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MINISTRY OF ENVIRONMENT, WATER
AND NATURAL RESOURCES

LAKE VICTORIA ENVIRONMENTAL MANAGEMENT PROJECT PHASE TWO (LVEMP II) - KENYA

KINGW'AL INTERGRATED WETLAND MANAGEMENT PLAN (2014-2018), NANDI COUNTY

"A well Conserved and Sustainably Utilized King'wal Wetland with Socio-cultural and Economic benefits"

LAKE VICTORIA ENVIRONMENTAL MANAGEMENT PROJECT
LVEMP II
FOR SUSTAINABLY MANAGED RESOURCES

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mazingira yetu | uhai wetu | wajibu wetu

THE WORLD BANK

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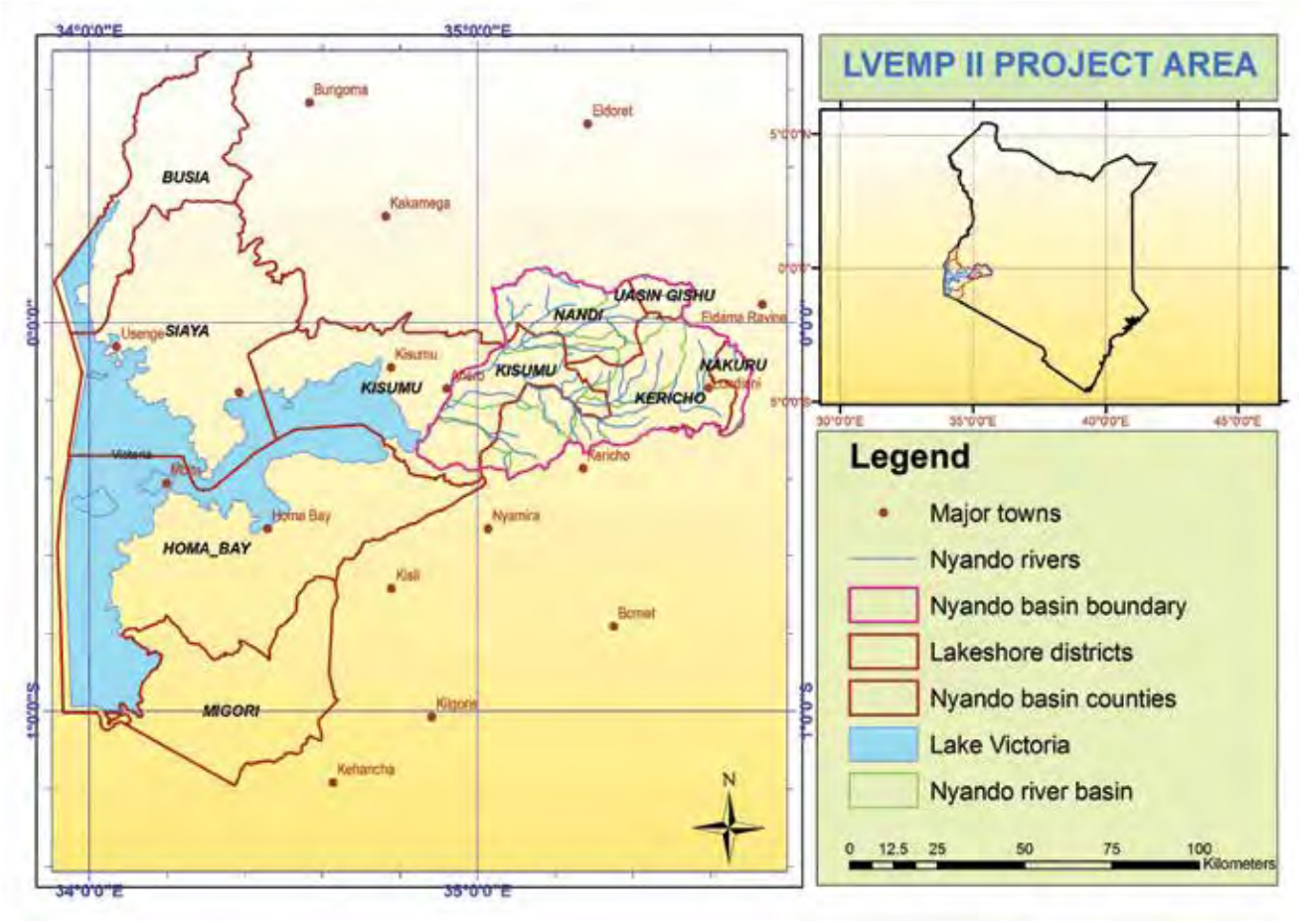
PROJECT COVERAGE AREA



NYANDO RIVER BASIN

FOREWARD

Globally, wetlands are recognized as important ecosystems providing essential goods and services. They regulate water flow, recharge ground water, store and release water, filter nutrients and other pollutants, stabilize shoreline and microclimate and are of exceptional importance as habitats supporting biodiversity. Wetland habitats are also of high economic importance for provision of water and fisheries and thus supporting livelihoods to riparian and wetland-dependent communities.

In Kenya, wetlands cover approximately 14,000 km^2 (ca 3-4%) of the surface area of the country. They are rich in living and non-living natural resources, and are important sources of food, water, medicinal plants, fuel wood, materials for building and handcrafts.

Despite the myriad of benefits that they provide, wetlands continue to be drained at an alarming rate, to provide space for agriculture, human settlement and urban development among other competing developmental needs. These changes have had significant and deleterious effects to wetland ecosystems and the people depending on them due to pollution and the resultant loss of important ecosystem goods and services.

Given the fragility and vulnerability of many wetlands, there is an urgent need to strike a balance between the environmental functioning and wetland use for livelihood support. This requires management systems that take cognizance of the wetland ecosystems' natural characteristics while also allowing for their wise use. Such management regimes must be aligned to the Ramsar Convention's (1971) wise-use principle, which also requires development and implementation of Integrated Wetland Management Plans ((IWMPs).

The Ministry of Environment, Water and Natural Resources (MWENR) continues to recognize the role wetlands play in the economy of this country and therefore has put in place the requisite legislations and policy frameworks to govern environmental and natural resource use in accordance with the Constitution of Kenya 2010 and the development blue print, Vision 2030. Further, the ministry shall enact appropriate legislation and review the old ones in order to align and make them current, responsive and relevant to address emerging environmental challenges including wetlands degradation and climate change.

The King'wal Integrated Wetland Management Plan (2014-2018) has set the stage for consolidating the efforts of various stakeholders in a bid towards effective and efficient wetland resource use for posterity. The implementation of the various programmes and actions set forth in this plan, envisions sustainable wetland management by halting the current degradation and loss of essential benefits that this wetland provides. The Ministry calls upon all stakeholders and actors to implement this plan. Importantly, is the recognition of environmental management mandate as a concurrent jurisdiction between the two levels of government, in which case, the County Government of Nandi is urged to provide leadership and guidance towards achieving the vision of this plan.

Richard L. Lesiyampe, Phd, MBS,

Principal Secretary

Ministry of Environment, Water & Natural Resources

PREFACE

Wetland Management requires collaborative efforts among the various actors of the Government, Non-State Actors, Media, local communities and institutions working towards the achievement of sustainable development. While the role of wetlands in supporting community livelihoods and enhancing resilience cannot be over-emphasized, the degradation of many wetlands in Kenya is a cause to worry.

The Environmental Management and Coordination Act of 1999, has provided substantial provisions and opportunities for conservation and sustainable management of wetlands in Kenya. Sections 42, 54 and 55 particularly, have elucidated the need for sustainable wetlands, marine and coastal resources. In addition, the subsidiary legislations (regulations) such as the Environmental Management and Coordination (EIA/Audit) regulation of 2003 and the Environmental Management and Coordination (Wetlands, Riverbanks, Lakeshore and Seashores Management) Regulations of 2009 among others, have further stressed sustainable development within and around wetland areas through development control and gazzetment of wetlands as protected and conservation areas.

As the environmental watchdog, the National Environment Management Authority (NEMA-Kenya) will continue to discharge its mandate on supervision and coordination of matters relating to sustainable environmental management, recognizing wetlands as Ecologically Sensitive Areas (ESAs) and instituting appropriate measures to reverse wetland degradation and loss. Additionally, as the principle government instrument charged with environmental management including coordinating of development of wetland management plans, I want to sincerely thank all the stakeholders for taking their time and resources to ensure the finalization of this plan. We shall therefore support the successful implementation of Ombeyi Integrated Wetland Management Plan for the benefit of both present and future generations.

Prof. Geoffrey Wahungu,

Director General

National Environment Management Authority

ACKNOWLEDGEMENTS

King'wal Integrated Wetland Management Plan has set the motion towards ensuring wise-use and sustainable management of the wetland resources. The plan which envisions a *"A well conserved and sustainably utilized King'wal wetland with socio-cultural and economic benefits"* is a product of commitments and good will of many stakeholders. Therefore, my warm gratitude goes to all stakeholders who participated in the development and drafting of this important framework document.

The development and finalization of this plan involved considerable consultations with stakeholders both at the County and National Government levels as well as communities. In recognizing the value and role that wetlands play in providing ecological balance, this enabled privatization of wetlands and watershed management as critical componets of LAVEMP II.

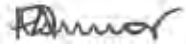
I recognize the financial support provided by the Government of Kenya and the World Bank without which this exercise could not have been achieved.

I want to thank members of the National Policy Steering Committee, National Technical Steering Committee and Project Coordinating Teams (NPCTs and DPCTs) for their valuable support and inputs during the wetland management plan preparation process. I wish to particularly thank the Principal Secretary, State Department of Environment and Natural Resources; as the Chairman of the National Policy Steering Committee and the Accounting Officer, for providing effective policy direction and decision making.

As this process was highly consultative, I am grateful for the patience, dedication, guidance, expertise and excellent facilitation accorded by the Lead Facilitators who steered the entire process right from community consultations, rapid ecological and hydrological assessments, drafting and finalization of this plan. In this regard, I owe much gratitude to Mr Benard Opaa, Ms. Stella Wanjala, Mr. Palapala Muteshi, Mr. Valentine Lala (all of NEMA-Kenya), together with the LAVEMP II Environment specialists Mr. Stanley Ambasa and Mr. Solomon Kihiu. I thank NEMA management for allowing these officers to participate and guide the process.

Also appreciated is the support accorded by the communities and the County Government of Kericho during consultations and fruitful inputs that have been essential in finalizing this plan. This has not only enabled ownership but also ensured that the plan's implementation is taken up by the County Government.

Last but not least, I am indebted to the Ministry of Environment, Water and Natural Resources, particularly to the Director Programmes, Projects and Strategic Initiatives / National Focal Point Officer, LAVEMP II Ms. Agnes Yobteric for her commitment and continued support during the entire plan development.



Francisca Owuor,

National Project Coordinator

Lake Victoria Environmental Management Project (Lvemp II), Kenya

LIST OF ACRONYMS

AEWA	African-Eurasian Water bird Agreement
AEZ	Agro ecological zone, Nandi
CCS	Christian Community Services
CBD	Convention on Biological Diversity
CBO	Community Based Organization
COP	Contracting Parties
EAC	East African Community
EMCA	Environmental Conservation Management Act
F	Females
GOK	Government of Kenya
IBA	Important Bird Area
IMP	Integrated Management Plan
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forestry Services
KWS	Kenya Wildlife Services
LH1	Lower Highland-Humid
LH2	Lower Highland-Sub-Humid
LVBC	Lake Victoria Basin Community
LVEMP	Lake Victoria Environnent Management Program
M	Males
MDG	Millennium Development Goals
MOA	Ministry of Agriculture
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
UH1	Upper Highland- Humid
UM1	Upper Midland- Humid
UM2	Upper Midland- Sub-Humid
UM3	Upper Midland- Semi-Humid
UN	United Nations agencies
UNCCD	United Nations Convention to Combat Desertification.
UNEP	United Nations Environment Program
UN-HABITAT	United Nations Human Settlements Program
UNO	United Nations Organization
WARMA	Water Resource Management Authority
WRUA	Water Resource Users Association
Y	Youths

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EXECUTIVE SUMMARY

Kingwal swamp is an extensive high altitude wetland located north of the Nandi Hills. It is renown as a breeding site for the Sitatunga antelope (*Tragelaphus spekii*) that is both rare and endangered (Sitienei et al, 2012). It is also a habitat for a considerable crane bird population and the Water Berry (*Sysygium guineense*) which can grow up to 15.30m tall and is valued by community for its medicinal value, edible purple-black fruits, leaves that are used for fodder, it's red-brown wood that makes excellent firewood and charcoal as well as it's bark that can be used for tanning and dyeing and for glazing ceramics The swamp is also used for communal grazing during the dry spells and for carrying out the culturally important initiation rites of the Nandi Community. The wetland offers several benefits to the local community in terms of water for livestock and agriculture, grass for livestock and house thatching among others. However these benefits are not equitably distributed to the various stakeholders. It is important to note that the potentials of the wetland have not been fully explored to benefit the local community in particular and the environment in general.

Part of the wetland has been excavated for clay in the brick-making industry while much of it has been drained for settlement and cultivation. Planting of eucalyptus trees has further shrunk the wetland (Ambasa 2005). Intensive agriculture also exposes the wetland to fertilizer leaching and hence eutrophication, creating conducive conditions for spread of invasive species such as elephant grass (*Pennisetum sp*) which has already colonized the Saiwa swamp, displacing the native Typha vegetation (Mohammed 2000).

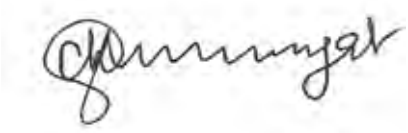
Generally, the wetland is threatened by anthropogenic activities such as brick making, agricultural activities, sewage disposal, and hydrological course change and wetland conversion among others

King'wal is a significant wetland because of its hydrological and ecological services, and the socio-economic and cultural values that it represents. In spite of being a habitat to endangered *Sitatunga*, this wetland is under threat from anthropogenic pressures, partly due to lack of recognition of the crucial roles it plays and services that this wetland provides.

This has been compounded inadequate and/or inaccurate information that can inform sustainable management including policy formulation, breakdown of traditional management structures and lack of appropriate and recognized property rights. Further, there are no management structures for the management of King'wal wetland as evidenced by the unsustainable utilization of its resources and the nature of activities around the wetland.

The participatory development of this management plan aims to enhance wise-use and sustainable management of the wetland. It is intended to provide a shift of dependency on natural resources by community through provision of alternative livelihoods, thus reducing despondency.

The Integrated Management Plan (IMP) for King'wal, developed through two-year stakeholder consultative process, provides the ultimate framework for interventions for the wetland and associated catchment areas. The plan has identified the strategic objectives, actions, indicators of success and actors intended towards broader stakeholder engagement, capacity building and resource mobilization. Key actions include catchment management, water pollution control and solid waste management, improving income levels and advancing monitoring and participatory research that inform policy formulation and structured decision-making processes. The ultimate goal of this plan is torealize the vision which is, *"well conserved and sustainably utilized King'wal wetland with socio-cultural and economic benefits."*



His Excellency,

CLEOPHAS KIPROP LAGAT
Governor,
Nandi County

1.0 INTRODUCTION

Wetlands play an important role in regulating water flow, groundwater recharge, water storage, filtering of nutrients and pollutants, shoreline and microclimate stabilization and are of exceptional importance as habitats for large number of species especially birds. Wetland habitats are also of high economic importance for provision of water and fisheries. Wetlands in arid and semi-arid lands are an important refuge for grazing.

However, wetlands are being drained for agricultural use at an alarming rate resulting in degradation of catchment areas, pollution and unsustainable harvesting practices. Given the fragility of wetlands there is an urgent need to strike a balance between the environmental functioning of wetlands and their use for livelihood. This requires management regimes which help maintain some of the natural characteristics of wetlands while also allowing for their wise use.

Swamps, dominated by *Cyperus papyrus*, form a distinctive wetland type in tropical Africa, supporting many endemic species (Hughes and Hughes 1992). One estimate puts the total area covered by papyrus swamps in Africa at 4000 km^2 (Thompson and Hamilton 1983), but their extent is decreasing due to human encroachment and intensified land use changes around them (Thompson and Hamilton 1983; Hughes and Hughes 1992; Mafabi 2000; Kairu 2001). Papyrus swamps around Lake Victoria play crucial socio-economic roles to the local people and are of great significance for wetland as well as wildlife conservation (Bennun and Njoroge 1999; Mafabi 2000; Byaruhanga et al. 2001). They host wildlife species such as the sitatunga antelope *Tragelaphus spekei,* African python *Python sebae* and a suite of papyrus specialist birds including the globally threatened papyrus yellow warbler *Chloropeta gracilirostris* and papyrus gonolek *Laniarius mufumbiri* (Nasirwa and Njoroge 1997; Bennun and Njoroge 1999; Byaruhanga et al. 2001; Birdlife International 2004). Further, the swamps supply large amounts of organic nutrients to fringing waters, thus allowing an increase in animal and plant production at the swamp edge (Gaudet 1980; Moore 1994).

In Kenya, papyrus swamps are patchy and localized, and are found mainly along river inflows on the shores of Lakes Victoria, Naivasha and Jipe (Britton 1978; Bennun and Njoroge 1999; Boar et al. 1999). Land use activities around papyrus swamps of Lake Victoria are dominated by cultivation, livestock grazing and settlements (Mafabi 2000).These activities have intensified in recent years and are of particular concern as they have led to other forms of disturbance to papyrus swamps such as pollution, burning and papyrus harvesting (van der Weghe 1981; Mafabi 2000). In the Kenyan side, these activities have increased at an alarming rate (Keya and Michieka 1993; Government of Kenya 1994, 1995; Bennun and Njoroge 1999; Kairu 2001).

1.1 LOCATION AND SIZE OF KINGWA'L WETLAND, NANDI COUNTY

The expansive King'wal wetland is situated in Nandi County with its main catchment arising from Uasin Gishu County, around Kesses. It comprises of a system of River Kesses, streams and springs and interconnected to numerous swamps within the region stretching from Lolminingai to Kombe locations.

Nandi County is one of the smallest Counties in the Rift Valley region, occupying an area of 2,839 sq. km (Table 1). The county is bordered by Kakamega County to the west; Uasin Gishu County to the north and east, Kericho County to the south-east corner, and Kisumu County to the south. Geographically, the unique jug-shaped structure of Nandi County is bound by the Equator to the South and extends northwards to latitude 00 34' to the North. The western boundary extends to longitude 340 45' East, while the eastern boundary reaches longitude 350 25' to the East.

TABLE 1: AREA OF THE NANDI COUNTY AND THE SUBCOUNTIES

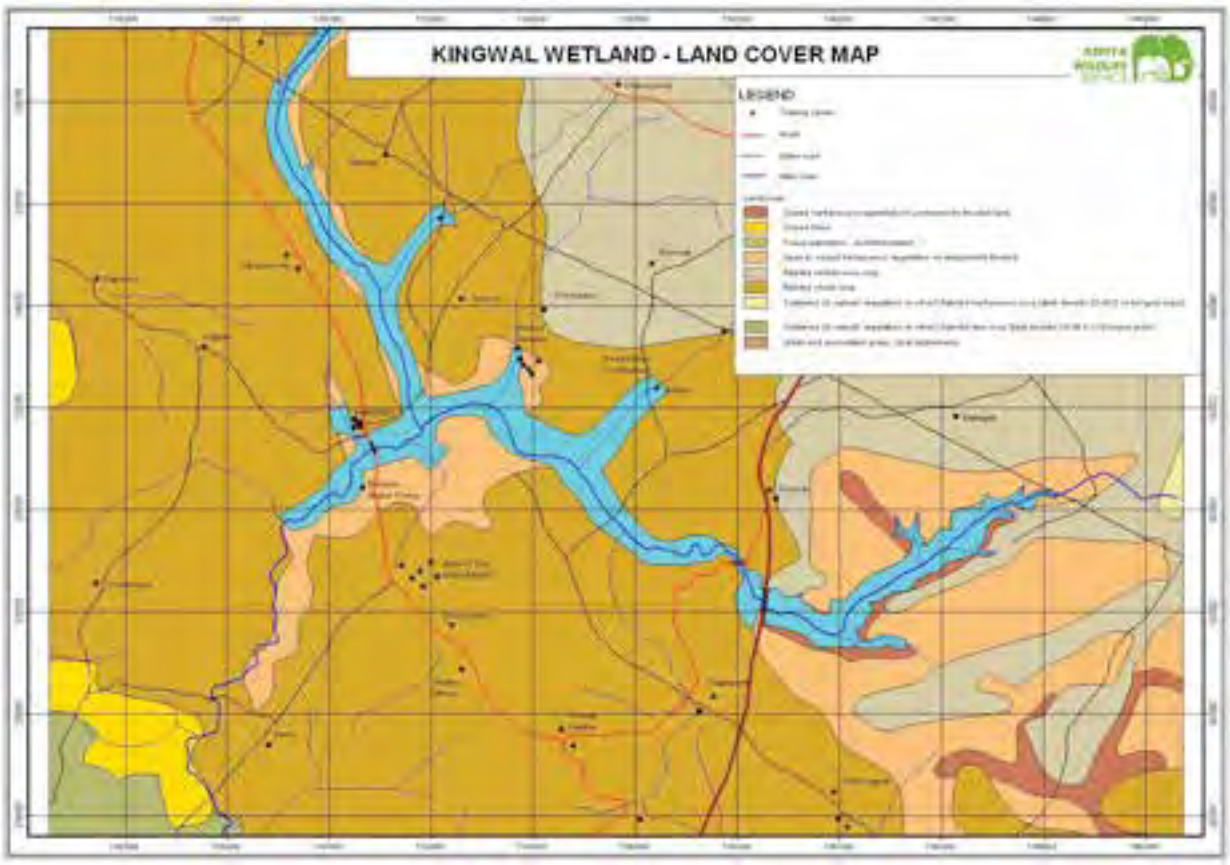
NAME OF DIVISION	AREA IN SQ. KM.
Mosop	769
Aldai	500
Tinderet	378
Kapsabet	529
Kilibwoni	279
Nandi Hills	387
Total	2,839

Source: District Survey Office, Nandi, 1993.

Kingwal Wetland is found in Nandi County, lying 25 kilometers from Eldoret towards Kapsabet and almost 400 kilometers from Nairobi. It is a massive swamp measuring 2.73 square kilometers (Fig. 1). The vegetation of the wetland consists of forests, grasslands, shrubs and scrubland, Dominant grass species include *Andropogon gayanus*, *Hetero-pogon contortus*, *Panicum maximum*, and *Sporobolus pyramidalis*.

About 40% of the area was converted into *Eucalyptus*, *Azadirachta indica* (neem), and tea plantations and parts of the area designated as forest reserves (Yenku A and B). The major human activities in the wetland are Extensive maize and vegetable cultivation, grazing and Brick making). Other activities include hunting, Eucalyptus cultivation (Ambasa, 2005).

FIGURE 1: KINGWAL WETLAND MAP



1.2 TOPOGRAPHY AND GEOLOGY

Nandi County is characterized by hilly topography that includes an outcrop of basement system rocks. These rocks are distinctly visible as govanite tors in the hills of Sang'alo and Sarura in the north. Southward, they are replaced by thick layers of red soil usually covered by anthills. The dissected scarp at the southern border of the district is another manifestation of rock exposure.

The physiography of Nandi County is composed of five units with typical topography as follows: rolling hills in the west; the Kapsabet Plateau (part of Uasin Gishu Plateau); the wooded highlands and foothills of Tinderet Volcanic mass in the south-east; Kingwal Swamp in the Centre (Baraton-Chepterit); and the dissected Nyando Escarpment at the southern border.

The first unit constitutes an undulating landscape typified by rolling hills. They are chiefly flat-topped ridges with identical summits that may be remnants of an eroded plain. The Kimondi and Mokong Rivers flow westward through the area eventually joining the Yala River.

The Kapsabet Plateau extends from Kapsabet eastwards. The eroded remains of the original high plain form a conspicuous incised peneplain near Kapsabet at a height of 2,020 metres above sea level. The unit constitutes an undulating land surface traversed by rivers that form a sub-parallel consequent drainage system incised on the lava surface. The course of some rivers is slightly North West indicating the general dip of original lava flows. River Kipkarren is one of them. Geologist believe that volcanic lava flowed along the gently sloping plateau northward, having been diverted by a hill at Kabiyet to flow west towards Sarora hills and also southward across the present King'wal Swamp.

The Tinderet Highlands are part of highly dissected piles of lava which form an extension of Kenya Highlands from the south-east corner of the district. In the wooded south-east corner, at the top of Meteitei Valley, rocks just out to a height of 2,500 metres. Fifteen kilometers to the east of the roads from Nandi Hills towards Songhor and Kisumu is a highly rugged landscape over which volcanic lava flowed.

Rivers in Tinderet form a northwest quadrant of radial drainage pattern. The Kipkurere, Kubos, Kindus and Ainabngetuny Rivers have deeply incised valleys, flowing south-west. The King'wal and Kipterges Rivers and their tributaries drain the northwestern flank of Tinderet Highlands. In the centre of the area, these rivers produce substantial waterfalls, dropping from the top of harder bands in volcanic rocks to the level of a swamp which foots the scarp. The King'wal Swamp lies at a height of over 1,960 metres and is considered to be a site of a hollow in the original landmass. The nearest basement system rocks outcrop the swamp near Chepterit. Drainage is prevented to the north and east by volcanic rock and prevented from the sourth by agglomerates of Tinderet. The rivers escape to the west over a series of rapids composed of hard bends in the basement system gneisses.

Nandi Escarpment is a manifestation of extremely rugged ground containing granite and volcanic rocks. The Equator runs alongside the scarp line in the area. There has been extensive faulting and intrusion both above and below the scarp. The rivers flowing the scarp descend in impressive rapids, dropping from 2,000m to 1,300m through Kibos. North of Nyando Scarp, hills occur at about 2,150 metres and a range of identifically high hills form a ridge westward along Nandi Fault. These, together with Kabiyet and Sang'alo Hills, are regarded as residuals of the original land surface. The wastershed of rivers descending the scarp (from Kimorick-Mocking system) runs only 10km.

These rivers, swamps and valleys have varied effects on the district's development. The rivers are the main sources of water supplies in the district. Due to the perennial water-flow in these rivers, enough water sources are available for both domestic use and commercial activities. Some rivers, especially in Tinderet Subcounty, have rapid falls which can be used to harness hydro-electric power. The swamps have not been put into any economic use. Most of them are poorly drained hence having no economic significance to the development of the district. Most of the valleys are for horticultural production. They are the main topography of the district results in very steep slopes which have a negative effect on transport system, especially during the wet seasons. This mainly interferes with the marketing operations and movement of people.

Four types of land slopes exist in the County:

1.1.1.1.1 Mountainous

The land generally has rather steep slopes especially in part of Meteitei and Tinderet areas to the south-east; Kemeloi, Banjoes, Kaptumek, Kapkures, Kapkerer areas to the south; and Kamwega and Soimining to the north west.

This type of topography has made transportation network very difficult to establish. This factor alone has created a drawback in provision of development facilities in the affected regions.

1.1.1.1.2 Steep Slopes

This includes parts of Chepterwai, Kipkarrensalient, Kabiemit, Ndalat, Sarora and Kabiyet areas to the north and Kapkangani areas to the west. Afforestation is required on the hills. Development of the main economic activities has been affected by the factors noted for the mountainous regions.

1.1.1.1.3 Rolling or Hilly Land

This includes parts Nandi Hills, Kaptel, Kaptumo, and Kobujoi areas. Farming and other economic activities are well developed and mostly mechanized. This is attributed to the ease of communication both on the roads and on the farms.

1.1.1.1.4 Gentle to Moderate Slopes

These cover parts of Kilibwoni, Kaplamai, Kosirai, Mutwot, Lelmokwo and Itigo areas. The topography of this region is just as in other areas. Also productivity of the farming activities is high due to high soil productivity and less capital injection towards soil conservation activities.

1.3 CLIMATE AND WEATHER PERSPECTIVES

The hilly and undulating topographical features of Nandi County coincide with a spatial distribution of ecological zones that define the agricultural and overall economic development potential of the area. The northern parts receive rainfall ranging from 1,300 mm to 1,600 mm per annum. The southern half is affected by Lake Basin atmospheric conditions receiving rainfall as high as 2,000 mm. p.a (table 2). Generally the County receives an average rainfall of about 1200mm to 2000 mm per annum. The long rains start in early March and continue up to end of June. The short rains start in mid September and end in November. However, there is no single month without some rainfall. The dry spell is usually experienced from end of December to mid March. The lowest rainfall is experienced in the eastern and north eastern parts of the district. The highest is recorded in the Kobujoi-Tindinyo area in Aldai subcounty. The rainfall distribution and intensity has direct relationship to economic activities in the County. Most parts of Nandi experience mean temperature between 180 C -220 C during the rainy season, but the portion of the County below Nyando Escarpment at 1,300 m above sea level receives temperatures as high as 260C. However, during the dry months of December and January the temperatures are as high as 23Cand during the cold spell of July and August the night temperature are as low as 140C (table 3).

The areas with 1500mm (and above) rainfall per annum, form the extended Agro-Ecological Zone for current and potential tea cultivation (LH1and UM1) (table 4 & 5). The relatively drier areas to the east and north-east which receive activity are carried out throughout the entire district. Due to the reliability of the rainfall in the entire County, Nandi has the potential to produce various agricultural crops ranging from tree crops, horticultural crops, and pyrethrum, cereals, and fruit trees.

TABLE 2: MEAN MONTHLY RAINFALL FOR VARIOUS STATIONS (10 YEARS MEAN MONTHLY RAINFALL IN MM UP TO 1992)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Nandi Hills	-	63.32	139.5	179.5	174.3	122.0	133.7	164.9	113.2	127.0	108.4	59.2
Kabiyet	70.0	111.6	111.6	153.7	165,86	115.5	147.0	181.8	127.8	79.7	56.6	31.1
Kobujoi	62.63	13.73	137.3	33.8	344.2	144.5	113.5	175.5	178.4	156.4	123.1	70.6
Kapsabet	62.9	73.8	73.8	14.4	137.3	135.1	154.2	127.2	125.7	107.73	152.7	92.4

Source: DAO's Annual Report, Nandi 1993.

TABLE 3: ANNUAL MEAN TEMPERATURE (0 C)

TOWN	KAIMOSI	KAPSABET	SONGHOR
ALTITUDE AEZ STATION	**1615M UM1**	**1998M LH1-2**	**2133M LH1-2**
January	21.1	18.1	19.4
February	21.6	18.3	19.7
March	21.4	18.6	19.3
April	21.1	18.8	18.3
May	20.5	17.1	17.8
June	20.1	16.7	16.8
July	19.3	16.2	16.6
August	19.8	16.1	16.9
September	20.4	16.1	17.7
October	20.4	17.5	18.8
November	20.6	18.1	18.8
December	20.8	17.5	19.2

Source: DAO's Annual Reports, Nandi, 1993.

Note: AEZ= Agro= ecological zone, Nandi

TABLE 4: CLIMATE IN VARIOUS AGRO-ECOLOGICAL ZONES OF NANDI DISTRICT

AGRO-ECOLOGICAL SECOND ZONE RAINS (MM.)	ALTITUDE	ANNUAL MEAN TEMPERATURE IN C	ANNUAL AVERAGE RAINFALL (MM.)	FIRST RAINFALL (MM.)	SECOND RAINFALL (MM.)
UH,	Forest	Reserve			
LH, Tea/Dairy Zone 550-800	1900-2400	18.0-15.0	1300-2100	630-850	550-800
LH-2 Maize/Wheat/ Pyrethrum Zone 500-700 750	1900-1400	18.0-15.0	1300-1800	600-750	500-700
LH3 Wheat/Maize/Barley Zone 500-600 680	1900-2300	20.5-15.5	1280-1650	500-680	500-600
UM4, Coffee Zone UM4	1600-2000	19.17.5	1200-1600	400-600	500-600

Source: Farm Management Handbook of Kenya.

TABLE 5: AGRO-ECOLOGICAL ZONES (SQ. KM)

AGRO-ECOL. ZONE	UH1	LH1	LH2	LH3	UM1	UM2	UM3	LM1	LM2
Area	111	344	306	612	473	83	111	56	195
Major marginal	Dairy	Dairy	Wheat	Wheat	Coffee	Coffee	Marginal	Sugarcane	-
Land use	Sheep	Tea	Barley	Barley/ Pyrethrum	Tea	-	Coffee	-	-

Source: Agricultural Management Handbook MOA, 1983.

Note:

- UH1- Upper Highland- Humid
- LH1-Lower Highland-Humid
- LH2- Lower Highland-Sub-Humid
- UM1- Upper Midland- Humid
- UM2- Upper Midland- Sub-Humid
- UM3 - Upper Midland- Semi-Humid

1.4 ADMINISTRATIVE AND POLITICAL UNITS

The Nandi County Council covers the entire County except for the areas covered by Kapsabet Municipal Council and Nandi Hills Urban Council.

1.5 ECONOMIC POTENTIAL

The distribution of soil depends on the soil forming factors which include the parent rock, climatic conditions, time and human as well as biological activities. Fertility depends on soil characteristics and varies with soil type and location.

1.6 WATER RESOURCES

Nandi County is blessed with 7 major rivers and myriad of permanent streams flowing throughout the year. They include Olare Onyonkie river, Kimondi-King'wal, Kabutie, Mokong, Yala, Kipchoria and Kundos Ainopngetuny rivers. All the major rivers except two have their sources outside the district.

1.7 FORESTRY

Nandi County is endowed with a rich supply of natural forestry resources. The County has about six gazetted forest reserves comprising only 75% of the initial natural forest reserves (table 6). The total length of the forest boundaries in 1978 was estimated at 231.7 Km of which 205.81 Km was artificial boundaries and 25.76 Km natural ones (rivers).

The forest area has gradually reduced from about 16% of the total County land area to around 12%. The North and South Nandi Forest Reserves are mainly confined to altitude below 1,900 metres above sea level, being a major contrast to North Tinderet Forest Reserve which lies between 2,300 metres to 2,500 metres above sea level.

The Nandi Forest is an extension of the tropical Kakamega Forest characterized by high rainfall and diverse species of trees. The Forest is composed of mixed indigenous hardwoods, besides 2,635.8 ha of exotic plantations at Kimondi and Cerengoni Forest Stations. The total boundary length of forest in the district is about 363.8 km. up from 205.81 km. (1978).

The medium potential areas are covered by shrubs and bushes. These grasslands cover mainly the eastern plateau parts, and portions lying below the scarp on Nyando Plains at 1,300 m. Woods, bushes and savanna grassland can be found in Songhor and extreme northern areas. Some land contains swamps, rocks and hills.

TABLE 6: GAZETTED FOREST RESERVED IN THE DISTRICT

STATION (1978)	FOREST RESERVE	AREA (HA.)
Nandi	Uhuru	433.4
Nandi North	Teressia	384.5
Tinderet	Nandi North	6,815.5
North Nandi (Mosop/Aldai)	North Nandi	11,460.3
Cerengoni/Kapchorwa	North Tinderet	17,432.5
Nandi and Kobujoi	South Nandi	17,961.4
Total		54,487.4

Source: MENR, Forestry Department, Nandi, 1993

1.8 BIODIVERSITY

The Wildlife population in the County is erratic due to concentrated and widespread human settlement coupled with intensive agricultural activities. Additionally, in order to protect biodiversity, zonation has been conducted by stakeholders (Table 7). The most common game animals are the primates mainly found in Tinderet Subcounty. A few leopards are found in Aldai Subcounty. From 1995 onwards, Sitatunga antelopes have inhabited King'wal wetland increasing the potential of Eco-tourism in the County. Kingwal wetland is hoem to many birds (Table 8).

TABLE 7: ZONATION FOR BIODIVERSITY CONSERVATION IN KINGWAL SWAMP

SR. NO.	ZONE	CRITERIA	OBJECTIVE	MANAGEMENT OPTION	RESPONSIBLE INSTITUTION/ PERSON
1	BIODIVERSITY	- Area under water - Fragile ecosystem -Endemic species -Endangered species -High valued indigenous tree species -Rich biodiversity	To conserve unique and rich biodiversity	-Sustainable use -Resource inventory -Research -Education -M&E -Linkages -Census	KFS KWS NK KEFRI King'wal Sitatunga Conservation Trust NEMA WRMA NMK WRUAs Religious organizations
2	UTILITY ZONE (Ecotourism, Beekeeping, Fish farming, Bird-watching, Sitatunga)	- Area immediately after the biodiversity zone - Areas where community graze livestock, collect firewood and herbal medicine besides water catchment and biodiversity zones -Identify areas -Carry out survey and map the areas -rich in biodiversity -scenic beauty -cultural sites -sacred sites -raised ground or view points -unique biodiversity e.g. sitatunga -Clear Nature trails	Conserve and protect biodiversity for sustainable use -Controlled utilization for community livelihood -To generate income from tourism -To promote local culture and heritage	-Controlled grazing according to carrying capacity -Sensitize community on efficient and controlled use of firewood -employ energy saving devices Identify and register herbalists -Control extraction of herbal products -Bandas -Camp sites -Resource centres -Tour guide -Nature trails -Cultural activities -Observational/ watch towers -Tree top houses -Ecolodges -Tourism circuit	KWS KFS Kingwal Sitatunga Conservation Trust NK NMK
3	INTERVENTION ZONE (IGAs-Tree farming, woodlots, Energy conservation technologies)	Riparian area	-To ease pressure on swamp resources -Improve livelihoods of communities adjacent to the swamp	-Community sensitization -Identify and establish farm forest -Initiate IGAs e.g. bee keeping, fish farming	

TABLE 8: BIRDS OF KINGWAL WETLAND

Notes: H = heard, S = seen

Names and sequence follow Checklist of the Birds of Kenya 4th ed. 2009

Ducks & geese

Egyptian Goose

Yellow-billed Duck

Storks

Yellow-billed Stork

Ibises & spoonbills

Sacred Ibis

Hadada Ibis

Herons, egrets & bitterns

Little Bittern

Cattle Egret

Black-headed Heron

Great White Egret

Yellow-billed (Intermediate) Egret

Cormorants

Reed (Long-tailed) Cormorant

Diurnal birds of prey

European Honey Buzzard

African Black-shouldered Kite

Black Kite

Augur Buzzard

Rails & relatives

Black Crake

Cranes

Grey Crowned Crane (2 pairs with young)

Doves

Red-eyed Dove

Ring-necked Dove

Blue spotted Wood Dove H

Lovebirds & parrots

Meyer's (Brown) Parrot

Swifts

African Palm Swift

Little Swift

Mousebirds

Speckled Mousebird

Kingfishers

Woodland Kingfisher

Malachite Kingfisher

Giant Kingfisher

Bee-eaters

Eurasian Bee-eater

Barbets & tinkerbirds

Yellow-rumped Tinkerbird

Honeyguides

Scaly-throated Honeyguide

Wrynecks & woodpeckers

Red-throated Wryneck

Helmetshrikes, bushshrikes, etc.

Tropical BoubouH

Shrikes

Common Fiscal

Monarch flycatchers

African Blue Flycatcher

Crows

Pied Crow

Tits

White-bellied Tit

Saw-wings, swallows & martins

White-headed Saw-wing

Barn Swallow

Wire-tailed Swallow

Lesser Striped Swallow

Mosque Swallow

Red-rumped Swallow

Cisticolas & allies

Chubb's Cisticola

Tawny-flanked Prinia

Grey-capped Warbler

Bulbuls

Common Bulbul

Old World warblers

Little Rush Warbler

Lesser Swamp Warbler

Dark-capped Yellow Warbler

Illadopses, babblers & chatterers

Black-lored Babbler H

Starlings

Greater Blue-eared Starling

Chats, wheatears & Old World flycatchers

Common Stonechat

White-eyed Slaty Flycatcher

Sunbirds

Scarlet-chested Sunbird

Bronze Sunbird

Variable Sunbird

Copper Sunbird

Sparrow-weavers & Old World sparrows

Kenya Rufous Sparrow

Grey-headed Sparrow

Weavers, bishops & widowbirds

Baglafecht Weaver

Holub's Golden Weaver

Village Weaver

Yellow-backed Weaver

Yellow Bishop

Fan-tailed Widowbird

Red-collared Widowbird

Waxbills: Common Waxbill Red-cheeked Cordon-bleu

Bronze Mannikin

Indigobirds & whydahs

Pin-tailed Whydah

Wagtails, longclaws & pipits

Cape Wagtail

African Pied Wagtail

Yellow-throated Longclaw

Canaries, citrils & seedeaters

African Citril

Southern Citril

Streaky Seedeater

2.0 KING'WAL WETLAND HYDROLOGY

KESSES DAM

The wetland was formed as a result of damming of Kesses River to supply Moi University with water. The Dam lies in a wide valley bottom surrounded by undulating landscape typified by rolling hills. Sources of water to this dam include river Kesses, direct rainfall, and surface runoff from the surrounding topography. The flow into the dam is fast due to the nature of slope of the land. As the flow enters into the dam, the velocity of flow is reduced causing sediment deposition. Below the dam sediment starved water flow at high velocities causing erosion of the river channel. The dam also plays an important role by regulating flow in the downstream section. This ensures that the river flows through the year.

MOI UNIVERSITY SEWAGE PONDS

The ponds are used for treatment of waste from Moi University. Outflow from the ponds flow into the wetland formed in the valley below the ponds. This is a wide valley bottom where river Kesses flows through. The sewage effluent augments the flow into the wetland at this point. However the effluent if not properly treated can compromise the water quality within the wetland.

RIVER KESSES

In the upstream of the bridge the topography is hilly and rocky, forming a V-shaped valley which is very deep. Flow velocity is very high in this section and as a result no wetland is formed. Downstream of the bridge the river flows into an area with a gently rolling topography with a U-shaped valley bottom. However much of the river floodplain has been cultivated therefore there is no significant wetland area.

NGECHECK

This area consists of gentle to rolling slopes of between 5 – 10% while the wetland lies in a wide valley bottom with a slope varying from 0 – 3%. This is part of the King'wal wetland proper. Source of water to this wetland comes mainly from Kesses River, Mumetet stream, springs, direct rainfall, and surface runoff from adjacent higher areas. In the upstream area of this point the wetland has been encroached and canals used to drain part of the wetland. Water is being pumped from the stream upstream of this point to supply areas adjacent to this wetland. The river flow is fast along the main channel within the wetland but much slower and sometimes stagnant in some parts of the wetland.

KIPTENDEN SITE

The topography comprise a gently rolling slopes of between 4 – 7% with the wetland lying in a wide valley bottom of 0 – 3%. Source of water to this wetland comes mainly from Kesses River, springs, direct rainfall, and surface runoff from adjacent higher areas. Signs of encroachment are evident from maize farms that are encroaching into the wetland.

KAPSABET – ELDORET ROAD AT THE BRIDGE

Topography of the surrounding land consists of gentle to rolling slopes of between 3 -10%. The wetland lies in a wide U-shaped valley of between 0 – 3% slope. The flow is well defined within the main channel but diffused within the wetland where the velocity of flow is far much slower than that of the channel. In some parts of the wetland

surface depressions intercept water that becomes completely stagnant. A thick mass of papyrus vegetation occurs both in the upstream and downstream of the wetland. There are signs of encroachment by agricultural activities.

BARATON

The characteristics of this wetland are the same as those of King'wal at Eldoret – Kapsabet Bridge discussed above. Baraton University draws its water from this wetland.

HYDROLOGICAL FUNCTIONS OF KING'WAL WETLAND SYSTEMS

The hydrologic characteristics discussed above imply that King'wal wetland system is important in the following ways:

- Source of water for various uses especially water supply for Moi University, Baraton University, Communities living along the wetlands at Ngechek. It is also a source of water for livestock and wildlife as well as for other agricultural activities;
- Receives and treats sewage effluents and other polluted water from the surrounding areas especially the case of Moi University sewage ponds;
- Receives high volumes of surface runoff from the adjacent areas, stores the runoff, and releases it slowly thereby preventing floods in the downstream areas;
- The slow release of stored water into Kesses River ensures the river has a long duration of flow and therefore water is available even during the dry season; and
- The wetland maintains a high water table thus ensures availability of groundwater in the nearby areas.

THREATS TO HYDROLOGICAL FUNCTIONS

The following human interventions which can change the hydrological characteristics of the wetlands were identified:

- The catchment destruction in the surrounding areas can lead to the increase in hydrological inputs particularly runoff and sediments. This increase in hydrological input is sometimes accompanied by large decreases in the delivery time to the system, which may result in wide fluctuations in water level thus affecting the survivorship or overall health of the plant species.
- Roads construction can interrupt historical sheet flow patterns and decrease the amount of runoff contributing basin to a wetland system or can block the natural flow and over-inundate the system;
- Reclamation by ditching (canals) for reclamation aids in faster removal water from the wetland and may enhance wetland disappearance;
- Encroachment into wetland areas through farming at the wetland edge which is likely to cause increased sediment deposition in the wetland and may lead to the overall decrease in wetland size; and
- The above threats are likely to lead to the lowering of the ground water table and to total disappearance of the wetlands

3.0 LEGAL FRAMEWORK

3.1 WETLAND MANAGEMENT POLICIES AND LEGISLATIVE FRAMEWORKS

It is unfortunate that to date Kenya does not have a wetland policy. However, there are authoritative documents that support the conservation of wetlands in the country. Such documents include the Environmental Conservation Management Act (EMCA) of 1999 (GOK, 2000), the draft Wetlands Conservation and Management Policy 2013 and most recently provisions in the Kenya Vision 2030. The draft Wetlands Conservation and Management Policy for example states in part that the government, in collaboration with stakeholders will endeavour to map wetland areas countrywide and encourage and support development and implementation of catchment-based wetland management plans through a participatory process, develop and implement catchment-based management plans for all Ramsar sites through a participatory process and ensure restoration of degraded wetlands, riverbanks and lakeshores where appropriate, promote and support establishment of constructed wetlands.

Further it is clear from the draft policy that the government is committed to harmonising and coordinating the roles of various regulatory agencies charged with the management of wetlands (GOK, 2008). Apart from the draft Wetland Conservation and Management Policy, an authoritative blue print approved to guide the country in different sectors, the vision 2030 in section 5.4 address environmental issues outlines clearly what the government aims to achieve in environmental conservation in line with the MDGs (GOK, 2007) and the post MDGs, the Sustainable Development Goals (SDGs).

3.1.1 REVIEW OF THE POLICY CONTEXT

The context that defines and informs the development of the Wetlands Policy can be divided broadly into three, namely: global, regional and national. The global context is defined by the processes around the Ramsar Convention and other relevant environmental conservation treaties and conventions, notably the Rio Declaration and Agenda 21, the United Nations Convention to Combat Desertification (UNCCD), and the Convention on Biological Diversity (CBD). The regional context is defined by the integration arrangement between Kenya and its four neighbouring countries within the framework of the East African Community (EAC). The Treaty Establishing the East African Community and the Protocol on Environment and Natural Resource Management are the key instruments in this regard. The national level context is defined by the Constitution, the National Land Policy, and the other policies and laws identified above.

3.1.2 THE GLOBAL CONTEXT

As a member of the international community, Kenya participates in global discourses touching on environmental conservation and sustainable development within the framework of the United Nations Organization (UNO). Moreover, as the only developing country to play host to key United Nations (UN) agencies, namely the United Nations Environment Programme (UNEP) and the United Nations Human Settlements Programme (UN-HABITAT), it is closely associated with these discourses and has played host to major global gatherings on different aspects of environmental governance and management. With the promulgation of the Constitution, such international processes are expected to have much more significance in national policy processes in view of the stipulation by Article 2 of the Constitution that general rules of international law shall form part of the law of Kenya, and that any treaty or convention ratified by the country shall form part of its national law.

3.2 RIO DECLARATION ON ENVIRONMENT AND DEVELOPMENT

The United Nations Conference on Environment and Development (Earth Summit) held in Rio de Janeiro, Brazil in June 1992 marked a high point in the development of international environmental law. Apart from adopting the Rio Declaration on Environment and Development as well as Agenda 21, the Heads of State and Governments launched the ratification process for the CBD and the UN Framework Convention on Climate Change.

The Rio Declaration and Agenda 21 are non-binding declarations, but their importance in articulating general principles of the international law of sustainable development is not in doubt. The Rio Declaration reaffirmed the Stockholm Declaration made 20 years earlier at the conclusion of the United Nations Conference on the Human Environment, and built on it to articulate "a new and equitable global partnership through the creation of new levels of co-operation among States, key sectors of societies and people". It laid the framework for collaborative action among governments and between them and other stakeholders in the realization of the goals of sustainable development, setting out principles that have come to define environmental governance at all levels.

The Rio Declaration has relevance to national environmental policy making in its statement of principles that reconcile imperatives of environment and development. It asserts that "environmental protection shall constitute an integral part of the development process" and commits all states and peoples of the World to "co-operate in the essential task of eradicating poverty as an indispensable requirement for sustainable development". It underscores the need for informed participation by all concerned citizens, including women youth and indigenous communities in decision-making regarding management of the environment, and the importance of legislative and institutional frameworks for managing the environment. Other principles articulated by the Declaration include the Precautionary Principle, internalization of environmental costs, the use of economic instruments to promote compliance, and environmental impact assessment as a key input for decision-making. These principles have been adopted in the management plan.

3.3 AGENDA 21

Agenda 21 is a comprehensive programme of work for the realization of sustainable development in the 21st century, complete with budgetary estimates. It sets out specific actions to be taken for conservation and management of resources, including landscape ecological planning that integrates entire ecosystems and watersheds. It specifies strategies and interventions for sustainable management of land, combating desertification and drought, sustainable agriculture and rural development, conservation of biological diversity, protecting and managing fresh water, among others. Entrenched in Agenda 21 is the idea of partnerships for sustainable management that involve the participation of all social groups – women, youth and indigenous communities – as well organized groups such as Non-Governmental Organizations (NGOs), the private sector, researchers, local governments and farmers. It also underscores the importance of funding arrangements, technology transfer, research, education, training and public awareness, capacity development, information, and international cooperation in its implementation.

3.4 CONVENTION ON BIOLOGICAL DIVERSITY

The CBD came into force in December 1993 upon receipt of the requisite number of ratifications. Kenya was among the countries that signed the Convention at Rio, and proceeded to fully ratify it on 26th July 1994. The country had been closely associated with the development of the Convention as its final negotiations were done in Nairobi.

The Convention seeks to promote the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources. It commits States Parties to maintaining the integrity of biological diversity and its components out of appreciation of its critical and multiple values to life and its importance "for evolution and for maintaining life sustaining systems of the biosphere".

Wetlands constitute an integral part of the concerns of the Convention, as is evident from the definition of biological diversity and ecosystem in Article 2. Biological diversity is defined as "the variability among living organisms from all sources, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems", while ecosystem is defined as "a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit".

The Convention obligates States Parties to develop national strategies, plans or programmes for conservation and sustainable use of biological diversity, and to integrate the conservation and sustainable use of biological diversity into sectoral or cross-sectoral plans, programmes and policies. Specific measures that Parties are enjoined to take in this regard include identifying components of biological diversity that need to be conserved and monitoring their conservation whether in-situ or ex-situ; integrating considerations of conservation and sustainable use into national decision-making processes; encouraging and protecting customary uses of biological resources that are compatible with conservation or sustainable use requirements; supporting local communities to rehabilitate degraded areas; and encouraging cooperation between government and private sector in developing methods for sustainable use of biological resources. Furthermore, Parties shall develop and implement social and economic incentives, promote research and training, public education and awareness creation, and environmental impact assessment to arrest and minimize adverse impacts on biological resources. Detailed provisions are also made for international cooperation in terms of technology transfer, information exchange and financing.

3.5 UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION

The United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa came into force on 26th December 1996 and was ratified by Kenya on 24th June 1997. It seeks to combat desertification and drought through "long-term integrated strategies that focus simultaneously, in affected areas, on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level" The strategies are to be implemented through cooperation with communities, NGOs and other stakeholders at national level and among countries at sub regional, regional and international levels. In addition to general obligations of Parties to the Convention, there are specific obligations for affected country parties and for developed country parties. The Parties also commit to give priority to affected African country parties.

3.6 RAMSAR CONVENTION ON WETLANDS

The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention on Wetlands) is the international Convention that has the greatest bearing on the development of the Wetlands Policy. The Convention, which is the only global environmental treaty that deals with a particular ecosystem, was negotiated outside the framework of the UN system, and its text agreed at an international conference in Ramsar, Iran on 2nd February 1971. The following day it was signed by representatives of 18 countries. It came into force in December 1975. Kenya ratified the Convention on 5th October 1990 and has 6 wetlands listed as Wetlands of International Importance, Lakes Nakuru, Naivasha, Baringo, Bogoria, Elementaita and the newest Tana Delta. The convention provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Parties commit themselves to the three pillars of the Convention, namely: to work towards the wise use of all their wetlands through national land use planning, appropriate policies and laws, management actions and public education; to designate suitable wetlands for the List of Wetlands of International Importance ("Ramsar List") and ensure their effective management; and to cooperate internationally concerning transboundary wetlands, shared wetland systems, shared species and development projects that may affect wetlands.

Parties to the Convention also commit to specific actions regarding formulation and implementation of national plans so as to promote conservation of listed wetlands and the wise use of wetlands in their territory; research and exchange of data and publications regarding wetlands and their flora and fauna; and training of personnel in wetlands research, management and wardening.

One is struck by the fact that in spite of this really comprehensive framework at the global level, the challenges to wetlands management and conservation have persisted. The global framework is useful for setting standards and creating mechanisms for collaboration especially with regards to trans boundary dimensions of environmental conservation and management, but at ultimately the gains of for the environment can only be realized when the imperatives set in global agreements and commitments are translated into actions at the local level. It is in this respect that the global environment movement speaks of thinking globally while acting locally. This is true for wetlands as it is for other environmental resources. It informs the requirement for national frameworks articulated by the Ramsar Convention.

The need for national policy frameworks for conservation and management of wetlands is alluded to in Article 3 of the Convention which enjoins Contracting Parties to "formulate and implement their planning so as to promote the conservation" of listed and other wetlands in their territories, although the Article does not specifically mention 'policy'. It is however in Recommendations and Resolutions made by Contracting Parties in periodic Conferences of the Contracting Parties (COP) that the requirement for national policies has been made more explicit.

By Recommendation 4.10 on Guidelines for the implementation of the wise use concept, the Parties agreed that "It is desirable in the long term that all Contracting Parties should have comprehensive national wetland policies, [which] should as far as possible address all problems and activities related to wetlands within a national context". Resolution VII.6 passed by the 7th Conference of the Contracting Parties held at San José, Costa Rica in 1999 adopted guidelines for developing and implementing national wetland policies, which were issued as an annex to the Resolution, and urged those Parties that had not yet developed such policies to give the highest priority to the matter. A *Handbook on National Wetland Policies* has been published by the Ramsar Secretariat to provide guidance to national governments in developing appropriate policies.

The need for a stand-alone wetland policy is justified by the fact that wetlands are seldom explicitly covered at national level in other natural resource management policies such as for water, forest, land, and agriculture, which denies wetlands the recognition and targeted action to deal with problems and challenges associated with their sustainable conservation and management. A wetland policy thus provides an opportunity for giving recognition to wetlands as ecosystems requiring different approaches to their management and conservation and avoids the risk or wetlands conservation being marginalized by other sectoral management objectives. As such, a National Wetland Policy should reflect attitudes, desired principles, goals, objectives and aims, show what choices have been made about strategic directions, make commitments, provide a focus for consensus, express concerns and provide advice, and clarify roles and responsibilities.

The key challenge in thinking about a National Wetland Policy is how to reconcile the need for specific attention, which drives the quest for a stand-alone policy on wetlands with the fact that wetlands constitute components of ecological systems, so that their sustainable conservation and management is only possible within the overall framework of environment and natural resources management. The policy imperatives that inform the management of land, water, forests, and biodiversity, among others, have a direct bearing on the opportunities for proper management of wetlands. In a context defined by limited human and financial resources and institutional capacity, it is doubtful how the stand-alone approach can benefit wetlands conservation and management.

The Handbook outlines a process for the development of a National Wetland Policy that merits consideration here, even though the remit of this review is limited to the content of the draft policy. This is because the process followed in developing a policy document is often as important as the content of the policy with regards to the buy-in from key stakeholders that is needed to ensure legitimacy, which in turn is critical for ensuring that the policy is implemented. The fact that the wetland policy has been in the works for more than a decade raises issues about process that should exercise the minds of stakeholders, as these have implications for the implementation of the policy once adopted.

3.7 THE AFRICAN - EURASIAN WATER BIRD AGREEMENTS

This was an agreement developed in 1993 from deliberations of the Bonn Convection. The first consultative meeting of range states of African-Eurasian Water bird Agreement (AEWA) was held in Nairobi in June 1994. AEWA is another agreement that offers a good opportunity for the management and conservation of wetlands.

4.0 SOCIO-ECONOMICS

The King'wal wetland provides a wide range of both direct and indirect benefits to the local community. However, the community associates herself mainly to the direct benefits of the wetland and seems ignorant of the indirect benefits. Currently, the wetland is utilized through harnessing water for irrigation, fish rearing, grass for making mats, planting of vegetables for commercial use, trees for firewood and timber for economic use, brick-making, tourism, herbal medicine, water for domestic use/washing/bathing/drinking by both people and livestock, Swimming/recreation, Cultural benefits and enhancement of scenic beauty within the landscape. The resources derived from the wetland are briefly described below.

I. GRASS

The wetland provides grass for livestock grazing (Elephant grass and reeds) during the dry season (December-April) and for thatching of houses.

It was reported that overgrazing usually occurs during the dry season leading to the depletion of this resource for the livestock resulting in conflicts over the use of grazing areas. Some land owners adjacent to the wetland have fenced off grazing paddocks for their livestock, hence restricting access to the wetland.

Land owners on the lower part of the wetland restrict access to grazing areas for the livestock since they claim ownership of land including the wetland (claims are that the boundaries goes up to the middle of the river). The only access to the wetland at Kimondi centre is around the bridge.

II. FISH

The wetland hosts many fish species. Different fish species are reported to exist in the wetland such as mud fish and tilapia. However the local community exploits the fish only in the dry season when other vegetables are scarce for household consumption and not for sale because they are not used to fish diet.

In harnessing for fish the community uses several methods such as line and hook, fishing net and buckets. They also use crude methods such as use of local brew (Busaa).

Further investigation is required to determine all the fish species that are found in this habitat in order to promote commercial fish production to boost the income of the local communities. Fish farming is currently being done at King'wal Bridge and at Kamoywo location, an indication of the wetlands potential in commercial fish production. The community requires more sensitization on fish diet and marketing and market information.

III. SOIL HARVESTING

The community harvests clay soil from the wetland for the decoration of houses, brick making and during cultural initiation (November). Brick making is mainly done around King'wal Bridge as an economic activity.

IV. MEDICINAL PLANTS

The community exploits some of the plants found in the wetland for medicinal purposes e.g Use of Senetwet to treat malaria and additive to milk.

V. WATER

Water from the wetland is harnessed for many purposes: Livestock watering in selected watering points with access routes, House construction, washing of clothes and utensils, and bathing.

Water is also used for irrigation to grow short-term crops such as tomatoes, onions, Solanum nigram, Sukuma wiki, cabbages, carrots, Irish potatoes during dry season as an economic activity on small scale basis. The community uses watering cans, buckets, and money maker pumps in these activities.

Although the water usually declines in both quality and quantity, the community has access to water throughout the year.

Drinking water for the community is fetched from the few boreholes or from a protected spring. There is no piped water along the wetland. Many community members who were consulted agree that if the wetland dries up then, water in the boreholes and springs will also disappear.

There are designated livestock watering points that can only be accessed through specific routes since many farms are fenced off up to the wetland.

VI. WILDLIFE HABITAT.

The wetland is an important habitat for the endangered rare antelope (*Sitatunga*) and migratory bird species and wild plants. The community is aware of the existence of the *Sitatunga* but appears not to have any attachment to them resulting to recurrent conflicts. They fill it belongs to Kenya Wildlife Service and unaware of the tourism potential that can boost the economy of the entire region.

The wild animals find refuge, water and food from the wetland. The interactions of the wild animals with the surrounding environment have resulted to conflict arising from disease transmission and crop destruction hence human-wildlife conflict.

VII. MUSHROOMS AND WILD FRUITS

The community collects mushrooms and wild fruits from the edges of the wetland which are eaten as food.

VIII. SALTLICKS

There are areas where livestock and wild animals go for saltlicks to boost animal nutrition.

IX. HARVESTING OF REEDS

The reeds are usually harvested on small scale to construct temporary structures and handicraft work of making mats and chairs. There is great potential for harnessing of papyrus although the communities have inadequate information of the potentials of the papyrus and skills to utilize the resources.

X. GENERAL FARMING

The main agricultural activity surrounding the wetland from the upper to the lower region is Main farming especially during long rains. In short rains communities grows millet.

XI. DISPUTE RESOLUTION

The only mechanism that exists to resolve resource use conflicts is through the village elders and area chiefs of the provincial administration. Main disputes reported arise from competition for livestock grazing, burning of wetlands and poaching of *sitatunga*.

XII. MANAGEMENT ASPECTS

In the areas traversed by River Kesses and its tributaries are poorly managed in the sense that cultivation is done up to the river banks hence siltation and pollution from agrochemicals, while in the region covered by the swamp, a buffer zone of grass strip is deliberately left to curb against soil erosion and siltation. Burning of farms is currently being discouraged by the provincial administration and local leaders.

Blue gum is being discouraged around the wetland and is being uprooted. Tree planting activities is going on in individual farms while tree nurseries are being established to raise environmentally friendly tree species. There is no and deliberate mechanisms of protecting the wetland that exists. There exists intelligence system on the protection of *Sitatunga* in the wetland.

XIII. INDIGENOUS KNOWLEDGE, CULTURAL PRACTICES AND COMMUNAL USE

The only community use of the wetland is for traditional initiation ceremonies in the months of November and December. Cutting of Erythrina abysinica and killing of Adada ibis is culturally prohibited as it portents bad omen to the killers.Children use some of these areas as playing field. They use clay soils for moulding.

XIV. FLOODS

During rainy season communication across the wetland is usually disrupted and at times causes drowning of people, destruction of crops and causes human diseases.

XV. WETLAND OWNERSHIP

The ownership of the wetland is not quite distinct. However in some parts land owners claim ownership up to the edges of the wetland (Middle catchment) while some parts people claim total ownership of entire wetland. Most of those who were consulted agree that the wetland should be conserved and that the government has a responsibility to spearhead the process. It is highly recommended that the community in consultation with the government and other stakeholders should define the area of the wetland that is to be collectively be conserved.

XVI. BIODIVERSITY

Most of the area under the wetland is mainly grassland vegetation. Most of the trees are exotic which were just introduced e.g. Eucalyptus, Gravellea, Wattle trees etc. These trees are harnessed for fencing, timber, charcoal and construction.

Low sedge zone

This has palatable grass species such as sedges of the Typha species, elephant grass, Sesbania spp. Solanum spp., Commelina Spp. and Rubus apetalla.

High sedges

This zone is dominated by Macrophyte such as sedges of the genus canex which form food for migrating water ducks. Other Macrophyte present in this zone are bidens species; Polygonum, and Typha spp.

This zone is dominated by elephant grass, Typha spp and a lot of Cyperus papyrus. Also present are fauna such as Water lice (Asellus acquaticus), Water beetle (Coleopteran) and Water bugs (Hemipteran) the invertebrates provide food for fish within the water.

The floating leaved

This zone is dominated by water lilies (Nymphaea spp.) and some invertebrates that may escape fish predation. Also present are small species of invertebrates available to planktovorous fish that are themselves consumed by fish – feeding birds like Hadadas ibis ((Hagedashia hagedashia) Herons (Ardea melanocephala), and cormorants (Phalacrocorax carbo). A summary of the common planst and animals as provided in table 9. Communities' value and use the plant and animal species for different purposes (table 10 & 11)

TABLE 9: SUMMARY OF FAUNA AND FLORA COMMON TO MOST SAMPLING SITES

MACROPHYTES

COMMON NAME	SCIENTIFIC NAME
Duckweed	*Lemna minor*
Floating fern	*Azolla filiculoides*
Papyrus reeds	*Cyperus papyrus*
Sesbania	*Sesbania* spp.
Acacia	*Acacia* spp.
Sadge grasses	*Typha* Spp.
Water lily	*Nyphaea alba*
Algae	*Chladomonus*
Wild strain berry	*Rubus apetala*
Wondering Jew	*Commelina bengalensis*
Solanum	*Solanum* spp.

BIRDS

COMMON NAME	SCIENTIFIC NAME
Crowned Cranes	*Balearica regulorum*
Weaver birds	*Ploceus castanops.*
Cormorant	*Phalacrocorax carbo*
Squacco Herons	*Adeola ralloides*
Egrets	*Egretta alba.*
Hadadas Ibis	*Hagedashia hagedashia*
Greater swamp warbler	*Acrocephalus rufescens*

INVERTEBRATES AND FISH

COMMON NAME	SCIENTIFIC NAME
Tilapia	*Oreochromis spp*
Catfish	*Clarias gariepinus*
Water – lice	*Asellus acquaticus*
Water – bugs	*Hemiptera*
Water beetles	*Coleoptera*
Earthworm	*Lumricus terrestris*

The sampling sites downstream are quite rich in terms of biodiversity but are highly threatened by the high rate of encroachment as articulated by members of the riparian community. Designing and implementation of a management plan for the wetland is therefore imperative biodiversity conservation.

TABLE 10: HOW COMMUNITY VALUE THE WETLAND PLANTS IN KING'WAL

PLANT NAME	PART USED	LIFE FORM/ CULTIVATION STATUS	USE	RELATIVE IMPORTANCE
Elephant grass	Leaves	Grass	Cattle feeds(fodder)	1
Papyrus (Mutwet)	Stake	Grass	-Making mats -firewood, Ceiling, Arm chairs, Fodder, Thatch	2
Samsamiet	Whole plant	Grass	-thatching houses -animal feeds -cultural activities	3
Cherungut	Leaves/stake	Grass	-animal feed	1
Saoset (Typha)	Leaves	Grass	-thatching houses, Fodder, Brick cover,	2
Sosiot	Leaves	Grass	-thatching houses	3
Kipcheyat	leaves	Grass	-food -source of income	3

KOIBEYOT	Leaves	Shrub	-Fuel, -Milk Preservation,	2
SIIRIK			Fuel, Fodder for animals, poles for construction, Fruits for birds, Roots are medicinal	3
MORONYIOT			Fodder for animals (Livestock and sitatunga)	3
CHEPKOIT (Cana Lilly)			Poisonous plant to sheep, goats and cattle	1
KIPTILCH			Animal fodder, Cuts to people on bare foot,	1

TABLE 11: HOW COMMUNITY VALUE ANIMALS FROM THE WETLAND

COMMON NAME/ LOCAL NAME	LOCATION	GENERAL DESCRIPTION	USE	IMPORTANCE
Fish	Water	Tilapia, mudfish,	-human food -tourism	3
Sitatunga	Swamp		-medicine -tourism	3
Shy otter (*Mengitabek*)			tourism	2
Snakes			tourism	2
Birds: Duck, kingfisher, Crested crane (*Kongonyot*)			-food -tourism - breeding along the swamp	3
Leopard(*cheptumiet*)			-tourism	2
Hare (*Kiplengwet*)			-food - tourism	2
Porcupine (*chepsweretit*)			-tourism	2
Chelokomiet			-snake eater	3
Guenea fowl			-food -seed dispersal- tourism	2
Ibis(*chebakwakwa*)			-tourism	2
Bat (*revesiet*)			-tourism	2
Egrets (*cheptuga*)			-Tick eater	2
KIPSGAA (Water Mangoose)			Eats fish, frogs, birds, Skin used	3
DADA NUS (*chebakwakwa*)			Eat worms, frogs, Not for human consumption	1
Owl			Eat birds, insects	1
CHEPTURURK			Eats insect, worms, frogs	3
DIK DIK (*Cheptirkichet*)			Hunted for meat, fur, skin, Eats Plants	2
Others that were spoted				
Water skates				

Butter flies				
Shy otter				
Papyrus warbler				

XVII. BEST PRACTICES

The communities in small groups have set up tree nurseries and fish ponds through the economic stimulus project at King'wal Bridge, handicraft making at Kimondi, tree nursery at Kaplolok and fish ponds and bee farm at Kamoywa location. These are clear indicators that if the wetland is adequately utilized, then many more activities of direct benefit to the people can be sustainably established.

XVIII. INDIRECT BENEFITS

The community was completely unaware of the indirect benefits of King'wal wetland which include flood control and mitigation, water purification, aesthetics, air purification and recharge of underground water.

4.1 ALTERNATIVE LIVELIHOODS

The wetland has the following potential that needs to be explored.

a) Tourism

b) Fish farming

c) Electricity generation by Diguna firm

d) Water processing for economic use (bottling)

e) Piped water

f) Wildlife conservation (plants, birds and animals)

g) Papyrus reeds

h) Carbon trade

PLATE 1: ENDANGERED SPECIES IN THE WETLAND

Sitatungas and crested cranes are among biodiversity endangered as a result of wetland degradation/ hunting

Sustainable conservation and development depend heavily on strengthening the capacity of local individuals and communities to implement conservation initiatives (IUCN, 1996). In other words, for Biodiversity conservation initiatives to succeed, local communities must 'own' the projects from its planning, inception and implementation. Conservation success hinges upon demonstrating that conservation and development are not mutually exclusive or antagonistic and that indeed biodiversity conservation can be a means to development. "Conservation can only work if local communities benefit"

The current rapid assessment report on biodiversity status in the King'wal wetland was carried out between 25th April and 30th April 2010. Four sites were identified for sampling of Macrophyte, vertebrates and macro-invertebrates. One site was set at the source of the main river supplying the wetland i.e Kesses River, and three others downstream of the wetland namely Kiptendon, King'wal Bridge (Chepterit location) and Kapsisiywa near Baraton University.

At the Kesses dam, the plants observed were mainly non-wetland species except for riparian species found growing close to the river. At the 3 other sampling sites downstream, there were four main zones into which the wetland could be divided:-

a) Low – sedges zone covered mainly by pasture grasses.

b) High – sedges zone consisting of seed producing plants.

c) Reed – Swamp zone (consisting of Invertebrates)

d) Floating – leaved zone (Having fish and aquatic plants such as water lilies).

The four zones constitute the principal habitats producing pasture, seed, Invertebrates and fish, respectively. Seeds and Invertebrates however are found in all the four zones. The low-sedges zone is normally flooded only in the rainy season whereas the reed- swamp only lacks water in very dry seasons; October to March.

4.2 THREATS TO THE WETLAND

The community acknowledges that there are a number of threats that face King'wal wetland and they recognize that most of them are human-based activities as listed below:

a) Planting of blue gum trees near wetland and/or in the wetland,

b) Agricultural activities in the wetland by draining and clearing of natural wetland vegetation (poor farming intervention),

c) Encroachment and settlements in the wetland,

d) Diversion of the rivers and streams for irrigation,

e) Overgrazing,

f) Over fishing,

g) Over harvesting of wetland products

h) Hunting sitatunga and other animals

i) Deforestation for firewood and timber,

j) Unsustainable soil harvesting for brick making,

k) Unsustainable clay soil harvesting,

l) Burning of wetland and burning of farms as a method of land preparations,

m) Over-abstraction of water from the wetland for irrigation and river damming at the source,

n) Poor farming practices on the farms and catchments – lack of water and soil conservation practices,

o) Climate change – flooding and drought,

p) Lack of awareness,

q) Invasive species – reeds and elephant grass colonizing papyrus habitat,

r) Laundry washing and bathing in the river,

s) Fertilizer and chemical use in the farms in the farms in catchment,

t) Release of poorly treated sewage from Moi university/pollution/point source

PLATE 2: THREATS TO WETLAND

Anthropogenic activities

Important trees that can be planted in wetlands for conservation/wetland friendly

- *Tebeswet*
- *Chemagaltet*
- *Kaibeiyot*

Medicinal plants in the wetland

- Senetwet
- Silibiet
- Lamaywet

5.0 PARTICIPATORY RESOURCE ANALYSIS

5.1 PROCESS USED

The King'wal Integrated Wetland Management Plan was developed using a community participatory approach, where the planning team gave strong consideration to using the vast knowledge and experience from local communities. Participatory resource analysis involved the following key activities:

- Identifying resources in the wetland;
- Ranking resource use;
- Identifying key wetland use benefits from different resources;
- Identify the key wetland resource user groups according to gender;
- Analyzing wetland resource use trends in the area over a period of about 40 years.

5.2 KEY WETLAND RESOURCES (GOODS/ SERVICES) FROM KING'WAL WETLAND ECOSYSTEM

Through a brain storming session, the planning team identified key wetland resources in the wetland system. Consensus was reached that the priority list of wetland resources should include those that existed in the past and are now non-existent. The team also agreed to consider some potential resource uses that are not necessarily being currently utilized but can be useful in future. Special emphasis was also given to key wetland services/ functions provided by the wetland system.

By using a voting system, the planning team ranked different resources from the wetland, as perceived according to use and importance in their livelihoods. Through group discussions composed of mixed Resource User Groups (RUGs) and other stakeholders, lists were made of the key wetland resource uses in the wetland. The planning team was also guided to provide more details on the specific benefits that were got from different wetland resources. Examples include grass as a resource, which can be utilised for different benefits, for example grazing, construction/ thatching, fuel and mulching. This was anticipated to have a bearing on management planning, because one resource may be having different threats, depending on the use at hand, while some benefits from the same resource may not be having problems.

A ranking exercise was conducted, to show the perceived relative importance of different wetland resources.

PLATE 3: WETLAND RESOURCES/ALTERNATIVE LIVELIHOODS

Provisioning services

5.3 IDENTIFICATION OF KEY WETLAND RESOURCE USER GROUPS

The planning team agreed to the fact that most of the resources are used by all sectors of society. They also noted that the relevant resource benefits are either harvested or utilized by different gender groups. Based on that fact, resource use in King'wal was disaggregated into use according to gender. Table 11 shows the key benefits from King'wal wetland system, analyzed by gender.

Resource use in King'wal is divided according to gender roles in different sectors of society. For example some activities are a domain of male adults (men), while some others are mainly dominated by women and youth. For example hunting and brick making are dominated by men. Women and youth were reported to be the ones mainly responsible for fetching of water and firewood.

Different gender roles in the use of King'wal wetland have a bearing on how to target interventions for management and conservation programmes. Concerns on decline of a particular resource will be felt by the relevant key resource users, who can have a stronger commitment to work together to find appropriate solutions. Future management and conservation programmes in the area should therefore focus on different genders.

TABLE 12: KEY RESOURCES FROM KING'WAL WETLAND SYSTEM RANKED ACCORDING TO PERCEIVED LEVEL OF IMPORTANCE:

Key :(F- Adult Female, M- Adult Male, Y- Youth)

RESOURCE	BENEFITS	GENDER	RANKING
Water	Human domestic use Livestock and wildlife use Irrigation	F,M,Y	1
Crops	Food security Income generation	F,M,Y	2
Grass	Livestock feed, prevent erosion and flooding Thatching houses Cultural use (during initiation)	F,M,Y	3
Sitatunga	Ecotourism for generation of of income	F,M,Y	4
Other wildlife spp	Medicinal use as in the case of shy otters Ecotourism Learning resource centre	F,M,Y	5
Fish	Provision of food Income generation	F,M,Y	6
Birds	Ecotourism Used as food for human beings	F,M,Y	7
Trees	Herbal medicine Firewood Fruits Aesthetic value Soil erosion control	F,M,Y	8
Cultural Site	For initiation activities rituals and ceremonies Ecotourism	F,M,Y	9
Medicinal plants	Herbal medicine	F,M,Y	10
Papyrus reeds	Carpet making Mat making For decoration and cultural use Basket making Arm chair making	F,M,Y	11
Sand	Construction of structures or facilities	F,M,Y	12
Clay	Pottery Making walls for building Brick making	F,M,Y	13
Salt-lick	Provision of minerals to livestock and wildlife; Livestock and wildlife deworming	F,M,Y	14
Mushroom	Used as food for humans	F,M,Y	15

5.4 KEY WETLAND SERVICES/ FUNCTIONS OF KING'WAL WETLAND SYSTEM

The planning team came to a consensus that wetland benefits from the wetland can be categorized in 2 classes as direct benefits (goods/ products) and indirect benefits (services/ functions). Whereas the goods/ products identified in section 3.1 can be harvested and utilized at home or sold in the markets, the services/ functions are not tangible though they contribute a lot to livelihood improvement. It was agreed that the services or functions are in most cases complementary in providing quality goods/ products. The team agreed that the services/ functions provided by King'wal wetland system are therefore very vital for the livelihoods of the communities in the area and beyond. Through a voting system, the services/ functions were ranked. Table 12 gives a summary of the key functions/ services from King'wal wetland system. After the exercise, the planning team appreciated the importance of the functions/ services, especially based on the likely impacts from loss of the relevant services.

TABLE 13: KEY WETLAND SERVICES/ FUNCTIONS FROM KING'WAL WETLANDS.

SERVICE/FUNCTION	RESOURCE SERVICE	SERVICE/ FUNCTION RANK
Water recharge and storage	Increased water level	1
Water filtration and cleansing	Provision of clean water	2
Carbon sinks	Purification of air	3
Habitat Provision for fauna and flora	Provision of habitat to wetland species of plants animals	4
Fish spawning and breeding grounds.	Increased fish production hence food security.	5
Fertility and nutrient retention	Increased crop production	6
Flood Control	Wetlands control floods by retaining silt which would have caused flat plains downstream hence flooding is avoided	7

5.5 HISTORICAL TRENDS OF MAIN ACTIVITIES CARRIED OUT IN KING'WAL WETLAND ECOSYSTEM

Based on the discussions about different resources and respective benefits, an analysis was made of the trends in use of the different resources over time. This was considered over a time frame of about 40 years, right from as far back as the 1960s, in time intervals of at least 20 years (1940s–1966, 1967-1986, 1987-2010). Tables 13 gives a summary of the key trends in wetland related activities in King'wal wetland system and appropriate linkages to some key wetland resources. The trends indicate increased resource use and a decline in availability for almost all resources.

TABLE 14:HISTORICAL RESOURCE USE PROFILE FOR KING'WAL WETLAND ECOSYSTEM

Resource	1940-1966	1967-1986	1987-2010
Wetland size	Less	Increased swamp area due to a) Construction of King'wal bridge that hampered speed of water flow	Expanded wetland area as a result of Siltation and obstruction of water flow
Papyrus reeds	Negligible	Notable presence due to reduced water flow and wetland soils	Great increase due to increased nutrient deposition and slow speed of water flow due to siltation and obstruction by the bridge
Water	Large volume	Reduced volume due to 1984 drought	Reduced volume due to human activities in the wetland Planting of blue gum trees Use of water for irrigation
Wildlife e.g Sitatunga,	Nil	Not seen	First seen in 1990 .population has drastically increased due to improved habitat (papyrus needs) and community sensitization
Trees	Many indigenous trees	Reduced number due to deforestation	Greatly reduced number due to human activities such as charcoal burning, timber sales etc
Birds and other wildlife species	Abundant	Decreased population due to habitat destruction as a result of encroachment, farming ,brick making	Some species are almost extinct due to:- Deforestation and environmental degradation that has resulted into habitat destruction
Cultural site	Highly conserved	Moderately conserved	Less conserved due to western culture influence

6.0 STAKEHOLDER ANALYSIS

A 'stakeholder' is defined as an interested individual, group or institution that may or may not be affected by decisions or actions pertaining to a specific resource, and may or may not be part of decision-making about the resource.

Stakeholder analysis involved identification of primary, secondary and key stakeholders, assessment of their interests and determination of how these interests affect the wetland.

6.1 PROCESS USED

The task was introduced in a plenary session before they were divided into groups to discuss assigned tasks. Deliberations from the group work were presented and discussed in plenary sessions before coming up with a consensus.

Multiple approaches were used to make the process fully participatory. The first session involved presentations which were used to raise awareness among stakeholders on specific issues. The participants were taken through presentations on wetland management planning process, stakeholder participation in wetland management and Stakeholder analysis.

The presentation on stakeholder participation in wetland management planning focused on: Who is a wetland Stakeholder and Stakeholder participation in management of wetlands. Some of the key issues discussed covered the following:

- Planning within the wise use concept;
- Overall goal to achieve optimal utilization;
- Long term objectives of planning within the framework of draft National Wetland Policy;
- Optimization of the benefits from wetland services;
- Contribution to the wellbeing of all communities;
- Enhancement of fair distribution of wetland benefits; and
- Provision basis for monitoring and evaluation of wetland resource use, among others.

The stakeholders were enlightened on the contemporary approach used in the wetland management planning process. Adaptive Management Approach i.e." learning by doing" while taking into account factors that affect the features of the site, continual development of the processes and demonstration that the management is appropriate and effective was emphasized.

The final output of the analysis was a matrix diagram with four groups (boxes) of stakeholders A, B, C and D. The categories of boxes A, B, C are key stakeholders that can significantly influence wetland management activities/ programmes contained in this plan.

6.2 STAKEHOLDER IDENTIFICATION

During the stakeholder identification process, stakeholders were identified by the participants and categorized into primary and secondary stakeholders. To ensure that the process was adequately done, the following checklist of questions was used as a guide:

- Have all primary and secondary stakeholders been listed?
- Have all potential supporters and opponents of the project been identified?
- Has gender analysis been used to identify different types of female stakeholders at both primary and secondary level?
- Have primary stakeholders been sub-divided into water user or occupational groups?
- Have the interests of vulnerable groups (especially the poor) been identified?
- Are there any new primary or secondary stakeholders that are likely to emerge as a result of the project?

6.2.1 PRIMARY STAKEHOLDERS (AS PROVIDED BY COMMUNITY)

- Land owners adjacent to the wetland
- Domestic water users
- Farmers (irrigation water for food crops and horticulture)
- People who use the wetland for:
    - Fishing
    - Grazing
    - Swimming
    - During initiation
    - Baptism
    - Agroforestry
- Herbalists
- Brick makers
- Papyrus harvesters
- Clay and sand harvesters
- Kingwal Sitatunga Community Organization

6.2.2 SECONDARY STAKEHOLDERS

- Ministry of Agriculture
- Ministry of Livestock
- Ministry of Tourism
- Ministry of Forestry and Wildlife
- Ministry of Environment and Minerals Resources/ NEMA
- Lake Victoria Environnent Management Project,

- Ministry of Water and Irrigation
- Ministry of Fisheries/KEFRI
- Ministry of Health
- County governments
- Local Authority
- Ministry of Education/ Higher Learning (Moi, Masinde Muliro and Baraton Universities)
- Ministry of Trade and Industrialization
- Ministry of National Planning and Vision 2030
- Community Based Organization (CBOs e.g Friends of Nandi Environment, Kingwal Wildlife and Environmental Organization)
- N.G.Os (C.C.S-Children community services)
- County Government
- Development partners
- Nature Kenya

6.2.3 OTHER STAKEHOLDERS

- Political Leaders/ Opinion leaders
- Churches
- Development partners
- Business community

6.3 STAKEHOLDER INTERESTS

After identifying all the stakeholders, it was important to identify their interests within the King'wal Wetland. The interests of all stakeholders are often difficult to define, especially if they are 'hidden' (covert) or in contradiction with the openly stated aims of the individuals, groups or institutions involved. However, this is an important process as knowing the interest of a stakeholder is a key to their involvement and participation in the management planning and overall role in the management of the resource. A rule of thumb is to relate each stakeholder to either the problem that a project seeks to address or the established objectives of the project. It is after identifying the interests of stakeholders that an initial list of those to be involved in the process was drawn out. A summary of the stakeholders and their stakes are presented in table 14. To ensure the interests of stakeholders was appropriately drawn; the following questions were used to guide the participants.

- What are the stakeholder's expectations of the project?
- What benefits are there likely to be for the stakeholder?
- What resources will the stakeholder wish to commit (or avoid committing) to the project?
- What other interests does the stakeholder have which may conflict with the project?
- How does the stakeholder regard others in the list?

TABLE 15:LIST OF KING'WAL WETLAND STAKEHOLDERS AND THEIR INTERESTS IN THE WETLAND

STAKE HOLDER	INTEREST	POTENTIAL IMPACT
KWS	▪ Biodiversity Conservation. ▪ Strengthening ecotourism.	▪ Increase in population of wet land flora and fauna with emphasis on Sitatunga antelope. ▪ Conservation of heritage. ▪ Improved standards of living.
Farmers Land owners	▪ Grazing land. ▪ Cultivation for food and economic gain.	▪ Overgrazing. ▪ Reduced water level. ▪ Water pollution due to introduction of farm chemicals. ▪ Soil erosion.
Brick-Makers	▪ Bricks for income generation.	▪ Loss of soil fertility. ▪ Creation of unfilled quarries. ▪ Air pollution. ▪ Recession of water level.
Fisheries department	▪ Aquacultural production of fish for food and income generation	▪ Water storage. ▪ Alternative livelihood hence conservation of biodiversity and habitats.
Universities and other institutions	▪ Research. ▪ Biodiversity conservation.	▪ New findings for educational information.
County government/ Municipal/County councils	▪ Custodians of trust land community land.	▪ Conservation of culture and heritage.
Community based organizations	▪ Conservation of biodiversity. ▪ Capacity building.	▪ Increase in population of flora and fauna. ▪ Dissemination of conservation skills and knowledge.
Line ministries eg Agriculture. Livestock. Tourism. Forestry and Wildlife. Environment and Natural Resources. Water and irrigation. Fisheries Health Interior and Coordination	▪ Food production. ▪ Livestock production. ▪ Tourism. ▪ Conservation of forests/ wildlife ▪ Environment conservation. ▪ Fish farming/crop production ▪ Fish farming ▪ Disease control	▪ Food security ▪ Eco-tourism. ▪ Habitat and species conservation. ▪ Water conservation ▪ Fish farming ▪ Fish farming ▪ Disease control
Education and higher learning (Moi, Masinde; Baraton University)	▪ Research	▪ Job provision of data for baseline of planning.
Industries	▪ Industrialization	▪ Job provision; increased living standards.
National Planning	▪ Future planning e.g. vision 2030.	▪ Future development planning
LVEMP II	▪ Lake Victoria basin conservation	▪ Increased water volumes; quality and conservation of habitat and biodiversity.
NEMA	▪ Environmental conservation.	▪ Enforced legislation on land and other natural resources.
Schools/Churches	▪ Education, both academic and spiritual.	▪ Provision of knowledge, skills and faith.
Businessmen/women	▪ Availing goods and services.	▪ Providing a source of livelihood
Administration	▪ Security enhanced	▪ Mobilization and coordination of government plans. ▪ Enforcing legislation ▪ Implementation of development activities

6.4 ANALYSIS OF STAKEHOLDER IMPORTANCE AND INFLUENCE

6.4.1 ASSESSING IMPORTANCE

Importance refers to those stakeholders whose problems, needs and interests are a priority of the King'wal Wetland Management Planning Project. Some of these stakeholders may be unrecognized primary stakeholders, upon whom the management of the resource places high priority (e.g. fishermen, women and poor subsistence farmers). These stakeholders may have weak capacity to participate in the project and limited power to influence decisions but their needs must be addressed effectively for the management of the wetland to be successful. Answers to the following questions were used to cross check whether the "importance" of the stakeholders was appropriately assessed.

- Which problems, affecting which stakeholders, does the plan seek to address or alleviate?
- For which stakeholders does the plan place a priority on meeting their needs, interests and expectations categories?

6.4.2 EXPLANATIONS OF THE CATEGORIES ARE AS FOLLOWS:

- **Box A:** Stakeholders of high importance but with low influence = Require special mechanisms if their interests have to be protected; they have a great say and role in decision making though may not have resources to initiate development projects
- **Box B:** Stakeholders appearing to have a high degree of influence, who are also of high importance to the success of wetland management = Development of good working relationship among these stakeholders can ensure an effective coalition of support;
- **Box C:** Stakeholders with high influence, who can affect outcome of the management process BUT whose interests are not the target = these stakeholders may be a source of significant RISK and will need careful monitoring and management;
- **Box D:** Stakeholders in this box have low influence on and low importance to the project objectives = they require limited monitoring and management but they are of low priority.

Almost all the primary stakeholders fell in category A. Some government departments and some civil society organizations fell in category B. Other government departments fell in group C with very few organizations falling in category D. This exercise gave the overall stakeholder situation in King'wal wetland area and was used to prepare the management plan.

6.4.3 ASSESSING INFLUENCE

Influence refers to the power a stakeholder has over the project to control what decisions are made, to facilitate project implementation or to exert influence which positively or negatively affects a project. Influence is best understood as the extent to which individuals, groups or institutions (i.e. stakeholders) are able to persuade or coerce others into making decisions and following certain courses of action. The power may be derived from the nature of a stakeholder's organization or their position relative to other stakeholders and may be formal or informal. It is also important to determine stakeholders whose power and influence may increase because of resources introduced by the trans-boundary wetland management project. The power and influence of the stakeholders were derived using the factors listed in Table 14.

TABLE 16:VARIABLES AFFECTING STAKEHOLDERS' RELATIVE POWER AND INFLUENCE

WITHIN AND BETWEEN FORMAL ORGANIZATIONS	FOR INFORMAL INTEREST GROUPS AND PRIMARY STAKEHOLDERS
✓ Legal hierarchy (command & control, budget holders)	✓ Social, economic & political status
✓ Authority of leadership (formal & informal, charisma, political, familial or cadre connections)	✓ Degree of organization, consensus & leadership in the group
✓ Control of strategic resources for the project (e.g. donors & suppliers of services)	✓ Degree of strategic control of strategic resources significant to the project
✓ Possession of specialist knowledge (e.g. hydraulics)	✓ Informal influence through links with other stakeholders
✓ Negotiating position (i.e. strength in relation to other stakeholders in the project	✓ Degree of dependence on other stakeholders

6.4.4 COMBINING INFLUENCE AND IMPORTANCE IN A MATRIX DIAGRAM

Combing influence and power is important in determining the various stakeholders' capabilities of influencing the success of the plan. In this context, table 16 summarizes this.

TABLE 17:WETLAND STAKEHOLDERS' IMPORTANCE AND INFLUENCE MATRIX DIAGRAM

BOX A: HIGH IMPORTANCE, LOW INFLUENCE	BOX B: HIGH IMPORTANCE, HIGH INFLUENCE
✓ Livestock farmers ✓ Fish farmers ✓ Bee keepers ✓ Institutions of higher learning ✓ C.B.Os ✓ Schools ✓ Horticultural farmers ✓ Cereal farmers ✓ Business people ✓ Green Belt ✓ Churches. ✓ KEFRI ✓ KFS ✓ Ecotourism	✓ KWS ✓ NEMA ✓ County Government ✓ Municipal councils ✓ Ministry of planning and vision 2030 ✓ LVEMP ✓ Ministry of Roads ✓ Ministry of Agric, Livestock and fisheries ✓ Ministry Trade and industries ✓ Ministry of Envt, Water and NR ✓ Ministry of culture and Social services.
BOX C:LOW IMPORTANCE, HIGH INFLUENCE	**BOX D:LOW IMPORTANCE, LOW INFLUENCE**
✓ Politicians , Media	✓ Poultry farmers., Brick Makers, Papyrus harvesters

7.0 ANALYSIS OF PROBLEMS AND CONFLICTS IN KINGWAL

7.1 ANALYSIS OF PROBLEMS RELATED TO WETLAND RESOURCES, COPING STRATEGIES AND SUGGESTED SOLUTIONS

The planning team made a critical analysis of the key issues at stake that either affect optimal utilization or may jeopardize the sustainable utilization of King'wal wetland ecosystem. These were categorized as either problems or conflicts.

It was agreed that whereas problems can be addressed by directly addressing what is observed as the main causes, in some cases, there is need to analyze the causes of problems and identify the root causes of the problems in order to effectively address the problem. For example, if the problem of reduced agricultural production is reduce water, directly addressing increasing rainfall may not be feasible. The pertinent problems in King'wal wetland were therefore analyzed up to the level of root causes.

In order to suggest feasible solutions, it was agreed that consideration should be made to ways in which the local communities have been using the resources to cope up with the problems. Table 17 outlines the key problems in relation to sustainable utilization of King'wal wetland system. The problems were ranked according to the perceived gravity of their likely impacts. Based on the problem analysis, some solutions were suggested for overcoming the problems, with reference to previous coping strategies.

TABLE 18: RESOURCE-BASED PROBLEM ANALYSIS

RESOURCE	PROBLEM AND RANK	CAUSE	SOLUTIONS
Water	Poor water quality (2) Low water quantity (1)	Farm chemicals Industrial effluent from institutions e.g. Moi and Baraton Universities. Planting tree species that consume a lot of water Wetland drainage Reduced tree cover	Control of soil erosion and surface run off. Treatment of effluents. Organized farming Planting indigenous tree species. Avoid draining the wetland. Afforestation and reforestation. Awareness creation
Grass	Soil erosion (3)	Burning of wetland Drought Over-exploitation through overgrazing	Community sensitization and awareness on the negative effects of clearing grasses

Sitatunga	Poaching (4) Habitat loss (12)	High demand for wild meat Attack by dogs and wild predators	Community sensitization and awareness Killing stray dogs Controlled movement of domestic dogs Heavy penalties Developing ecotourism to Co-management of Sitatunga and guard against crop destruction Introduction of ranger out-posts Sharing of benefits between community and KWS.
Other wildlife spp Crested cranes	Endangered species like the crested crane (5)	Destruction of habitat Low capacity among community members	Conservation of wetland and hence habitat
Trees	High demand cause for construction materials, fuel and planting of wetland unfriendly free species such as the blue gun water sources (6) Decline of trees in the catchments, farmland and wetlands	Charcoal burning, land clearing for farming, Increased demand for wood products Low capacity among community members	Planting indigenous trees (afforestation and reaforestation) Education and awareness creation
Sand and clay	Land degradation (7)	High demand for building materials Lack of alternative building materials.	Alternative livelihood
Papyrus	(8) Increased wetlands size	Siltation	Control of soil erosion and therefore siltation
Environment	Habitat loss (9)	Brick making Sand harvesting Encroachment Poor farming method Overstocking	Enforcing of legislation. alternative livelihood Improved farming methods.
Sitatunga	Human wildlife conflict (10)	Farming the swamp Encroachment Burning of wetland	Benefit sharing from ecotourism Enforcing legislation Alternative livelihood
Wetland habitat	Fire outbreaks (11)	Burning of wetland	Planting fine break species e.g. Mexican green Hash along buffer zones Avoid burning in wetland
Livestock	Overgrazing (13)	Overstocking	Keeping fewer livestock

TABLE 19: PROBLEM ANALYSIS RELATED TO ANTHROPOGENIC ACTIVITIES IMPACTING KING'WAL WETLAND ECOSYSTEM

PROBLEM	CAUSE	EFFECTS	SOLUTIONS
Encroachment	-Low capacity among community members -Population pressure -High poverty levels	Wetland degradation	-Law enforcement and awareness creation -Provision of piped water to stakeholders -Alternative livelihood options
Fire outbreaks	-Poor farming activities at the time of land preparation -Low capacity and poor attitude on wetland use. -Efforts to restrain wetland from extending to farmlands	-Destruction of the vegetation cover -Loss of biodiversity	-Use proper farming system/methods -Construction of firebreaks -Availability and proper use of firefighting equipment -Control of soil erosion and hence siltation -Creation of fire barriers
Brick making	-Lack of employment/ income -Increased demand for construction material	- Open pits left are breeding grounds for mosquitoes -The pits can cause accidents eg/through drowning	-Use of proper farming methods Construction of firebreaks -Alternative livelihood options -Rehabilitation of degraded sites
Overharvesting of papyrus	-Ignorance/lack of options or alternatives	-Loss of biodiversity	-Formulation of policies that restricting over exploitation of papyrus Encourage sustainable use of the wetland
Chemical pollution	-Poor farming methods -lack of land specially for tea -Use of herbicides on farms	-Pollution of water bodies -Diseases - human and livestock deaths	-Proper /Ecofarming and farming methods -Biological pest control -Proper waste disposal -Awareness creation
Defforestation	-High demand for timber/ building materials High demand for charcoal	-Destruction of water catchments -Soil erosion	-Reforestation/catchment rehabilitation -Regulation enforcement -Planting indigenous trees by the community
Planting of eucalyptus in riparian areas	Ignorance	Water loss	-Replace eucalyptus with indigenous trees -Enforcement of government guidelines and regulations on planting trees including species siting for eucalyptus trees
Wetland Drainage	Reduced quantity of water/climate change	Drying of wetlands Reduced water quantity	-Enforcement of legislation -Provision of piped water for irrigation
Sand harvesting	-Lack of Income and general poverty -High demand for construction materials	Wetland degradation	-Enforcement of legislation -Enforcing guidelines given by NEMA on sand harvesting.
Clay harvest	Mudding of houses	-Open pits are breeding grounds for mosquitoes -open pits are dangerous eg may cause death through drowning	-Enforcement of legislation -Sensitization of community on sustainable use of King'wal wetland

Overgrazing	-Overstocking -Drought -Inadequate grazing land	-Erosion -Wetland degradation	-Upgrading of livestock breeds (zero grazing) -Sensitization of the community on modern methods of farming through agricultural extension officers.
Siltation	-Overstocking -Inadequate grazing land	-Soil erosion -Water pollution	-Zonation of grazing areas -Develop a grazing strategy -Farm planning -Discourage planting on steep slopes

PLATE 4: SOME OF THE WETLAND PRODUCTS

8.0 MANAGEMENT OBJECTIVES, VISION AND ACTIONS

8.1 PROCESS

The objectives set targeted the stakeholders who were most critical in the achievement of objectives. Focus was directed to what the relevant stakeholders need to know and provide information that increases their understanding and thereby build support either through communication or use of appropriate incentives. Management objective therefore focused on the value and interest of the stakeholders rather than exclusively on the ecological values, say biodiversity conservation.

The guidelines used to prepare objectives in this Wetland Management planning process was a stepwise process which includes

- Step 1: Description of site features,
- Step 2: Evaluation of features and selection of key features,
- Step 3: Formulation of long-term objectives for each key feature,
- Step 4: Formulation of short-term operational objectives for each key feature.

This process was clearly outlined to the stakeholders and the significance of each step explained to help them make informed decisions.

However, the approach used to set vision and management objectives recognized the above provision but varied to some extent. The focus was on what affects the people in the exploitation of the wetland. As such stakeholders were given an opportunity to raise all the issues affecting them or causing conflicts/problems within the King'wal Wetland. Several issues were raised and then grouped into four thematic areas which included:

- Environmental Conservation issues
- Social-cultural benefits
- Socio-economic viability
- Sustainable use of wetland

The stakeholders were then randomly divided into the four groups and mandated to discuss the problems in detail, their causes and possible remedial measures that would help resolve the conflicts. They were also mandated to deliberate on long and short term management objectives for each identified issues. Each of the groups also deliberated on what vision they wish to set for King'wal Wetland Management Plan.

8.2 VISION FOR KING'WAL WETLAND

The following key words were identified by the stakeholders as the building blocks for the vision that they wanted of their wetland. They stakeholders wanted a King'wal Wetland which:

- Is well conserved;
- Is sustainably utilized;
- Provides cultural and economic benefits;

Four different sets of visions were drafted by different groups during group discussions. After lengthy deliberations, all the stakeholders came up with a common vision, which focuses at attaining:

"A well conserved and sustainably utilized King'wal wetland with socio-cultural and economic benefits."

8.3 FORMULATION OF MANAGEMENT OBJECTIVES

The overall objective of King'wal integrated wetland management plan was formulated by unpacking the vision, "A well conserved and sustainably utilized King'wal wetland with socio-cultural and economic benefits." reflecting on aims for achievement and sustenance of benefits from the wetland.

The management objectives were set to address the major thematic areas and were as follows:

- To control water pollution and increase the water level in the wetland
- To control encroachment and reduce population pressure on the wetland
- To control floods and reduce incidences of water borne diseases in the wetland community
- To control fires on the wetland
- To promote re-afforestation in the wetland
- To Improve the water table in the wetland
- To improve livestock husbandry practices
- To promote sustainable livelihood options
- To reduce human-wildlife conflict

8.4 FORMULATION OF MANAGEMENT ACTIONS AND ACTIVITIES

To achieve the intended objectives of management and ultimately the vision for King'wal wetland, the planning team unpacked the formulated objectives into actions/ activities/ interventions. Table 18 summarizes the key activities formulated under each of the objectives.

TABLE 20: IMPLEMENTATION PLAN FOR KING'WAL

OBJECTIVE	ACTIVITY	TIMEFRAME	RESPONSIBLE/ACTORS	INDICATORS	BUDGET(IN MILLION KSHS)
To control water pollution	• Carry out integrated solid waste management (ISWM) • Develop and enforce community bye-laws on water pollution • Encourage integrated pest management (IPM) through biological means • Regular/periodic water quality assessment and monitoring • Establish cattle watering troughs on designated areas • Demarcate wetland boundary including buffer /riparian zone • Practice zero grazing • Encourage rainwater harvesting • Planting of wetland friendly tree species such as bambooo around the wetland • Undertake Agroforestry practices • Plant fruit trees and fodder • Establish woodlots • On-farm tree planting • Provide Energy saving/ cleaner production technologies • Train communities on use and production of biogass • Train communities on carbon trading/CDM • Establish CDM projects at community-level	2014-2018	KFS, King'wal wetland Management committee; NEMA; Ministry of agriculture; Ministry of energy; NGOs such as VI-Agroforestry; Local Communities; County Government; WRMA; Ministry of Environment, Water and NR; Ministry of Interior Coordination	• Size/acres planted; • Number of cleaner production and waste management and disposal technologies initiated/ adopted ; • No of Trainings held on biogass production and use at the household level; number of farmers with dairy cows; tree seedlings established; • Number of households using improved Cooking's Stoves (ICS); • Water quality and quantity data and improvement trends; • Number of Households accessing river/wetland water; Number of CDM projects; Other climate related data and trends eg rainfall etc	30

OBJECTIVE	ACTIVITY	TIMEFRAME	RESPONSIBLE/ACTORS	INDICATORS	BUDGET(IN MILLION KSHS)
To promote afforestation and re-afforestation at the catchment scale	• Undertake training and sensitization on environmental management and the existing laws and regulations • Establish woodlots • Establish indigenous wetland friendly trees/ vegetation within and around the wetland • Practice agroforestry/farm forestry • Explore and adopt household level green energy/renewable energy • Promote exchanges for information and best practices	2014- 2018	King'wal wetland Management committee; Ministry of education; Ministry of Interior Coordination; NEMA; Ministry of public Health and sanitation; MEWNR; KFS; WRMA; Nandi County Government; Ministry of Energy	Number of training /sensitization sessions conducted; No. of Field visits and number of participants attended/participated; Number of woodlots established; size/acreage planted with wetland friendly trees/vegetation; levels of adoption and use of green/ renewable energy sources; rainfall intensity and frequency;	24.0
To control fire outbreaks and wetland burning	• Establish community bye-laws to deal with errant individuals causing fires/wetland burning • Train communities and committees on fire fighting skills • Undertake de-stocking and promote zero grazing • Create awareness on wetland laws and regulations • Construct fire breaks • Plant cover crops • Establish Community-level structures eg sub committees) to deal with enforcement • Heighten Environmental Surveillance and enforcement by government agencies • Seek /provide alternative livelihood sources such as apiary and fishfarming	2014-2018	NEMA; Local Wetlands Committee; MEWNR, KFS/ KWS; WRUAs; Chiefs/and sub-chiefs;; WRMA; County Government; Ministry of agric, livestock and fisheries; Fisheries Department	Number of offenders penalized; Existence of community-based wetland management by-laws and rules; Trainings held and number participated; existence of enforcement committee; number of livelihoods; firebreaks created	7.0

OBJECTIVE	ACTIVITY	TIMEFRAME	RESPONSIBLE/ACTORS	INDICATORS	BUDGET(IN MILLION KSHS)
To halt soil erosion	• Plant cover crops • Construct gabions • Afforestation and tree planting and rehabilitation of degraded sites • Destocking • Regulate clay, sand harvesting • Encourage other livelihood sources	2014- 2018	NEMA; Ministry Envt, Water and NR; Ministry of Agriculture, Fisheries and Livestock; King'wal wetlands Management committee; WRMA; KFS; County Government	Size of rehabilitated sites; Area planted with cover crops; number/population of livestock; existing regulations and community bye-laws; No. of Farm forestry and livelihood initiatives initiated;	40.0
To reduce human-wildlife conflicts	• Training and awareness creation Promote nature based enterprises such as tour guiding, bird watching, game drives, curio shops • Organize awareness on sustainable wildlife management eg Sitatunga night • Wildlife surveillance and patrolling • Erect sign posts • Adoption of other nature friendly livelihood options • Establish wildlife (Sitatunga) sanctuaries	2014-2018	NEMA; KWS; MOA, Fisheries & Livestock; Community; WRMA; County Government; Media; Ministry of education; Development Partners;	Training reports and number trained; number of livelihood enterprises initiated; human – wildlife conflict incidence (reports) incidences of livestock/people deaths	25.0
To promote research and education	• Conduct participatory wetland related researches including gendered impacts of climate change and variability on the ecosystem and biodiversity • Undertake biodiversity inventory and water quality assessments; • Undertake Market researches for wetland products and valuation • Population, health and Environment (PHE) assessments/studies • Wetland Policy related researches • Collaborate with relevant authorities so as to source wetland information on relevant issues • Value addition to wetland products • Collect data on plants, forestry, human resource capacity and socio-economics	2014- January 2018	Ministry of Education, Science and Technology; NEMA King'wal wetland development committee; Ministry of Planning; Research institutions; Universities; NGOs, KWS, WRMA, KEFRI, KEMFRI, KARI; development partners	Research reports; water quality data; biodiversity inventory	9.0

9.0 IMPLEMENTATION STRATEGY

9.1 MONITORING AND EVALUATION

Monitoring and evaluation of the management plan should be a continuous activity following adaptive (experimental) management approach. This is because the management of wetland ecosystems is a new and dynamic discipline which is done alongside generation of new information / data which must be fed into the system as time goes on. The action plan set for the wetland will therefore be evaluated regularly on the basis of information, data and knowledge generated by the implementation of the management plan, particularly in the thematic areas. The guiding principle for the whole process should target maintenance of essential values and functions of wetlands, preservation of the multi-functionality of the wetlands, taking into account the interrelationships between wetland and other ecosystems, integration all development agenda / investments with conservation and lastly by ensuring the full involvement of all the wetland dependent stakeholders.

The monitoring indicators are clearly stated in the action plan (Table 19), it is expected that the community members elected to oversee the implementation of the management plan will be directly involved in M and E in close collaboration with the county NEMA officials and the Wetland Management Plan Implementation Committee.

TABLE 21: KEY MONITORING INDICATORS FOR KING'WAL WETLAND MANAGEMENT PLAN

OBJECTIVE	MONITORING INDICATORS
To control water pollution	✓ Number of awareness meetings done ✓ Number of people trained on health matters in the community ✓ Number of radio programs aired on water pollution control and benefits of wetland conservation ✓ Number of laboratory water quality analyses and results on water sample from King'wal wetland ✓ Number of farmers using eco-friendly /organic farming & chemicals
To reduce soil erosion levels in the wetland.	✓ Number of terraces done ✓ Number of trees planted ✓ Area of hill tops planted with trees ✓ Number of check dams constructed ✓ Distance /area/size of river banks uncultivated ✓ Number of tree nurseries established ✓ Number of farmers practicing zero grazing
To control encroachment and increase biodiversity	✓ Boundary/ Area of wetland demarcated/secured ✓ Number of people practicing alternative livelihood such as Dairy goats keeping, Poultry, Dairy cows, Fish farming, Bee keeping, Rabbit keeping, Horticulture, Eco tourism ✓ Number of water friendly indigenous trees planted ✓ Area of wetland recovered through conservation ✓ Number of fish ponds established
Raise the water table in the wetland	✓ Number of people trained in wetland conservation and its benefits ✓ Number of buffer zones created ✓ Number of eucalyptus trees uprooted from the wetland

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REINSURANCE PLAZA, 2ND FLOOR
P.O. BOX 9220- 40100, KISUMU
TEL: +254-57-2020563
FAX: +254-57-2020284
Email: lvemp2kenya@gmail.com
Website: wwwlvemp2kenya.org