Tana River Delta (TRD) Conservation and Development Master Plan

FINAL REPORT

June 22, 2010
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Acknowledgement

I am thankful to all the institutions, organizations and individuals who made invaluable contributions towards the preparation of this report. I would like to mention a few them. First, I would like to recognize the much needed support by Nature Kenya staff, particularly Ms Serah Munguti. In addition, I would like to express gratitude to my research assistant Mr Godwin Opinde for his much needed assistance. The warm welcome and cooperation by the local communities and government officials is highly appreciated.
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<th>Description</th>
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<tbody>
<tr>
<td>ACAC</td>
<td>Area Catchment Advisory Committee</td>
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<tr>
<td>ASAL</td>
<td>Arid and Semi Arid Lands</td>
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<tr>
<td>BMU</td>
<td>Beach Management Unit</td>
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<tr>
<td>CDA</td>
<td>Coast Development Authority</td>
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<tr>
<td>CDF</td>
<td>Constituency Development Fund</td>
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<tr>
<td>CFA</td>
<td>Community Forest Association</td>
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<tr>
<td>CFEAH</td>
<td>Coastal Forest of Eastern Africa Hotspot</td>
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<tr>
<td>DDO</td>
<td>District Development Officer</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>KFS</td>
<td>Kenya Forest Service</td>
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<td>KLDP</td>
<td>Kenya Livestock Development Project</td>
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<tr>
<td>KMFRI</td>
<td>Kenya Marine and Fisheries Research Institute</td>
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<td>Kenya Wildlife Service</td>
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<td>Ministry of Agriculture</td>
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<td>Ministry of Fisheries</td>
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<td>MoL</td>
<td>Ministry of Lands</td>
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<td>MoLG</td>
<td>Ministry of Local Government</td>
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<tr>
<td>MoW &amp; I</td>
<td>Ministry of Water &amp; Irrigation</td>
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<tr>
<td>NEMA</td>
<td>National Environmental Management Authority</td>
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<td>NGOs</td>
<td>Non-Governmental Organization</td>
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<tr>
<td>NT</td>
<td>Near Threatened</td>
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<tr>
<td>OP</td>
<td>Office of the President</td>
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<tr>
<td>SUMATADE</td>
<td>Sustainable Management of Tana River Delta</td>
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<td>TADESADEFO</td>
<td>Tana River Delta Sustainable Development Forum</td>
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<tr>
<td>TARDA</td>
<td>Tana and Athi River Development Authority</td>
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<tr>
<td>TISP</td>
<td>Tana Integrated Sugar Project</td>
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<tr>
<td>TRPNR</td>
<td>Tana River Primate National Reserve</td>
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<tr>
<td>WRMA</td>
<td>Water Resource Management Authority</td>
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<tr>
<td>WRUA</td>
<td>Water Resource Users Association</td>
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<td>WSB</td>
<td>Water Services Board</td>
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<td>WSRB</td>
<td>Water Service Regulatory Board</td>
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Chapter One

1.1 Introduction

Tana River Delta is of global, regional and national importance in the conservation of biodiversity resources. The Delta is home to unique biodiversity resources, some of which are endemic in the region. In addition, some of these biodiversity resources are threatened with extinction. Tana River red colobus (Procolobus rufomitratus) and Tana River crested mangabey (Cercocebus galeritus) are endemic in the region. It is because of the strategic importance of the Delta in biodiversity resources that has been declared Important Bird Areas. More than 345 species of birds including the threatened Basra reed warbler and Tana River cisticola occur in the Delta. This area is a stronghold for two Near Threatened, restricted-range species, Anthus melindae and Acrocephalus griseldis. Tana River Delta also supports one of the very few breeding sites for colonial water birds in Kenya. Regionally threatened species include Casmerodius albus; Ephippiorhynchus senegalensis (a regular visitor in small numbers, May to September) and Turdoides squamulatus (local and uncommon).

River Tana is the longest river in Kenya measuring approximately 850 km with a catchments area of 95,000 km². It is one of the two perennial rivers that drain into the western Indian Ocean along coastal Kenya. It discharges on average 4,000 million m³ of freshwater and 3 million tonnes of sediments annually into Indian Ocean near Kipini at Ungwana Bay. This Delta area and associated ecosystems cover an area of 1,300 km². Tana River Delta is Kenya’s only major ocean delta. It is a low-lying area composed largely of sediments brought down by the river. It is subject to frequent flooding and changes in the network of channels and canals. The Delta has a coastal strip of 35 km protected by a 50 m high sand dune system. This beach area provide habitat for turtle nesting. The river has a gentle slope at the mouth and thus experiences marine tidal impact. This leads to a zone with fluctuating salinity that can reach far upstream from the river mouth, the estuarine zone. Typically, only specialist plant species such as the mangroves are adapted to low or fluctuating salinities. Hence, within the estuary, biodiversity is relatively low but densities are very high because of the continuous supply of food and nutrient from the river. Resultant high density of bivalves, snails and other benthic invertebrates attracts a wealth of birds. The lower Tana riverine forests are part of the Coastal Forests of Eastern Africa Hotspot as well as a major faunal link between northern and southern bio-geographic zone species.

Despite the huge potential for the conservation of biodiversity, Tana River Delta is threatened by anthropogenic pressures arising from population growth, weak conservation efforts and changing land use practices within and upstream of the Delta. The Delta is an important dry season grazing area for pastoralists from as far as Wajir and Somalia. In addition, the region has witnessed intensification of sedentary settlements, irrigation and rain-fed farming. The Delta has been a centre of conflict as sedentary farmers and pastoralists compete over key resources, namely pasture, water and farming land. Further, land use activities upstream of the Delta have been associated with siltation and discharge of chemical residues into the river. These land uses have put pressure on the ecological integrity of the Delta. Another area of great concern is that River Tana basin has been prioritised for irrigation in Vision 2030. Already major irrigation projects are under way in the basin. These
proposed developments are going to have far reaching implications on biodiversity resources in Tana River Delta.

Given the unique biodiversity resources in the Delta, the area has huge potential for nature-based development such as ecotourism. Successful ecotourism in the region can create alternative sources of income and employment. This can be instrumental in the promotion of conservation of biodiversity resources in the Delta, thus reduce pressure on biodiversity resources. It is worth noting that previous conservation efforts by the government has not yielded much success, for example the government established Tana River Primate National Reserve (TRPNR) in 1976 to conserve Tana River red colobus (Procolobus rufomitratus) and Tana River crested mangabey (Cercocebus galeritus), and the unique biodiversity of the lower Tana River forests. However, these endemic biodiversity resources are still threatened with extinction suggesting little success in the current conservation efforts. Therefore, there is need to reconfigure the conservation of biodiversity resources in the Delta. This will call for proactive involvement of all key stakeholders centred around the local communities and systematically tackle the increasing anthropogenic pressures some of which are driven by the Government itself.

1.2 Methodology
The preparation of the plans involved participatory planning processes in addition to review of relevant secondary data. Focus group discussions, interview of key informants and workshop methods were used to prepare and validate the plans. Participatory planning process involved three focus group discussions (fishermen, pastoralists and farmers), interview of key informants and two stakeholder workshops (for plan preparation and adoption respectively). Resource persons interviewed and participated in the workshops were drawn from Tana River County Council, Kenya Wildlife Service, Kenya Forest Service, Coast Water Services Board, TARDA, NEMA, Kenya Fisheries, Ministry of Livestock, Ministry of Agriculture, and G4 International Ltd. During the plan preparation and validation, representatives were drawn from each location within the delta as well as key institutions.
Chapter Two

Vision, mission and objectives

2.1. **Vision:** Sustainable Management of Tana River Delta for the benefit of local, national and international communities

2.2. **Mission:** To effectively and efficiently manage Tana River Delta for the continuous improvement of socio-economic standards of the local communities and conservation of biodiversity in the delta

2.3. **Objectives of the master plan and action plans**

1. Enhance and maintain ecological functions and socio-economic values derived from Tana River Delta;
2. Promote innovative planning and integrated management approaches towards Tana River Delta sustainable conservation and management
3. Establish a functional institutional framework for the management of the delta;
4. Carry out demand driven research and monitoring in Tana River Delta
5. Enhance capacity building within government and local community institutions involved in conservation and management of Tana River Delta.
6. Promote communication, education and public awareness among stakeholders
7. Establish a Tana River Delta information management system;
8. Promote public-private partnerships in the conservation and development of the delta;

2.4. **Guiding principles**

   a) **Sustainability:** Due to the significant contribution of Tana River Delta to the livelihoods of the local communities and biodiversity conservation, the use of its resources should be based on the principles of sustainability
   
   b) **Precautionary principle:** Where information is inadequate for decision making, the precautionary principle will apply. Lack of full scientific information should not prevent implementation of measures to minimize / manage Tana River Delta degradation
   
   c) **Collaborative and participatory approach:** An integrated approach to Tana River Delta conservation and management should involve stakeholders at all levels including government, local community, private sector and NGO
   
   d) **The global dimension:** the global dimension of environmental impacts of actions and policies should be recognized and considered in the management of the delta
   
   e) **Polluter pays principle:** persons/institutions causing pollution of Tana River Delta should be made to pay
2.5. **Institutional arrangement for plans implementation**

It is recommended that Tana River Delta Sustainable Management Forum be formed to spearhead the conservation of the delta. A committee of about 20 members would be reasonable although other members can be incorporated on an *ad hoc* basis depending on the issues being dealt with at any given time. The forum should be established to initiate structured and systematic conservation of the delta. The forum shall define modus operandi. The members of the forum may include the following:

1. Representatives of local communities
2. WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB
3. Ministries responsible for livestock, fisheries, agriculture, forestry, lands, water, wildlife, environment, mineral resources, local government, energy, infrastructure, regional development, national heritage, planning, wetlands, tourism, research, administration and security, social services, trade and industries etc.
4. Representatives of NGOs
5. Representatives of the private sector
6. Any other, person or organization as may be decided by the forum
Chapter Three

Policy and legislative framework

3.1. Introduction

There are several legislations of relevance to the management of Tana River Delta. Kenya has during the last decade made efforts to improve institutional frameworks in diverse fields. Serious efforts have been directed towards environmental, water, forest, and land sectors. Wetland policy and revised Wildlife Policy and Act are underway. In August 2010, a new national constitution was born with strong provisions for the management of land and environment. In 1999, Environmental Management and Co-ordination Act was passed into law to provide a basis for environmental governance in the country. Other notable efforts were seen in the preparation of Water Policy in 1999 and passage of Water Act in 2002. In addition, the government prepared Forest Act in 2005 and Forest Policy in 2007 to improve management of the forest sector. The preparation of Vision 2030 in 2007 was a major effort geared towards consolidating government development agenda while in 2009 the preparation of National Land Policy was concluded. It is worth noting that the implementations of these policy initiatives are still at infancy. The implementation of these policies and legislations face several challenges including weak capacity and overlapping/conflicting mandates.

3.2. Relevant provisions in 2010 national constitution

Bill of Rights on Environment

For the first time in Kenyan history, environment has been appropriately positioned in the development process. Environment is now one of the bills of right according 2010 constitution. Article 42 states that every person has the right to a clean and healthy environment, which includes the right (a) to have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69; and (b) to have obligations relating to the environment fulfilled under Article 70.

National Land Policy principles

National land policy principles are also articulated in the constitution. Article 60 (1) states that land in Kenya shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable, and in accordance with the following principles —

(a) equitable access to land;
(b) security of land rights;
(c) sustainable and productive management of land resources;
(d) transparent and cost effective administration of land;
(e) sound conservation and protection of ecologically sensitive areas;
(f) elimination of gender discrimination in law, customs and practices related to land and property in land; and
(g) encouragement of communities to settle land disputes through recognised local community initiatives consistent with this Constitution.
(2) These principles shall be implemented through a national land policy developed and reviewed regularly by the national government and through legislation.

The new constitution has prescribed major reforms in the management of community land that hitherto managed under Trust Land Act. Article 63 (1) of the constitution states that Community land shall vest in and be held by communities identified on the basis of ethnicity, culture or similar community of interest.

Community land
Article 60(2) states that community land consists of—

a) land lawfully registered in the name of group representatives under the provisions of any law;
b) land lawfully transferred to a specific community by any process of law;
c) any other land declared to be community land by an Act of Parliament; and
d) land that is—
   I. lawfully held, managed or used by specific communities as community forests, grazing areas or shrines;
   II. ancestral lands and lands traditionally occupied by hunter-gatherer communities; or
   III. lawfully held as trust land by the county governments, but not including any public land held in trust by the county government under Article 62 (2).

(3) Any unregistered community land shall be held in trust by county governments on behalf of the communities for which it is held.

(4) Community land shall not be disposed of or otherwise used except in terms of legislation specifying the nature and extent of the rights of members of each community individually and collectively.

(5) Parliament shall enact legislation to give effect to this Article.

Obligations of the state towards environment
The new constitution also prescribes obligations to the state towards environment. Clause 69 (1) states that 69. The State shall:

(a) ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
(b) work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
(c) protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
(d) encourage public participation in the management, protection and conservation of the environment;
(e) protect genetic resources and biological diversity;
(f) establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
(g) eliminate processes and activities that are likely to endanger the environment; and
(h) utilise the environment and natural resources for the benefit of the people of Kenya.
Clause 69(2) similarly obliges every person properly manage the environment. It states that every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

**Enforcement of environmental rights**

The new constitution gives person in Kenya right to seek legal redress in case of real or potential risk of environmental degradation. Clause 70 (1) states that if a person alleges that a right to a clean and healthy environment recognised and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.

Clause 70(2) states that the court may make any order, or give any directions, it considers appropriate—

a) to prevent, stop or discontinue any act or omission that is harmful to the environment;

b) to compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or

c) to provide compensation for any victim of a violation of the right to a clean and healthy environment.

Clause 70(3) safeguards every person from unnecessary legal obstacles by stating that an applicant does not have to demonstrate that any person has incurred loss or suffered injury.

### 3.3. Environmental Management & Co-ordination Act (EMCA)

Section 3(1) of EMCA entitles every person in Kenya to a clean and healthy environment and every person has a duty to safeguard and enhance the environment. Part VIII of EMCA on environmental quality standards makes elaborate provisions to safeguard environmental quality. The actors within Tana River Delta including Local Authorities, TARDA, CDA, pastoralists, farmers, traders and industrialists are bound by these legislative provisions. For example section 72(1) prohibits discharge of any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permits any person to dump or discharge such matter into the aquatic environment. Section 87(1) of the Act states that no person shall discharge or dispose of any waste in such a manner as to cause pollution to the environment or ill health to any person. Section 87(5) states that every person whose activities generate wastes shall employ measures essential to minimize wastes through treatment, reclamation and recycling. Environmental audit is provided for in part VII of EMCA. Section 68 (3) states that the owner of premises or the operator of a project shall take all reasonable measures to mitigate any undesirable effects not contemplated in the environmental impact assessment study report.

There have been noticeable cases of land degradation. For example, improper use of agro-chemicals has polluted water sources, poisoned and compacted soils. At the same time, inappropriate tillage methods and cropping practices have accelerated environmental degradation. Unsustainable land-use practices have severely reduced the potential of some areas. There is therefore need for efficient and appropriate use of fertilizer, pesticides, tillage methods, and cropping practices in order to reduce or control degradation. However,
agricultural intensification is likely to put additional pressure on water, soil, forestry and wildlife resources (NEMA, 2006).

Despite good legislative provisions in EMCA and related subsidiary legislations, enforcement remains weak. Therefore, environmental degradation persists mainly because of weak enforcement of the legislations. Weak enforcement of the legislations is blamed in part on inadequate capacity of the existing institutions.

3.4. Vision 2030

Kenya has developed a long term development policy, known as Vision 2030, as a blueprint to guide development in the country during the 2008/30 period. Vision 2030 aims at making Kenya a newly industrializing, “middle income country providing high quality life for all its citizens by the year 2030”. The vision is based on three pillars: economic, social and political pillars. The economic pillar aims at providing prosperity of all Kenyans through an economic development programme aimed at achieving an average Gross Domestic Product (GDP) growth of 10% per annum during the next 25 years. The social pillar seeks to build “a just and cohesive society with social equity in a clean and secure environment”. The political pillar aims at realizing a democratic political system founded on issue based politics that respects the rule of law, protects the rights and freedom of every individual in the Kenyan society.

Water and environmental management is also captured in the Vision 2030. The vision concurs that the country is water scarce. The country therefore aims to conserve water resources and start new ways of harvesting and using rain- and ground-water. To promote agricultural productivity, the area under irrigation and drainage will increase from 140,000 to 300,000ha. Irrigated agricultural expansion in the lower Tana will represent a major challenge, particularly in the face of dwindling water resources and use of water inefficient furrow irrigation technologies. The expansion of irrigation as envisaged in Vision 2030 is not based on rationalized water resources utilization framework.

Kenya’s main forests constitute five water towers (Mt. Kenya, Aberdares Range, Mau Escarpment, Cherangany Hills and Mt. Elgon), which cover more than 1 million hectares and form the upper catchments of all main rivers in the country. In the past two decades, Kenya’s forests have experienced severe destruction as a result of several factors, the main one being increased demand for agricultural land. This has, in turn, affected the hydrological cycles in the water towers and resulted in water shortages across the country. Current forest cover is less than 3 per cent compared to the internationally recommended 10 per cent.

The vision for the environmental sector is “a people living in a clean, secure and sustainable environment”. The vision is inspired by the principle of sustainable development and by the need for equity in access to the benefits of a clean environment. The country will intensify conservation of strategic natural resources (forests, water towers, wildlife sanctuaries and marine ecosystems) in a sustainable manner without compromising economic growth. Kenya intends to have achieved 10 per cent forest cover by 2030. In addition, specific measures will be adopted to promote bio-prospecting activities e.g. research and development of commercial products such as drugs, cosmetics and detergents. The overall goal in forest
conservation is to increase current forest cover by 50 per cent. This will include significantly improving the contribution of forest services to the economy and providing a base for the growth of the forestry sector. Regarding wildlife conservation, the goal is to fully protect all wildlife ecosystems. This will sustain the anticipated high growth rate of the tourism sector.

3.5. Forest policy and legislative framework

**Forest Policy**
The general goal of the forest policy is to enhance the contribution of the forest sector in the provision of economic, social and environmental goods and services. The forest policy statements are:

1) Promote the sustainable management of forests for climate amelioration, soil, water and biodiversity conservation.
2) Carry out inventories and valuation of forest resources and their utilization to generate accurate information for decision making.
3) Empower local communities to manage forests through community forest associations.
4) Ensure that forest plantations are sustainably managed to realize their maximum potential.
5) Support forest management, which will embrace preservation of religious and cultural sites, traditional medicinal sources, water catchments, and habitats for endemic and threatened species of flora and fauna.
6) Support the formulation of criteria and indicators for sustainable forest management.
7) Promote good governance in the forest sector.

The specific objectives of the forest policy are to:

- Contribute to poverty reduction, employment creation and improvement of livelihoods through sustainable use, conservation and management of forests and trees;
- Contribute to sustainable land use through soil, water and biodiversity conservation, and tree planting through the sustainable management of forests and trees;
- Promote the participation of the private sector, communities and other stakeholders in forest management to conserve water catchment areas, create employment, reduce poverty and ensure the sustainability of the forest sector;
- Promote farm forestry to produce timber, wood fuel and other forest products;
- Promote dry land forestry to produce wood fuel and to supply wood and non-wood forest products;
- Promote forest extension to enable farmers and other forest stakeholders to benefit from forest management approaches and technologies; and
- Promote forest research, training and education to ensure a vibrant forest sector.

The above policy statements are unique on a number of fronts. First, the policy provides for the multi-dimensional function of forest management especially water catchment, biodiversity, soil conservation and socio-economic resources. Second, the policy provides for community participation in the management of both state and individual forests. Third,
the policy recognizes the local communities’ right to access resources from the forests, such as medicines which they have traditionally been denied access to in gazetted forests. In the past forest management has always been seen as a state responsibility, thus local communities adjacent to forests have always been officially excluded from forest management even though these same forests have all along been part of their heritage. Before the designation of these forests, local communities have always accessed resources from them, especially medicine, honey, building materials and firewood. Therefore, the policy creates a framework for fundamental reforms in forest management in the country. However, the implementation will require reforms in the value systems and capacity building of the beneficiary communities as well as the lead agencies to embrace and effectuate these changes to sustainably manage forests and forestry resources in the country. Otherwise forests may suffer accelerated degradation due to weak capacity to enforce the reforms.

**Forest Act 2005**

The Forest Act (2005) creates Kenya Forest Service (KFS) to oversee forest management in the country. The functions of KFS include the following:

1. Manage all state forests;
2. Manage all provisional forests in consultation with the forest owners;
3. Promote capacity building in forest management;
4. Collaborate with other organizations and communities in the management and conservation of forests and for utilization of biodiversity therein;
5. Promote the empowerment of associations and communities in the control and management of forests;
6. Manage forests on water catchment areas primarily for purposes of water and soil conservation, carbon sequestration and other environmental services.

Section 7 of the Act exhibits a strong top – down power structure, for example the Act gives the board the following powers:

- Consider all management agreements including granting of management licenses for state plantation;
- Negotiate financial and other incentives for the advancement of the forestry – related activities of private persons, companies, communities, NGOs and local authorities;
- Consider applications for the undertaking of activities within forest areas;
- Establish forest conservancy areas for purposes of conservation and management of forests in Kenya; and
- Approve the provision of credit facilities and technical training for community based forest industries and the provision of incentives to persons who exploit wood and non-forest products sustainably.

Section 13 (4) establishes conservancy and the conservancy’s functions include: to inform the board on the ideas, desires and opinions of the people within the forest conservancy areas in all matters relating to the conservation and utilisation. Review and recommend to the Board applications for licenses and renewals, and regulate the management of forests in the relevant conservancy areas, including the setting up charges and retention of income.

Section 20 of the Act states that all forests in Kenya, other than private and local authority forests, are vested in the state, subject to any rights of user in respect thereof, which by or
under this Act or other written law, have been or are granted to any other person. Section 21 states that nothing in this Act shall be deemed to prevent any member of a forest community from taking, subject to such conditions as may be prescribed, such forest produce as it has been the custom of that community to take from such forest otherwise than for the purpose of sale.

Upon recommendation of the forest conservation committee for the area within which a forest is situated, the local authority and the Board, the Minister shall declare any land under the jurisdiction of a local authority to be a local authority forest where the –

a) Land is an important catchments area, a source of water springs, or is a fragile environment;
b) Land is rich in biodiversity or contains rare, threatened or endangered species;
c) Forest is of cultural or scientific significance; or
d) Forest supports an important industry and is a major source of livelihood for the local community.

Section 24 (1) of the Act states that a person who owns a private forest, including a forest in the course of establishment, on land owned by the person may apply to the Service for registration under this section.

Part IV of the Act creates structures for community participation in forest management. Section 45 (1) of the Act states that a member of a forest community may, together with other members or persons resident in the same area, register a community forest association under the Societies Act. Subsection (2) states that an association registered under subsection (1) may apply to the Director for Permission to participate in the conservation and management of a state forest or local authority forest in accordance with the provisions of this Act.

Section 46 (1) states that an association approved by the Director under section 46 to participate in the management or conservation of a forest or part of a forest shall include—

a) protect, conserve and manage such forest or part thereof pursuant to an approved management agreement entered into under this Act and the provisions of the management plan for the forest;
b) Formulate and implement forest programmes consistent with the traditional forest user rights of the community concerned in accordance with sustainable use criteria;
c) Protect sacred mangroves and protected trees;
d) Assist the Service in enforcing the provisions of this Act and any rules and regulations made pursuant thereto, in particular in relation to illegal harvesting of forest produce.

The management agreement between the Director of KFS and the association may confer on the association all or any of the following forest user rights – (a) collection of medicinal herbs; (b) harvesting of honey; (c) harvesting of timber or fuel wood; (d) grass harvesting and grazing; (e) collection of forest produce for community based industries; (f) ecotourism and recreational activities; (g) scientific and education activities; (h) plantation establishment through non-resident cultivation; (i) contracts to assist in carrying out specified silvicultural operations; (j) development of community wood and non-wood forest based industries; and (k) other benefits which may from time to time be agreed upon between an association and
the Service: provided that none of the activities specified in this subsection shall be carried out so as to conflict with the conservation of biodiversity.

Section 52 (1) states that except under a license or permit or a management agreement issued or entered into under this Act, no person shall, in a state, local authority or provisional forest –

a) Fell, cut, take, burn, injure or remove any forest produce;
b) Be or remain therein between the hours of 7 p.m. and 6 a.m. unless he is using a recognized road or footpath, or is in occupation of a building authorized by the Director, or is taking part in cultural, scientific or recreational activities;
c) Erect any building or livestock enclosure, except where the same is allowed for a prescribed fee;
d) Smoke, where smoking is by notice prohibited, or kindle, carry or throw down any fire, match or other lighted material;
e) De-pasture livestock, or allow livestock to be therein;
f) Clear, cultivate or break up land for cultivation or for any other purpose;
g) Enter any part thereof which may be closed to any person;
h) Collect any honey or beeswax, or hang on any tree or elsewhere any honey barrel or other receptacle for the purpose of collecting any honey or beeswax, or enter therein for the purpose of collecting honey and beeswax, or be therein with any equipment designed for the purpose of collecting honey or beeswax;
i) Construct any road or path;
j) Set fire to, or assist any person to set fire to, any grass or undergrowth or any forest produce;
k) Possess, bring or introduce any chain saw or logging tools or equipment; and
l) Damage, alter, shift, remove or interfere in any way whatsoever with any beacon, boundary mark, fence notice or notice board.

Section 54 (8) states that any person who, in any forest area –

a) Introduces any exotic genetic material or invasive plants without authority from the Service;
b) Dumps any solid, liquid, toxic or other wastes;
c) Grows any plant from which narcotic drugs can be extracted; or
d) Extracts, removes or causes to be removed, any tree, shrub or part thereof for export, commits an offence and is liable on conviction to a fine not exceeding five million shillings or to imprisonment for a term not less than ten years, or to both such fine and imprisonment.

Key issues in the forest sector

- The new forest policy and legislation are currently being implemented. Effective implementation of the Act can potentially reverse the ongoing loss of forest cover and create a basis for sustainable management of forestry resources.
- The new forest policies and legislation have instruments for better community participation in forest management, for example it requires of KFS to collaborate with other stakeholders as well as supporting local communities and associations in forest management.
• Weak capacity of the established institutions to carry out the devolved functions (KFS, conservancy and community forest associations) may trigger serious risks of forest resources degradation.
• The Act bestows too much power on the Board and Minister, e.g. issuance of a license, permit, and levy charges on the beneficiaries.
• Overlapping mandate of management of forest areas which double as watersheds
• Multiple licensing authorities (for forest produce extraction) including local authorities, provincial administration and other departments.
• Depletion of forest cover through over-exploitation and excision.
• Land-use conflicts between forests, agriculture and urban development.

3.6. **Water Policy and Act**

National Policy on Water Resources Management and Development (1999) outlines the following specific policy objectives:

• Preserve, conserve and protect available water resources and allocate it in a sustainable, rational and economical way;
• Supply water of good quality and in sufficient quantities to meet the various water needs while ensuring safe disposal of wastewater and environmental protection;
• Establish an efficient and effective institutional framework to achieve a systematic development and management of the water sector;
• Develop a sound and sustainable financing system for effective water resources management, water supply and sanitation development.

Water Act of 2002 section 3 of the Act states that every water resource is vested in the State, subject to any rights of user granted by or under this Act or any other written law. The Act establishes Water Resources Management Authority (WRMA) (part III, section7). The Authority shall have the following powers and functions (Section 8):

• To develop principles, guidelines and procedures for the allocation of water resources;
• To monitor, and from time to time reassess, the national water resources management strategy;
• To receive and determine applications for permits for water use;
• To monitor and enforce conditions attached to permits for water use;
• To regulate and protect water resources quality from adverse impacts;
• To manage and protect water catchments in accordance with guidelines in the national water resources management strategy;
• Determine the charges to be imposed for the use of water from water resource;
• To gather and maintain information on water resources and from time to time publish forecasts, projections and information on water resources;
• To liaise with other bodies for the better regulation and management of water resources; and
• To advise the Minister concerning any matter in connection with water resources.
The Water Act established an autonomous Water Resources Management Authority to manage and protect Kenya’s water resources. It also shaped an institutional framework that gave responsibility for providing decentralized services to seven regional Water Services Boards (WSB). These Boards manage water services assets and ensure that they remain in the public realm. The institutional structure comprises Water Resources Management Authority, Water Supply Regulatory Board, and the Water Supply Trust Fund Board which provide a solid foundation to build upon for the management of water sector in Kenya. The Water Policy calls for the decentralization of the operational activities, private sector participation and increased community involvement in the sector. Overall supervision of water services are consequently carried out by the Water Services Regulatory Board (WSRB), an organ in charge of regulating the services supplied by the regional Boards and their providers. Area Catchments Advisory Committees and Water Resource Users Associations are created by the Water Act to strengthen community participation in water resources management. Despite the noble intentions of the policy and Act, eight years down the line, operationalisation of the various provisions remains a challenge. For example, WRUA are yet to be formed country – wide including in Tana River Delta. Therefore, the full effects of water sector reforms are yet to be realized.

The instruments provided for in the Act for water resources management include: a water resources management strategy, classification of water resources and resources quality objectives and determination of reserves. The water resources management strategy defines the manner in which water resources in Kenya shall be managed, protected, used, developed, conserved and controlled. The Minister shall determine the reserve for the whole or part of each water resource which has been classified. A determination of the reserve shall ensure that adequate allowance is made for each aspect of the reserve. Water reserve is the amount of water resource that must be retained in the environment to guarantee sustainability of water supply as well as proper ecological and bio-physical functions of the said resources. Below the water reserve, it is possible to expect depletion of water resources with serious ramification on the environment. It would be important to determine the water reserve for the various basins to better manage the increasingly scarce water resources. This will be particularly important for the lower Tana River basin that is expected to attract major irrigation projects. A basin wide water reserve for Tana River will help determine the amount of water available for irrigation, livestock and domestic. The water reserve will similarly help in rationalizing water resources utilization in the basin.

Water Act and Water Policy makes useful provisions for basin – wide resources management, stronger community participation in water resources management. The formation of Catchments Advisory Committees and Water Resources Users Association are particularly important in facilitating community participation in water resources management.

3.7. Agricultural policy and legislation

Sessional Paper No 3 of 1993 on national food policy states that the country seeks food self-sufficiency, food security, employment creation, income generation, generation of foreign exchange earnings, rural-urban balance, and overall growth. Other important objectives of the agricultural sector are generation of raw materials for domestic industry and agricultural
exports. An economy based on agriculture, as is the case in Kenya, must allocate sufficient resources to its agricultural sector to ensure that national food security is achieved, through self-sufficiency in the production of basic food commodities and the generation of foreign exchange, which can be used for the importation of other foods, and the occasional importation of basic food when the need arises.

Agriculture Act CAP 318 is the main legislation governing agriculture sector, although there are numerous legislations specific to sub-sectors. Section 48 (1) states that the government can, for the purposes of the conservation of the soil or prevention of the adverse effects of soil erosion on any land, make rules for any or all of the following matters: prohibiting, regulating or controlling the breaking or clearing of land for the purposes of cultivation; grazing or watering of livestock; the firing and clearing and destruction of vegetation including stubble. Pursuant to section 48(1)(b) of the Act, the government may require, regulate and control afforestation or reafforestation of land; the protection of slopes, catchments areas, the drainage of land including the construction or maintenance or repair of artificial or natural drains, gullies, contour banks, terraces and diversion ditches. Section 48 (1)(c) states that the government may require uprooting or destruction, without payment of any compensation therefore, or any vegetation which has been planted in contravention of a land preservation order. The Act empowers the government to supervise unoccupied land and to prohibit, restrict or control the use of land for any agricultural purpose.

Despite the existence of the instruments provided for in Agriculture Act to support soil conservation, land degradation has heightened over the years. The full effects of these noble intentions have not been achieved partly because of weak institutional framework. Also, the Act is characterized by top – down approach to soil conservation. In addition, the sectoral nature of the Act makes it difficult for the sector to harness the full potential of integrated natural resource management. Kenya has not been able to effectively implement a comprehensive soil and water conservation strategy even though Agriculture Act takes cognizance of soil conservation as means of enhancing productivity.

3.8. National Land Policy

The country approved the first National Land Policy in 2009. Since independence the country has operated without a land policy. The new National Land Policy creates a basis for sustainable management of land and land – based resources. The land that was hitherto mismanaged under Trust Land Act to the detriment of the local communities will now be managed by the local communities themselves under community land. Similarly, the Policy guarantees local communities benefits from natural resources within their areas of jurisdiction. However, it is worth noting that the implementation of the Policy will take time and require good will of the political leadership and local communities as well as capacity building. Therefore, the full effects of the Policy may be felt after a decade. The following aspects of the Policy are worth noting in relation to the conservation of Tana River Delta.
**Vision of the Policy:** A National Land Policy that will guide the country towards efficient, sustainable and equitable use of land for prosperity and posterity.

**Objectives of the Policy**
The overall objective of the National Land Policy is to secure rights over land and provide for sustainable growth, investment and the reduction of poverty. Specifically the policy shall offer a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide:

1) All citizens with the opportunity to access and beneficially occupy and use land;
2) Economically viable, socially equitable and environmentally sustainable allocation and use of land;
3) Efficient, effective and economical operation of land markets;
4) Efficient and effective utilization of land and land-based resources; and
5) Efficient and transparent land dispute resolution mechanisms.
Land Policy Principles
Equitable access to land for subsistence, commercial productivity, settlement, and the need to achieve a sustainable balance between these uses;

- Intra- and inter-generational equity;
- Gender equity;
- Secure land rights;
- Effective regulation of land development;
- Sustainable land use;
- Access to land information;
- Efficient land management;
- Vibrant land markets; and
- Transparent and good democratic governance of land.

Philosophy of national land policy

- Land is an economic resource that should be managed productively;
- Land is a significant resource to which members of society should have equitable access for livelihood;
- Land is a finite resource that should be utilized sustainably; and
- Land is a cultural heritage which should be conserved for future generations.

Types of land tenure
This policy designates all land in Kenya as Public Land, Community Land and Private Land.

Community Land
Community land refers to land lawfully held, managed and used by a given community as shall be defined in the “Land Act”. There has been widespread abuse of trust in the context of both the Trust Land Act (Cap 288) and the Land (Group Representatives) Act (Cap 287). Thus county councils, which are the trustees of Trust land, have in many cases disposed of trust land irregularly and illegally. Further, in the case of pastoral communities, the group representatives entrusted with the management of that land have in many cases disposed of group land without consulting the other members of their groups.

To secure community land, the Government shall:

a) Document and map existing forms of communal tenure, whether customary or contemporary, rural or urban, in consultation with the affected groups, and incorporate them into broad principles that will facilitate the orderly evolution of community land law;

b) Repeal the Trust Land Act (Cap 288);

c) Define, in the “Land Act”, the term “community” and vest ownership of community land in the community;

d) Lay out, in the “Land Act”, a clear framework and procedures for:
   i. The recognition, protection and registration of community rights to land and land based resources taking into account multiple interests of all land users, including women;
   ii. Resolving the problem of illegally acquired trust land;
   iii. Governing the grant to, and regulation of, rights of use to members;
iv. Reversion of former Government land along the Coastal region to community land after planning and alienation of land for public usage;

v. Governing community land transactions using participatory processes;

vi. Accountability of groups, individuals and bodies entrusted with the management of community land, and community participation in the allocation, development and disposal of community land;

vii. Incorporating mechanisms for community land management and dispute resolution;

viii. Members opting out of the communal arrangements and buying out of non-members;

ix. Reviewing and harmonizing the Land (Group Representatives) Act (Cap 287) with the proposed “Land Act”;

x. Setting apart of community land for public use; and

xi. Vesting fish landing sites to appropriate local institutions.

**Benefit-Sharing from Land – Based Natural Resources**

Strategies for sharing benefits should be developed taking into account the nature of the resources involved and the contribution that diverse actors make to the management of the resources. To protect community and individual interests over land based resources and facilitate benefit sharing, the Government shall:

1. Establish legal frameworks to recognize community and private rights over renewable and non-renewable land-based natural resources and incorporate procedures for access to and sustainable use of these resources by communities and private entities;

2. Devise and implement participatory mechanisms for compensation for:
   i) Loss of land and related non-renewable natural resources;
   ii) Loss of land where this is deemed important in the public interest for the sustainable management of renewable natural resources; and
   iii) Damage occasioned by wild animals;

3. Put in place legislative and administrative mechanisms for determining and sharing of benefits emanating from land based natural resources by communities and individuals where applicable;

4. Make benefit-sharing mandatory where land based resources of communities and individuals are managed by national authorities for posterity; and

5. Ensure the management and utilization of land-based natural resources involves all stakeholders.

**Conservation and Sustainable Management of Land Based Natural Resources**

To manage these resources sustainably, the Government shall:

1. Facilitate the preparation of participatory environmental action plans by communities and individuals living near environmentally sensitive areas in order to take into account cultural and socio economic;

2. Identify, map and gazette critical wildlife migration and dispersal areas and corridors in consultation with the local communities and individual land owners;

3. Encourage the development of wildlife sanctuaries and conservancies and involve local communities and individuals living contiguous to the parks and protected areas in the co – management of such areas;

4. Provide mechanisms for resolving grievances arising from human/wildlife conflicts;
5. Review the gazettement of forests and protected areas to foster the realization of their multiple values and ensure that they are protected for their ecosystem values and not merely to physically exclude human activities;

**Ecosystem Protection and Management Principles**

To ensure the protection of ecosystems and their sustainable management, the Government shall:

1. Undertake a survey of all critical ecosystems to determine their sustainable land uses;
2. Establish measures to ensure that healthy ecosystems are protected through land use controls; and
3. Define and maintain beaches at high and low water marks and put in place measures to control beach erosion.

Fragile ecosystems shall be managed and protected using the following measures:

a) Developing a comprehensive and integrated land use policy having regard to fragile areas and the needs of neighbouring communities and individuals in such areas;
b) Zoning forest land comprising water catchment areas to protect it from further degradation;
c) Developing procedures for co-management and rehabilitation of forest resources, recognizing traditional management systems and sharing of benefits with contiguous communities and individuals;
d) Establishing participatory mechanisms for sustainable management of fragile ecosystems in partnership with public, private and community stakeholders; and
e) Declaring all national parks, game reserves, islands, front row beaches and all areas hosting threatened biodiversity as fragile ecosystems.

The Government shall ensure that development activities in all islands and front row beaches take into account concerns of public access to beaches, the fragility of the ecosystem and national security, and subject such activities to strict controls and management orders.

The protection of watersheds, lakes, drainage basins and wetlands shall be guided by the following principles:

a) Prohibition of settlement and agricultural activities in the water catchment areas;
b) Identification, delineation and gazettement of all water courses and wetlands in line with International Conventions; and
c) Integrated resource management based on ecosystem structures regardless of administrative or political boundaries.

The Government shall ensure that all land uses and practices conform to land use plans and the principles of biodiversity protection, conservation and sustainable development.
Chapter Four
Situation analysis

4.1. Location and size
Tana River Delta is found in Tana River Delta and Lamu Districts in Coast Province. It is found between 02°30’S, 40°20’E. The delta measures 130,000 ha. The altitude of the Delta is in the range of 0–37 m above sea level, although other areas rise up to 140 m above sea level.

Figure 1: The Mouth of Tana River Delta at Ungwana Bay, (http://www.vub.ac.be)

River Tana is the longest river in Kenya being approximately 850 km in length with catchments area of 95,000 km². It is one of the only two perennial rivers that drain into the western Indian Ocean along coastal Kenya. It discharges on average 4,000 million m³ of freshwater and 3 million tonnes of sediments annually entering the ocean near Kipini at Ungwana Bay. This delta area and associated ecosystems cover an area of 1,300 km². Tana River delta is Kenya’s only major ocean delta. It is a low-lying area composed largely of sediments brought down by the river. It is subject to frequent flooding and changes in the network of channels and canals. The input of water is almost exclusively from the river itself because of the net outward flow of water, except in situations where invasions of saltwater occur. The delta maintains high levels of productivity in a dynamic balance which revolves around the frequency, extent and duration of flooding. Water circulation transports nutrients, influences a wide variety of habitat types, flushes away wastes, controls salinity and disperses and nurtures larval stages of a number of coastal organisms.
4.2. Climate, geology and soil

The region is characterized with low and unreliable rainfall. The district receives low and erratic bimodal rainfall that is highly variable in both space and time. In most cases, rain falls as short high intensity storms that produce considerable runoff and soil erosion. Average rainfall figures are deceptive in these circumstances because there tends to be a few years of rainfall well above average whilst the probability of occurrence is low. Mean annual range from 300 – 900mm per annum. Average humidity is 85. Temperature in the district is relatively high with a mean temperature of 30°C, ranging between 20.6°C and 38°C.

Tana River Delta falls within the Coastal Plains, one of the three physiographic zones on Kenyan coast that rises from sea level to 140 m. The delta has a coastal strip of 35 km long protected by a 50 m high sand dune system. The geomorphology of the Coastal Plain is dominated by a series of raised old sea level terraces. Most of the coastal environment and the modern shore configuration follow the 0-5 m and the 5-15 m sea level terrace complexes.

Soils at the Tana River Delta are generally classified as Fluvisols being divided into two subgroups: eutric and vertic Fluvisols. The floodplain consists of chromic Vertisols, i.e. silt clay with no salinity or alkalinity. In the meander belt (river levee land) taking into consideration old and new river courses, the soils are yellowish – brown, often stratified, sand to clay rich in Micas. The textures of topsoil ranging variably from sand to clay while the sub-soil being firm clay. Infiltration of such soils will thus vary with texture being slow in areas with clay as topsoil, and fast where sand forms the topsoils. Such soils have been described for the area between Lango la Simba and Abarfarda River where the topography is flat to gently undulating.

On the fringes of levee land is the river basin land, an area with different soil types dependent on levels of sedimentation. Typically, these soils consist of heavy to very heavy clay. Here the topsoils (up to 100 cm) are non-saline but salinity increases with depth. The soils have slow infiltration, especially when saturated and can be classified into three subtypes. On flat, moderately high lying and weak Gilgai areas, the soils are deep with 10-20 cm of very dark gray clay overlying dark brown clay. On moderately low lying areas, top soils are very dry dark gray clay over dark grayish brown, cracking clay. On areas of shallow depressions on gullies, the dark gray topsoil overlies dark gray, cracking clay.

4.3. Water resources

River Tana is the longest river in Kenya covering about 850km long with a catchments area of about 95,000 km² traversing the landscape from its source in Aberdare Ranges in central Kenya to the Indian Ocean. It discharges on average 4,000 million m³ of freshwater annually entering the ocean near Kipini at Ungwana Bay. The Seven Folks Hydro Electric Power Stations and Bura and Hola irrigation schemes are located upstream of the delta. Tana River supports industrial and other socioeconomic functions such as power generation, agriculture, livestock, tourism, and micro-enterprises found within the basin.

The delta has many shallow lakes and wetlands resulting from meanders of the Tana and recharged through ground water seepage or by the periodic flooding of the River. These are
not only unique habitats but also provide food, livelihoods and social benefits to local communities. The basins of oxbow lakes and the deeper parts of dammed lakes where water remains for most of the year include Lakes Bilisa, Shakababo, Kongolola, Kitumbuini, Dida Waredo, Harakisa, Moa and Kenyatta.

4.4. Biodiversity resources

Tana River Delta is an important biodiversity conservation area. It is home to rare, vulnerable, migratory and threatened species. Some of the unique bird species found in the area are Malindi Pipit, Basra Reed-warbler and Tana River Cisticola. Other important biodiversity resources found in the Delta are: hippos, crocodile, mangrove forests, fisheries and fisheries spawning grounds. Given the ecological importance of the area, it has been designated as an area of Important Bird Species to help consolidate conservation of the area.

The coastal strip provide habitat for turtle nesting. The river has a gentle slope at the mouth and thus experiences marine tidal impact. This leads to a zone with fluctuating salinity that can reach far upstream from the river mouth, the estuarine zone. Typically, only specialist plant species such as the mangroves are adapted to low or fluctuating salinities. Hence, within the estuary, biodiversity is relatively low but densities are very high because of the continuous supply of food and nutrient from the river. Resultant high density of bivalves, snails and other benthic invertebrates attracts a wealth of birds.

The lower Tana riverine forest is unique to Kenya being remnants of continental forests resembling western more than eastern African vegetation communities. Of great importance, they provide remaining habitats for two endangered primates: the Red Colobus, and the Crested Mangabey. An inventory of the woody flora and ecological study of 12 forest areas in the Tana River National Primate Reserve (TRNPR) described the composition and structure of this riverine forest ecosystem and identified patterns of regional and local diversity. Up to 175 species in 49 families have been recorded in the woody flora, but the geographic affinities of 98 species are from four major floristic regions in Africa: Zanzibar-Inhambane (31%), Somalia-Masai (16%), Guinea-Congolian (12%), and Zambejian (1%). Ten species are rare and/or disjunct. Important tree species in these forests included Acacia elatior, Acacia robusta, Barringtonia racemosa, Tamarindus indica and Newtonia hildebrandtii, common on inactive levees occurring toward the edge of the floodplain, and Rinorea elliptica, an understory species found on levees. Changes along the river in sediment deposition and hydrology explain the high diversity of landforms and corresponding forest types in the lower Tana forests.

The oxbow lakes and wetlands in the delta are unique habitats for fisheries resources. In the oxbow lakes profuse growths of true aquatic plants occur. The Nile cabbage or water lettuce (Pistia stratiotes) carpets the water surface and interspersed with it are the water lily (Nymphaea lotus) and the floating aquatic fern (Azolla nilotica). Lake Bilisa is an expansive wetland dominated by grasses, sedges, floating macrophytes and submerged macrophytes. The dominant plant species include aquatic grasses (Bothriochloa bladhii, Echinochloa baphoclada), sedges (Cyperus frerei, C. heterophylla, C. tuberosus), floating macrophytes (Pistia stratiotes, Azolla nilotica, Lemma spp.) and submerged macrophytes (Ceratophyllum demersum).
Birds

More than 345 species of birds including the threatened Basra reed warbler and Tana River cisticola occur in the delta. This area is a stronghold for two Near Threatened, restricted-range species, *Anthus melindae* and *Acrocephalus griseldis* (probably its main wintering ground). The wetlands, including the coastline and offshore islets, at times hold exceptional concentrations of water birds. Internationally important populations have been recorded here for no fewer than 22 species, making the delta one of the key sites in the country for water bird conservation. The Tana River Delta also supports one of the very few breeding sites for colonial water birds in Kenya. This heronry is near Idsowe, south of Garsen, on Ziwa la Matomba, a seasonally-flooded lagoon where the birds nest in a thicket of *Terminalia brevipes*, usually between May and September but also at other times if the lagoon is flooded. Up to 5,000 colonial water birds of at least 13 species have been recorded nesting here, including *Anhinga rufa* (up to 100 pairs), *Ardea cinerea*, *A. purpurea*, *Egretta ardesiaca*, *Ardea ralloides* and *Nycticorax nycticorax*, *Casmerodius albus*, *Mesopogon intermedia* and *Egretta garzetta*, *Anastomus lamelligerus*, *Threskiornis aethiopicus* and *Plegadis falcinellus*, and *Platalea alba*. Mwamba Ziwayuu, a small coral platform offshore from the Tana estuary, is a resting site for significant numbers of *Sterna saundersi* and *S. bengalensis* that feed in Ungwana Bay. Regionally threatened species include *Casmerodius albus*, *Ephippiorhynchus senegalensis* (a regular visitor in small numbers, May to September) and *Turdoïdes squamulatus* (local and uncommon).

Mammals

The forests support a number of other primate species. Of special concern are the “vulnerable” Zanzibar galago (Lee et al., 1988) (*Galago zanzibaricus*), and the endemic subspecies of Tana Sykes (Kingdon 1971) (*Ceropithecus mitis albotorquatus*). The forests are home to four other primate species: grivet monkey (*Ceropithecus aethiops pygerythrus*), Yellow baboon (*Papio cynocephalus cynocephalus*), Garnett’s galago (*Otolemur garnettii*), and Senegal galago (*Galago senegalensis*) (Butynski & Mwangi 1994). These forests are vital to the survival of a large number of other species, some of which are endemic, making the region one of Kenya’s biodiversity hotspots.

Plate 1: Critically endangered Tana River Crested Mangabey (*cercocebus galeritus*)
Nearly 200 mammals are found in the Coastal Forests of Eastern Africa hotspot, and 11 of these are endemic, including the endangered Ader's duiker (*Cephalophus adersi*), the Kenyan wattled bat (*Glauconycteris kenyacola*), and the endangered golden-rumped elephant shrew (*Rhynchocyon chrysopygus*). Larger mammals in the eco-region are generally habitat specialists that take advantage of the forest patches, but cross to open savanna and grasslands. These include bushpig (*Potamochoerus porcus*), bushbuck (*Tragelaphus scriptus*), yellow baboon (*Papio cynocephalus*), elephant (*Loxodonta africana*), leopard (*Panthera pardus*), lion (*Pantera leo*), and caracal (*Caracal caracal*).

4.5. Demographic characteristics

Tana River Delta is an area with a modest population. The area is characterized by a migratory population consisting of livestock herders who migrate to the lower plains during the drought months. The population of Tana River Delta district is estimated at 87,201 based on the 1999 population census using a growth rate of 3.62%. The total number of households in the delta is 12,457 with mean household size of 7. The population density in the district ranges from 4 – 27 persons per km² with a mean of 7. The low population density favours pastoralism requiring expansive landscape. The communities living in the delta are: Pokomos - 44%, Ormas - 44%, Wardei - 8% while the other ethnic groups account for the remaining 4%. The Wardei are a smaller pastoralist group originating from Ethiopia. The Pokomo are mainly subsistence farmers who farm along River Tana.

The district suffers under heavy burden of high incidence of poverty estimated at 76% compared with a national average of about 50%. The unemployment rate in the district is estimated at 33% compared with a national average of 20%.
Table 1: Tana River District Profile

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<td>16</td>
<td>11,412</td>
<td>45,369</td>
<td>4</td>
</tr>
<tr>
<td>Tarasaa</td>
<td>4</td>
<td>10</td>
<td>838</td>
<td>22,610</td>
<td>27</td>
</tr>
<tr>
<td>Kipini</td>
<td>4</td>
<td>8</td>
<td>715</td>
<td>15,354</td>
<td>21</td>
</tr>
<tr>
<td>Tsavo NP</td>
<td>-</td>
<td>-</td>
<td>3049</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>92</td>
<td>384,466</td>
<td>222,228</td>
<td>5</td>
</tr>
</tbody>
</table>


4.6. Socio – economic characteristics

Agriculture and livestock keeping are the most important economic activities in the district contributing 82.2% of the household income. The delta is a dry season grazing area for pastoralists. Pastoralists come from as far as Garissa, Wajir and Mandera to graze in the delta during the dry season. The contribution of the delta to pastoral economy becomes even more critical during severe drought when livestock depends exclusively on the delta causing overgrazing. As shown in table 2 below, in 2009 the number of livestock in the delta was 140,000, but seasonal influx of cattle (during severe drought) into the delta is estimated at 600,000. Table 2 below shows that the number of cattle, sheep, goats, camels, and donkeys are on the increase. This is occurring as pasture decreases leading to overgrazing, thus degradation of delta. As shown in table 3, total area under natural pastures is on the decline.
Table 2: Types and numbers of livestock in Tana River Delta District

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cattle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zebu</td>
<td>140,000</td>
<td>150,000</td>
<td>120,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Exotic Beef</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Goats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>65,000</td>
<td>50,000</td>
<td>45,000</td>
<td>40,000</td>
</tr>
<tr>
<td>Dairy</td>
<td>3,500</td>
<td>2,200</td>
<td>1,400</td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Sheep</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hair</td>
<td>85,000</td>
<td>80,000</td>
<td>58,000</td>
<td>41,000</td>
</tr>
<tr>
<td><strong>Camels</strong></td>
<td>250</td>
<td>200</td>
<td>150</td>
<td>90</td>
</tr>
<tr>
<td><strong>Donkeys</strong></td>
<td>3,900</td>
<td>3,200</td>
<td>2,200</td>
<td>1,400</td>
</tr>
<tr>
<td><strong>Pigs</strong></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td><strong>Rabbits</strong></td>
<td>250</td>
<td>350</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td><strong>Poultry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indigenous</td>
<td>60,000</td>
<td>55,000</td>
<td>25,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Layers</td>
<td>500</td>
<td>1,200</td>
<td>830</td>
<td>450</td>
</tr>
<tr>
<td>Broilers</td>
<td>0</td>
<td>260</td>
<td>200</td>
<td>0</td>
</tr>
<tr>
<td>Ducks</td>
<td>1,500</td>
<td>1,200</td>
<td>700</td>
<td>450</td>
</tr>
<tr>
<td>Turkeys</td>
<td>25</td>
<td>30</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>Geese</td>
<td>25</td>
<td>20</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td><strong>Bee hives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KTBH</td>
<td>350</td>
<td>300</td>
<td>280</td>
<td>200</td>
</tr>
<tr>
<td>Langstroth</td>
<td>482</td>
<td>282</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Long hives</td>
<td>1,600</td>
<td>1,500</td>
<td>1,100</td>
<td>850</td>
</tr>
</tbody>
</table>


Table 3: Forage Situation and Trend

<table>
<thead>
<tr>
<th>Division</th>
<th>Napier grass – Ha</th>
<th>Natural pasture Ha</th>
<th>Fodder shrubs Nos</th>
<th>Other legumes (desmodium, lucern, etc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garsen</td>
<td>0.1</td>
<td>200,000</td>
<td>3500</td>
<td>30</td>
</tr>
<tr>
<td>Kipini</td>
<td>4.0</td>
<td>400,000</td>
<td>1500</td>
<td>60</td>
</tr>
<tr>
<td>Tarasa</td>
<td>0.1</td>
<td>270,000</td>
<td>2500</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>4.2</td>
<td>870,000</td>
<td>6500</td>
<td>105</td>
</tr>
<tr>
<td>2008</td>
<td>5.2</td>
<td>980,000</td>
<td>7200</td>
<td>120</td>
</tr>
<tr>
<td>2007</td>
<td>3.2</td>
<td>985,000</td>
<td>7300</td>
<td>125</td>
</tr>
<tr>
<td>2006</td>
<td>2.5</td>
<td>920,000</td>
<td>7500</td>
<td>130</td>
</tr>
</tbody>
</table>


Crops most commonly grown in the basin are: mangoes, cashew nuts, cotton, rice, maize, cassava, bananas, greengrams, beans, peas, melons, cowpeas, pawpaw, tomatoes, kales, onions, cabbages, sugarcane, and vegetables. These crops are produced for both household consumption and sale. The region is well known for the production of the popular apple mango, while Bura and Hola irrigation schemes were popular for rice farming before they collapsed in the 1990s.
Table 4: The economic activities of Tana River Delta communities

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herdsman (pastoralists)</td>
<td>38.9</td>
</tr>
<tr>
<td>Keeping livestock</td>
<td>8.3</td>
</tr>
<tr>
<td>Business man/woman</td>
<td>1.7</td>
</tr>
<tr>
<td>Farming and livestock</td>
<td>8.9</td>
</tr>
<tr>
<td>Farming</td>
<td>35.6</td>
</tr>
<tr>
<td>Employed</td>
<td>6.7</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: HVA International, 2007

Agricultural expansion and intensive grazing in the delta has continued to exert pressure on the natural resources in the delta leading to over-gazing, human – wildlife conflict, and human – human conflicts.

4.7. Planned major agricultural expansion in the delta

During the last decade, Tana River Delta has witnessed increased interest in agricultural expansion. Apart from the ongoing rehabilitation of a multi – million TARDA irrigation project, three major irrigation projects are under way, namely Tana Integrated Sugar Project – 33,000ha, G4 International irrigation project – 28,000ha, Bedford International irrigation project – 90,000ha and Matt International irrigation project – 33,000ha. These proposed projects will cover about 200,000ha of land, which will irreversibly change the delta. Of great concern is that these projects are being implemented in the absence of integrated water resources management plan. These irrigation projects are going to be based on high water demanding furrow irrigation system. These irrigation projects are going to eat into the pastureland, thus threatening the livestock economy. Further, there is evidence of decreasing river discharge. Therefore, these projects are going to exert serious pressure on the available natural resources especially water and soil, with serious risk of environmental degradation. Tana Integrated Sugar Project may exemplify the scale and potential impacts of these projects.

Table 5: List of proposed projects in Tana River Delta

<table>
<thead>
<tr>
<th>No.</th>
<th>Project Proponent</th>
<th>Proposed Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Coastal Aquaculture Limited</td>
<td>Shrimp and prawn farming</td>
</tr>
<tr>
<td>2.</td>
<td>G4 Industries</td>
<td>Oil seed farming (Irrigated crambe, castor and sunflower)</td>
</tr>
<tr>
<td>3.</td>
<td>Mumias Sugar Company &amp; TARDA</td>
<td>Tana Integrated Sugar Project (TISP) Large scale sugar plantation and eco-friendly bio-fuels</td>
</tr>
<tr>
<td>4.</td>
<td>TARDA</td>
<td>Grow rice and maize in response to Kenya’s recent drought and food shortage</td>
</tr>
<tr>
<td>5.</td>
<td>Mat International Limited</td>
<td>Sugarcane</td>
</tr>
<tr>
<td>6.</td>
<td>Bedford Bio-fuels Inc</td>
<td>Bio-fuels farm growing Jatropha curcas</td>
</tr>
<tr>
<td>7.</td>
<td>Tiomin Kenya Limited</td>
<td>Titanium extraction from the sand dunes of Tana Delta</td>
</tr>
<tr>
<td>8.</td>
<td>Gulf State of Qatar</td>
<td>Grow fruit and vegetables to have Lamu port worth £ 2.4 billion constructed</td>
</tr>
</tbody>
</table>
**Tana Integrated Sugar Project**

According to the project feasibility study report, Mumias Sugar Company Ltd (MSC) and Tana and Athi Rivers Development Authority (TARDA) are in the process of implementing Tana Integrated Sugar Project (TISP) in Tana River Delta and partly in Lamu District about 200 km north of Mombasa. The project area extends from Sailoni village in the North of the delta to the villages of Mwanja and Arithi in the south covering land of about 40,000 ha gross including out-growers. The TISP site is rather flat and located at the lower end of the Tana River. It forms part of the delta covering 200,000 ha. The feasibility study report shows that the project will comprise of irrigated sugarcane production through estate (16,000 ha) and out-grower systems (4,000 ha), water supply to the project sugar factory, co-generation facility of about 34 MW power capacity, 75 KLPD ethanol production plant, a livestock feed lot and other livestock supporting activities including fisheries. The sugar factory will be designed for 8,000 TCD to be expanded to 10,000 TCD in a span of three to four seasons. A furrow irrigation system has been designed to supply water under gravity through a network of earthen canals. Water will be abstracted via Sailoni Headworks north of the project area at the rate of 25 m$^3$/sec representing a third of the Tana River water during the dry season.

4.8. **Fisheries resources**

Tana River Delta is an important habitat and spawning area for fishery resources. The following fish species are found in the delta: Mochokidae, Protopteraidae, Claroteidae, Schilbeidae, Cichlidae, Alestidae, Clariidae, Mormyridae and Cyprinidae. FISHBASE website has listed 44 fish species, while a study conducted in 2002 by Luc De vos et al. recorded at least 30 species in the lower Tana River, most of which were found in the main river channels, particularly in sheltered, low velocity areas, swamps and in the oxbow lakes, which provide unique spawning grounds for fish species. These fisheries resources (especially lung fish) provide ecological functions not only to the coastal market but also to fish eating communities in other parts of the country. Fishing along the river has attracted not only the local communities but traditionally fishing communities from other parts of the country who are engaged in small scale fishing for the purposes of domestic consumption as well as for sale. Fishing is an important source of food, income and employment. However, due to population growth, use of inappropriate fishing gear, poorly regulated fishing and siltation of oxbow lakes, the sustainability of fishing in the delta is threatened because of over – fishing and siltation of oxbow lakes.
Chapter Five

Synopsis of Key Conservation Issues in Tana River Delta

Policy and institutional framework
The conservation of Tana River Delta remains a great challenge because it is held under Trust Land Act, which has often been abused. The recent reforms on policy and institutional framework in the country have created opportunities for better management of our environment including Tana River Delta. The passage of National Constitution in August 2010 is seen as a major milestone in the management of land and environment in the country. For the first time in the country’s history a clean and healthy environment has been made a human right. Further, the constitution has restructured management of community land. Apart from the constitution, the other major reforms in the country have been seen in environment, land, forest and water with new legislations passed into law. Effective implementations of the constitution and these other laws can benefit the conservation of the delta.

Population growth
The population in Tana River Delta is estimated at 87,201 and it is growing at the rate of 3.62%, which is far above the national average (2.9%). The rising population continues to exert pressure on the available resources, particularly land, pasture and water.

Overgrazing
Tana River Delta has traditionally been used as a dry season grazing area based on traditional pastoral economy. As a result, pastoralists coming from as far as Wajir, Mandera and Somaliland migrate to the Delta during the dry season. Therefore, Tana River Delta has been an important lifeline for the pastoral economy in the region. The importance of Tana River Delta has even been more evident as a result of increased recurrence of severe drought. During the last decade, the Delta has served as a year round grazing area making it impossible for the pasture to regenerate leading to overgrazing. Overgrazing has been blamed on not only severer drought, but also dwindling grazing areas both within and outside the delta because of population pressure, sedentarisation of settlements, and rising livestock numbers. Overgrazing is threatening to disrupt the livelihood system of the pastoralists as well as the ecosystem of the delta. Intensive grazing in the delta is also rapidly altering the ecosystem leading to loss of biodiversity resources. Therefore, in order to safeguard the livelihoods of the pastoralists as well as conserve the biodiversity resources in the delta, overgrazing must be addressed through structured grazing management regime.
Flooding and declining water levels
The delta has been affected by increased recurrence of severe floods on the one hand and declining river water discharge on the other. Flooding has wrecked havoc on infrastructure and settlements in the delta. The floods associated with 1997/08 El Nino ruined a multi million TARDA irrigation project by destroying the infrastructure. Flooding has also contributed to siltation of oxbow lakes and river beds. The impact of flooding has been more visible because of increased settlements in the floodplains. It has been reported that the normal/low flows of River Tana has significantly declined during the last three decades. The decline of the river discharge has been blamed on many factors including unsustainable water resources utilization, rising demand for water, and climate change. The twin factors of flooding and declining river water levels calls for rationalization of water resources utilization. Flood water could be harnessed to meet increasing water demand, especially irrigation and livestock. In addition, declining river water levels is a wake up call for sustainable water resources management requiring adoption of water use efficient technologies.

Changing course of the river
One of the key characteristics of a delta is the changing course of a river. This is explained by flat terrain and silt deposits around the rive mouth. Therefore, whenever a river changes its course sedentary settlements are fundamentally affected. The challenge has been to maintain a river along a particular course in the face of natural processes leading to changes in the course. In the recent past a section of the river changed course leaving behind a
settlement that has been there for over a century. Given the stability of settlements, local communities considered rerouting the river to the previous course with little success. These have led to interplay of manipulating a natural process and changing river course spurred by increased siltation.

**Siltation of river beds and oxbow lakes**

There has been significant siltation of the river beds and oxbow lakes in the delta. Increased siltation of the riverbeds and oxbow lakes has been blamed on poor land use practices upstream of the delta as well as prolonged severe droughts followed by rainstorms and floods. The siltation of river beds has contributed to changes in river course that has greatly affected sedentary communities that hitherto depended on such sections of the river. Also, the oxbow lakes may eventually die as a result of continued siltation. During focus group discussions, it was reported that the water volume in the oxbow lakes have declined to the extent that during prolonged droughts the lakes literally dry up. The oxbow lakes perform both ecological and economic functions. Oxbow lakes are integral part of the delta ecosystem supporting important biodiversity resources. In addition, oxbow lakes are the lifeline of fisher communities. Therefore, the drying up of the oxbow lakes will fundamentally alter the ecosystem of the delta as well threaten the livelihood of the fisher communities. Management of siltation requires a regional approach as silts originate from far upstream sources including Mt Kenya and Abardares.

Source: Field Survey, April 2010

Plate 2: A section of silt laden Moa Oxbow Lake
Over – fishing
Over – fishing has been reported in the delta by the fisher communities around oxbow lakes and along River Tana. Over – fishing is threatening the livelihoods of the fisher communities such as Luo and Luhyia communities that migrated to the delta because of the available fishery resources. Over – fishing in the region is explained by rising population, use of inappropriate fishing gear and uncontrolled fishing. There are no effective mechanisms to regulate fishing for sustainability. It was reported that fish yield from the oxbow lakes can no longer meet the nutritional and income needs of the fishermen. The problem has been made worse by continued siltation of oxbow lakes, which has significantly affected the habitat of fisheries. In order to assure sustainable fishing, there is need to determine and maintain sustainable yield for the oxbow lakes as well as diversify livelihood options such as fish farming, small holder irrigation and livestock keeping. Unfortunately previous efforts by fisher communities to engage in pastoralism have been made difficult because of the open hostilities by the existing pastoral communities.

Field Survey, April 2010
Plate 3: A section of idle fish smoking pans at Moa Oxbow Lake due to lack of fish

Changing livelihoods and lifestyles
There is evidence of changing livelihoods and lifestyles because the existing livelihood options can no longer meet the needs of the growing population. The fisher communities are taking to crop and livestock keeping, while the pastoralists are also taking to crop
farming and fishing. Given the fragility of the ecosystem, these land use changes are exerting pressure on the environment apart from igniting ethnic hostilities. For example, the pastoral communities do not want to see fisher communities engage in crop farming and livestock keeping, for example livestock kept by fisher communities are regularly stolen by the pastoral communities. The changing livelihoods and lifestyles have heightened pressure on the available resources.

**Intensification of settlements**

Tana River Delta has traditionally housed both pastoralists and sedentary communities. The delta has witnessed increased densification of settlements driven by rapid population growth (3.62%) and changes in settlement patterns. Pastoralists have increasingly adopted semi-pastoralism with both sedentary settlements and movement of livestock during wet season. Therefore, there has been sedentarisation of pastoral communities and densification of settlements of sedentary communities, especially Pokomo. Sedentary and pastoral villages dot the delta including grazing areas and flood plains. Increased sedentary settlements in the delta continue to alter the ecosystem in the area. These changes have been associated with the use of the delta as a year–round grazing area.

![Plate 4: A section of a typical sedentary settlement by pastoralists in Tana River Delta](image)
Agricultural expansion

Tana River Delta natural resources are under increased pressure from planned agricultural expansion. Apart from the ongoing revival of Tana River Delta Irrigation Project (TDIP), three major projects are underway: Mumias Sugar irrigation project, Matt International irrigation project and G4 International irrigation project. These projects are going to fundamentally change the ecosystem of the delta through vegetation clearance, pollution and increase in water demand. These projects are being implemented in the absence of a comprehensive plan that rationalizes natural resources management. In addition, these irrigation projects seek to tap low flow water from the river in the face of declining river discharge. Therefore, the proposed open canal irrigation projects are likely to make the matter worse. Because of declining low flow, sea water intrusion is on the increase altering ecosystems of the delta.

Resource use conflicts

Resource use conflicts have intensified in the delta as a result of increased pressure on the natural resources. The resource use conflicts have exhibited themselves as wildlife – human and human – human conflicts. Tana River Delta has traditionally been wildlife corridor for wildlife from Tsavo National Park. In addition, there are wildlife resident in the delta. Increased human encroachment of wildlife habitats for settlement, grazing and farming have exacerbated wildlife – human conflict in the delta causing loss of life and destruction of farmlands. Human – human conflicts have been associated with competition for pasture and farmland. This has in the past pit Pokomo sedentary community against Orma pastoral community leading to loss of life and destruction of property. As farmers from Pokomo community expand their farms along the river including in pastureland confrontation arises as Orma pastoral community graze in the farm. The government in collaboration with the local communities has made efforts to reduce conflicts by establishing peace committees. Resource use conflicts within the delta should be reduced by designating grazing and farming zones as well rationalizing livestock numbers against available pasture. In addition, wildlife conservation areas should be designated, mapped and secured.
Chapter Six

Master Plan

The preparation of this master plan is aimed at creating structures for sustainable management of Tana River Delta. This plan takes cognizance of the conservation status of the delta including the existing land tenure system, increasing demand for resources in the delta and the absence of structured conservation efforts. The master plan covers the following aspects: planning issues, strategies, proposed activities, time frame and responsible institution. The Master Plan addresses the following strategic issues:

1. Ecological and socio-economic functions;
2. Planning and management;
3. Institutional framework;
4. Research and monitoring;
5. Capacity building;
6. Communication, education and public awareness;
7. Information management system;
8. Public – private partnerships; and
9. Local communities’ participation in the management of the Tana River Delta.

Further the Master Plan addresses the following key issues:

1. Declining river discharge;
2. Over-grazing;
3. Over-fishing;
4. Changing course of the river;
5. Human – wildlife conflicts;
6. Human – wildlife conflicts;
7. Insecure land tenure system;
8. Declining vegetation and forest cover;
9. Agricultural expansion;
10. Lack of integrated management plan for Tana River Delta; and
11. Weak capacity of the institutions responsible for the management of Tana River Delta.

The detailed master plan is presented in appendix 1 and 2.
Chapter Seven

Location Action Plans

In order to harness community participation in the conservation of Tana River Delta, action plans are prepared for 11 locations in the newly created Tana River District. These are the locations found in the lower parts of the delta. The action plans specified: planning issues, strategies, activities, time frame and responsible institutions. The detailed location action plans are provided in appendix 2. The action plans are prepared for the following locations:

1. Dido Waride,
2. Kone Mansa,
3. Kipao;
4. Kipini Location,
5. Ngao,
6. Wachu – Oda,
7. Kilelegwani,
8. Galili,
9. Shirikisho,
10. Chara Location, and
11. Ozi

Although some planning issues are specific to certain locations, most of the issues are found in other locations. Combinations of the following planning issues are addressed in the action plans:

1. Declining river discharge
2. Over-grazing
3. Over-fishing
4. Changing course of the river
5. Human – wildlife conflicts
6. Human – human conflicts
7. Insecure land tenure system
8. Declining vegetation and forest cover
9. Agricultural expansion
10. Major dams constructions upstream
11. Poor farming practices – small holder
12. Low literacy levels
13. Pollution of the sea
14. Extensive flooding and prolonged drought
15. Sea water intrusion
Chapter eight

Management Strategies for the Tana River Delta

Objective 1: To enhance and maintain ecological functions and socio-economic values derived from Tana River Delta;

Tana River Delta Functions, Products and Services

Tana River Delta is known to perform crucial functions and provide vital products and services essential for environmental integrity and human well being in the area and Kenya in general. Being hugely diverse in its interactions, Tana River Delta has developed intricate relationships with human livelihood, the Indian Ocean and the general surrounding environment. Like in many wetlands in Kenya, these ecological and socio-economic values in Tana River Delta have not been valued in monetary terms but its innate contribution to conservation and development agenda is invaluable. Before the actual monetary contribution of Tana River Delta 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 Tana River Delta.

Tana River Delta 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. Tana River Delta is also in-situ bank for genetic resources. Thus, the management of Tana River Delta for biodiversity conservation is critical.

Management strategies

- Promote ecosystem based approach to the management of Tana River Delta
- Promote the sustainable exploitation of resources in the Tana River Delta
- Promote sustainable agricultural practices
- Zone strict conservation and multiple use areas
- Add value to Resources products to reduce wide scale exploitation
- Study the Tana River Delta resources 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 Tana River Delta to cushion future biodiversity losses
- Develop and initiate non-consumptive uses e.g. Tourism and carbon trading
Tana River Delta Natural products

Fish and other food products
Tana River Delta sustains commercial and subsistence/artisan fisheries. Its importance as fish nursery grounds and for replenishing natural stocks in Indian Ocean 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 Tana River Delta
- Promote conservation measures that protect fish nurseries and breeding grounds in the Tana River Delta
- 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
Tana River Delta 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 Tana River Delta
- Promote sustainable extraction and utilization of products derived from Tana River Delta
- 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 Tana River Delta

Tourism and Recreation
The nature and serenity of Tana River Delta makes it important ecotourism and recreation centre. The presence of a wide range of wildlife species as well as its aesthetic value makes Tana River Delta 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 Tana River Delta is strategically placed for this noble development at the Kenyan coast.

Management Strategies
- Establish a tourism hotspot in the name of Tana River Delta 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, boat rides, sport fishing and wildlife viewing has the highest immediate potential and these products 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

**Tana River Delta ecological values**

**Flood Control and Soil Erosion Prevention:**

*Tana River Delta* 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 Indian Ocean. In addition, Tana River Delta vegetation slows down the flow of floodwater resulting in silt and sediment retention and Indian Ocean protection. Besides reduction of flooding events downstream, this process also ensures slow and sustainable recharge of clean filtered water into Indian Ocean for which Kenya, depend for national and regional economic growth. The Tana River Delta 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 Tana River Delta.
• Promote application of standard procedures and processes for developments with potential for changing the status of Tana River Delta.

**Water Recharge and Discharge**

The retention ability of Tana River Delta enables sustainable water discharge and recharge into Indian Ocean. The impeded drainage allows the water to stay in one place long enough to maximize infiltration, enhancing recharge of Indian Ocean and groundwater and aquifers.

**Management strategies**

• Implement long-term water flow monitoring into and out of Tana River Delta
• Promote measures that ensure protection of water resources and sources
• Promote and encourage sustainable use of Tana River Delta waters.

**Water Purification, Nutrient and Toxic retention**

Tana River Delta vegetation absorbs nutrients and toxic substances from inflowing water from agriculturally active upstream areas thereby improving the quality of water in Indian Ocean. Nutrients and toxic substances originate from agricultural, domestic and industrial
sources. The materials eroded in the watershed are filtered by the Tana River Delta vegetation resulting in water purification. The sediment retained in the wetland protects Indian Ocean 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 Tana River Delta specific by-laws to government land management and production systems to reduce over fertilization and pollution of the Tana River Delta Waters
- Promote organic farming methods around the Tana River Delta and upstream in the water sources

Carbon Storage

Tana River Delta is among the most effective ecosystems for carbon storage. The Tana River Delta 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 vegetation and peatlands are drained and exposed to fires.

Management strategies

- Promote and support conservation measures to maintain Tana River Delta vegetation and general ecosystem health.
- Institute measures to discourage the drainage of Tana River Delta
- Promote uses that allow Tana River Delta 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

Tana River Delta is an important site for scientific research and education. There is urgent need to promote long term studies at local, national and global levels on environmental status and trends in the Tana River Delta. Research areas within Tana River Delta include ecology, archaeology, ornithology, hydrology, geology, pollution control, medicine, agriculture, climatology, and paleolimnology and biofuel, among others.
Management strategies
- Establish and promote establishment of a Tana River Delta 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 Tana River Delta.
- Initiate a school-based education programme in all the schools around Tana River Delta

Religious and Cultural Values and Significance
Tana River Delta is an important historical site that comprises important components of the coastal 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 Tana River Delta management.
- Encourage community participation through establishment of local management institutions and structures e.g. Site Support Groups (SSGs)
- Promote the conservation of Tana River Delta religious and cultural significance
- Produce education, awareness and research guides and publications in local languages.

Objective 2: Promote innovative planning and integrated management approaches on Tana River Delta

While Tana River Delta 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, pollution and use of fertilizer, unattainable resources 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. Private sector involvement is a major threat and there seems to be true scramble for the Delta resources without regard to the rights of indigenous local communities. Poor management and lack of or just the poor implementation of environmental laws and guidelines and climate change add to the Tana River Delta problems. These threats have induced changes that have eroded the ecological and socio-economic values and services derived from Tana River Delta. The underlying threat remains lack of recognition of the importance of Tana River Delta 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 Tana River Delta conservation and management:
Challenges

Reclamation and Conversion of Tana River Delta
Drainage and reclamation of Tana River Delta for agricultural development, human settlement and agricultural industrial development is one of the biggest threats to the conservation and management of Tana River Delta. In the past, Tana River Delta has been regarded as “wasteland” that should be converted to a useful asset mainly through drainage for agriculture. This has led to large-scale drainage and conversion for alternative uses without regard to ecological, biological and socio-economic values.

Management strategies

- Drainage and reclamation of Tana River Delta will not be allowed unless a greater public interest is demonstrated within a framework of maintained ecological integrity of Tana River Delta.
- Tana River Delta will be zoned for multiple land uses restricting any degrading developments to the already opened up areas
- Any alteration of Tana River Delta 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 Tana River Delta, and maintain the functions of the Tana River Delta.
- Undesirable developments and plant species that negatively impact the ecology and hydrology of the Tana River Delta will be disallowed, and where already introduced, will be replaced with appropriate developments and plant species.
- Uncontrolled burning of wetland biomass will be prohibited.
- Land uses that allow maintain ecological integrity within a sustainable development framework will be promoted.

Overexploitation of Tana River Delta resources
Increasing human populations and change from subsistence to commercial exploitation of Tana River Delta resources 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 Tana River Delta.

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.
- Tana River Delta ecological goods and services will be valued and periodically reviewed to ensure sustainable off-take
- Extraction volumes of Tana River Delta resources (water, fish and plant products), will be based on sustainable yields
• Limits will be set for non-consumptive uses of Tana River Delta to maintain the health and functioning of the system.
• Subsistence and environmental needs will take priority over commercial interests in the planning for resource access and extraction in the Tana River Delta

**Alien Invasive Species**

Like many wetlands, Tana River Delta is highly vulnerable to alien and potentially invasive species. Many wetlands 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. 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 Tana River Delta 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.

**Establishment of Tana River Delta Conservation Area**

The ecological, biological and socio-economic benefits, values and services provided by the Tana River Delta are critical and must be maintained for posterity.

**Management strategies**

• Tana River Delta will be accorded protection and conservation status necessary for the maintenance of its functions that support existing indigenous local community multiple land uses. Three levels of protection will be recognized: Nature Reserve for strict protection in areas that will function as natural gene banks; National Reserve for regulated consumptive and non-consumptive uses; and Community Conservation Areas (CCAs) all current multiple land uses will be managed for reduced impacts on the environment. These CCAs will be entirely managed by the local communities including the surrounding community areas where production activities for day-to-day livelihoods will take place. For such important wetland areas, consumptive uses will be prohibited.
• In designating such sites the representative nature of different services of Tana River Delta will be taken into consideration.
• Ensure the domestication and institutionalization of the Ramsar Convention
• List Tana River Delta as a wetland of international significance by subjecting it to the Ramsar criteria for which it obviously fulfills.

Restoration and Rehabilitation of Tana River Delta
Sections of Tana River Delta have been degraded and are in dire need of rehabilitation. Upstream, there are serious environmental threats to the invaluable ecological goods and services provided by the Tana River Delta through drainage, pollution, sedimentation and introduction of exotic species.

Management strategies:
• Tana River Delta 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 resources will be allowed for degraded parts.
• Rehabilitated parts of Tana River Delta 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.

Tana River Delta Ownership
Tana River Delta is held under Trust Act many by the respective local authorities on behalf of local communities. Private individuals and enterprises and government agencies have also been accorded ownership through 99 year land leases mainly for agricultural intensification.

Management strategies:
• Ownership of Tana River Delta will be vested in the local communities with only a few sections designated for public interest in conservation and development and these will be subject to vetting by local communities for their continued benefits for posterity.
• Legitimate rights for land ownership will be accorded to true indigenous local communities to sustain their environmentally friendly multiple land uses in support of local livelihoods and national economies.
• Tana River Delta 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.
• Environmentally friendly cultural and traditional practices for use of Tana River Delta resources will be permitted.
Objective 3: Establish a functional institutional framework for the management of the delta

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 aimed 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 Tana River Delta is still greatly threatened by degradation.

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

Institutional frameworks
Currently there is no defined institutional framework for the management of Tana River Delta.

Management strategies
- Request Kenya Wildlife Service (KWS) to manage gazetted sections and all fauna and flora in the Tana River Delta for posterity with benefits flowing to all stakeholders
- Establish a Tana River Delta Conservation Forum to guide implementation of this conservation and development master plan
- Gazette the Tana River Delta or parts of it as a National Reserve to legitimize the presence of Kenya Wildlife Service (KWS) as a manager of land, wildlife and people
- Establish local community conservation institutions e.g. Site Support Groups and build their capacity as stakeholders for the management of the Tana River Delta
- Establish user groups and build their capacity to ensure sustainable access and use for Tana River Delta resources
Objective 4: Carry out demand driven research and monitoring in Tana River Delta

Research, Inventorying, Monitoring and Information Systems
At the moment, there is lack of a comprehensive data and monitoring system for Tana River Delta 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 Tana River Delta. However, there is no infrastructure, no capacity and no continuity in data collection and in any 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

- Tana River Delta conservation and management will be based on sound scientific principles.
- A full inventory of all Tana River Delta 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 be utilized.
- Monitoring protocols and data management will be developed, standardized and applied
- A Tana River Delta information center will be set up.
- Indigenous knowledge will be documented and incorporated in decision-making.
- Annual status and trends report for Tana River Delta will be produced

Objective 5: Enhance capacity building within government and local community institutions involved in the conservation and management of Tana River Delta

Capacity and Human Resource Development
A key issue and problem leading to the uncontrolled past threats and loss of Tana River Delta ecological goods and services is the lack of government and local community capacity to stem the threats. Tana River Delta is not under any routine management regime. Traditional uses that are less destructive allowed the wetland a chance to thrive but this is no longer possible in the face of increased pressure for the delta’s resources. 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 Tana River Delta conservation for posterity
• Infrastructure for inventorying, monitoring and management of Tana River Delta will be developed and applied.

Objective 6: Promote communication, education and public awareness among stakeholders

Tana River Delta is degraded 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 Tana River Delta resources.

Management Strategies

• Promote education and public awareness on Tana River Delta to encourage understanding and participation of the public, private sector, local authorities, NGOs and other interested parties through all appropriate means.
• Incorporate Tana River Delta (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 Tana River Delta

Objective 7: To establish a Tana River Delta information management system

At the moment there is scanty information on Tana River Delta making it impossible to effectively and efficiently manage the delta. There is no standardized and comprehensive information on biophysical and socio–economic characteristics of the delta. In order to better manage the delta, it is important to develop sound information management system for the delta.

Strategy

• To develop Tana River Delta information management system

Objective 8: To promote public–private partnerships in the conservation and development of the delta

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 Tana River Delta.
- Forge partnerships with the private sector to assist in the conservation and management of Tana River Delta.
- 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 Tana River Delta conservation activities.

Management strategies:

- Encourage non-state actors and local communities to undertake Tana River Delta conservation activities.
- NGOs and local communities will be included in the Tana River Delta Management Committee
- Non-state actors will be acknowledged as contributors when they provide support to managing government agencies
- Schemes for private sector involvement in Tana River Delta conservation and development agenda 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 Tana River Delta institutional frameworks
Promote synergy and a coordinated national approach towards domestication of Multilateral Environmental agreements (MEAs) relevant to Tana River Delta

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 Tana River Delta conservation, development and management.
- Encourage the proportional representation of the youth, women, the vulnerable and marginalized groups in the management of Tana River Delta.

**Objective 9: Promote local communities participation in the management of Tana River Delta.**

Community participation in the development process has long been recognized in our policies and legislations including the new constitution. Despite its benefits, effective community participation remains a great challenge. Further, local communities depend on the delta for their livelihoods. In order to guarantee the livelihoods of the local communities in the face of increasing demand for the delta’s resources, they should be involved in conservation of the delta.

**Strategy**

Effective involvement of local communities in the conservation of Tana River Delta
Chapter Nine

Barriers to the implementation of the plans

1. The new constitutional dispensation
   In August 2010, Kenya promulgated a new constitution. There are several legislations that must be passed into law to effect the new constitution for example Land Act. It may take several years before we realize the benefits of the new constitution, especially the management of community land. This may cause delay in effective management of Tana River Delta.

2. Lack of institutional framework on the conservation of Tana River Delta
   At the moment, there is no clearly defined institutional framework for the conservation of the delta making it difficult to undertake systematic and structured conservation of the delta. The ongoing conservation efforts are ad hoc in nature. In the absence of an effective institutional framework, it is unlikely to expect successful conservation of the delta. Effective planning and conservation of the delta hinges on the establishment of a functioning institutional framework.

3. Lack of up to date data including geospatial data on Tana River Delta
   At the moment, there is no reliable data base for planning and decision making. The existing and proposed land uses are not captured in accessible data base making it difficult to determine the efficacy of these activities. At the same time, it is impossible to spatially locate conservation activities. This makes it imperative to develop a sound data base to inform rational planning and conservation effort.

4. Conflicting and overlapping policy and institutional frameworks
   The conservation of the delta involves several institutions with conflicting and overlapping mandates. Some of the relevant policies and legislations are those governing environment, agriculture, livestock, wildlife, fisheries, forest and land tenure. While Vision 2030 prioritized irrigation agriculture in the Tana River Basin, Environmental Management and Coordination Act and Wildlife Act are concerned with the conservation of the delta’s biodiversity resources.

5. Insecure land tenure system
   At the moment, land within the delta is held under the Trust Land Act managed by the Local Authorities in the delta. Local authorities have often allocated land in total disregard of the local communities’ interests. Therefore, continued management of the land by the local authorities may disenfranchise the local communities of the right to own and utilize the land.

6. Lack of resources – personnel and finance
   Sustainable management requires adequate resources, such as personnel and finance to acquire and utilize the much needed data. The conservation of the delta requires huge investment in infrastructure, especially roads and development of nature based enterprises.

7. Rapidly growing demand for the delta’s resources - water, land and biodiversity.
   There is rapid increase in the demand for resources in the delta ranging from major expansion of irrigation agriculture, clearance of land for farming, rising demand for pasture and increased sedentary settlement. These activities threaten the sustainability of the delta.
Chapter Ten

Conclusions and recommendations

It is evident that the sustainability of Tana River Delta is threatened by anthropogenic pressures driven by population growth and expansion of socio-economic activities in the absence of requisite plans and strategy. Tana River Delta is an important dry season grazing area and pastoralists come from as far as Mandera, Garissa and Wajir. Against increasing incidence of severe drought and increasing livestock numbers, the delta is now used for all year round grazing leading to overgrazing seriously impacting on its ecosystem. In addition, major furrow irrigation projects are planned in the region, for example Tana River Integrated Sugar Project, G4 International Irrigation Project and Matt International Irrigation Project including rehabilitation of TARDA irrigation project. The implementations of these projects are expected to put immense pressure on strategic resources in the region, especially water and pasture.

Tana River is of strategic importance not only to Kenya but also to the world community. The delta is home to endemic biodiversity resources of global importance. Further, it supports the regional pastoral economy housing up to 600,000 livestock during the dry season. Therefore, sustainable management of Tana River Delta is of critical importance. Priority areas for intervention are: overgrazing, over-fishing, flooding, declining river water discharge, resource use conflicts, agricultural expansion, insecure land tenure, changing course of the river, siltation of both riverbed and oxbow lakes, densification of settlements, and changing livelihoods and lifestyles.

Effective implementation of the 2010 national constitution provides a solid foundation for the management of land and environment in the country. The constitution for the first time has categorized a clean and health environment as a human right. Further, the constitution has restructured the management of community that has hitherto been abused at the expense of the community under the Trust Land Act. Therefore, the new constitution safeguards the interests of local communities in community land. Therefore, 2010 constitution together with the National Land Policy of 2009 creates mechanisms for better management of Tana River Delta.

In order to effectively manage Tana River Delta, it is plausible to establish Tana River Delta Sustainable Management Forum. The Forum should champion the implementation of the 2010 national constitution and other relevant policies and legislations. The Forum should implement the following strategic issues: Ecological and socio-economic functions; planning and management; institutional framework; research and monitoring; capacity building; communication, education and public awareness; information management system; public – private partnerships; and local communities’ participation in the management of the Tana River Delta. Efforts should also be directed at the preparation and implementation of: integrated natural resources management plan for the basin, zoning of grazing areas, zoning of farming areas, establishing Livestock Grazing Committee, determine optimal livestock numbers, strengthen traditional grazing system, seek alternative low impact livelihoods e.g. beekeeping, fish farming, small scale irrigation, mangoes farming and processing.
Reference


## Appendices

### Appendix 1: Master Plan

<table>
<thead>
<tr>
<th>No</th>
<th>Objectives</th>
<th>Activities</th>
<th>Time frame</th>
<th>Responsible institutions</th>
</tr>
</thead>
</table>
|    | Enhance and maintain ecological functions and socio-economic values derived from Tana River Delta; | 1. Regulated grazing  
2. Zone areas for ecotourism promotion  
3. Low impact investments  
4. Zone areas for irrigated agriculture | √          | WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB, Relevant line ministries NGO’s Local communities |
|    | Promote innovative planning and integrated management approaches towards Tana River Delta sustainable conservation and management | 1. Prepare basin – wide integrated natural resources management plan  
2. Prepare biodiversity conservation plan  
3. Prepare action plans addressing specific issues and spatial units | √          | WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB, Relevant line ministries NGO’s Local communities |
|    | Establish a functional institutional framework for the management of the delta | 1. Establish and operationalise Tana River Delta Sustainable Management Forum  
2. Lobby lead agencies to join and support the Forum  
3. Lobby key stakeholders to join the Forum | √          | WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB, Relevant line ministries NGO’s Local communities |
|    | Carry out demand driven research and monitoring in Tana River Delta          | 1. Conduct baseline survey  
2. Undertake natural resource assessment  
3. Undertake research on biophysical, biodiversity and socio – economics of the delta  
4. Undertake research requested by any interested party  
5. Establish a monitoring framework  
6. Monitor biophysical, biodiversity and socio – economic changes in the delta | √          | WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB, Relevant line ministries NGO’s Local communities |
|    | Enhance capacity building within government and local community institutions involved in conservation and management of Tana River Delta | 1. Undertake capacity building needs assessment  
2. Conduct workshop – based capacity building training  
3. Establish best practices pilot projects  
4. Support the establishment of Tana River Delta Conservation Forum: personnel, equipment and office space and operational expenses | √          | WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB, Relevant line ministries NGO’s – Nature Kenya |
6. **Promote communication, education and public awareness among stakeholders**
   - 1. Regularly conduct training seminars and workshops for the stakeholders
   - 2. Establish and regularly publish a newsletter on Tana River Delta, possibly internet-based
   - 3. Publish research findings in the scientific media, newspapers, websites
   - 4. Establish a website on TRD
   - 5. Regularly facilitate discussion through the radio stations
   - 6. Establish a discussion forum on the delta

   | WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB, Relevant line ministries NGO’s – Nature Kenya |

7. **Establish a Tana River Delta information management system**
   - 1. To establish data base on the delta: biophysical, socio-economic and biodiversity
   - 2. To regularly update the database

   | WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB, Relevant line ministries NGO’s – Nature Kenya Local communities |

8. **Promote public-private partnerships in the conservation and development of the delta**
   - 1. Create Friends of Tana River Delta
   - 2. Lobby the private sector to support conservation of the delta
   - 3. Lobby for the participation of the private sector in Tana River Delta Conservation Forum
   - 4. Lobby the private sector investors in the delta to engage in sustainable economic activities

   | WRMA, TARDA, CDA, KMFRI, KFS, KWS, NMK, NEMA, KEFRI, KARI, NIB, CWSB, Relevant line ministries NGO’s – Nature Kenya Local communities |

9. **Promote local communities participation in the management of the Tana River Delta**
   - Local communities to elect representatives in Tana River Delta Sustainable Conservation Forum

   | Registered CBOs engaged in the conservation of the delta Opinion leaders |

**NB:** ST – short term: up to 2 years; MT- medium – term: 5 years; LT – long term: 10 years
Start date: January 2011
### Appendix 2: Issue Specific Master Plan

<table>
<thead>
<tr>
<th>No</th>
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<th>Time frame</th>
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<td></td>
<td></td>
<td>To rationalize water resources utilization</td>
<td>Prepare water resources management plan</td>
<td>ST</td>
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<td>Declining river discharge</td>
<td>To conserve available water resources</td>
<td>Adopt water use efficient technologies</td>
<td>MT</td>
<td>Local Communities, MoW, WRMA, TARDA, CDA, MoLG, MoA, MoLG</td>
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<td></td>
<td></td>
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<td>Harvest flood water</td>
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<td></td>
<td>Establish Water Resource Users Association</td>
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<tr>
<td></td>
<td></td>
<td>To maintain livestock numbers within the carrying capacity of the available pasture</td>
<td>Establish Delta grazing committee</td>
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<td></td>
<td></td>
<td>To rehabilitate pasture</td>
<td>To determine the optimal number of livestock for the location</td>
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<td></td>
<td></td>
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<td>Prepare grazing management plan</td>
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<td>To reduce the number of livestock owned by individuals</td>
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<td>Education and awareness raising on keeping small herds</td>
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<td>Overgrazing</td>
<td>Promote traditional nomadic grazing regime - wet and dry season grazing system</td>
<td>Enforce fishing regulations: amounts, fishing nets</td>
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<td>Local Communities, MoL, TARDA, CDA</td>
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<td>To maintain livestock numbers within the carrying capacity of the available pasture</td>
<td>Maintain sustainable yield of fish</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>To rehabilitate pasture</td>
<td>Seek alternative livelihood options, e.g. livestock keeping, irrigation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Fish farming</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overfishing</td>
<td>Promote sustainable fishing</td>
<td>Establish Delta grazing committee</td>
<td>ST</td>
<td>Local Communities, MoF, TARDA, CDA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Enforce fishing regulations: amounts, fishing nets</td>
<td>MT</td>
<td>Local Communities, MoF, TARDA, CDA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Maintain sustainable yield of fish</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Seek alternative livelihood options, e.g. livestock keeping, irrigation</td>
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<td></td>
<td></td>
<td></td>
<td>Fish farming</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Changing course of the river</td>
<td>Revert river to the original course Manage the river in its original course (River bank conservation)</td>
<td>Close the brooks</td>
<td>ST</td>
<td>Local Communities, MoW, WRMA, TARDA, CDA, MoLG, MoL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Build gabions</td>
<td>MT</td>
<td>Local Communities, MoW, WRMA, TARDA, CDA, MoLG, MoL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Regular desilting of riverbed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human – wildlife conflicts</td>
<td>Promote co – management of wildlife</td>
<td>Designate, map and secure conservation areas</td>
<td>ST</td>
<td>Local Communities, MoF, KWS, OP, MoA, TARDA, CDA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Establish eco – tourism facilities</td>
<td>MT</td>
<td>Local Communities, MoF, KWS, OP, MoA, TARDA, CDA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Education and awareness raising</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human – human conflicts</td>
<td>Promote integrated crop farming and livestock keeping</td>
<td>Establish Delta Conflict Resolution Committee</td>
<td>ST</td>
<td>Local Communities, MoA, MoLD, TARDA, CDA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Zone farming and grazing areas</td>
<td>MT</td>
<td>Local Communities, MoA, MoLD, TARDA, CDA</td>
</tr>
<tr>
<td></td>
<td>Insecure land tenure system</td>
<td>Promote secure land tenure system</td>
<td>Lobby for the implementation of National Land Policy</td>
<td>ST</td>
<td>Local Communities, MoL, MoLG, TARDA, CDA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MT</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Issue Description</td>
<td>Actions</td>
<td>Acknowledged</td>
<td>Acknowledged Proof</td>
<td>Responsible Bodies</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Declining vegetation and forest cover</td>
<td>To improve vegetation and forest cover using environmentally friendly trees</td>
<td>On farm tree planting Establish community tree planting committees Establish community tree nurseries</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>9</td>
<td>Agricultural expansion</td>
<td>To rationalize water resources utilization Conserve available water resources</td>
<td>Prepare water resources management plan Establish Water Resource Users Association Harvest flood water Land adjudication Adopt water use efficient technologies</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>10</td>
<td>Lack of an Integrated Management Plan for Tana River Basin</td>
<td>To prepare Tana River Integrated Natural Resources Management Plan</td>
<td>Create a committee responsible for the preparation of Integrated Natural Resources Management Plan of Tana River Basin Mobilize resources for the plan preparation</td>
<td>WRMA, KFS, CDA, TARDA</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Weak capacity of the institutions responsible for the management of Tana River Delta</td>
<td>To prepare a capacity building plan for the management of Tana River Delta</td>
<td>Education and awareness creation on the conservation of Tana River Delta Training of key institutions responsible for the management of Tana River Delta Establish and equip requisite local institutions, e.g. WRUA, CFA, BMU</td>
<td>Nature Kenya WRMA, KFS, local communities</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 3: Location Action Plans

1. DidaWaride Location

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible institutions</th>
</tr>
</thead>
</table>
| 1. Over – grazing          | To maintain livestock numbers within the carrying capacity of the available pasture | Establish location grazing committee  
To determine the optimal number of livestock for the location  
Prepare grazing management plan  
To reduce the number of livestock owned by individuals  
Education and awareness raising on keeping small herds | ST         | Local Communities  
Ministry Livestock  
Ministry of Northern Kenya and other ASAL  
Ministry of Local Government  
TARDA  
CDA  
Nature Kenya |
|                            |                                                                          | To rehabilitate pasture                                                                                                                     | MT         |                                                                                                           |
|                            |                                                                          | Establish Water Resource Users Association  
Prepare water resources management plan  
Harvest flood water  
To adopt water use efficient technologies                                                                 | LT         |                                                                                                           |
| 2. Declining river discharge | To rationalize water resources utilization  
To conserve available water resources                                                                                                      | ST         | Local Communities  
Ministry of Water and Irrigation  
WRMA  
Tana Water Board  
KenGen  
Ministry of Northern Kenya and other ASAL  
TARDA  
CDA  
Nature Kenya |
|                            |                                                                          | Establish Water Resource Users Association  
Prepare water resources management plan  
Harvest flood water  
To adopt water use efficient technologies                                                                 | LT         |                                                                                                           |
| 3. Over – fishing          | Promote Sustainable fishing                                               | Enforce fishing regulations: amounts, fishing nets  
Maintain sustainable yield  
Start fish farming  
Seek alternative livelihood options, e.g. livestock keeping, irrigation  
Establish fishing management committee                                                                 | ST         | Local communities  
Ministry of Fisheries  
TARDA  
CDA |
|                            |                                                                          | Establish Water Resource Users Association  
Prepare water resources management plan  
Harvest flood water  
To adopt water use efficient technologies                                                                 | LT         |                                                                                                           |
## 2. Kone Mansa Location

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Persons/Institutions</th>
</tr>
</thead>
</table>
| 1. Overgrazing | Promote traditional nomadic grazing regime - wet and dry season grazing system  
To maintain livestock numbers within the carrying capacity of the available pasture  
To rehabilitate pasture | Establish location grazing committee  
To determine the optimal number of livestock for the location  
Prepare grazing management plan  
To reduce the number of livestock owned by individuals  
Education and awareness raising on keeping small herds | ST | ✓ ✓ |
| | | | MT | Local Communities  
Provincial administration  
Ministry Livestock  
Ministry of Northern Kenya and other ASAL  
Ministry of Local Government  
TARDA  
CDA  
Nature Kenya |
| 2. Planned major irrigation projects | To rationalize water resources utilization  
To conserve available water resources | Prepare water resources management plan  
Establish Water Resource Users Association  
Harvest flood water  
Land adjudication  
Adopt water use efficient technologies | ✓ ✓ ✓ | Local Communities  
Ministry of Water and Irrigation  
WRMA  
Tana Water Board  
KenGen  
Ministry of Agriculture  
Ministry of Livestock  
Ministry of Northern Kenya and other ASAL  
TARDA  
CDA  
Nature Kenya |
| 3. Major dam constructions upstream | To rationalize water resources utilization  
Conserve available water resources | Prepare water resources management plan | ✓ ✓ | Local Communities  
Ministry of Water and Irrigation  
WRMA  
Tana Water Board  
KenGen  
Ministry of Agriculture  
Ministry of Livestock  
Ministry of Northern Kenya and other ASAL  
TARDA |
### 4. Changing course of the river

- **Mnazini, matoba, handaraku**

| Activity | Responsible
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Closure of brooks</td>
<td>Local Community, Ministry of Water and Irrigation, Ministry of Lands, Ministry of Local Government, WRMA, TARDA, CDA, Provincial administration</td>
</tr>
<tr>
<td>Construction of barriers along river banks</td>
<td>CDA, Nature Kenya</td>
</tr>
</tbody>
</table>

| Local Community, Ministry of Water and Irrigation, Ministry of Lands, Ministry of Local Government, WRMA, TARDA, CDA, Provincial administration | CDA, Nature Kenya |

### 3. Kipao Location

#### Issue

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Persons/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overgrazing</td>
<td>Promote traditional nomadic grazing regime - wet and dry season grazing system To maintain livestock numbers within the carrying capacity of the available pasture To rehabilitate pasture</td>
<td>Establish location grazing committee To determine the optimal number of livestock for the location Prepare grazing management plan Education and awareness raising on keeping small herds To reduce the number of livestock owned by individuals</td>
<td>√</td>
<td>Local Communities, Provincial administration, Ministry of Livestock, Ministry of Northern Kenya and other ASAL, Ministry of Local Government, TARDA, CDA, Nature Kenya</td>
</tr>
<tr>
<td>2. Changing course of the river</td>
<td>Revert river to the original course River be managed at its original course (River bank conservation)</td>
<td>Closure of brooks construction of barriers along river bank Desilting of the river canals</td>
<td>√</td>
<td>Local Community, WRMA, MoLG, Ministry of R &amp; PW</td>
</tr>
<tr>
<td>3. Low crop production</td>
<td>To promote sustainable agriculture</td>
<td>Small scale irrigation, high value crops Harvest flood water for irrigation Strengthen agricultural extension work</td>
<td>√</td>
<td>Local Communities, Ministry of Agriculture, TARDA, CDA, Ministry of Northern Kenya</td>
</tr>
</tbody>
</table>
### 4. Low literacy levels

- To improve literacy levels
  - Employ more teachers
  - Expand and equip existing learning institutions
  - Develop additional institutions of learning

<table>
<thead>
<tr>
<th>4. Kipini Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue</strong></td>
</tr>
</tbody>
</table>
| 1. Pollution of the sea | Sustainable management of coastline | Establish beach environment committee  
Education and awareness raising  
Prepare environmental management plan for the coastline | √ | Ministry of environment  
NEMA  
Conservation group (BMU)  
Ministry of Fisheries |
| 2. Over – fishing | Promote sustainable fishing | Enforce fishing regulations, amounts, fishing nets  
Maintain sustainable yield  
Seek alternative livelihood options, e.g livestock keeping, irrigation  
Establish fishing management committee  
Fish farming | √ | Local communities  
Ministry of Fisheries  
TARDA  
CDA |
| 3. Insecure land ownership | Promote secure land tenure system | Lobby for the implementation of National Land Policy |  | MoL  
MoLG  
Council of elders |
| 4. Overgrazing | Promote traditional nomadic grazing regime - wet and dry season grazing system  
To maintain livestock numbers within the carrying capacity of the available pasture  
To rehabilitate pasture | Establish location grazing committee  
To determine the optimal number of livestock for the location  
Prepare grazing management plan  
Education and awareness raising on keeping small herds  
To reduce the number of livestock owned by individuals | √ | Local Communities  
Provincial administration  
Ministry Livestock  
Ministry of Northern Kenya and other ASAL  
Ministry of Local Government  
TARDA  
CDA  
Nature Kenya |
### 5. Ngao Location

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Persons/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Changing course of the river</td>
<td>Re-route the river to its original course&lt;br&gt;Restoring and rehabilitation of silted lakes</td>
<td>Close the brooks&lt;br&gt;Build gabions&lt;br&gt;Desilting (L. Kongolaola and Lake Shakababo)</td>
<td>√&lt;br&gt;√</td>
<td>Local Community&lt;br&gt;TARDA&lt;br&gt;CDA&lt;br&gt;CDF&lt;br&gt;Ministry of Local Government&lt;br&gt;Provincial administration</td>
</tr>
<tr>
<td>2. Human / wildlife conflict</td>
<td>Promote co – management of wildlife</td>
<td>Map and secure conservation areas&lt;br&gt;Establish eco – tourism facilities&lt;br&gt;Education and awareness raising</td>
<td>√&lt;br&gt;√</td>
<td>Local Community&lt;br&gt;KWS&lt;br&gt;Provincial administration&lt;br&gt;Ministry of Local Government&lt;br&gt;NGOs</td>
</tr>
<tr>
<td>3. Overgrazing</td>
<td>Promote traditional nomadic grazing regime - wet and dry season grazing system&lt;br&gt;To maintain livestock numbers within the carrying capacity of the available pasture&lt;br&gt;To rehabilitate pasture</td>
<td>Establish location grazing committee&lt;br&gt;To determine the optimal number of livestock for the location&lt;br&gt;Prepare grazing management plan&lt;br&gt;Education and awareness raising on keeping small herds&lt;br&gt;To reduce the number of livestock owned by individuals</td>
<td>√&lt;br&gt;√</td>
<td>Local Communities&lt;br&gt;Provincial administration&lt;br&gt;Ministry Livestock&lt;br&gt;Ministry of Northern Kenya and other ASAL&lt;br&gt;Ministry of Local Government&lt;br&gt;TARDA&lt;br&gt;CDA&lt;br&gt;Nature Kenya</td>
</tr>
</tbody>
</table>
### 6. Wachu – Oda Location

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Persons/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Declining river discharge</td>
<td>To rationalize water resources utilization&lt;br&gt;Conserve available water resources</td>
<td>Prepare water resources management plan&lt;br&gt;Establish Water Resource Users Association&lt;br&gt;Harvest flood water&lt;br&gt;Removal of silt from dried up river for easy water flow&lt;br&gt;Adopt water use efficient technologies</td>
<td>ST: √&lt;br&gt;MT: √&lt;br&gt;LT:</td>
<td>Local Communities&lt;br&gt;Ministry of Water and Irrigation&lt;br&gt;WRMA&lt;br&gt;Tana Water Board&lt;br&gt;KenGen&lt;br&gt;Ministry of Agriculture&lt;br&gt;Ministry of Livestock&lt;br&gt;Ministry of Northern Kenya and other ASAL&lt;br&gt;TARDA&lt;br&gt;CDA&lt;br&gt;Nature Kenya</td>
</tr>
<tr>
<td>2. Insecure land tenure system</td>
<td>To promote secure land tenure system</td>
<td>Lobby for the implementation of National Land policy</td>
<td>ST: √&lt;br&gt;LT:</td>
<td>Local Communities&lt;br&gt;MoI&lt;br&gt;MoLG</td>
</tr>
<tr>
<td>3. Declining vegetation/forest cover</td>
<td>To improve vegetation cover using environmentally friendly trees</td>
<td>On farm tree planting&lt;br&gt;Establish community tree planting committee&lt;br&gt;Establish community tree nurseries</td>
<td>ST: √&lt;br&gt;LT:</td>
<td>Ministry of environment&lt;br&gt;KFS&lt;br&gt;NEMA&lt;br&gt;Local community</td>
</tr>
</tbody>
</table>
### 7. Kilelengwani Location

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Persons/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Declining river discharge</td>
<td>To rationalize water resources utilization  Conserve available water resources</td>
<td>Prepare water resources management plan  Establish Water Resource Users Association  Harvest flood water  Adopt water use efficient technologies</td>
<td>ST</td>
<td>√  LT</td>
</tr>
<tr>
<td>2. Overgrazing</td>
<td>Promote traditional nomadic grazing regime - wet and dry season grazing system  To maintain livestock numbers within the carrying capacity of the available pasture  To rehabilitate pasture</td>
<td>Establish location grazing committee  To determine the optimal number of livestock for the location  Prepare grazing management plan  Education and awareness raising on keeping small herds  To reduce the number of livestock owned by individuals</td>
<td>ST</td>
<td>√  LT</td>
</tr>
<tr>
<td>3. Insecure land tenure system</td>
<td>To promote secure land tenure</td>
<td>Lobby for the implementation of National Land Policy</td>
<td>ST</td>
<td>√  LT</td>
</tr>
<tr>
<td>4. Over – fishing</td>
<td>Regulation of fishing activity</td>
<td>Enforce fishing regulations, amounts, fishing nets  Maintain sustainable yield  Seek alternative livelihood options, e.g. livestock keeping, irrigation</td>
<td>ST</td>
<td>√  LT</td>
</tr>
</tbody>
</table>
### 8. Galili Location

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible persons/institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Extensive flooding and prolonged drought</td>
<td>To rationalize water resources utilization&lt;br&gt;Conserve available water resources&lt;br&gt;Adopt water use efficient technologies</td>
<td>Prepare water resources management plan&lt;br&gt;Establish Water Resource Users Association&lt;br&gt;Harvest flood water</td>
<td>√</td>
<td>Local Communities&lt;br&gt;Ministry of Water and Irrigation&lt;br&gt;WRMA&lt;br&gt;Tana Water Board&lt;br&gt;KenGen&lt;br&gt;Ministry of Agriculture&lt;br&gt;Ministry of Livestock&lt;br&gt;Ministry of Northern Kenya and other ASAL&lt;br&gt;TARDA&lt;br&gt;CDA&lt;br&gt;Nature Kenya</td>
</tr>
<tr>
<td>2. Over – fishing</td>
<td>Control influx of fisher men&lt;br&gt;Conserve fish breeding Areas</td>
<td>Enforce fishing regulations, amounts, fishing nets&lt;br&gt;Maintain sustainable yield&lt;br&gt;Seek alternative livelihood options, e.g. livestock keeping, irrigation&lt;br&gt;Establish fishing management committee&lt;br&gt;Fish farming</td>
<td>√</td>
<td>Local communities&lt;br&gt;Ministry of Fisheries&lt;br&gt;TARDA&lt;br&gt;CDA</td>
</tr>
<tr>
<td>3. Lack of structured grazing management regime</td>
<td>Promote sustainable grazing</td>
<td>Establish location grazing committee&lt;br&gt;To determine the optimal number of livestock for the location&lt;br&gt;Prepare grazing management plan&lt;br&gt;Education and awareness raising on keeping small herds&lt;br&gt;To reduce the number of livestock owned by individuals</td>
<td>√</td>
<td>Local Communities&lt;br&gt;Provincial administration&lt;br&gt;Ministry Livestock&lt;br&gt;Ministry of Northern Kenya and other ASAL&lt;br&gt;Ministry of Local Government&lt;br&gt;TARDA&lt;br&gt;CDA&lt;br&gt;Nature Kenya</td>
</tr>
</tbody>
</table>
4. Lack of small scale irrigation schemes

| Promote small scale irrigation agriculture | Small scale irrigation, high value crops
Harvest flood water for irrigation
Strengthen agricultural extension work | √ |
|-------------------------------------------|-----------------------------------------------------------------------------------|

| Local Communities
Ministry of agriculture
TARDA
CDA
Ministry of Northern Kenya and other Arid Lands |

5. Human – wildlife conflicts

| Promote co – management of wildlife resources | Map and secure conservation areas
Establish eco – tourism facilities
Education and awareness raising | √ |
|-----------------------------------------------|-----------------------------------------------------------------------------------|

| Local Community
KWS
Provincial administration
Ministry of Local Government
NGOs |

9. Shirikisho Location

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Institution/Persons</th>
</tr>
</thead>
</table>
| 1. Declining river discharge       | To rationalize water resources utilization
Conserve available water resources | Prepare water resources management plan
Establish Water Resource Users Association
Harvest flood water
Adopt water use efficient technologies
Community to block brookes | √         | Local Communities
Ministry of Water and Irrigation
WRMA
Tana Water Board
KenGen
Ministry of Agriculture
Ministry of Livestock
Ministry of Northern Kenya and other ASAL
TARDA
CDA
Nature Kenya |

| 2. Human – wildlife conflicts       | Promote co – management of wildlife resources | Map and secure conservation areas
Establish eco – tourism facilities
Education and awareness raising | √         | Local Community
KWS
Provincial administration
Ministry of Local Government
NGOs |
3. Overgrazing

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Institution/Persons</th>
</tr>
</thead>
</table>
| Promote traditional nomadic grazing regime - enforce wet and dry season grazing system  
To maintain livestock numbers  
To maintain livestock numbers within the carrying capacity of the available pasture  
To rehabilitate pasture | Establish location grazing committee  
To determine the optimal number of livestock for the location  
Prepare grazing management plan  
Education and awareness raising on keeping small herds  
To reduce the number of livestock owned by individuals | √ √ | Local Communities  
Provincial administration  
Ministry Livestock  
Ministry of Northern Kenya and other ASAL  
Ministry of Local Government  
TARDA  
CDA  
Nature Kenya |

4. Insecure land tenure system

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Institution/Persons</th>
</tr>
</thead>
</table>
| To promote secure land tenure system | Lobby for the implementation of National Land Policy | √ √ | Local Communities  
Ministry of Lands  
Ministry of Local Government |

10. Chara Location

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Institution/Persons</th>
</tr>
</thead>
</table>
| 1. Changing course of the river | The river to be diverted to its original course  
River be managed at its original course (River bank conservation)  
Re direction of the river | Close the brooks  
Build gabions  
Desilting | √ √ | Local Community  
TARDA  
CDA  
CDF  
Ministry of Local Government  
Provincial administration |
| 2. Insecure land tenure system | Promote secure land tenure system | Awareness on importance of owning land privately  
Lobby for the implementation of National Land Policy | | Community committee  
Govt ministry |
| 3. Conflict between pastoralists and farmers | Promote integrated crop farming and livestock keeping | Establish location committee on crop and livestock farming  
Zone farming and and grazing areas | √ √ √ | Community  
Govt agency  
Donors |
| 4. Human wildlife conflicts | To promote co – management of wildlife resources | Map and secure conservation areas  
Establish eco – tourism facilities  
Education and awareness raising | √ √ | Local Community  
KWS  
Provincial administration  
Ministry of Local Government  
NGOs |
<p>| 5. Construction of | To rationalize water resources utilization | Prepare water resources management | √ √ | Local Communities |</p>
<table>
<thead>
<tr>
<th>Issue</th>
<th>Strategy</th>
<th>Activities</th>
<th>Time Frame</th>
<th>Responsible Institution/Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Human – wildlife conflict</td>
<td>To promote co – management of wildlife resources</td>
<td>Map and secure conservation areas</td>
<td>√</td>
<td>Local Community, KWS, Provincial administration, Ministry of Local Government, NGOs</td>
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<td>Establish eco – tourism facilities</td>
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<td>Education awareness in the community</td>
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<td>Prepare water resources management plan</td>
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<td>Establish Water Resource Users Association</td>
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<td>Harvest flood water</td>
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<td>Community to block brookes</td>
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<td>Adopt water use efficient technologies</td>
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<td>2. Sea water intrusion</td>
<td>To rationalize water resources utilization</td>
<td>Conserve available water resources</td>
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<td></td>
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<td>Establish available water resources</td>
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<td>Adopt water use efficient technologies</td>
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<td>3. Destruction of rice by snails and crabs</td>
<td>Promote sustainable agriculture</td>
<td>Intensify agricultural extension work</td>
<td>√</td>
<td>Community, Ministry of agriculture, Ministry of fisheries</td>
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<tr>
<td>4. Insecure land tenure system</td>
<td>To promote secure land tenure system</td>
<td>Lobby for the implementation of National Land Policy</td>
<td>√</td>
<td>Local Community, MoL, MoLG, NGOs</td>
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</tbody>
</table>