural production	MoA, , MoFD, MoL MOW&I, KARI, WWF, WORLD VISION, CDN, SHDI, NAWACOMP	X	X	X	X	X	X	X	X	X	X	X	X
2.1.4 Construction of water reservoirs, dams, pans, boreholes, de-silting of dams	National Water Co. & Pipeline, World Vision, MoA, MOW&I, Farmers, Davis & Shirtliff, CDN, WWF	X	X	X	X	X	X	X	X				
2.1.5 Promote efficient irrigation technologies	MoA, MOW&I, KARI, HORT IPRO, AMIRAN,	X	X	X	X								
2.1.6 Undertake baseline water quality and quantity assessments	WRMA, MOW&I, WRUA, WWF, MoA, LNGG, LNRA, NEMA	X	X	X	X								
2.1.7 Install water meters at all abstraction points throughout the catchment	WRMA, WRUAs, NGO	X	X	X	X								
2.1.8 Develop a code of conduct for water users	WRMA, WRUAs, NGO	X	X	X	X	X	X						
2.1.9 Monitoring and evaluation of water abstraction	WRMA, WRUAS, MOW&I,	X	X	X	X	X	X	X	X	X	X	X	X
2.1.10 Promote construction of wetlands for waste water treatment	NEMA, KWS, LNGG, MoA, WWF, WRUAS,	X	X	X	X	X	X	X	X				
2.1.11 Promote recycling of waste water	LNGG, NEMA, L. Naivasha Tour Operators Group, LNRA, COOPERNIC	X	X	X	X	X	X	X	X				
2.2 Promote sustainable small - scale household irrigation technologies in the catchment													
2.2.1 Promote small scale water efficient irrigation technologies	FARMERS, MoA, WRUAS, WWF, World Vision, SHDI, MOW&I, KARI,	X	X	X	X	X	X	X	X				

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
2.2.1 Promote water storage facilities	WWF, Min of water & Irrigation, MoA, World Vision,	X	X	X	X	X	X	X	X				
2.2.2 Develop guidelines for efficient irrigation systems	MoA, MOW&I, NIB	X	X										
2.2.3 Water recycling at small scale level	MoA, MOW&I, Communities, WRMA, WRUAs,	X	X	X	X								
2.2.4 Promote Mulching in agricultural farm lands	MoA, Farmers	X	X	X	X								
2.2.5 Promote Environmental friendly green houses	Amiran, MoA, Public Health, NEMA, KEBS, KEPHIS	X	X	X	X	X	X	X	X	X	X	X	X
2.2.6 Promote efficient irrigation systems	MoA, MOW&I, NIB	X	X	X	X	X	X	X	X	X	X	X	X
2.2.7 Formation of cooperatives & Linking farmers to micro-finance institutions	MoCD, AFC, NCPB, Banks,	X	X	X	X	X	X	X	X				
2.3 Develop an Irrigation master plan for the basin													
2.3.1 Map/geo-reference suitable areas for irrigation	MOW&I, WRMA, WRUAs, MoL&S, MOP, NEMA, NMC, LNGG, CSOs, Donors, MoA, DRSIS,	X	X	X	X								
2.3.2 Undertake land Use planning & zonation	MOW&I, WRMA, WRUAs, MoL&S, MOP, WWF, MoA	X	X	X	X								
2.3.3 Undertake environmental impact assessments & audits	MoA, NEMA, Communities	X	X	X	X	X	X	X	X	X	X	X	X
2.4 Promote technologies for dry land farming													
2.4.1 Promote efficient water use technologies and conservation	MoA, MoW&I, WRMA, WRUA, KARI	X	X	X	X	X	X	X	X				
2.4.2 Reclamation & restoration of degraded land	MoE, MoA, KFS, WRMA	X	X	X	X	X	X	X	X	X	X	X	X
2.4.3 Promote drought tolerant and appropriate crops varieties	MoA, Seed Growers, KARI	X	X	X	X	X	X	X	X	X	X	X	X
2.4.4 Promote crops rotation	MoA. Kenya Seed, MoA,	X	X	X	X	X	X	X	X	X	X	X	X
2.4.5 Promote soil conservation technologies including agro-forestry	MoA ,WRMA, Farmers , KEFRI, ICRAF	X	X	X	X	X	X	X	X	X	X	X	X
2.5 Promote efficient use of farm inputs													
2.5.1 Strengthen Public/ Private / Farmer Linkages	Farmers, MoA, WRMA, PCPB, KEPHIS, NCPB, LNGG, WRUAS, LNRA,	X	X	X	X	X	X	X	X	X	X	X	X

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
2.5.2 Provide extension services (capacity building on organic farming, proper use of chemicals and fertilizers)	Farmers, MoA, WRMA,	X	X	X	X	X	X	X	X	X	X	X	X
2.5.4 Enforce use of approved agricultural chemicals and fertilizers	MoA, KEPHIS, PCPB, NEMA	X	X	X	X	X	X	X	X	X	X	X	X
2.6 Upscale the payment for environmental services program on the entire catchment													
2.6.1 Upscale soil and water conservation structures in the entire basin	Dev. Partners, WWF, LNGG, CARE Kenya, WRUA, LNRA, WRMA ,MoA	X	X	X	X	X	X	X	X	X	X	X	X
2.6.2 Capacity building for implementation of PES to farmers	Communities, Min of Agric. LNRA, LNGG, WWF,	X	X	X	X	X	X	X	X	X	X	X	X
2.6.3 Resource mobilization for incentives to farmers	WWF, CARE Kenya, LNGG, WRMA, WRUAs	X	X	X	X	X	X	X	X				
2.6.4. Improve marketing linkages of produce from farmers under PES program	Investors, LNGG, Min of Agri., Kenya Flower Council. COPANNIC					X	X	X	X	X	X	X	X
2.7 Develop an invasive species control strategy for the LNB													
2.7.1 Identify the invasive species and their impacts on the environment and livelihoods	KARI, KWS, WWF, KEMFRI, KEFRI	X	X	X	X	X	X	X	X				
2.7.2 Map out the areas affected by invasive species	KWS, KARI, KEPHIS, WWF, KEMFRI, KEFRI	X	X	X	X								
2.7.3 Develop and implement an invasive species management strategy	Fisheries, NEMA, KWS, MoA, WRMA, KARI,.KEFRI,.KEMFRI	X	X	X	X	X	X	X	X	X	X	X	X
2.8 Adopt best management practices appropriate to all land uses throughout the catchment													
2.8.1 Enhance use of appropriate farming practices – soil conservation measures, agro-forestry, organic farming etc	Farmers, Min of Agric., WRUAS, CFAS, KFS	X	X	X	X	X	X	X	X	X	X	X	X	
2.8.2 Develop and implement land use plan/zonation in the catchment	Min. of Agri, Min of Forestry, KWS, Min of Land, WWF, Min of Env	X	X	X	X	X	X	X	X					
2.8.3 Monitor and regulate on- farm practices within the horticultural sector	NEMA, MoA, KEPHIS, LNGG ,HCDA	X	X	X	X	X	X	X	X	X	X	X	X	
2.8.4 Advocacy on sustainable land use practices	MoA, Naivasha CSO Forum, WRUAS, NEMA, KFS	X	X	X	X	X	X	X	X	X	X	X	X	

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*												
		Y1 (2012/4				Y2 (2014/18					Y3 2018/22			
2.8.5 Develop best practices guidelines for key land use activities in the catchment	Min of Land & Agri, WWF, Min of Livestock, KWS	X	X	X	X									
2.8.6 Encourage Use of alternative energy sources	Min of Agric, Min of Energy, WWF, World Vision, RECONCILE, NAWACOMP	X	X	X	X	X	X	X	X	X	X	X	X	
2.9: Implement integrated catchment management principles														
2.9.1 Build capacity for integrated catchment management at community and institutional levels	WWF, IMARISHA, KWS, MoEMR	X	X	X	X	X	X	X	X	X	X	X	X	
2.9.2 Monitor the implementation of the integrated management principles	WWF, IMARISHA, KWS, MoEMR	X	X	X	X	X	X	X	X	X	X	X	X	
2.10: Protect and reclaim encroached riparian areas.														
2.10.1 Enforce existing laws and regulations	NEMA, AGRI., WRUAS, CFAS, Community, KWS, KFS	X	X	X	X	X	X	X	X	X	X	X	X	
2.10.2 Sensitization of community riparian land protection	DEV. PARTNERS, WRUAS, CFAS, Media,	X	X	X	X	X	X	X	X	X	X	X	X	
2.10.3 Rehabilitation of degraded riparian areas.	NEMA, MoA., WRUAS, CFAS, Community, KWS, KFS	x	x	x	x	x	x	x	x	x	x	x	x	

3) Forestry Development

Issues

The key issues associated forestry development include;

- Deforestation including Illegal logging
- Overgrazing
- Forest fires
- Planting of unsuitable tree species
- Encroachment of forest ecosystems
- Lack of alternative sources of energy
- Charcoal burning
- Inadequate enforcement of forest laws and regulations

Goals

The overall goal of the forestry programme is to conserve and manage gazetted and on-farm forestry resources within the basin

Objective

To increase forest cover for enhanced ecosystem service provision within the basin.

Implementation Strategies: Forestry

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				**Y2 (2014/18**				**Y3 2018/22**			
3.1: Build capacity on agro-forestry practices													
3.1.1 Enhance extension services to farmers	KFS, MoA	X	X	X	X	X	X	X	X	X	X	X	X
31.2 Training on agro forestry skills	KFS, MoA	X	X	X	X								
3.1.4 Promote the appropriate agro-forestry species and diversify	KEFRI, KFS	X	X	X	X	X	X	X	X	X	X	X	X
3.2: Promote on-farm forestry													
3.2.1 Encourage the establishment of woodlots to supply domestic energy needs	KFS, CFA, Farmers, WRUA	X	X	X	X	X	X	X	X	X	X	X	X
3.2.2 Establish community tree nurseries for afforestation programs	Community KFS, CFA, Farmers, KEFRI, WRUA	X	X	X	X								
3.2.3 Promote alternative energy sources e.g. solar, wind and biogas	Min. of Energy, KFS, Community, Universities, KARI, MoA	X	X	X	X	X	X	X	X	X	X	X	X
3.2.4 Promote IGAs e.g. ecotourism, bee keeping, butterfly farming, aquaculture	MoA, MoT, KFS, MoLD, SME Institutions	X	X	X	X	X	X	X	X	X	X	X	X
3.3 Strengthen the management of State Forests													
3.3.1 Strengthen the capacity of the Kenya Forest Service to carry out their mandate	Maisha Bora, MoF&W, WWF, NWC, Save the Mau Trust, LNGG,	X	X	X	X								
3.3.2 Strengthen the capacity of the community forest Associations, to implement Forest management agreement	CFA, IMARISHA, KFS (MoF&W), Dev. Partners	X	X	X	X	X	X	X	X				
3.3.2 Step up rehabilitation of degraded sites	KFS, WWF, NWC, Save the Mau , CFAs, TRUST, LNGG, Self Help Africa, World Vision	X	X	X	X	X	X	X	X	X	X	X	X
3.3.3 Enhance the capacity of Government officials, NGOs, CFAS, local communities and entrepreneurs to tap a range of forestry incentive schemes initiatives e.g. REDD +, Green Climate Fund and Carbon Trading	KFS/UNDP, KFWG, WWF, Save the Mau Trust,	X	X	X	X	X	X	X	X	X	X	X	X

4) Livestock Development

Issues

The key issues associated with livestock development include

- Loss of vegetation cover
- Soil erosion
- Pollution of water sources
- Spread of livestock diseases
- Poor livestock breeds
- Overstocking beyond carrying capacity
- Pastoral conflicts
- Land fragmentation

Goal

The overall goal of the livestock programme is to enhance sustainable livestock production and reduce impacts of livestock on environment within the basin

Specific Objectives

The livestock management programme will have the objectives:-

i). To improve livestock production through promotion of advanced livestock breeds and apportionment of the required daily nutrient uptake for different zones in the basin.

ii). To strengthen market linkages for livestock and livestock products.

iii). To promote proper use and management of livestock chemicals.

Implementation Strategy: Livestock Development

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
4.1 Improved selection of livestock breeds for different zones in the basin.													
4.1.1 Community education on livestock management	MoLD, CSOS, Farmers, Ranchers, Pastoralists, 4K Club, KARI, KENGEN	X	X	X	X	X	X	X	X	X	X	X	X
4.1.2 Exchange visits to other areas	MoLD, NGOs, CBOs Farmers, KARI		X				X					X	
4.1.3 Enhance livestock extension services to local farmers	MoLD, Farmers, companies involved in livestock products, KARI	X	X	X	X	X	X	X	X	X	X	X	X
4.1.4 Selection of high yield disease resistant breeds	Min of Livestock, Farmers, Pastoralists, KARI, NGOs, CBOs	X	X	X	X	X	X	X	X	X	X	X	X
4.2 Promotion of markets for livestock products													
4.2.1 Undertake livestock supply and market survey	MoLD, CSOs, Farmers, Ranchers, Pastoralists, Local councils, KMC, Export and slaughter houses	X	X	X	X	X	X	X	X	X	X	X	X
4.2.2 Enhance coordination amongst value chain actors	MoLD, Farmers, NGOs ,CBOs, Public Health, KCC	X	X	X	X	X	X	X	X	X	X	X	X
4.2.3 Promote value addition	MoLD, Pastoralists, KENYA Livestock Traders Org., Private Cos. in dairy and Beef, KARI, NGOs, CBOs	X	X	X	X	X	X	X	X	X	X	X	X
4.2.4 Encourage cooperative society/movement approach	MoLD, Kenya Livestock Traders Org, NGOs, CBOs. MoCD ,	X	X	X	X	X	X	X	X	X	X	X	X
4.2.5 Enforcement of livestock marketing/movement laws	MoLD, Local Authorities	X	X	X	X	X	X	X	X	X	X	X	X
4.2.6 Support marketing infrastructure development	Local Council, Pastoralists, MoR	X	X	X	X	X	X	X	X	X	X	X	X
4.3. Building capacities for communities to practice sustainable livestock production													
4.3.1 Promoting participatory research and linkages with farmers	MoLD, CSOs, Farmers, Ranchers, Pastoralists, KARI, Private Sector	X	X	X	X	X	X	X	X	X	X	X	X
4.3.2 Capacity building on Livestock and pasture management	MoLD, MoA , Dev. Partners	X	X	X	X	X	X	X	X	X	X	X	X

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
4.3.3 Sensitization and adoption of improved technologies in livestock production (Zero grazing, paddocking, AI services)	Livestock owners , MoLD, KARI, MoA, Private Sector	X	X	X	X	X	X	X	X	X	X	X	X
4.3.4 Promote information sharing amongst sectoral players	MoLD, CSOs, Farmers, Ranchers, Pastoralists, KARI, Private Sector	X	X	X	X	X	X	X	X	X	X	X	X
4.3.5 Educating the communities on the dangers of cross border movements to avoid transfer of diseases	PASTORALISTS, Veterinary Dept., MoLD, NGOs, CBOs, MoA and Private Sector	X	X	X	X	X	X	X	X	X	X	X	X
4.4 Enhancing pasture and water supply for livestock production													
4.4.1 Promote paddocking for pasture regeneration	MoLD, CSOs, Farmers, Ranchers, Pastoralists	X		X		X		X		X		X	
4.4.2 Promote land consolidation	Community Land Boards, CBS, County Land boards, Land Adjudication Settlement Officers, land and settlement Boards.	X	X	X	X	X	X	X	X	X	X	X	X
4.4.3 Promote optimal stocking rates within the carrying capacity	Pastoralists, Farmers, MoLD, Veterinary Dept	X	X	X	X	X	X	X	X	X	X	X	X
4.4.4 Rehabilitation and servicing of boreholes, wells & springs for water supply	Min of Water, WRUA, WRMA, Private Sector, NGOs, CBOs	X					X				X		
4.4.5 Establish and facilitate conflict resolution mechanisms	WRUAs, Community Leaders, Land Control Board, District Adjudication Officers, local Government , NGOs, Provincial Administration	X	X	X	X	X	X	X	X	X	X	X	X
4.4.6 Enforce livestock management laws	MoLD, Provincial Administration ,	X	X	X	X	X	X	X	X	X	X	X	X
4.4.7 Promote processing conservation, storage and use of feeds for livestock during the dry season	MoLD, MoA.		X	X			X	X			X	X	
4.5 Regulate direct access, grazing and watering of livestock in riparian zones and forests													
4.5.1 Strengthen the resource user's institutions	WRUAs, CFAs, organized CBOs, WRMA, Line ministries.	X			X			X				X	
4.5.2 Providing water for livestock at designated points	WRUA, PRIVATE SECTOR, pastoralists, local community, Development partners,			X				X					

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				**Y2 (2014/18**				**Y3 2018/22**			
4.5.3 Identify and manage corridors to be used in access to the water resources to minimize direct grazing in the riparian areas	Min of Livestock, Min of water, NEMA, WRUAS, other regulating bodies, KWS , Fisheries, community, local government, Private Sector		X				X				X		
4.5.4 Identify and manage access routes to the forest grazing zones	Min of Livestock, CFAs, KFS, KWS , NEMA												
4.5.5 Development of alternative water sources (e.g. water pans, water harvesting, and boreholes)	Min of livestock, Min of water & irrigation, WRMA, NGOs, CBOs, Private sector			X			X			X			
4.6. Promote environmental sound use of livestock chemicals.													
4.6.1 Training and educating of livestock owners on proper locations & use of chemicals in livestock health control	Min of livestock, NGOs, CBOs, Private sector, local communities, Min of Health,	X	X	X	X	X	X	X	X	X	X	X	X

5) Fisheries Development

Issues

The key issues associated with fisheries development include;

- Overfishing
- Poor fishing methods
- Declining fisheries
- Illegal fishing/poaching
- Encroachment of fish habitats
- Inadequate law enforcement
- Invasive species
- Poor marketing
- Inadequate public participation in Fisheries management
- Low level of adoption of fish farming techniques/aquaculture
- Inadequate capacity (financial, human and Infrastructure) in fisheries management

Goals

The goals of the fishery management programme are as follows:

To develop a sustainable fisheries management strategy for the Lake Naivasha basin comprising of both capture and culture fisheries

Objectives

i). Design and develop sustainable fisheries management strategies

ii). Promote aquaculture to increase fish production as an alternative source of livelihoods

iii). To enhance the institutional capacity in fisheries management

Implementation Strategy: Fisheries Resource Management

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
5.1 Designing appropriate fisheries management strategies													
5.2.1 Survey and establishing regulations to protect fish breeding areas, and the papyrus fringe and landing sites	FD, KMFRI, BMUs, KWS,	X	X	X	X								
5.2.2 Gazettement of existing fish landing sites and establishing additional fish landing grounds	MoFD, BMUs, MoL&S,					X	X	X	X				
5.2.3 Support the restoration of degraded fish breading sites and associated habitat	BMU, FD, KMFRI, KWS, WRUAs, NGOs, WRMA, CBOs	X	X	X	X	X	X	X	X	X	X	X	X
5.2.4 Promote stakeholders participation fisheries Co-management	FD, BMU, KWS, WRMA, Stakeholders	X	X	X	X	X	X	X	X	X	X	X	X
5.2.5 Improve the monitoring tools and strategies.	FD, KMFRI, WRMA	X	X	X	X								
5.2.6 Promote fisheries research to improve knowledge on fishery resources, including the ecology of fisheries and fish habitats	FD, Research Institutions (KWS, KARI, KMFRI, Universities), Fishermen	X	X	X	X	X	X	X	X	X	X	X	X
5.2.7 Protection of fish habitats	MoLD, FD, BMUs, KWS, KMFRI, WRMA, PA, LNGG, LNRA	X	X	X	X	X	X	X	X	X	X	X	X
5.2.8 Strengthen the capacities of the fisheries institutions	MoFD, DEV. PARTNERS, NGOS	x	x	x	x	x	x	x	x	x	x	x	
5.2.9 Review sectoral code of conduct	FD, BMU, NGOs, Private Sector	X	X	X	X								
5.2 Monitoring and collecting data for sustainable fisheries management													
5.2.1 Standardize monitoring and data collection protocols	FD, KMFRI, BMUS, Fish Farmers and Traders, Fishermen	X	X	X	X	X	X	X	X	X	X	X	X
5.2.2 Train data collectors and analysts	FD, KMFRI, BMU, Fish Farmers and Traders, Fishermen	X	X	X	X								
5.2.3 Establishing data collection centres	FD, KMFRI, BMU, Fish Farmers and Traders, Fishermen	X	X	X	X								
5.2.4 Develop data base and information dissemination system	FD, KMFRI, FD, KMFRI, BMU, WRUAs	X	X	X	X	X	X	X	X	X	X	X	X
5.3 Enforcement of fishing regulations within the basin													

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
5.3.1 Control of illegal fishing through Increased monitoring and control surveillance	BMU, FD, KWS, PA	X	X	X	X	X	X	X	X	X	X	X	X
5.3.2 Regulating number of fishers and fishing gear for sustainability	FD, BMU, KWS, KMFRI	X				X				X			
5.3.4 Awareness creation to enhance compliance	FD, BMU, KWS, KMFRI, PA, WRUAs, NGOs,	X	X	X	X	X	X	X	X	X	X	X	X
5.4 Capacity Building of players within the Fisheries sector													
5.4.1 Training of fish farmers, fishermen and traders	MoFD, BMU, NGOs, Dev. Partners,	X	X	X	X	X	X	X	X	X	X	X	X
5.4.2 Support acquisition of appropriate gear	MoFD, BMU, NGOs,	X	X	X	X	X	X	X	X	X	X	X	X
5.4.3 Promote the development of markets and value chains (service providers, value addition, markets and infrastructure)	FD, NGOs, Dev. Partners, Local Authorities , GoK Agencies,	X	X	X	X	X	X	X	X	X	X	X	X
5.4.4 Support mobilization of financial resources to enhance fisheries activities	SACCOs, Banks, Development Partners, GoK Agencies, Private Sector Partnerships.	X	X	X	X	X	X	X	X	X	X	X	X
5.4.5 Enhance awareness creation on fisheries best practices	FD, BMU, NGOs, Public Health, Local Authorities,	X	X	X	X	X	X	X	X	X	X	X	X
5.5 Promote aquaculture to increase fish production													
5.5.2 Train farmers on aquaculture practices	FD, KMFRI, MoA, NGOs, Dev. partners, WRMA, WRUAs	X	X	X	X	X	X	X	X	X	X	X	X
5.5.3 Promote research on aquaculture within the basin	KMFRI, FD, Research Inst.(KMFRI & Universities), Dev. Partners,	X	X	X	X	X	X	X	X	X	X	X	X
5.5.4 Promote extension services among fish farmers	FD, NGOs, MoA, Dev. Partners	X	X	X	X	X	X	X	X	X	X	X	X
5.5.5 Establish market linkages	FD, NGOs, MoA, Dev. Partners, MoT&I	X	X	X	X	X	X	X	X	X	X	X	X
5.6 Promote equitable in access to fisheries resources													
5.6.1 Advocate for improved access to the lake	PA, FD, BMUs, CSOs, MoLD, Private Sector, WRUAs, IMARISHA, WRMA	X	X	X	X								
5.6.2 Mainstreaming gender and disadvantaged groups in fisheries management	FD, BMU, NGOs, Dev. Partners, MoY&G	X	X	X	X	X	X	X	X	X	X	X	X

6) Wildlife Conservation and Management

Issues

The key issues associated with wildlife conservation and management include;

- Human wildlife conflicts
- Over population (lake riparian land around lake Naivasha)
- Land fragmentations
- Poaching
- Encroachment and disconnect of wildlife corridors and dispersal areas
- Inadequate law enforcement
- Weak wildlife policies (in terms of penalties, compensations and incentives)

Goals

To conserve and manage wildlife and their habitats, at optimal and harmonious levels, in order to yield sustainable benefits.

Objectives

i). To enhance community participation in wildlife management while promoting wildlife related economic opportunities

ii). To maintain numerically viable and ecologically functional populations and;

iii). Secure land/habitat for wildlife

Implementation Strategy: Wildlife Conservation and Management

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
6.1 Promote community wildlife conservation practices and enterprises													
6.1.1 Promote game farming and wildlife sanctuaries	KWS, Communities, NGOs , CBOs, Land Owners	X	X	X	X	X	X	X	X	X	X	X	X
6.1.2 Promote benefit sharing mechanisms (incentives) from protected areas	MOF&W, KWS, NGOs , CBOs , Private Sector , Communities	X	X	X	X	X	X	X	X	X	X	X	X
6.1.3 Promote sustainable community based ecotourism	MOF&W, KTB , KWS, NGOs , CBOs & Private Sector , Communities	X	X	X	X	X	X	X	X	X	X	X	X
6.1.4 Build the capacity of communities in wildlife conservation	MOF&W, KWS, NGOs , CBOs & Private Sector , Conservation Education and Training Centres, Communities	X	X	X	X	X	X	X	X	X	X	X	X
6.1.5 Promote in-reach and outreach programs for school groups in conservation areas within the basin.	MOF&W, Ministry of Education , KWS , KFS , NGOs , CBOs ,Land Owners , Private Sector , Communities , Learning Institutions	X	X	X	X	X	X	X	X	X	X	X	X
6.2 Control degradation of wildlife habitats and corridors													
6.2.1 Undertake habitats carrying capacities surveys	MOF&W, MoL&S, KWS , NEMA , NGOs , CBOs , Private Sector , Communities	X	X	X	X								
6.2.2 Secure wildlife corridors	MOF&W, MoL&S, KWS , NEMA , NGOs , CBOs , Private Sector , Communities	X	X	X	X	X	X	X	X				
6.2.3 Creation of buffer zones	MOF&W, MoL&S , KWS , KFS , NEMA , NGOs , CBOs , Private Sector, Local Communities	X	X	X	X	X	X	X	X				
6.2.4 Control habitat carrying capacity	MOF&W, MoL&S, MoA , KWS , NEMA , NGOs , CBOs , Private Sector , Communities	X	X	X	X	X	X	X	X	X	X	X	X
6.3 Conserve wildlife habitats in the wetlands and catchment areas													
6.3.1 Increase patrols and enforcement	KWS, NEMA, KFS , NGOs , CBOs, Private Sanctuaries, Communities	X	X	X	X	X	X	X	X	X	X	X	X
6.3.2 Demarcate & secure the riparian zones & other critical wildlife habitats.	MOF&W, MoL ,County Government , KWS , NEMA , NGOs , CBOs ,Land Owners , Communities	X	X	X	X	X	X	X	X				

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
6.3.3 Develop and implement strategy for conserving and managing the areas	Dev Partners, KWS, NWC, COLANGO					X	X	X	X	X	X	X	X
6.3.4 Promote sustainable livelihood activities by communities	MOF&W, MoL , KWS ,KFS , NEMA , NGOs , CBOs , Private Sector , Communities	X	X	X	X	X	X	X	X	X	X	X	X
6.3.5 Control of invasive alien species	MOF&W, MoLD , KWS , NEMA , NGOs , CBOs , Private Sector, KFS, KEFRI, Research Institutions	X	X	X	X	X	X	X	X	X	X	X	X
6.3.6 Empower local communities to enhance surveillance and law enforcement	MOF&W, MoLD, MoFD, WRMA , KWS , NEMA, NGOs , CBOs, Private Sector, KFS	X	X	X	X		X	X	X				
6.4 Protect endangered, vulnerable and rare fauna and flora													
6.6.1 Protection and management of habitats for endangered, vulnerable and rare fauna and flora	KWS, NEMA, KFS, WRMA, Community	X		X	X	X	X	X	X	X	X	X	X
6.5 Support and promote wildlife conservation in large private and group ranches													
6.5.1 Promote wildlife user rights (incentives)	MOF&W, MoLD , KWS , KFS, NEMA , NGOs , CBOs , Private Sector,					X	X	X	X	X	X	X	X
6.6 Monitor wildlife populations													
6.6.1 Conduct regular resource inventory e.g. game census and water fowl counts	KWS , NMK, DRSRS, Nature Kenya, NGOs , CBOs, Land Owners, Research Institutions	X	X	X	X	X	X	X	X	X	X	X	X
6.6.2 Promote participatory GIS based resource mapping for the basin	KWS , NMK, DRSRS , NGOs , CBOs, Land Owners, Research Institutions	X	X	X	X	X							
6.6.3 Involve local communities in resource inventory	KWS , NMK, NGOs , CBOs, Land Owners, Research Institutions	X	X	X	X	X	X	X	X	X	X	X	X
6.6.4 Establish an information management system (Data Base & Resource Centres)	KWS , NMK, DRSRS , NGOs , CBOs, Land Owners, Research Institutions	X	X	X	X	X							
6.7 Eradicate poaching and illegal possession of wildlife products													
6.7.1 Promote and support education and awareness on the values of wildlife	KWS, MoE, NMK, DRSRS , NGOs , CBOs, Land Owners, Research Institutions & Education Centres	X	X	X	X	X	X	X	X	X	X	X	X
6.7.2 Create a strong anti-poaching and intelligence network among wildlife keepers and community to reduce poaching	MOF&W, KWS, NGOs , CBOs , Communities, Landowners	X	X	X	X	X	X	X	X				

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				**Y2 (2014/18**				**Y3 2018/22**			
6.8 Reduce Human Wildlife Conflict													
6.8.1 Strengthen Kenya Wildlife Service and community relations in HWC reporting and PAC	MOF&W, KWS ,NGOs CBOs, Land Owners, Communities	X	X	X	X	X	X	X	X	X	X	X	X
6.8.2 Employ community wildlife scouts	MOF&W, KWS ,NGOs CBOs, Land Owners , Communities , Training Institutions	X	X	X	X								
6.8.3 Facilitate timely compensation	MOF&W, KWS , Private Sector	X	X	X	X	X	X	X	X	X	X	X	X

7) Tourism Development

Issues

The key issues associated with tourism development

- Concentration of tourism activities around Lake Naivasha (Impact)
- Inadequate communication and marketing capacity of tourism products by local communities
- Inadequate tourism products in the middle and upper catchment except the Aberdare National Park and forests
- Lack of a strong tourism stakeholder forum for the Lake Naivasha basin
- Inadequate tourism infrastructure in the middle and upper catchment

Overall Goal

The overall goal of the tourism programme is to promote sustainable tourism in the basin.

Objectives

i). To develop and diversify tourism products (such as cultural and agri-tourism) coupled with a marketing strategy for the basin

ii). To establish a strong tourism stakeholder forum to advocate for tourism issues within the basin

Implementation strategy: Tourism Development and Management

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
7.1 Promote and improve tourist infrastructure in the catchments (middle and upper)													
7.1.1 Improve tourist road network & Circuits	MOPW, and County Government, KWS, MoT, KHA & KURA, Private Sector	X	X	X	X	X	X	X	X	X	X	X	X
7.1.2 Establish camping, Picnic sites and associated infrastructure (nature trails, canopy walks, board walks)	KWS, CBOS, NGOS, MoT,(CFAs, WRUAs), , Private Investors, Land owners, Communities	X	X	X	X								
7.1.3 Develop Eco- lodges in the vicinity of forests (Eburru, Mau, Kinangop & Aberdares)	KWS, KTB, KFS, CBOs, NGOS, Private Investors, Communities etc	X	X	X	X	X	X	X	X				
7.3 Establish a tourism stakeholders' forum													
7.3.1 Undertake stakeholders consultative and sensitisation meetings	KWS , Ministry of Tourism , NGO's, CBO's, & Private Sector, and Communities	X											
7.3.2 Operationalisation of the forum	KWS, NGOs , CBOs , Private Sector , AG's Office, and Communities	X	X	X									
7.3.3 Capacity building of stakeholders	Ministry of Tourism, KWS , CBOs, NGO's , Private Sector	X	X	X	X	X	X	X	X	X	X	X	X
7.3.4 Promote and support local tourism investments in the catchment	KWS, KFS , KTB ,NGO's ,CBOs ,Private Sector and communities, LNB Tourism Forum	X	X	X	X	X	X	X	X	X	X	X	X
7.4 Develop cultural tourism													
7.4.1 Stimulating cultural and heritage tourism products	Ministry of Tourism , Ministry of Culture and Heritage , KTB , KWS, NGOs , CBOs and Communities, LNB Tourism Forum												
7.5 Develop a marketing strategy for tourism in the catchment													
7.5.1 Develop tourism marketing strategy guidelines	Ministry of Tourism , KTB , KWS , County Government , Land Owners , NGOs , CBOs , Private Sector	X	X	X	X								
7.5.2 Establish Website & other appropriate information materials for marketing	Ministry of Tourism , KTB , County Government , KWS , KFS , Land Owners , NGOs , CBOs , Private Sector	X	X	X	X	X	X	X	X	X	X	X	X

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				**Y2 (2014/18**				**Y3 2018/22**			
7.5.3 Identify target tourist sources, their needs and aspirations	Ministry of Tourism , KTB , KWS , KFS , NGOs , CBOs ,Ministry of Information , Media, Local Investors,	X	X	X	X	X	X	X	X				
7.5.4 Conduct an analysis of tourism value chain to determine contacts and actors.	Ministry of Tourism , KTB , KWS , KFS , NGOs , CBOs ,Local Investors, Communities	X	X	X	X								
7.5.5 Capacity building on marketing strategies	Ministry of Tourism , KWS ,KTB , County Government , Land Owners , NGOs , CBOs , Private Sector, Communities	X	X	X	X	X	X	X	X	X	X	X	X
7.5.6 Conduct stakeholders meetings to adopt the tourism strategy guidelines	Ministry of Tourism ,KWS , KTB , County Government , Land Owners , NGOs , CBOs , Private Sector	X	X	X	X								

8) Energy Production

Issues

The key issues associated with energy production

- Impact of geothermal power stations
- Water abstraction,
- Environmental pollution (air, water, noise, odour)
- Alteration of environment
- Excessive use of biomass fuel (fuel wood and charcoal)
- Low adoption of renewable energy e.g. solar, wind and biogas energy

Goals

To promote sustainable production and use of renewable energy (geothermal, wind, bio-gas, solar) in Naivasha basin

Objectives

i). To promote greater focus on clean energy through adoption of diversified renewable energy sources and technologies

ii). Reduce the impacts of energy production in the Naivasha basin especially on water resources, biodiversity and atmosphere.

Implementation Strategy: Energy Production

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				Y2 (2014/18				Y3 2018/22			
8.1 Promote alternative renewable energy technologies at household level													
8.1.1 Identify appropriate renewable energy technologies for the area	MoA, GiZ, IMARISHA, CFAs, CSOs, WWF												
8.1.2 Undertake household energy needs survey	MoA, GiZ, IMARISHA, CFAs, CSOs, WWF												
8.1.3 Undertake capacity building on renewable energy	MoA, GiZ, IMARISHA, CFAs, CSOs, WWF												
8.1.4 Support transfer of viable renewable energy technologies	MoA, GiZ, IMARISHA, CFAs, CSOs, WWF												
8.2 Promote alternative renewable energy technologies at Industrial level													
8.2.1 Promote large scale wind energy production	KenGen												
8.2.2 Promote large scale biogas production and use within the large scale farms	Growers, IMARISHA												

9) Urban Development

Issues

The key issues associated with urban development include;

- Increased production of liquid and solid wastes.
- Poor waste water and sewage management.
- Urban floods due to poor drainage
- Unplanned settlements/informal settlement
- Poor infrastructure for social and economic development (housing and roads)
- Increased human population
- Increased pressure and competition of resources (environment, social amenities)
- Increased demand for water resources, declining supply and poor management
- Limited exploitation of alternative sources of energy

Overall Goals

To ensure sustainable urban development in the Naivasha basin

Objectives

i). To develop and implement sound urban planning for the urban centres
ii). To develop and implement a comprehensive integrated waste management plan
iii). To improve water supply / distribution
iv). To improve and provide appropriate infrastructure (roads, housing and markets)

Implementation Strategy: Urban Development

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				**Y2 (2014/18**				**Y3 2018/22**			
9.1 Develop and implement sound urban planning for the urban centres													
9.1.1 Review the physical plan /zoning by- laws through stakeholder participation	Town Physical Planners; Local Authorities; All Counties(Market & Rural Centres)	X	X	X	X								
9.1.2 Enhance the capacity of the planning office to implement the physical plan	Town Physical Planners; Local Authorities; All Counties(Market & Rural Centres)	X	X	X	X	X	X	X	X	X	X	X	X
9.1.3 Ensure compliance and enforcement of zoning by-laws	Local Authorities; DEC	X	X	X	X	X	X	X	X	X	X	X	X
9.1.4 Promote public participation in urban plans implementation	DEC, Local Authorities	X	X	X	X	X	X	X	X	X	X	X	X
9.2 Develop and implement a comprehensive integrated waste management plan in all urban centres													
9.2.1 Designate and secure dumpsites	Local Authorities; NEMA, & Private Companies	X	X	X	X								
9.2.2 Establish well maintained treatment sewage systems	NEMA, Local Authorities; Water Service Providers	X	X	X	X								
9.2.3 Put up litter bins around the urban centres for solid waste	Municipal Council of Naivasha, other Corporate Bodies	X	X	X	X								
9.2.4 Establish private sector solid waste management (e.g. youths, CBOs, Individuals)	Local Authorities , Min of Youth, MoGCSD	X	X	X	X								
9.2.5 Enhance capacity of Local Authorities in waste management	NEMA, Local Authorities	X	X	X	X	X	X	X	X	X	X	X	X
9.2.6 Promote clean – up campaigns	CSOs, Schools, Local Authorities; Business Community	X	X	X	X	X	X	X	X	X	X	X	X
9.2.7 Install Incinerators for hazardous wastes	Local Authorities	X	X	X	X								
9.2.8 Enhance the capacity of entrepreneurs to start waste management businesses e.g. recycling, composting and, incineration	MoEMR, Local Authorities	X	X	X	X	X	X	X	X	X	X	X	X
9.2.9 Ensure compliance and enforcement of waste management regulations	NEMA, Local Authorities; MoPH&S	X	X	X	X	X	X	X	X	X	X	X	X

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				**Y2 (2014/18**				**Y3 2018/22**			
9.3 Promote urban forestry													
9.3.1 Awareness creation on urban forestry	KFS, NMC, School, Business Community	X	X	X	X	X	X	X	X	X	X	X	X
9.3.2 Develop and initiate urban forestry program	KFS, Local Authorities , School, Business Community	X	X	X	X	X	X	X	X	X	X	X	X
9.3.3 Enhance enforcement of by laws on livestock in urban areas	Local Authorities	X	X	X	X	X	X	X	X	X	X	X	X
9.3.4 Review Environmental By-Laws	Local Authorities	X	X	X	X								
9.4 Develop an urban recreation and conservation parks plan for all towns													
9.4.1 Establish and maintain public parks	Local Authorities; KFS, Public Works	X	X	X	X	X	X	X	X	X	X	X	X
9.4.2 Gazettement of public parks	Local Authorities; KFS, MOPW, Min of lands	X	X	X	X								
9.5 Enforcement of EMCA regulations in urban development													
9.5.1 Subject the IMP for strategic environmental assessment	Naivasha CSO Forum, NEMA	X	X	X	X								
9.5.2 Create Awareness on EMCA regulations including EIA and EA procedures	NEMA, Local Authorities; Proponents, CSOs, Env. Experts, Lead Agencies	X	X	X	X	X	X	X	X	X	X	X	X
9.5.3 Ensure compliance and enforcement EMCA Regulations	NEMA, Ministry of Lands, MoPH&S	X	X	X	X	X	X	X	X	X	X	X	X
9.5.4 Capacity Building of the District Environment Committees	NEMA, local authorities, CSOs, Business Community, Lead agencies	X	X	X	X	X	X	X	X	X	X	X	X
9.5.5 Develop State of Environment Report for the Lake Naivasha Basin	NEMA, Local Authorities, CSOs, Business community, Lead agencies	X	X	X	X								
9.6 Ensure proper design and installation of urban drainage to minimize the risk of urban flood disasters.													
9.6.1 Develop drainage system plans and review with time	Local Authorities , Physical Planning Office, Urban Property Owners	X	X	X	X								
9.6.2 Construct well planned drainage system	Local Authorities , Physical Planning Office, Urban Property Owners	X	X	X	X	X	X	X	X				
9.6.3 Encourage roof catchment in the town	Local Authorities , Physical Planning Office, Urban Property Owners	X	X	X	X	X	X	X	X	X	X	X	X

Management Action and Activities	*Persons/Institutions Responsible*	*Timeframe*											
		Y1 (2012/4				**Y2 (2014/18**				**Y3 2018/22**			
9.6.4 Establish constructed wetlands/pans to filter and slow down flow of drainage water at discharge points	Local Authorities , Physical Planning Office, Urban Property Owners	X	X	X	X	X	X	X	X				
9.6.5 Promote water harvesting in the L. Naivasha catchment	Local Authorities , Physical Planning Office, Urban Property Owners	X	X	X	X	X	X	X	X	X	X	X	X
9.7 Build capacity for urban disaster management													
9.7.1 Enhance capacity of the Districts and local disaster management committee	Prov. Admin. & Line Ministries, NEMA, Private sector, District Disaster Management Committee	X	X	X	X	X	X	X	X	X	X	X	X
9.7.2 Develop a disaster management strategic plan		X	X	X	X								
9.7.3 Develop a resource mobilization strategy	District Disaster Management Committee	X	X	X	X								
9.7.4 Centralize registry of available resources Inventory	District Disaster Management Committee, Prov., Admin.	X	X	X	X								
9.7.5 Public education and awareness on disaster management	District Disaster Management Committee, CSO's, CBOs, Business Community	X	X	X	X	X	X	X	X	X	X	X	X

Chapter

8

PLAN IMPLEMENTATION, MONITORING AND EVALUATION

The IMP implementation will be undertaken by agencies based on the sector plans in this management plan. The Imarisha-Naivasha Board will provide supervisory role in this management and oversee successful implementation of the plan.

Monitoring and Evaluation (M&E)

Monitoring and evaluation of the management plan should be a continuous activity following adaptive management approaches. The M&E component of this plan essentially provides a basis for correction, adjustments and improvements to the proposed goals, targeted activities and assessment of the achievements attained. The guiding principle for the whole process will target maintenance of multi-functionality values of the ecosystems of the basin including the integration of development agenda/investments with conservation and finally ensuring full involvement of all basin-dependent stakeholders. During this stage, problems encountered in implementation of planned activities are identified and strategies to address them outlined. Notwithstanding, a reflection of the past is made in a bid to making the future successful.

Method of Monitoring and Evaluation

A monitoring and evaluation plan will be designed and reviewed regularly for the purpose of this management plan. Monitoring will be continuous throughout the plan period. A log flame will be institutionalized to guide monitoring and evaluation. Monitoring indicators will be clearly stated in the implementation/action plan. Evaluation will be undertaken at mid-term and at the end of the plan period to assess the progress and achievements in the implementation of the planned activities. The

evaluation will also help to address the constraints encountered during the implementation of the plan.

Issues to be monitored and evaluated include;

i). The extent of acceptance of the management plan among the stakeholders
ii). The responsive to education and awareness initiatives
iii). Implementation of activities by synthesizing progress reports, work plans, and stakeholder involvement and participation
iv). Impacts of management prescriptions
v). Environmental status of the lake and its catchment through the use of biological, physical, social and economic indicators.
vi). Budget allocations, expenditure and accounting procedures

Monitoring and evaluation indicators will be identified, quantified, qualified and verified for the different management activities to assess the progress and achievements of the set targets in the management plan

Responsibilities

The implementing agencies will be responsible for the monitoring and evaluation of their activities. It should be noted that for each action in the management plan, responsibilities have been assigned to particular institutions or stakeholders.

Resources mobilization

Substantial funds will be needed for the implementation of the activities proposed in the plan. Imarisha Naivasha will take the lead role in mobilizing resources for the implementation of the plan. However, each implementing institution will be responsible for mobilizing resources to implement their specific activities.

Sustainability

During the management plan implementation period the capacity and governance of the participating institutions will be enhanced to ensure sustainability. The implementation of the plan will be based on the existing institutional structures.

Disputes

In the events of disputes concerning this plan, the Ministry of Environment will provide the dispute resolution framework.

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ANNEXES

Lake Naivasha Basin Stakeholders

The following stakeholders are involved in the conservation and management of environment in the Naivasha basin.

1. Community Forest Associations (CFAs)
2. Centre for Pastoralist Development (CEPAD)
3. District Administration, Naivasha
4. District Physical Planner, Naivasha
5. District Physical Planner, Nyandarua
6. District, Administration, Nyandarua
7. Friends of Kinangop Plateau (FoKP)
8. Greenbelt Movement (GBM)
9. Indigenous Biodiversity Environmental and conservation Association (IBECA)
10. Imarisha Naivasha Board
11. World Conservation Union (IUCN)
12. Kenya Agriculture Research Institute (KARI)
13. Kenya Marine Fisheries Research Institute (KEMFRI)
14. Kenya Generating Company (KENGEN)
15. Kenya Wildlife Service (KWS)
16. Kenya Forest Services (KFS)
17. Beach Management Unit (BMU)
18. Lake Naivasha Growers Group (LNGG)
19. Lake Naivasha Riparian Association (LNRA)
20. Lake Naivasha Nature Club
21. Ministry of Agriculture
22. Ministry of Environment & Mineral Res
23. Ministry of Fisheries Development
24. Ministry of Livestock Production and Developments
25. Ministry of Lands
26. Ministry of Tourism
27. Ministry of Wildlife & Forestry
28. Ministry of Water & Irrigation
29. Municipal Council of Naivasha

30. Naivasha Water Sewerage & Sanitation Company
31. Nakuru Wildlife Forum
32. National Environment and Management Authority (NEMA)
33. Lake Naivasha Basin Water resources Users Association (WRUAs)
34. Resource Conflict Institute (RECONCILE)
35. Rift Valley Water Services Board
36. Naivasha Civil Society (CSO) Forum
37. Water Resources management Association (WRMA)
38. Wild Wide Fund Nature (WWF)