

Dunga Swamp Important Bird Area

Conservation Management Plan

**Draft for discussion
(Version 1: February 2010)**

Chapter 1

{from IBA Site Accounts. Need to add latest literature}

Introduction

Dunga Swamp

01°10'S, 34°47'E, Nyanza Province, Kisumu District

c. 500 ha

Altitude: 1,130 m

Status: Unprotected

IBA criteria: Globally-threatened species, Lake Victoria Basin biome species

Site description

Dunga (or Tako River mouth) is a wetland situated about 10 km south of Kisumu town on the shores of Winam Gulf, Lake Victoria. At the western limit is a beach, used as a major fish landing point. Papyrus *Cyperus papyrus* stands stretch south-eastwards along the shore from here for about 5 km, in a strip that varies in width from about 50 to 800 m. A number of streams drain into the lake through the swamp, the main one being Tako River.

Birds

This site is one of the most reliable sites in Kenya for the scarce and threatened Papyrus Yellow Warbler. All but one of Kenya's nine Lake Victoria Basin biome species have been recorded here, and it is especially important for Papyrus Gonolek, White-winged Warbler and Papyrus Canary, all papyrus endemics.

Globally-threatened species

The swamp is predominantly Papyrus (*Cyperus papyrus*) which forms distinctive habitat type for papyrus specialist birds. The birds include the restricted range endemics like the globally threatened Papyrus Yellow Warbler (*Chloropeta gracilirostris*), the near threatened Papyrus Gonolek (*Linarius mufumbiri*), White Winged Warbler (*Bradypterus carpalis*), Carruthers's Cisticola (*Cisticola carruther*) and Papyrus Canary (*Serinus koliensis*).

Other wildlife

No information is available. Wetlands around the shores of Lake Victoria are known to be important refuges for a number of the lake's endemic haplochromine fish species

Conservation issues

Dunga is close to a major town, and this puts particular strain on the wetland. Papyrus harvesting is often excessive and unsustainable. The incoming streams bring pollution in the form of sewage and solid wastes from nearby residential estates. Lake Victoria's papyrus swamps are under increasing pressure in general. The Water Hyacinth *Eichhornia crassipes* has infested much of the Winam Gulf (e.g. Johnstone & Githongo 1997). By preventing fishermen from fishing, it forces them to seek other forms of livelihood. Often, the only alternative available is to harvest papyrus, or to clear it in order to cultivate crops. Dunga urgently requires better formal protection, as it has no conservation status at present. The site is already a popular area for recreation. Its proximity to Kisumu town gives it potential for environmental education and bird tourism focused on the papyrus endemics.

The major threats to Dunga swamp and associated biodiversity include: Pressure caused by high population densities on its edges, over-harvesting of Papyrus for thatching and making products such as mats and baskets, clearing of Papyrus beds for agriculture by the local people rendering them less suitable for birds, grazing ground for cattle at times of drought.

Started in 1997, the Lake Victoria Sunset Birders (LVSB)-works with the support of Nature Kenya, to enhance the conservation of Dunga, Yala, Kusa and Koguta Swamps through lobbying and advocacy, research, promotion of sustainable livelihoods and organizing trainings for grass root wetland custodians. More specifically LVSB promotes the conservation of these wetlands through the following means: public awareness forums like school and community outreaches, periodic site monitoring for conservation action, promotion of avitourism in the sites as a sustainable resource use alternative, offering trainings relevant to wetland conservation and micro enterprise development to the local community upcoming groups. Through LVSB programs, 20 schools are already actively involved in advocating for Dunga swamp conservation. This has been enabled by the many school awareness programs supported in the past by Nature Kenya and the Rufford Small Grants Foundation. Data collected through periodic site monitoring in Dunga and Yala swamp has facilitated the development of on going conservation actions in the site. Since 2004 research findings have been published in the Kenya's annual Important Bird Areas Status and Trends Reports. LVSB membership base has risen from six to fifty two which has complemented conservation efforts at community level in four lake Victoria wetlands.

Further reading

Nasirwa & Njoroge 1997

Human Population around Dunga Swamp

{Add data here}

Policy, legal and institutional background

Existing policies and legislation

There are more than 77 sectoral statutes, policies and legislation on wetlands inscribed under various sectors' acts all relevant to wetlands conservation and management. This had resulted into duplications and conflicts. To harmonize these, the country developed the National Environment Management and Co-ordination Act (EMCA), whose Section 42 deals with wetlands. It was expected to harmonize all the statutes. The existence of all these frameworks however have not created the desired impact thus the need for a national wetland policy to guide the various aspects relating to wetland use and development in Kenya.

{Put more data here}

Chapter 2

Principles, Goal, and Objectives

The challenges affecting Dunga Swamp are impacting negatively its ability to function optimally, thereby impeding its sustainable use and contribution to biodiversity conservation and socio-economic development in the area. In order to address the challenges, the Dunga Swamp Conservation Management plan is guided by the principles contained in the National Wetlands Conservation and Management Policy:

The guiding principles

1. **Wise use:** Due to the significant contribution of Dunga Swamp to the health and well being of Kenyans, Dunga Swamp should be integrated into the national Protected Areas network and also the local and national economic planning for sustainable development, wealth creation and environmental and biodiversity management
2. **Precautionary principle:** Where information is inadequate for decision making, the precautionary principle will apply. Lack of full scientific information should not prevent implementation of measures to minimise/ manage Dunga Swamp degradation
3. **Collaborative and participatory approach:** An integrated approach to Dunga Swamp conservation and management should involve stakeholders at all levels including; government, local community, civil society and the private sector.
4. **The global dimension:** the global dimension of environmental impacts of actions and policies should be recognised and considered
5. **Polluter pays principle:** Persons who pollute Dunga Swamp environments should meet the cost of cleaning them up, and also meet the cost of the pollution to resource users.

Vision, purpose and strategic objectives

The goal of the Dunga Swamp Conservation Management Plan is to ensure wise use and sustainable management of Dunga Swamp by and for stakeholders in order to enhance sustenance of Dunga Swamp ecological and socio-economic functions for the present and future generations of Kenya and the world.

Specific Objectives

1. Enhance and maintain ecological functions and socio-economic values derived from Dunga Swamp in order to protect biological diversity and improve livelihoods of Local Communities
2. Promote innovative planning and integrated management approaches towards Dunga Swamp sustainable conservation and management

3. Establish an effective and efficient institutional framework for integrated management and wise use of Dunga Swamp and create enabling environment for the participation of all stakeholders.
4. Carry out demand driven research and sustainable biodiversity and resource base monitoring on Dunga Swamp to improve scientific information, knowledge base and inform biodiversity conservation, development agenda and general management objectives
5. Enhance capacity building within government and local community institutions involved in conservation and management of Dunga Swamp.
6. Promote communication, education and public awareness among stakeholders to enhance their appreciation and participation in Dunga Swamp conservation and participatory management
7. Establish a Dunga Swamp information management system and database including tools and packages targeted to schools, the general public and private groups.
8. Engage private sector in the conservation and development agenda in the Dunga Swamp.

Chapter 3

Management strategies: Importance, significance and values of Dunga Swamp

Objective: Enhance and maintain ecological functions and socio-economic values derived from Dunga Swamp in order to protect biological diversity and improve livelihoods of Local Communities

Dunga Swamp Functions, Products and Services

Dunga swamp is a filter to sediment entering lake Victoria, it controls flooding in the area among others..Like in many wetlands in Kenya, the ecological and socio-economic values in Dunga Swamp have not been valued in monetary terms but its innate contribution to conservation and development agenda invaluable. Before the actual monetary contribution of Dunga Swamp is properly valued it will take long and this management plan proposes management strategies based on the known and unknown values to ensure that current actions do not threaten the future survival of threatened biodiversity, the invaluable ecological goods and services and the direct socio-economic benefits for the people living around the Dunga Swamp.

Dunga Swamp Wildlife Habitats and Reservoirs:

Dunga swamp is a natural wildlife habitat for a variety of plants and animals some of which are of conservation significance including endemic, endangered and migratory species. Dunga swamp is also *in-situ* bank for genetic resources. Thus, the management of Dunga Swamp for biodiversity conservation is critical.

Dunga Swamp holds eight out of Kenya's nine Lake Victoria biome bird species, including the globally-threatened Papyrus Yellow Warbler. The near-threatened Great Snipe, a Palaearctic migrant, probably also occurs. Because of its size and the generally good condition of the papyrus, Dunga Swamp is an important site for East Africa's papyrus endemics. These include Papyrus Yellow Warbler, Carruthers's Cisticola, White-winged Warbler and Papyrus Canary. Many other wetland birds also occur (Britton 1978, Nasirwa & Njoroge 1997).

Management strategies:

- Promote ecosystem based approach to the management of Dunga Swamp
- Promote the sustainable exploitation of papyrus in the Dunga Swamp
- Zone strict conservation and multiple use areas
- Add value to Papyrus products to reduce wide scale exploitation
- Study the Dunga swamp papyrus birds and biodiversity and develop species action plans
- Monitor birds and biodiversity and produce annual status and trends report for management interventions
- Enhance the protection status of Dunga swamp to cushion future biodiversity losses
- Develop and initiate non-consumptive uses e.g. Tourism and carbon trading

Dunga Swamp Natural products:

Fish and other food products:

Dunga Swamp sustain commercial and subsistence/ artisanal fisheries. The western side of the swamp is a major fish landing site. Its importance as fish nursery grounds and for replenishing natural stocks in lake Victoria is well recognised. Fish farming within wetland areas is increasingly becoming an important alternative to natural production.

Management strategies:

- Promote efficient techniques and technologies for harvesting and processing fish and other food products within Dunga Swamp
- Promote conservation measures that protect fish nurseries and breeding grounds in the Dunga Swamp
- Promote fish-based businesses and add value for higher returns to local people and government
- Establish commercial fish farming for indigenous species

Wildlife and plant products:

Dunga swamp communities are increasingly harvesting wetland resources to enhance and improve their livelihoods. Wetland plants are harvested to provide materials for construction and thatching, the cottage industry, canoes, fishing baskets and traps. Wetland plants are also used for medicinal purposes and as a food source.

Management strategies:

- Determine and monitor the wildlife and plant based resources in the Dunga Swamp
- Promote sustainable extraction and utilization of products derived from Dunga Swamp
- Develop appropriate marketing infrastructure for wetland products for maximum benefits to the community.
- Establish user groups and develop regulations for access and extraction of wildlife and plant resources in the Dunga Swamp

Tourism and Recreation:

The nature and serenity of Dunga Swamp makes it important ecotourism and recreation centre. The presence of a wide range of wildlife species as well as its aesthetic value makes Dunga Swamp a unique attraction for tourism, which is an important foreign exchange earner at the national level and source of livelihood for local communities. The Kenya government has a plan to diversify tourism products and tourism attractions and Dunga Swamp is strategically placed for this noble development in the western Kenya region.

Management Strategies:

- Establish a tourism hotspot in the name of Dunga Swamp Conservation Area and map it on the national tourist attractions map
- Promote development and establishment of recreation and eco-tourism facilities.

- Build government and local community capacity to manage the tourism activities including tour guiding. Bird tourism has the highest immediate potential and this product will be singled out and marketed nationally and globally.
- Produce and distribute tourism marketing materials
- Establish links and networks with the national and global tourism networks

Dunga Swamp ecological values

Flood Control and Soil Erosion Prevention:

Dunga Swamp act as sponge, absorbing excess storm from heavy rainfall, thereby ensuring flow regulation/ flood control and soil erosion prevention. Floodwater are stored in the soils or retained as surface water, thereby reducing floodwater volumes into Lake Victoria. In addition, Dunga Swamp vegetation slows down the flow of floodwater from a number of streams that drain into Lake Victoria resulting in silt and sediment retention and the lake's protection. Besides reduction of flooding events downstream, this process also ensures slow and sustainable recharge of clean filtered water into lake Victoria for which Kenya, Uganda and Tanzania and the Nile basin countries depend for national and regional economic growth. The Dunga Swamp vegetation also shields the soil from damage by strong waves and wind and is home to invaluable globally threatened biodiversity.

Management Strategies

- Enforce relevant national regulations and laws that promote maintenance of ecological integrity of Dunga Swamp.
- Promote application of standard procedures and processes for developments with potential for changing the status of Dunga Swamp.

Water Recharge and Discharge:

The retention ability of Dunga swamp enables sustainable water discharge and recharge into Lake Victoria. The impeded drainage allows the water to stay in one place long enough to maximize infiltration, enhancing recharge of Lake Victoria and groundwater and aquifers.

Management strategies

- Implement long-term water flow monitoring into and out of Dunga Swamp
- Promote measures that ensure protection of water resources and sources
- Promote and encourage sustainable use of Dunga Swamp waters.

Water Purification, Nutrient and Toxic retention

Dunga Swamp vegetation absorbs nutrients and toxic substances from inflowing water from Kisumu City and agriculturally active upstream areas thereby improving the quality of water in Lake Victoria. Nutrients and toxic substances originate from agricultural, domestic and industrial sources. The materials eroded in the watershed are filtered by the Dunga swamp vegetation resulting in water purification. The sediment retained in the wetland protects Lake Victoria and biodiversity resources. Sediment retention in the flood plains benefits agriculture by renewing nutrients and soil and creates unique habitats with unique fauna and flora.

Management strategies

- Institute measures for efficient waste management from point sources.

- Support and promote enforcement of relevant national regulations and laws related to environmental pollution.
- Develop Dunga Swamp specific by-laws to government land management and production systems to reduce over fertilization and pollution of the Dunga swamp Waters
- Promote organic farming methods around the Dunga Swamp and upstream in the water sources

Carbon Storage:

Dunga swamp is among the most effective ecosystems for carbon storage. The Dunga Swamp vegetation takes up carbon from the atmosphere and converts it into plant biomass during the process of photosynthesis. In many wetlands, waterlogged soil conditions prevent decomposition of the plant material thereby retaining carbon in the form of un-decomposed organic matter (Peat). The long retention of carbon in wetlands prevents excessive amounts of atmospheric carbon, thereby reducing global warming. The retained carbon is easily released into the atmosphere wherever peatlands are drained and exposed to fires.

Management strategies

- Promote and support conservation measures to maintain Dunga Swamp vegetation and general ecosystem health.
- Institute measures to discourage the drainage of Dunga Swamp
- Promote uses that allow Dunga Swamp vegetation to provide ecological, biological and socio-economic benefits in a sustainable manner
- Develop capacity to tap carbon trading resources under the Climate Change Convention

Research and Education:

Dunga Swamp is an important site for scientific research and education. There is urgent need to promote long term studies both local, national and global levels on environmental status and trends in the Dunga Swamp. Research areas within Dunga Swamp include ecology, archaeology, ornithology, hydrology, geology, pollution control, medicine, agriculture, climatology, and paleolimnology among others.

Management strategies:

- Establish and promote establishment of a Dunga Swamp research and information centre
- Establish and promote linkages and partnerships with higher learning institutions both Kenyan and outside Kenya
- Promote studentship and studies that help students pursue their professional endeavours
- Publish regular education and research materials to provide continuous up to date information for better management of Dunga Swamp.
- Enhance the ongoing school based education programme in all the schools around Dunga Swamp

Religious and Cultural Values and Significance:

Dunga Swamp is an important historical site that comprises important components of the Luo community cultural heritage. Local communities have strong attachments to the swamp because of their social, cultural and spiritual importance. The communities also promote indigenous knowledge and practices on environmental functions and values that are essential for their survival.

Management strategies:

- Promote recognition and application of traditional indigenous knowledge in Dunga Swamp management.
- Encourage community participation through establishment of local management institutions and structures e.g. Site Support Groups (SSGs)
- Promote the conservation of Dunga Swamp religious and cultural significance
- Produce education, awareness and research guides and publications in local languages.

Chapter 4

Management strategies: Threats and challenges in Dunga Swamp

Objective: Promote innovative planning and integrated threat management approaches towards Dunga Swamp sustainable conservation and management

While Dunga Swamp has the potential of contributing significantly to the socio-economic development of Kenya, it faces a myriad of diverse and severe threats. Drainage for agriculture, land transformation, trampling and overgrazing during dry and drought periods, pollution and fertilization, unsustainable papyrus harvesting, over siltation due to poor agricultural practices upstream, over flooding due to catchment degradation upstream, encroachment for settlement due to increasing demands for land and over removal of wildlife species especially fish and mammals notably the Sitatunga. Poor management and lack of or just the poor implementation of environmental laws and guidelines and climate change add to the Dunga Swamp problems. These threats have induced changes that have eroded the ecological and socio-economic values and services derived from Dunga Swamp. The underlying threat remains lack of recognition of the importance of Dunga Swamp as a finite resource whose roles in both the national economy and community livelihoods is taken for granted.

The following issues have been identified as critical in addressing the challenges of Dunga Swamp conservation and management:

Challenges and Threats

Reclamation and Conversion of Dunga swamp

Drainage and reclamation of Dunga Swamp for agricultural development, expansion of Kisumu City, human settlement and agricultural development is one of the biggest threats to the conservation and management of Dunga swamp. In the past, Dunga Swamp has been regarded as “wasteland in which mosquitoes breed” that should be converted to a useful asset mainly through drainage for agriculture. This has led to drainage and conversion for alternative uses without regard to ecological, biological and socio-economic values.

Management strategies:

- Drainage and reclamation of Dunga Swamp will not be allowed unless a greater public interest is demonstrated within a framework of maintained ecological integrity of Dunga Swamp.
- Dunga Swamp will be zoned for multiple land uses restricting any degrading developments to the already opened up areas
- Any alteration of Dunga Swamp for public interest will be subject to Environmental Impact Assessment (EIA), cost benefit analysis, and wide stakeholder consultations.

- Any conversion should be in harmony with the integrity of the Dunga swamp, and maintain the functions of the Dunga Swamp.
- Undesirable developments and plant species that negatively impact the ecology and hydrology of the Dunga swamp will be disallowed, and where already introduced, will be replaced with appropriate developments and plant species.
- Uncontrolled burning of wetland biomass will be prohibited.

Overexploitation of Dunga Swamp resources

Increasing human populations and urban expansion of Kisumu City continue to exert increasing pressures, resulting in a decline of values and services and quality as well as quantity of ecological, biological and socio-economic products derived from Dunga Swamp.

Management strategies:

- Abstraction of water will be strictly regulated and will require meeting laid down standards and regulations.
- Exploitation of goods and services from wetlands will be regulated to ensure the integrity of wetlands is maintained.
- Dunga Swamp ecological goods and services will be valued and periodically reviewed to ensure sustainable offtake
- Extraction volumes of Dunga resources (water, fish and plant products), will be based on sustainable yields
- Limits will be set for non-consumptive uses of Dunga Swamp to maintain the health and functioning of the system.
- Subsistence and environmental needs will take priority over commercial and industrial interests in the planning for resource access and extraction in the Dunga Swamp

Pollution and Eutrophication of Dunga Swamp

The quality of many water sources in Kenya is declining as a result of municipal, agricultural and industrial wastes/ discharges. These have negatively impacted water quality and biodiversity within the wetland ecosystems thereby reducing their values. Increased nutrient loads have led to eutrophication and episodes of algal blooms in most wetlands. In the Dunga Swamp, excessive abstraction of waters, diversions, and catchment degradation, have led to reduced water quality and reduction on Dunga Swamp goods and services.

Management Strategies:

- Appropriate measures will be taken to protect riverbanks and lakeshores.
- Dumping of waste in Dunga Swamp will be disallowed and disposal sites close to Dunga Swamp subjected to Environmental Impact Assessment.
- In light of the industrial and domestic discharges, any effluent discharged into Dunga swamp will be regulated and treated to meet appropriate wastewater standards. Where appropriate industries will be asked to treat and recycle their as proof that safe standards are met.
- Environmentally friendly farming techniques that reduce nutrient silt and pollutant loading in the Dunga Swamp will be promoted.
- Public awareness including at household level on proper management of waste including reduction, reuse and recycling will be promoted.

- Coordination and enforcement of wetland and general environmental laws will be promoted.

Alien Invasive Species

Like many wetlands, Dunga Swamp is highly vulnerable to alien and potentially invasive species. Many wetlands e.g. Lake Victoria, have in the past been affected by the introduction of alien invasive species that have altered the biodiversity characteristic and diminished the services provided by wetlands. The introduction of Nile perch in lake Victoria nearly eliminated the indigenous fish species of Lake Victoria while water hyacinth, *Salvinia sp.* and *Typha sp.* have affected numerous wetlands. Introduced species easily occupy new niches due to lack of competition and predators.

Management strategies:

- Introduction of alien and potentially invasive species without due appraisal of their potential impacts in Dunga Swamp is prohibited.
- Conditions that are conducive for the establishment and proliferation of invasive species will be managed.
- Guidelines, regulations and procedures will be developed and enforced to control introductions of alien and genetically modified organisms.
- Public education and awareness campaigns on the dangers of alien species will be carried out, and stakeholders will be involved in the management of wetlands threatened by invasive species.
- Research collaboration with universities to promote understanding on alien species will be promoted to help develop strategies and actions to manage alien species.

Management strategies: Conservation and management

Objective: Promote innovative planning and integrated management approaches towards Dunga Swamp sustainable conservation and management

Establishment of Dunga Swamp Conservation Area

The ecological, biological and socio-economic benefits, values and services provided by the Dunga Swamp are critical and must be maintained at all costs for posterity. There is no reason why Dunga Swamp should guarantee these invaluable services in the long-term unless the management of the area is addressed. The Government has established parks and reserves to ensure that areas similar to the Dunga swamp are protected and managed sustainably. However the Dunga Swamp remain waiting for this conservation benefit.

Management strategies:

- Dunga swamp will be accorded protection and conservation status necessary for the maintenance of its functions. Community Conservation Areas (CCAs), entirely managed by the local communities—including the surrounding community areas will be designated and delineated, where production activities for day-to-day livelihoods will take place. For such important wetland areas, consumptive uses will be prohibited. The community conserved

areas will be based on a multiple land use approach, where there will be a strict conservation area, and multiple use areas where activities such as fishing and ecotourism are allowed.

- In designating such sites the representative nature of different services of Dunga Swamp will be taken into consideration.
- Ensure the domestication and institutionalization of the Ramsar Convention
- List Dunga Swamp and other Lake Victoria wetlands as a wetland of international significance by subjecting it to the Ramsar criteria for which it obviously fulfills

Restoration and Rehabilitation of Dunga swamp

Dunga swamp has many parts of it that have been degraded and are in dire need of repair through well tailored rehabilitation mechanisms. Upstream there are serious environmental threats that threaten the invaluable ecological goods and services provided by the Dunga Swamp through drainage, pollution, sedimentation and introduction of exotic species. These arise from the catchment threats mainly arising from catchment degradation, over exploitation of resources, upstream damming and diversion among others.

- Dunga Swamp restoration and rehabilitation programs will be developed and implemented
- In restoring degraded areas the indigenous vegetation and other biodiversity will be given priority.
- As much as feasible, natural regeneration of papyrus will be allowed for degraded parts.
- Rehabilitated parts of Dunga Swamp will be closely monitored to ensure maintenance of ecological integrity, functions and services.
- Advocacy programmes for upstream catchment rehabilitation will be developed and implemented through sectoral collaboration

Dunga swamp Ownership

Dunga Swamp ownership is under Government as trust land held by the local county in trust for the public and local communities.

Management strategies:

- Ownership of Dunga Swamp will be vested in the state while recognizing legitimate rights of users who depend on it for livelihoods.
- Dunga Swamp owing to its invaluable contribution to the pool of national and global commons (ecological functions and biodiversity values) will be declared a public resource.
- Appropriate buffer zones will be delineated within which human activities will be controlled.
- Environmental friendly cultural and traditional practices for use of Dunga swamp resources will be permitted.
- No privatization of any part of Dunga swamp. Developers will only be allowed into Dunga Swamp through time bound negotiated leases after proofing zero environmental costs for their developments.

Management Strategies: Information Management, Education and Awareness, Monitoring and Research

Objective: Carry out demand driven research and sustainable biodiversity and resource base monitoring on Dunga Swamp to improve scientific information, knowledge base and inform biodiversity conservation, development agenda and general management objectives

Inventorying, Monitoring and Information Systems

At the moment, there is a total lack of comprehensive monitoring system for Dunga swamp and as a result decisions affecting wetlands are based on inadequate information. Nature Kenya carries out annual monitoring and produces an annual status and trends report for IBAs including the Dunga Swamp. However, there is no infrastructure, no capacity and no continuity in data collection and in case the IBA monitoring focuses largely on the birds and their habitats. There is no monitoring for the ecosystem services and as result resource baselines are only a subject of undocumented traditional knowledge.

Management strategies:

- Dunga Swamp conservation and management will be based on sound scientific principles.
- A full inventory of all Dunga Swamp resources and services will be carried out to determine their quantities, type, status, values and threats. The information acquired must be made available to the managers and local communities in a form that they can utilize.
- Monitoring protocols and data management will be developed, standardized and applied
- A Dunga Swamp information center will be set up.
- Indigenous knowledge will be documented and incorporated in decision-making.
- Annual status and trends report for Dunga Swamp will be produced

Management Strategies: Capacity building

Objective: Enhance capacity building within government and local community institutions involved in conservation and management of Dunga Swamp.

Capacity and Human Resource Development

A key issue and problem leading to the uncontrolled past threats and loss of Dunga Swamp ecological goods and services is the lack of government and local community capacity to stem the threats. Dunga Swamp is not under any routine management regime and everything was left under the mercy of the exploiters. Traditional uses that are less destructive allowed the wetland a chance to thrive but this is no longer possible given the advent of mechanized agriculture. Institutional, human and local community capacities including skills to advocate and fight for indigenous rights are critical.

Management Strategies:

- Measures will be implemented to enhance the capacity for sustainable management through infrastructure and human resource development, communication and information provision.
- Empowerment and education of local communities will be promoted as cost effective and efficient method of inventorying and monitoring.
- Capacity for carrying out Environmental Impact Assessments (EIA) procedure on proposed wetland development projects will be strengthened.
- Local communities and Site Support Groups (SSGs) will be trained in institutional management, leadership and governance and knowledge management to ensure sustainable Dunga Swamp conservation for posterity
- Infrastructure for inventorying, monitoring and management of Dunga Swamp will be developed and applied.

Management strategies: Education and Public Awareness

Objective: Promote communication, education and public awareness among stakeholders to enhance their appreciation and participation in Dunga Swamp conservation and participatory management

Dunga Swamp is degraded because because the public is either not fully aware or does not appreciate the diversity, finite, and fragility of its functions and values. Education and public awareness is essential to create commitment and positive attitudes towards conservation and sustainable utilization of Dunga Swamp resources.

Management Strategies:

- Promote education and public awareness on Dunga Swamp to encourage understanding and participation of the public, private sector, local authorities, NGOs and other interested parties through all appropriate means. .
- Incorporate Dunga Swamp (as also other wetlands) conservation and management issues into the national environmental education strategy and other available and relevant systems
- Show case the sustainable wetland conservation model in the Dunga Swamp

Management Strategies: Institutional framework for Dunga Swamp Conservation and Management

Objective: Establish an effective and efficient institutional framework for integrated management and wise use of Dunga Swamp and create enabling environment for the participation of all stakeholders.

Legal Legislative frameworks

The Kenyan Government has undertaken reforms aimed at conservation of environmental resources including wetlands. This includes enactment of legislations related to conservation and management of wetlands in the country. The relevant laws include the Environment Management and Coordination Act (section 42), the Lakes and Rivers Act cap 409, the Wildlife policy and Bills and the Water Act (2002) which deals with management, conservation and control of water sources.

The government has also developed strategies for water services development and water resources management. It has also gazetted regulations arrived at protection of wetlands. These include the EMCA Water Quality Regulations, 2006 that set stringent standards for effluent discharge into aquatic bodies. In spite of the above reforms Dunga swamp is still greatly threatened by degradation.

Management strategies:

- Monitor and ensure implementation of the National Wetlands Policy in the Dunga Swamp through development of appropriate site based regulations and by-laws
- Implement EMCA and other laws that have provisions for the conservation of wetlands like Dunga Swamp
- Develop a Dunga Swamp conservation and management manual with guidelines, regulations and procedures for all users
- Integrate Dunga swamp conservation concerns into district level planning

Institutional frameworks

No body is in control in Dunga Swamp. As a result it has become a free for all resource. That free hold access and use cannot work in a world where resources are extremely limited, repair for environmental damage is high and public accountability and environmental ethics are low. Some one must become in-charge and help to management the resources to guarantee the services in perpetuity. Different aspects of Dunga Swamp conservation and management are handled by different agencies, such as KWS, fisheries, water, regional development authorities, agriculture, local authorities, and communities, without clear legal mandate on any one of them. This has therefore meant that no single agency is in charge of overall coordination. This status highlights the fact that Dunga swamp has often been marginalized and regarded as “wasteland” and this neglect has contributed to massive wetland loss and degradation.

Management strategies:

- Request Kenya Wildlife Service (KWS) to manage the Dunga Swamp for posterity with benefits flowing to all stakeholders

- Establish a Dunga Swamp Management Committee to guide implementation of this management plan
- Gazette the Dunga Swamp or parts of it as a Community Conserved Area managed by and for the local people
- Establish local community conservation institutions e.g. Site Support Groups and build their capacity as stakeholders for the management of the Dunga Swamp
- Establish user groups and build their capacity to ensure sustainable access and use for Dunga Swamp resources

Management Strategies: Resource mobilization and private sector engagement

Objective: Engage private sector in the conservation and development agenda in the Dunga Swamp.

Resource Mobilization

Sustainable financial resources have remained the principal impediment to promoting sustainable development and environmental protection. National budgetary resources have failed to adequately provide for wetland conservation and management. As a result, the country has been unable to effectively respond to challenges of wetland conservation and management.

Management strategies:

- Adequate and reliable resources to be mobilized from Government, development partners, private sector and other agencies to support conservation and management of Dunga Swamp.
- Forge partnerships with the private sector to assist in the conservation and management of Dunga Swamp.
- Develop and implement fundraising plans targeting access to multilateral funding institutions.

Non-State Actors

Some Non -State Actors, including Non Governmental Organizations (NGOs), Professional Associations, and Private Sector have in-depth experience in wetland related matters. Their experiences will be fully utilized through mechanisms to be jointly developed with the government. Collaboration between these actors, government agencies, and local authorities will be developed. Participatory wetland management will be enhanced, by involving concerned non-state actors and local communities in planning and implementation of Dunga Swamp conservation activities.

Management strategies:

- The government will encourage non-state actors and local communities to undertake Dunga Swamp conservation activities.
- NGOs and local communities will be included in the Dunga Swamp Management Committee

- Non-state actors will be acknowledged as contributors when they provide support to managing government agencies
- Schemes for private sector involvement in Dunga Swamp conservation will be developed and implemented

Promoting International obligations

A number of International Agreements, Protocols and Conventions impact on wetlands. These include the Ramsar Convention, The United Nations Convention to Combat Desertification, Convention on Biological Diversity (CBD). Kenya appreciates positive impacts on sustainable wetland management and will continue to play an active role in their management and implementation.

The global implications of wetlands should therefore be considered in accordance with the regional and international agreements, conventions, protocols and other instruments in which the country has interest so as to recognize the multiple roles of wetlands and tap further investment in the sector from new international agreement.

Management strategies:

- Mainstream the provisions of relevant conventions and agreements into the Dunga Swamp institutional frameworks
- Promote synergy and a coordinated national approach towards domestication of Multilateral Environmental agreements (MEAs) relevant to Dunga swamp
- Promote inter site collaboration within Kenya and outside to ensure sustainable management of all wetlands in Kenya and beyond

Gender and youth issues

Traditional gender roles have inhibited the participation of women and youth in wetland management. Initiatives by women and youth have convincingly demonstrated the necessary and potential value of their participation in wetland management at the community level.

Management strategies:

- Endeavor to deliberately involve women and youth in participatory Dunga Swmap management.
- Encourage the proportional representation of the youth women vulnerable and marginalized groups in the management of Dunga swamp.

Management structure