River Sabaki Estuary Management Plan

2009 – 2015

Draft Outline

CHAPTER 1: GENERAL INTRODUCTION

- **Background information & site description**
- **Location and size**

  Sabaki River Mouth marks the point where Kenya's second largest river empty into the ocean. It is located 03^{o}09'S and 40^{o}08'E, within Malindi District of Coast Province. It is 5 km North of Malindi town, between the Malindi-Mambrui road bridge and the sea. The estuary covers an area of about 6 km^2 and consists of sandbanks, mudbanks, dunes and seasonal and permanent freshwater pools, mangroves and scrub. The state and size of the estuary vary seasonally depending on river flows. Just North and South of the River Mouth are grassy sand dunes that conceal permanent or temporary water pools of fresh water.The estuary cover an area of about 6 km^2 and measures approximately 200 km long from its entry into Chakama Location of the Sabaki River Mouth, within this area there are mudflats, sandbanks and mangrove which is a rich ground for fish which sustains the local communities' fisheries.

Historical background

- In 1918 people started to settle in Sabaki and were mainly farmers keeping goats, cattle and chicken. The major crops were maize simsim and cow peas later they started to plant; cotton, coconuts and mangoes. They provided wage employment to Arabs and Indians, when the Europeans settled at the coast they also sourced labour from the community. At that time there was a lot of fish in the area.
- Between 1941 and 1945 there were major famines thus most families did not have food the famine was called "Njaa ya foleni"
- By 1950 Missionaries started coming to Sabaki, where the seventh day Adventist church was established by Mr. Willard after which Baptist and catholic missionaries established churches too.
- In 1957 exotic tree species were introduced in Sabaki notably the neem tree mathenge (prosopis fujifora) was introduced in 1979.
- 1958-1970 there was a diversity of wild animals as baboons, monkeys, antelopes now only hares are present.
- 1960 the President of United States of America JF Kennedy supplied yellow corn flour because of prolonged famine. The famine was called "Njaa ya Msolo"
- 1989 following settlements between 1918 -1977 Land adjudication was conducted in 1989
- 1990 and 1992 there was severe drought and famine called "njaa ya changilo"
- 1997 the Sabaki Bridge was constructed by Japanese engineers at the same time the Chinese constructed the Sabaki-Garsen Road.

- And it was in 1998 that the village started to experience weather changes whereby the village experienced intense sun and excess rain. At the same time El nino rains and impacts as increase in mosquito population. (Joan Gichuki 2007)

The Rapid Social Economic Appraisal which was conducted in 2007 revealed various sources of livelihoods for the Sabaki community as listed below:

- Fishing
- Fruit farming
- Subsistence farming
- Tapping palm wine
- Business (shops)
- Seafood supply
- Charcoal burning and selling
- Selling palm wine
- Tour guiding
- Salaried employment

Climate & Hydrology

The area covers the CL3 Coconut-Cassava agro-ecological zones. The annual temperature ranges between 24.0^0C to 26.6^0C and annual average rainfall is 1,000mm-1,200mm.

Soil

Sabaki River is characterized by poor soils, shallow depressions and a gently undulating terrain characterized by sandy, sandy loam soils with very high infiltration rates. In some areas, the soils are dry with drainage and salinity. In some places, the soils are covered with thick top soils, which are loamy sand to sandy loam.

Vegetation &Biodiversity

The vegetation of the area is varied and is dependent on both proximity to fresh and marine water as well as the soil that range from sand dunes to river bed sediments. On the sand dunes scrub vegetation exists consisting of 103 plant species of 43 families.

Seasonal grasslands on the recent silt deposit form an expansive flat on the northern shores where invasive *Prosopis juliflora* thicket with scattered stands of *Casuarinas* has developed.

Sabaki river mouth is one of the Important Bird Areas (IBAs) in Kenya (Bennun and Njoroge, 1999). It hosts large visiting stocks of the Madagascar Pranticole and is also an important nesting, roosting and feeding ground for gulls and terns.

A total of 68 species have been recorded and a maximum count of 11,753 birds. Peak numbers appear to be in the northern spring, notably April. Counts of tern and gull roosts have also been carried out at peak times when birds were most abundant. High numbers of terns have been recorded in January/February with a night-time roost of Sundowners in the region of 80,000 birds, day time counts occasionally reach 25,000 birds.

The Collard Pratincole bird has a limited breeding distribution within Kenya and this is the only known breeding location for this species on the Kenyan coast. Numbers of palaeratic waders and broad billed sand pipers also occur. The globally threatened and range restricted Malindi Pipit is also resident in and around the dune grasses.

Some of the species which have recorded sufficient numbers in Sabaki estuary include; pelicans, cormorants, herons, flamingoes, ducks, geese, waders, gulls, terns and kingfishers.

The estuarine is rich in fishes and crustaceans which have in turn supported fishing which is the main livelihood for the people of the area. The beaches are good nesting places for sea turtles.

There is also a presence of insects; insect collection has a total of 339 taxa. The presence of this great diversity of insects is the well-being of the Sabaki River Estuary. This is mainly due to the big role played by these insects in the ecosystem. They are a source of food to a variety of birds and other small animals.

Other species of wildlife include crocodiles and hippopotamus in the mangroves. Small antelopes such as the Suni and Duikers still exist in small numbers in the scrub vegetation in the adjacent areas.

Land use

The main types of land uses are livestock keeping, growing of drought resistant crops, fisheries and sand harvesting. Small -holder horticultural irrigation for vegetables is already being practised in some of the places. Agriculture remains the main economic activity of the people. Arable agricultural land is under small-scale crop production with the main food crops grown being maize, beans and cassava.

Water

The main sources of water for Sabaki community is from the Sabaki River, shallow wells within the sand dunes, while at times people are forced to go some few Kilometres away from Sabaki towards Malindi in order to get water for consumption. The Sabaki River is Kenya's second longest river with its waters originating from the Aberdares, Ngong and Mount Kenya highland forests in the Nairobi and Central provinces of Kenya. At the estuary the fresh waters of Sabaki River converge with the salty waters of the Indian Ocean. The quantity of water from this river is sufficiently high thus a source of water to Malindi town, Mombasa, Kilifi and Watamu.In addition it provides water for livestock and irrigation.

- Methodology – preparatory process

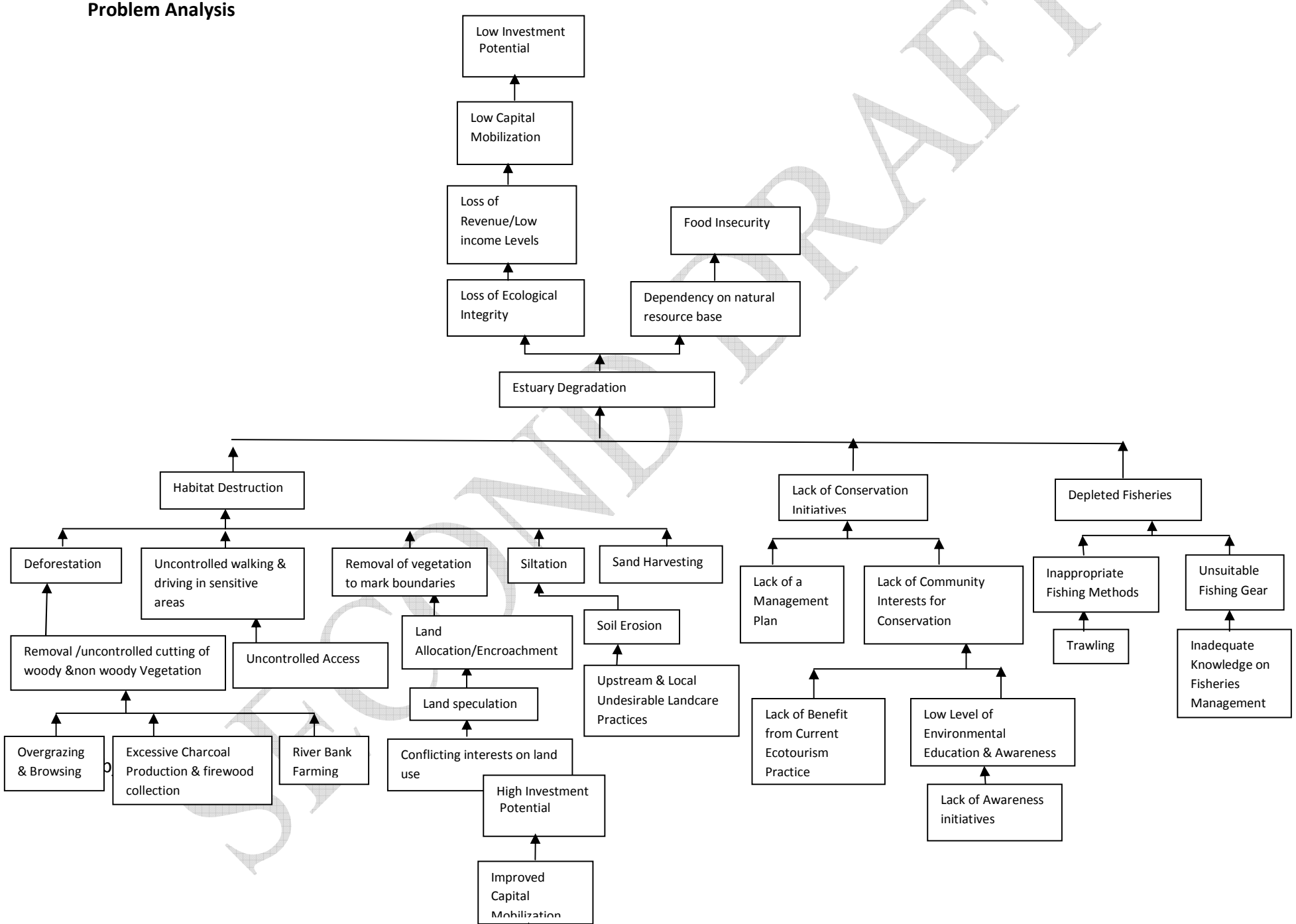
CHAPTER 2: POLICIES, GOVERNANCE AND INSTITUTIONAL FRAMEWORK

- Policy analysis about wetland conservation – policy linkages & synergies
- Governance issues on wetlands

- Institutional frameworks

CHAPTER 3: OBJECTIVE ORIENTED PLANNING

Problem Analysis



Stakeholders Analysis

Actor	**Importance of Stakeholder Influence in implementation (mandate, mobilization of knowledge, contacts, people, finance etc) High++/low--**				**Interest of stakeholder (based on needs) High++/low--**	**Relation with other actors Optimal--/suboptimal++**
	Mandate on the resource	Mobilization of knowledge	Contacts With resource	Human resource		
Fishers	Low	low	high	Low	high	suboptimal
Farmers	Low	low	high	Low	high	suboptimal
community	Low	low	high	Low	high	suboptimal
Sabaki River Environment						

CHAPTER 4: ALTERNATIVE MANAGEMENT APPROACHES

Plan Principles

Management Goals and Objectives

The goals of the Estuary Management plan are:

Environmental

- To conserve indigenous terrestrial flora and fauna and enhance habitats
- To conserve aquatic habitats and restore ecological integrity
- To reduce the impact of development and human activities on the estuary
- To promote ecological sustainable development

Economic

- To encourage low impact tourism and recreation
- To improve fish stocks and achieve commercial fishery

Social

- To increase the understanding of the estuary's value and estuarine processes
- To recognize and protect natural and cultural heritage

1.GOAL: TO CONSERVE INDIGENOUS TERRESTRIAL FLORA AND FAUNA AND ENHANCE HABITATS **Objective 1: To protect and enhance riparian and foreshore vegetation and areas of high conservation value**				
Strategy		**Action**	**Responsibility**	**Cost Estimate**
Improve the condition of existing and wetland vegetation including dune vegetation	**1.1**	Undertake flora surveys/assessments and identify species of conservation significance in terms of biodiversity and threatened species (develop a species checklist)		
	1.2	Negotiate voluntary conservation agreements for private land of high conservation value		
	1.3	Develop a weed/invasive species control and bush regeneration program		
	1.4	Encourage animal keepers to manage stock(livestock) to minimize damage to riparian and wetland vegetation		
	1.5	Identify appropriate buffer zone widths and building setbacks		
	1.6	Encourage the establishment of indigenous vegetation on private property by providing stock to adjacent landowners. Where possible plants should be propagated from local seed sources or vegetative stock		
	1.7	Support local community initiatives in the revegetation and restoration of degraded areas		
	1.8	Work with farmers and landcare groups to develop on-farm vegetated buffer strips		

Objective 2: To protect, improve and increase habitat/dispersal areas for native and migratory fauna				
Strategy				
Provide undisturbed vegetated corridors/reserves and also protect native fauna and migratory birds from predation by introduced domestic and feral animals and other threats	**1.9**	Identify and protect existing dispersal areas for feeding, breeding and nesting (e.g. zonation arrangement)		
	1.10	Encourage landowners to participate in landcare to improve /regenerate bushland for wildlife		
	1.11	Institute entrance management systems that will minimize manipulations to mimic a more natural regime		
2. GOAL: TO CONSERVE AQUATIC HABITATS AND RESTORE ECOLOGICAL INTEGRITY **Objective 1: To protect and conserve native aquatic species and habitats**				
Strategy		**Action**	**Responsibility**	**Estimated Cost**
Improve the condition and characteristics of existing wetland flora and fauna	**2.1**	Compile information on flora and fauna and identify species of conservation significance in terms of biodiversity and threatened species and specific points of interests in conservation (develop a species checklist). For example fish nursery		
	2.2	Consider zonation arrangements to reflect specific areas of conservation interests		
Objective 2: To address human impacts on natural estuarine processes				

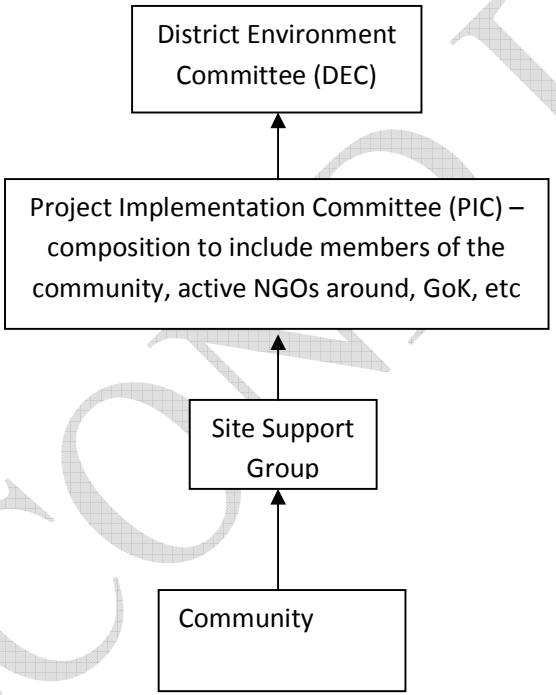
Strategy		Action	Responsibility	Estimated Cost
Maintain and improve tidal exchange	**2.3**	Undertake detailed investigations to determine the environmental benefits and costs of opening up the causeway to increase tidal flushing		
	2.4	Consider harvesting of sediment to maintain free tidal flow. The sediment is thought to be rich in minerals and can be used elsewhere e.g. farming. But then, what could be the impact of sediment removal?		
	2.5	Institute and enforce erosion and sediment control for activities which have the potential to impact on the estuary		
3. GOAL: TO IMPROVE FISH STOCKS AND ACHIEVE A SUSTAINABLE COMMERCIAL FISHERY **Objective 3: To conserve and increase fish stocks for commercial fishing**				
Strategy		**Action**	**Responsibility**	
Regulate artisal and commercial fishing	**3.1**	Based on precautionary principle, increase/enhance controls on fishing e.g. closures, quotas, restrictions on fishing methods, fishing of undersized fish		
4. GOAL: TO RECOGNIZE AND PROTECT NATURAL AND CULTURAL HERITAGE **Objective 4: To recognize the natural and cultural heritage values of the estuary**				
Strategy		**Action**	**Responsibility**	
Promote an understanding and obtain recognition of	**4.1**	Institute an ambitious educational program in the form of interpretive materials such as signs, brochures among other media.		

the heritage values by making information accessible to the general public and visitors				
	4.2	Management system for access and parking, appropriate recreational use to limit damage from cars and visitors		
5. GOAL: TO ENCOURAGE LOW IMPACT RECREATION AND TOURISM **Objective 5: To encourage low-key recreation and tourism opportunities**				
Strategy		**Action**		
Provide facilities for low-key tourism and recreational uses	**5.1**	Develop infrastructure for tourism activities such as access roads, visitor reception, walking trails, board walks and picnic sites	**Responsibility**	
	5.2	Promote tourism packages through tour operators and publications		
Objective 6: To minimize the impacts of recreational and tourism use on conservation and local amenity value				
Strategy		**Action**	**Responsibility**	
Control pedestrian access	**5.3**	Formalize and signpost walking trails and construct boardwalks in sensitive wetland areas		
Control vehicle access	**5.4**	Install log barriers to restrict cars to cleared parking areas		
Provide information to the community	**5.5**	Provide education brochure/handout, erect information boards and warning notices		

and visitors on minimizing recreational impacts				
6. GOAL: TO INCREASE THE UNDERSTANDING OF THE ESTUARY VALUE AND ESTUARINE PROCESSES **Objective 7: To gain a better understanding of factors affecting biological and physical processes in the estuary**				
Strategy		**Action**	**Responsibility**	**Cost**
Investigate the different parameters in order to understand the estuarine processes	**6.1**	Undertake detailed investigations to determine parameters such as silt deposition patterns, tidal flows, water quality, mangrove growth, benthic fauna, birds etc		
	6.2	Seek opportunities for further research into key estuarine processes using master students, PhD students & other government agencies		
Objective 8: To encourage environmental awareness				
Strategy		**Action**	**Responsibility**	**Cost**
Encourage greater participation by the estuary adjacent communities	**6.3**	Provide support to community groups undertaking tree, shrub & grass regeneration, erosion control work , species identification e.g. provision of tools, training/empowerment, etc		
Provide information on responsible	**6.4**	Develop a brochure/handout of Sabaki estuary wit rates notices and tourist		

environmental management		accommodation providers and tourism operators. Include also information on the ecology of the estuary and importance of maintaining riparian and foreshore vegetation. The brochure also to contain actions individuals can take to protect the estuary e.g. planting indigenous trees, disposing of rubbish in bins or taking it home.		
	6.5	Hold briefing sessions for attendants, visitors on best practices e.g. plant identification		
7. GOAL: TO REDUCE THE IMPACT OF DEVELOPMENT AND HUMAN ACTIVITIES ON THE ESTUARY **Objective 9: To minimize the impacts of construction activities and other development work on the estuary**				
Strategy		**Action**	**Responsibility**	**Cost**
To control development activities	**7.1**	Ensure development applications for proposed projects undergoes environmental impact assessment and other procedures to get approval		
?				
8. GOAL: TO PROMOTE ECOLOGICALLY SUSTAINABLE DEVELOPMENT **Objective 10: To guide development activities by zonation?**				
Undertake zoning specifications	**8.1**	To prepare a zonation plan to		
Undertake nature based enterprises	**8.2**	Promotion of nature based activities e.g. beekeeping		

CHAPTER5: DESIGN OF IMPLEMENTATION STRATEGY



- Institutional arrangements
- Logical framework
- Monitoring & Evaluation

CHAPTER 6: COMPLIANCE & ENFORCEMENT

- Policy for compliance & enforcement