MANGO TREE MARINE LIMITED

ENVIRONMENTAL IMPACT ASSESSMENT STUDY
FOR THE
PROPOSED DREDGING/DE-SILTATION AND SAND HARVESTING AT SONDU MIRIU RIVER DELTA.

Coordinates:
Longitude E 34.7941° and latitude S 0.2590°

Name and Address of Proponent:	**FIRM OF EXPERTS:**
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AUGUST, 2021

CERTIFICATION

Project Proponent: Mango Tree Marine Limited

Assignment Title: Environmental Impact Assessment Study for the Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta.

Report Submitted by:

Signature: ..... Date: 02 AUG 2021

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MANGO TREE MARINE LTD
02 AUG 2021
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LIST OF ACRONYMS AND ABBREVIATIONS

AIPS	Alien Invasive Plant Species
BMUs	Beach Management Units
CBD	Convention on Biological Diversity
CHAA	Critical habitat Area of Analysis
CITES	Convention on International Trade on Endangered Species
COVID -19	Corona Virus Disease
DOSHS	Directorate of Occupational Safety and Health Services
DN	Digital Number
EA	Environmental Audit
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ESMP	Environmental and Social Management Plan
FGDs	Focus Group Discussions
Ha	Hectare
IFC	International Finance Corporation
IMO	International Maritime Organization
IUCN	International Union for Conservation of Nature
KMA	Kenya Maritime Authority
KWS	Kenya Wildlife Service
NEMA	National Environment Management Authority
OSHA	Occupational Safety and Health Act
PAHs	Polycyclic aromatic hydrocarbons
PCM	Public Consultation Meeting
PPE	Personal Protective Equipment
RRMA	Riparian Resource Management Association
TDS	Total Dissolved Substance
TSHC	Technical Sand Harvesting Committee
TSS	Total Suspended Solid
WRA	Water Resources Authority
WGS	World Geodetic System

EXECUTIVE SUMMARY

This Environmental Impact Assessment (EIA) Study report was prepared as per the provisions of the Environmental Management and Coordination Act No. 8 of 2015 and the Environmental (Impact Assessment and Audit) IEIA/EA Regulations 2019. It is also in line with local and international laws and policies that regulate projects of this nature. This Study gives the findings of the Environmental Impact Assessment undertaken as an integral part of the planning and design process. The Study highlights salient social, economic and environmental issues associated with the Proposed Dredging/De-Siltation and Sand Harvesting.

The perennial flooding at Sondu Miriu River flood plain occurs due to heavy rains in the catchment as well as deforestation upstream as a result of poor land use practices, causing serious sedimentation and forming deltas at the river mouth. The dredging/de-siltation and sand harvesting project should therefore be undertaken to forestall human suffering during floods among other things opening up of canals, drainages, streams and water channels to reduce siltation.

Views gathered from stakeholders point to the anticipation that the Dredging/De-Siltation and Sand Harvesting Project will help to control flooding within the Sondu Miriu River Delta while reducing displacements, water borne diseases and deaths. In addition the project will also improve navigation within the lake and the river and resuscitate livelihoods such as farming and other economic activities that were previously been interrupted by floods. Respondents mentioned that the project will also help in mitigating against human-wildlife conflict especially the menace of hippos who during floods find their ways to people homes that becomes extension of riparian due to flooding. In spite of the consulted parties airing a few concerns and suggestions over how certain aspects of the project should be handled, they indicated support for the proposed development and look forward to its implementation.

The adverse elements notwithstanding, the benefits that will be realized from the proposed dredging/de-siltation and sand harvesting outweigh most of the inconveniences and negative impacts that have been categorized in this ESIA Study as temporary, moderately significant and limited to the project area. The ESIA Study determined that if the project is implemented with due attention to the mitigation and monitoring measures entailed in this document, most if not all, adverse environmental and social impacts will be manageable. Overall, the Proposed Dredging/De-Siltation and Sand Harvesting Project is deemed timely, highly beneficial and should therefore be allowed to proceed within the given framework.

It is recommended that for the prevention and mitigation of potentially adverse environmental and socio-economic impacts, the following should be done:

- The operation and maintenance of the proposed project must comply with the best management practices and the principles of environmental management including the principles of sustainability, intergenerational equity, prevention and precaution;

- Ensure the views expressed by the public during the consultation exercise are integrated in the design and implementation plan of the project, especially where aspects of social interest are concerned;
- Regular environmental and social safeguard monitoring and auditing should be undertaken and any identified shortcomings addressed. This will ensure that all projects are in conformance with established laws and regulations for the management of environment, safety and health;
- Institute effective communication, education and awareness raising for project workers and neighbours for enhanced acceptability and social harmony;
- The proponent should ensure the local community benefits from employment opportunities during the implementation of the project that is being executed; and
- The proponent should expedite on the works to minimize adverse livelihood impacts and inconveniences to the community due to the perennial flooding.

1. INTRODUCTION

1.1 The Proponent

The Proponent, Mango Tree Marine Limited (incorporated in Kenya) is part of the larger Mango Tree Group Ltd, a professional maritime enterprise which provides comprehensive services in: navigation route survey; waterway setting, dredging, water surface / water hyacinth clearing; ship design, building and maintenance; port / pier design, construction, operation and water transport service provision. Since its establishment in 2011, Mango Tree Group has been fully implementing the strategies as "brand, quality, efficiency, integrity" to enable it to rapidly grow and develop with successive branches in South Sudan, Uganda, DRC, Burundi and Kenya. Incorporation certificate and PIN of the Proponent are attached under **Appendix III** of this report.

In Kenya, Mango Tree Marine Limited is currently implementing the dredging of Kisumu and Mbita Ports under bigger Kisumu Port Expansion and Modernization Project whose objective is to enable the business demand and future growth of the traffic in the lake.

1.2 Project Background

The Proponent, Mango Tree Marine Ltd has proposed to carry out Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta to reduce the impact of flooding due to sedimentation at the river mouth by easing the flow of water to the lake.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta Project including its associated components is categorized a **high risk** project mining and other related activities including harvesting of aggregate, sand, gravel, soil and clay and is required to undergo a **full ESIA study**.

The proposed project has the potential of causing impacts to the environment. It is against this backdrop that Mango Tree Marine Limited commissioned Gomake Consultancy Company to carry out an Environmental Impact Assessment (EIA) Study for the project. The Consultant's current license to practice as a firm of expert is attached in **Appendix X** of this report.

1.3 Project Justification

Sondu Miriu River is one of the six major rivers in the Lake Victoria basin. It is the fourth largest river in Kenya, originating from the western slopes of Mau Escarpment and flowing through Nakuru, Bomet, Kericho, Nyamira, Homa Bay and Kisumu Counties before discharging into Lake Victoria.

The diversion of part of Sondu Miriu River flow to the south and flow restriction by the expansive vegetation in the south at Chuowe beach poses a socio-economic dilemma for fisheries economy. Perennial flooding has in the recent been observed in the south and northern side of the river. These areas include the Rachuonyo North and Nyakach Sub-Counties of Homa Bay and Kisumu Counties, respectively. An estimated 2,268 number of people have been displaced, properties lost and socio-economic activities disrupted. L. Victoria water level

have also been increasing leading to backflow that has submerged over 700 acres of farmland. Besides this, there has been increased sediment loading from the river due to deforestation in upstream. (Source: parliamentary report attached in **Appendix II** of this report)

A petition regarding perennial flooding of River Sondu Miriu was presented to the National Assembly by the Hon. Speaker, on behalf of Mr. Fredrick Gaya, on 12th August, 2020. Mr. Fredrick Gaya was acting on behalf of residents from Osodo Kobala, Kobuya, West Koguta and West Nyakach areas of Rachuonyo North and Nyakach Sub-counties of Homa Bay and Kisumu Counties.

The Parliamentary Departmental Committee on Environment and Natural Resources conducted an inspection visit to Sondu Miriu River on Saturday 10th October, 2020. During the visit, the Committee made a courtesy call to the Deputy County Commissioner for Rachuonyo North Sub County then visited the following sites: Osodo Primary School, Chuowe Beach, Kobuya Secondary School, Sangoro Primary School, Rota Beach, Nyadina Primary School, and Nyongonga Primary School.

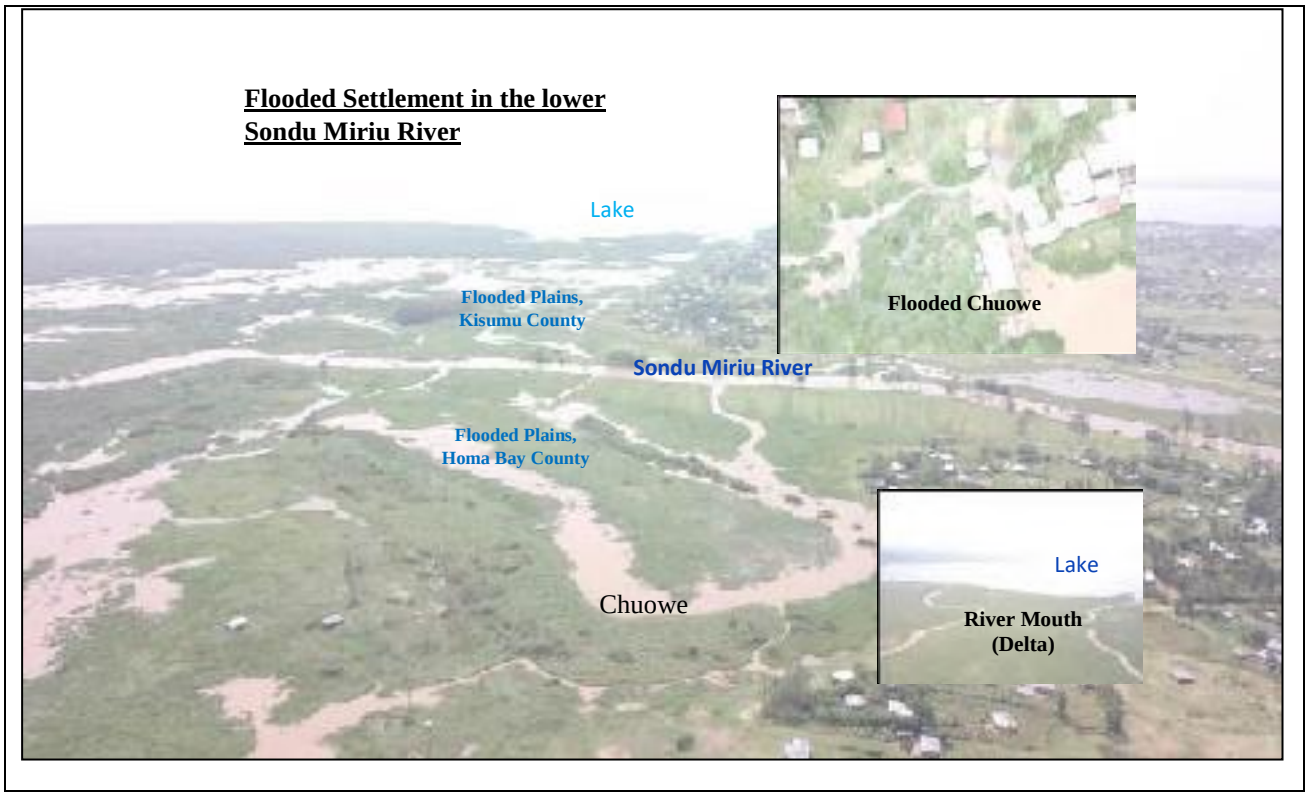


Plate 1: Aerial photograph showing flooded settlement in the lower Sondu Miriu River

Mitigation to the impact of flooding has been made to dredge and unblock the river channel in the delta to ease the flow of water into the lake. Construction of dykes on both sides of the river is further proposed on both sides of the river downstream of the bridge along Kendu Bay – Katito Road.

The parliamentary report is attached in **Appendix II** of this report.

1.4 Objectives of the EIA study

The main objective of the EIA study is to carry out a systematic examination of the baseline environmental conditions within the project area in order to determine how the project will impact the environment. The specific objectives of the study included, but are not limited to the following:

- Determination of the suitability of the Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta with the local environmental conditions.
- Identification and evaluation of the significant environmental impacts of the proposed project with special emphasis on:
  - Biodiversity
  - Fisheries
  - Water quality and pollution
  - Impact on socio-economics and livelihoods
- Assessment and analysis of the environmental and social costs and benefits that may accrue from the proposed project.
- Incorporation of the Environmental and Social Management Plan and Monitoring mechanisms during implementation of the project.

1.5 EIA Study Terms of Reference

Screening was done to determine whether or not the proposed project falls within a category that requires EIA prior to commencement. Other considerations during the screening process included a preliminary assessment of the environmental sensitivity of the areas that will be traversed by the Proposed Dredging/De-Siltation and Sand Harvesting. This entailed a desk review of information and designs availed by the Proponent. It was determined that the project is listed in the EMCA Amended Second Schedule through Legal Notice No 31 of 2019 as a High Risk Project under mining and other related activities including harvesting of aggregate, sand, gravel, soil and clay for which a full environmental impact assessment study shall be undertaken.

Terms of Reference for the Study was formulated and submitted to NEMA for approval and is attached in **Appendix I**. The key issues identified are concerned with include increased turbidity on Lake and River Water; loss of biodiversity due to unavailability of phytoplankton; impact of dumping of dredged material; oil spills and bioaccumulation of polycyclic aromatic hydrocarbons (PAHs) from dredging activities; impact dredging on fisheries and livelihoods; increased human-wildlife conflicts; compromised health and safety and employment, among others.

The process involved having discussions with the Proponent on the key issues and collection of primary and secondary data on the same. The primary data was collected using both qualitative and quantitative methods of data collection through field visits/site walks, public and stakeholders consultation. Secondary data was collected through literature review which included the review of policies, Acts and regulations; County Development Plans; project area maps; previous project area reports among others.

This exercise was designed to meet the requirements of EMCA 1999 (Amended 2015) and the Environmental (Impact Assessment and Audit) IEIA/EA Regulations 2019. For the most part,

the exercise involved studying the environmental impacts of Proposed Dredging/De-Siltation and Sand Harvesting. In addition, baseline information was obtained through desk studies, physical investigation of the project areas, public and key informant consultations. The study adopted an integrated approach whereby a multi-disciplinary team was engaged in the data collection and analysis. Generally, the key activities that fed in to the EIA Study entailed, but are not limited to the following:

- A site visit to collect baseline information of the project area.
- A comparative analysis of the project with existing economic activities in the area.
- A review of relevant policy and legislation.
- Discussions with the project proponent to obtain information on various project aspects.
- Identification of health and safety concerns that may be occasioned by the project.
- Seeking views and input through discussions and interviews with the public and key informants.
- Assessment of the site to detail the various existing and likely impacts.
- Proposal of mitigation measures to avert or minimize negative impacts.

1.6 Scope and Methodology of the ESIA Study

The study identified the anticipated and foreseeable impacts on the environment resulting from the implementation of Proposed Dredging/De-Siltation and Sand Harvesting Project. The physical scope covers the Delta region including Winam Gulf and Sondu Miriu River ecosystem where the project will be sited and the adjacent environment that may be affected by, or which may affect the project. All potential impacts, (localized or delocalized) have been carefully evaluated against the guidelines provided by the Environmental Management and Coordination Act, EMCA 1999 (Amended 2015) and the Environmental (Impact Assessment and Audit) IEIA/EA Regulations 2019.

The study involved literature review and fieldwork to collate relevant environmental data for environmental impact assessment. Scope of study was refined to enable proper planning for gathering of baseline information and contextualization of the impact assessment.

The study established baseline conditions of biodiversity that will potentially be affected by the Proposed Dredging/De-Siltation and Sand Harvesting Project. After review of activities of dredging and associated impacts baseline study focused on water quality parameters that influence ecological conditions of fish. These include both spatial and temporal distribution of the water quality parameters. Biodiversity taxa that their ecological behaviours is likely to be affected considered in the baseline are fish, birds, reptiles and amphibians, and plants. The assessment covered the delta area, 6 km into the open lake and on the upstream of the river mouth up to Wadh Lang'o (slightly upstream of Kendu – Katito Road Bridge. Impact analysis therefore mostly dwelt on the water quality and biodiversity taxa and effects on the livelihood of the residents in the delta area.

1.6.1 Desktop Analysis

1.6.1.1 Literature Review

Review involved literature review and analysis of other secondary data for developing background information on fisheries, aquatic invertebrates, wetland birds, vegetation, invasive species, and herpetofauna; including water quality and ecosystem services. Scientific publications and technical reports were reviewed for developing background information.

1.6.1.2 Sediment dispersal assessment

The potential extent of sediment loads by Sondu-Miriu River was determined by assessing satellite images for dry and wet season. It is assumed that sediment plumes are generated during wet season due to high erosion in the catchments. The plume phenomenon affects the colour of water in the lake which can be ultimately affects the reflectance properties of water. The plumes travel far during rainy season due to high energy with which the river water enters the lake. Reflectance of lake water was analysed in False Colour Composite of satellite images. The reflectance for sediment plumes was used to determine potential plume extent in the lake. Sediment settling rate was conducted using high temporal satellite images. Field data collection on the Total Suspended Solids was used in combination of drone image and satellite data for upscaling and derivation of sediment settling rate.

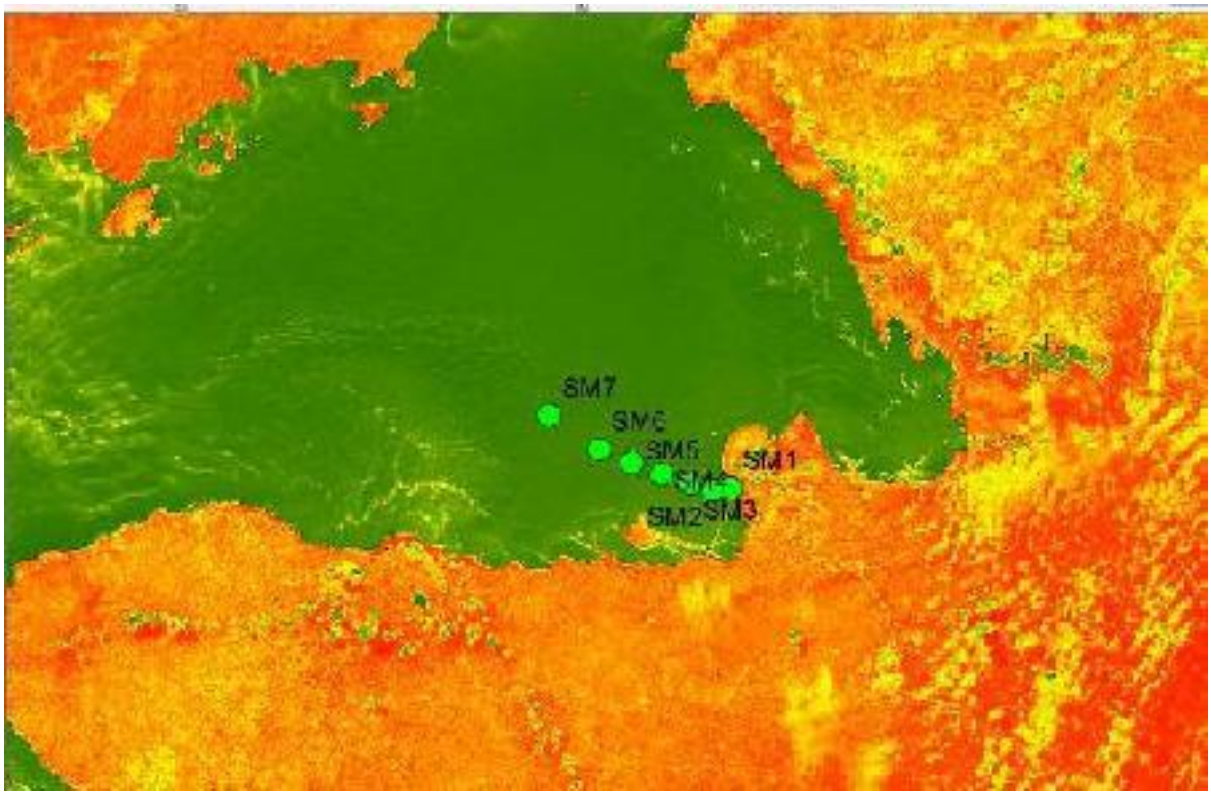


Figure 1: Sampling points for water quality parameter at the delta and 6.3 km off the delta habitat

1.6.1.3 Phytoplankton and spectral characteristics

Secondary sources for previous studies were used to determine phytoplankton in Winam Gulf near the Proposed Dredging/De-Siltation and Sand Harvesting Project. This included literatures from scientific journals and thesis. Spectral analysis was conducted from satellite images from Landsat and Sentinel band 1 which has potential for mapping phytoplankton.

1.6.1.4 Herpetofauna Survey

This group consist of reptiles and amphibian species. Local accounts with fishermen were used to validate presence of species such as python and other herpetofauna in the area. Literature review and database was sought for documentation of this group of species.

1.6.2 Fieldwork

1.6.2.1 Water quality Parameter

Dredging activity is envisaged to cause disturbance of the bottom sediments that will cause sediment plumes that can travel far from the project site. The sediment plumes will affect the physico-chemical and biological parameters of the water quality. These parameters are important in assessing habitat conditions for fish and planktonic organisms. Water quality parameters that were measured included pH, Temperature, Total Dissolved Substance (TDS), Electrical Conductivity (EC) and Total Suspended Solid (TSS). Sampling was done by distance from the proposed dredging site in order to determine baseline water quality condition that will provide basis for future monitoring of the dispersal sediment to the open lake area and along the shores on the eastern side of the river mouth.

Plate 2: Secchi Disc used for measuring water transparency in the near distance of Sondu Miriu River mouth

1.6.2.2 Fisheries Species Survey and mapping of breeding sites

Assessment of fisheries species was conducted by visiting different beaches in proximity to the proposed dredging location. These included Chuowe, Osodo and Kawere Beaches. Interview with key officials of Beach Management Units on fisheries and dynamics were made in different beaches. Observations were made on fish landings on beaches in order to determine common fisheries species. Besides these approaches, literatures and databases build from previous studies were used to document status of fisheries in the area.

Plate 3: Interview made with the local Beach Management Unit official at Chuowe Beach, Chuowe Dispensary Center

1.6.2.3 Birds Survey

A rapid survey of birds on different beaches and along the channels in the delta was conducted during field work. Priority sampling was given to areas identified as potential fish breeding sites. Bird survey conducted along the shores of the lake on a transect of 6 km the southern sides of the shores in Chuowe, Osodo and Kawere beach. From this approach, bird species were identified based on direct observation. Local accounts of bird species were given by fishermen based on a run through bird identification guide. In addition to this, literature review was used to build up list of bird species in Koguta wetland.

1.6.2.4 Aquatic Plant Survey

A rapid survey was conducted at the delta along the channels, and different beaches in proximity to the proposed dredging location. Different plant covers were determined using the Unmanned Aerial Vehicle (drone-Mavic Pro) that was flown over from Chuowe Beach to the vegetated mosaics in the delta. In addition to this, literatures were reviewed on documented plant species in the area.

1.6.2.5 Mammal Survey

Documentation of mammal species was achieved by conducting discussion with the local residents and KWS officials. This group were not easy to sight, especially the Hippos that hide in the papyrus and only comes out at night for grazing. Literature reviews was also used including databases.

1.6.2.6 Local accounts of species

Due to time limitations in the field, more species data was also collected from interview with the local people on the shores with experience on species. The information from the locals was verified by comparing it with the literature and the geographical distribution of the highlighted species. The identification was done using the relevant guide books for each taxon.

1.6.3 Validation of Species of Conservation Importance

These are threatened species listed to the IUCN red list, species endemic to the region, and species listed under CITES. Impact of the proposed dredging was analysed against the habitat integrity and ecology of species of conservation importance. Conservation status of species in checklist generated by desktop analysis, field observations and local accounts were validated using IUCN red list of threatened species. There are different categories of conservation status of species and are described in the IUCN red list data. Based on the categories, species were assigned status:

- CRITICALLY ENDANGERED (CR) when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria (A to E in the IUCN Red List Categories);
- ENDANGERED (EN) when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria (A to E in the IUCN Red List Categories);
- VULNERABLE (VU) when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the criteria (A to E in the IUCN Red List Categories);
- LOWER RISK (LR) when it has been evaluated does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Species included in the Lower Risk category are separated into three subcategories;
- Conservation Dependent (CD). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years;
- Near Threatened (NT). Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable;
- Least Concern (LC). Taxa which do not qualify for Conservation Dependent or Near Threatened;

- DATA DEFICIENT (DD) when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status; and

- NOT EVALUATED (NE) when it has not been assessed against the IUCN criteria

1.6.4 Convention on International Trade on Endangered Species (CITES)

The species covered by CITES are listed in three Appendices, according to the degree of protection they need. (For additional information see www.cites.org)

- **Appendix I** includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances
- **Appendix II** includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival
- **Appendix III** contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade

1.6.5 Critical Habitat Analysis

Mapping of Critical habitat was conducted and is described by the IFC as areas of the planet with highest biodiversity conservation (IFC, 2012). The concept was developed by the IFC as part of its performance standards with the aim of promoting biodiversity conservation and sustainable management of living resources. This concept values an area based on the kind of biodiversity it harbours. Recognizing the irreplaceability of biodiversity, the critical habitat concept pushes for protection of such areas by marking them as sites that should not be used for any development project that may compromise their ability to support the so threatened species. It considers the global assessment of the conservation status of the species as the reference in deciding whether a place is inhabited by the said species. Examples of the assessments referred to include the IUCN, Important Bird Areas and Key Biodiversity Areas.

Critical habitats are considered as potential areas where species are expected to occur in high diversity, high frequency of habitat use for forage, breeding, passage or roosting. Biodiversity values considered by the IFC 2012 for a critical habitat was adopted and this consist of areas of habitat that:

- Has significant importance to Critically Endangered and/or Endangered species;
- Has significant importance to endemic and/or restricted-range species;
- Support globally significant concentration of migratory species and/or congregatory species;
- Has a highly threatened and/or unique ecosystems; and/or;
- Is an area associated with key evolutionary processes;
- Is legally protected areas and internationally recognized areas and/or;
- Is an area of other biodiversity values

Consultation with the local informants was conducted to understand the biodiversity value present in the vicinity of the project areas and identifying existing conservation concerns. Critical habitats were identified using spatial unit of analysis (Critical habitat Area of Analysis (CHAA) and Discrete Management Unit). This was achieved through screening biodiversity features (i.e. at the species, ecosystem and landscape scales), and evaluating the distributions of CH (Stefan et al., 2013).

1.6.6 Identification and Engagement of Stakeholders

1.6.6.1 Stakeholder Identification

The consultant conducted additional stakeholder identification and engagement based on the desktop review in order to fill any potential gaps. The stakeholder identification and engagement included; identifying the various administrators, county officials, Lead agencies officials, local leaders as well as the public in the project area

The stakeholders identified include:

- NEMA Homa Bay and Kisumu
- National Land Commission
- Fisheries Departments
- Government officials
- Civil Societies
- Beach Management Units (BMUs)
- Health and Education Institutions
- Water Resources Authority
- Kengen – Sondu Miriu Station
- Kenya Wildlife Service
- Religious Leaders
- Local administration

Following the identification of the different stakeholders, different methods of engaging with these stakeholders based on their roles and positions were devised.

1.6.6.2 Method used for Stakeholder Engagement

The methods applied to engage the stakeholders included key stakeholder interviews, Questionnaire administration, Focus Group Discussions (FGDs) and Public Consultation meetings (PCMs). The FGDs were mostly carried with Lead agencies and BMU leadership in getting fish related information and activities along the delta shoreline while PCMs were carried in all the locations bordering the Lower Sondu Miriu River. Two FGDs with Lead Agencies and Three PCMs were convened from July 9-22, 2021 as given in Table 2 under Chapter 6.

One set of questionnaires was used to gauge the perception of key stakeholders, such as staff from Kenya Wildlife Service, County Government, National Government, Kenya Fisheries

Service and Civil Societies about the proposed project. Another set of questionnaires was used obtain the opinion of households, which were located in areas / settlements the project area.

Feedback forms/questionnaires were distributed towards the end of PCM to get feedback from the meeting participants.

The process of consultations was carried out as follows:

- Carrying out key informant interviews by using key informant guide;
- Administration of ESIA questionnaires to key stakeholders including local administration officers, service providers and lead agencies;
- Holding a question and answer session with PCM participants;
- Administration of ESIA feedback forms/questionnaires to PCM participants;
- Administration of socio-economic questionnaires to the community.

1.7 The Study Team

The team's diverse disciplines are consistent with the multi/inter/trans– disciplinary nature of the environmental management tools and the code of practice for the registered EIA/EA firm of experts.

Name	**Expertise**
1. Kennedy Kijana **(Principal Consultant)**	EIA/EA Lead Expert
2. Dr. Dickens Onyango Odeny **(Research Scientist)**	Biodiversity and Aquatic Ecology Expert
3. Dorcas Thomas Awuor **(Sociologist)**	Social Scientist and Community Development Expert
4. Flora Mitchel Akinyi **(Associate Expert)**	Environmental Associate Expert
5. Fred Maseno **(Health & Safety Expert)**	Occupational Safety and Health Specialist.

1.8 The Project Cost

The Proponent avers that the total estimated project cost is *Kenya Shillings Five Hundred million to complete the operation of dredging/de-siltation of the delta*. The amount to be expended in the different project phases of survey, operations and disposal of the dredged material.

2. PROJECT DESCRIPTION

2.1 Introduction

Sedimentation is the accumulation of silt, sand and other debris on the bottom of a river, lake, canal or stream over time. An excessive build-up of sediment can cause a series of issues. For instance, it can reduce the depth of the waterway and prevent the passage of ships. It can also lead to contamination that poses a threat to aquatic plant and wildlife. In the project area the sediment accumulation has blocked the smooth flow of Sondu Miriu River into Lake Victoria causing backflow leading to flooding of the settled farmlands and beaches around the area.

It has become necessary to find a way to remove a large accumulation of sediment within the delta area to ease the flow of water to the lake so as to reduce cases of flooding through a process known as dredging.

The sediment removal process uses a machine known as a dredger to excavate the accumulated sediment and debris. A dredger is either partially or completely submerged in water and allows the operator to easily gather the sediment and transport it to a different location. When dredging is done, sediment is relocated to a new location and used for a number of purposes. There are also other types of machines such as excavators that can be used for sediment removal.

2.2 Benefits of Dredging

2.2.1 Increasing Waterway Depth

As sediment builds up on the bottom of the lake and the river channel, it reduces the depth of the water. Dredging will strip away the accumulated debris, to restore the water body to its original depth and reduce the risk of flooding.

2.2.2 Gathering Construction Materials

The sediment removal process shall also be used to gather sand, gravel and other debris used to make concrete for construction projects.

2.2.3 Environmental Remediation

Sediment removal will help to restore the onshore lands in the project area to its original condition by reversing the effects of land degradation due to on farm sand harvesting.

2.2.4 Preserving Aquatic Life

Dredging is projected to produce a healthier aquatic eco-system that can result in a more suitable habitat for fish and other wildlife. It will also be used for trash and debris removal to support eco-friendly waterways.

2.2.5 Remediation of Eutrophied Water

Eutrophication is an excessive amount of nutrients in a water body typically caused by water runoff from the surrounding land. Eutrophication has led to an overabundance of plant growth such as water hyacinth and hippo grass at the delta that may result in oxygen deprivation and can cause the death of aquatic wildlife. The proposed dredging may be the most viable remediation option since the area has experienced eutrophication leading to overabundance of plant growth at the delta.

2.3 Different Types of Dredgers

There are several types of dredges used in the sediment removal process. The most common types of dredgers are:

2.3.1 Plain-Suction

A plain-suction dredge is the most common type of sediment removal equipment. Unlike other dredger versions, it doesn't contain a tool for penetrating or cutting into the bottom of the water body — it relies on suction to remove loose debris.

2.3.2 Cutter-Suction

This type of dredge contains a cutting tool that loosens material from the bottom and transports it to the mouth of the suction apparatus. The use of a cutter-suction dredge may be necessary for removing debris from hard surfaces that would prevent efficient suction via standard methods. The sucked debris will then be transported via a pipeline to the disposal areas within the project area. The community during the public consultation meetings suggested reclaiming derelict sand harvesting pits within the project area.

2.3.3 Auger-Suction

An auger-suction dredge essentially bores holes into the bed to loosen and suck up the debris. The rotating auger can burrow deeply into the surface. This type of dredge works well for sludge removal applications at wastewater treatment plants and other areas requiring heavy-duty sediment removal.

2.4 The Dredging Process

During the process of dredging, the Proponent shall mainly use Plain-Suction Dredge to remove sediments and sand from the bottom of the lake and river. During dredging, the dredger operator will lower the boom of the dredger to the bottom of the body of water. A rotating cutter-bar then uses teeth to loosen the settled material, as the submersible pump removes the sediment from the bottom of the lake or river.

The dredger is equipped with a submersible pump that relies on suction to excavate the debris. A long tube carries the sediment from the bottom of the body of water to the surface and onto the dredge compartments which can hold up to 4 tons. The silt and debris are then transported away for final processing. The disposal of the dredged material including sand shall be conducted in compliance with NEMA and the county governments' of Kisumu and Homa Bay laws and regulations.

Plate 4: Cutter-Suction and Plain-Suction dredgers that will be used during the project

3. ANALYSIS OF ALTERNATIVES

3.1 Overview

Alternatives with respect to the proposed project, technology and waste management were analyzed with an aim of coming up with the most sustainable project considerations that will ensure optimal benefits are realized from the project. A range of factors were put into consideration including the receiving environment, anticipated impacts and views and concerns gathered from the stakeholder consultations. The alternative options are discussed below.

3.2 No Project Option

Proponent, Mango Tree Marine Ltd has proposed to carry out Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta to reduce the impact of flooding due to sedimentation at the river mouth by easing the flow of water to the lake in response to the recommendations of the Parliamentary Departmental Committee on Environment and Natural Resources in the report dated December 2020 that urged the National Assembly to recommend to the Government of Kenya to urgently spearhead the dredging/de-siltation of Sondu Miriu River and unblocking the river deltas in Adera, Nyalmera and Chuowe around Winam Gulf to ease the flow of water to the lake. The parliamentary report is attached in **Appendix II** of this report.

The no project option therefore means that the human suffering during floods as a result of the blocked Sondu Miriu Delta will continue unabated. Displacement of human populations and disruption of the school calendar (since the schools in the area are used as evacuation centers during floods) will continue during flooding seasons. The only possible advantage of this option is that the environment will not be interfered with. The No Project Option is the clearly the least preferred.

On the flipside, this option will deny the project region benefits that can only be realized from the Proposed Dredging/De-Siltation and Sand Harvesting project as mentioned below:

- Restoration of the Sondu Miriu River mouth to its original depth and reduce the risk of flooding due to backflow;
- Sand and gravel harvesting for construction projects;
- Reclamation of the onshore lands in the project area to their original condition by reversing the effects of land degradation due to on farm sand harvesting through dumping of the dredged materials in these pits;
- Removal of trash and debris to support eco-friendly Sondu-Miriu River; and
- Reduction of eutrophication leading to overabundance of plant growth at the delta.

3.3 Analysis of Alternative Flood Control and Management Strategies

Sondu Miriu River drains into Lake Victoria from the slopes of Mau Escarpment. During heavy rains, it causes intense flooding in parts of Kisumu and Homa Bay Counties particularly the low-lying areas where it drains into the Lake. It breaks its banks hence flooding occurs in adjoining settlements causing displacement and loss of property. Rising lake levels also cause flooding in areas bordering the shores of Lake Victoria. Apart from the heavy rains in the catchment area, degradation of upstream vegetation as a result of poor land use practices causes flooding.

Some of the proposed flood management strategies include:

- Development of a flood management strategy
- Building evacuation centers for nearby communities to avoid usage of schools as evacuation centers,
- Instituting reforestation programs, river training, and sustainable land use practices in the upstream area of Sondu Miriu River to reduce erosion and consequent sedimentation of rivers in the lake basin which is a major cause of floods.
- Expediting the construction of a 2-kilometer dyke on the left bank of River Sondu Miriu from Sang'oro power station and a 5-kilometer dyke on either side of the river after Kendu Bay-Katito road towards the lake.

3.4 Analysis of Alternative Dredging Technology

The Proponent plans to use plain-suction dredger in areas where there are loose debris such as sand and other sediment into the dredger compartments by use of suction technology. The dredged materials inside the ship will mostly be re-used as building material for construction industry.

Another alternative type of dredger that will be deployed is the Cutter-Suction dredger that contains a cutting tool that loosens material from the bottom and transports it to the mouth of the suction apparatus. This will mainly be used for the removal of debris from hard surfaces that would prevent efficient suction via standard methods. The sucked debris will then be transported via a series of pipes to the disposal areas within the project area.

3.5 Analysis of alternative material storage and disposal sites

Currently, the Proponent has material storage sites in Kisumu Port area and in Mbita where the dredged sand and silt will be stored before re-use in construction industry. Other dredged materials including aggregates, soil and mud will be used to reclaim the derelict sand harvesting pits within the project area in consultation with the local community and the respective county governments. Measures shall be put in place to ensure that the dredged materials do not get into the water system again through soil erosion prevention mechanisms.

4. ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE CONDITIONS

4.1 Project Location

The proposed project location is situated in the Sondu Miriu delta and its open water. The delta, is also known as Koguta Wetland, situated on the eastern side of Winam Gulf of Lake Victoria. The general spatial location the delta is on Longitude E 34.7941° and latitude S 0.2590° on datum of WGS 1984. It is about 4.3 km to the north west of the bridge on Kendu – Katito Road. Existing literature indicate Koguta Wetland has a total of 550 ha. Sondu Miriu River derives it from upstream drainages such as Kipsonoi River and Itare located in the Mau Forest Complex.

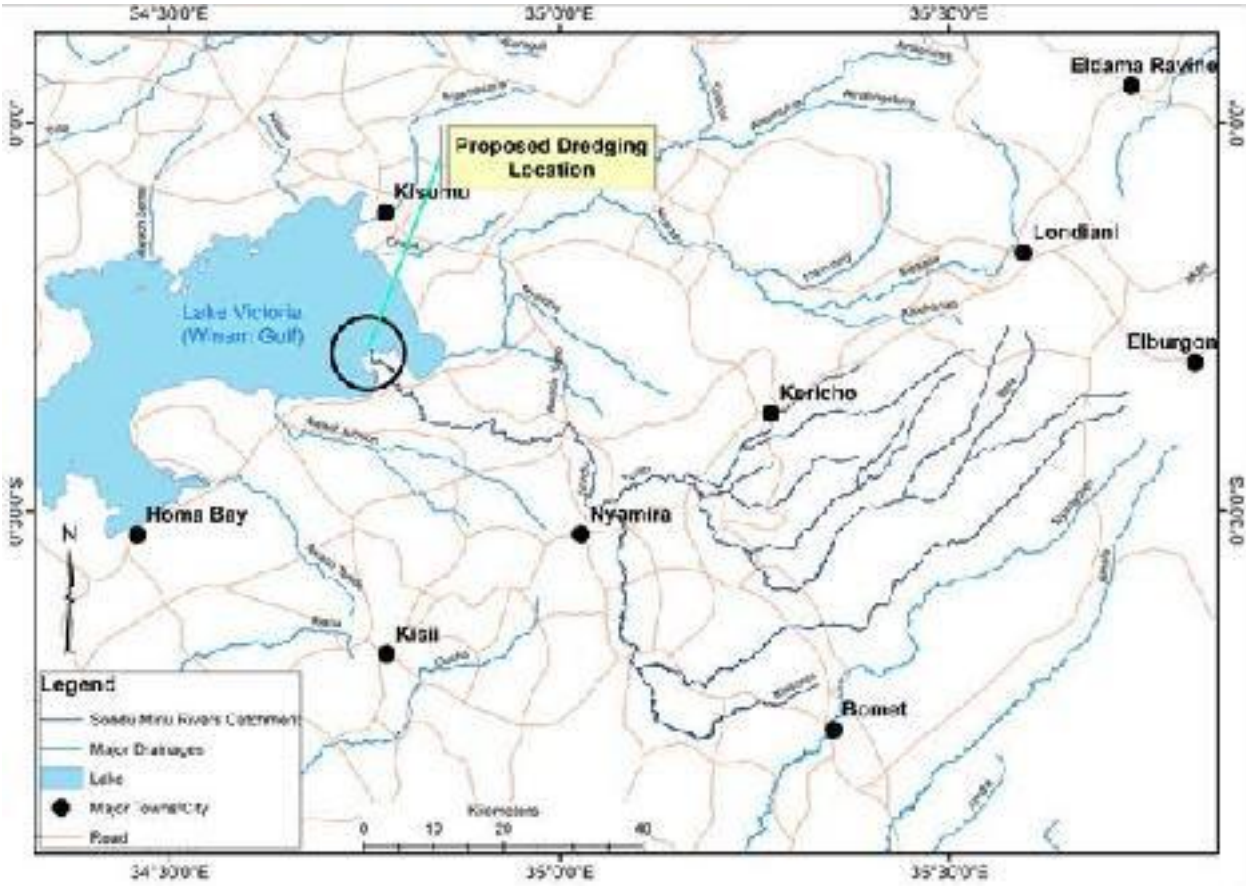


Figure 2: Location of Project Area in Homa Bay and Kisumu Counties

4.2 Geomorphology of the project area

Sondu Miriu Delta is one of the unique river geomorphological features among others located in the eastern side of Winam Gulf of Lake Victoria. The description of the Sondu Miriu is derived from analysis of series of satellite images that provide a scenario of how the delta evolved over period of time. The physical characteristic of river mouth observed in series of satellite images provides a scenario for analysis of river mouth geomorphology.

The dynamic climate in the region in the past has seen the river undergoing through natural sedimentation (siltation). This probably led to the siltation at the mouth of the river which caused natural diversion of the flow direction into the lake. After the diversion, periodic erosion of the bank of vegetated piled siltation the banks gave way into a channel from which the river emptied its waters into the lake. The initial channel eventually lost energy and got colonized by aquatic macrophytes.

Sondu Miriu River has in the recent burst its banks which have caused reduction of energy in the original channel to transport sediments farther into the lake. This contributed more to the blockage of the original channel. After this period, new channels have emerged sequentially due to high river energy diverted to the south especially on seasonal basis. Two channels running south-westerly flow directly into the lake. The channel flowing to the south emerged as a result of flooding. The flow of water into the lake from this channel is disrupted by intact vegetation of papyrus and hippo grass.

Figure 3: Sondu Miriu River mouth changes in channels from northern to the southern flowing direction as observed through from 1973 to 2021 on satellite images

The earliest satellite observation in record was in the year 1973 (February, 01) from Landsat Multispectral Scanner (43m resolution). Since 1973, observations on the shape and area of Sondu Miriu Delta have relatively changed from 683 hectares in the year 1973 to 645 ha in 2021. This implies the delta has been reducing at a rate of 1.3 ha per year. However, there are periods when it increases; for instance in 2008, the area increased to a total area of 971 ha. The extension of the delta papyrus into the lake in 1973 was 2.6 km; in tangent to the lake water

mark line. There have been gradual decrease in extension delta over period of time; in 1995 to 2008, it was 2.3km and, it further reduced to 2.1 km in 2021. The expansion of papyrus in the northern extent is limited; expansion is more pronounced in the southern side, in Chuowe beach area.

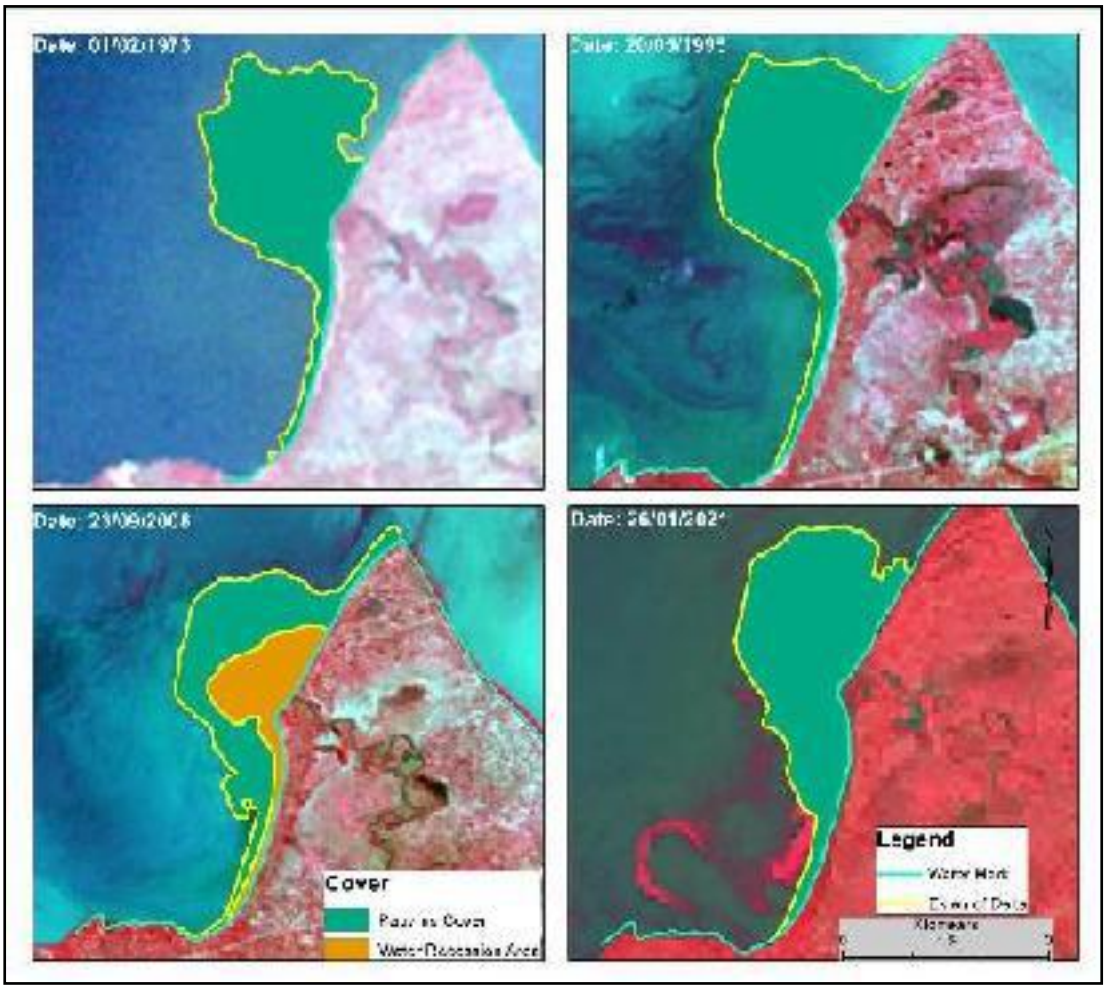


Figure 4: Evolution of Sondu Miriu River Delta as observed through from 1973 to 2021 on satellite images

4.3 The Environmental Survey Results of the Project Area

4.3.1 Surface Water Quality

Water quality parameters assessed on the proposed Dredging/De-Siltation and Sand Harvesting project site were measured with by distance at intervals from the mouth of the river and depth of the point of measurements. The Total Suspended Solids range from the minimum of 34 mg/L at the mouth of the river to about 80 mg/L at about 6 – 7 km away from the river mouth with the average estimated to be 57.5 (±7.3) mg/L. Higher measurement values of TSS are more varied and mostly recorded far away from the mouth of the river; less variation in TSS occur near the mouth of the river. The average estimate value for water transparency is estimated to be 0.5 (±0.1) m from the surface of water. The transparency of the lake water range from a minimum of 0.32 m near the mouth of the river to 0.74 m offshore from the river mouth. Areas with poor transparency is more varied near the mouth of the river; but less variation is observed in relatively far and deeper part of the project site. The Total Dissolved Substances (TDS)

measurements within the project area range between 59 to 76 ppm with an estimated average of 65.7 (±2.7) ppm. While the average values of Electrical Conductivity (EC) in the project area is 131 µS with the values ranging from 117 to 152 µS. Both TDS and EC vary more in the higher values but less variation is in low values. Lake water in the project area is slightly alkaline ranging with pH levels from 7.78 to 8.53 and with estimated average pH of 8.2. An average temperature of 25.6 (±0.2) ˚C of is estimated in the proposed project area. The minimum temperature measured is 25 while the maximum temperature in the project location is 26.1 ˚C. Water temperature is mostly varied in low measurements which occur offshore in the project area.

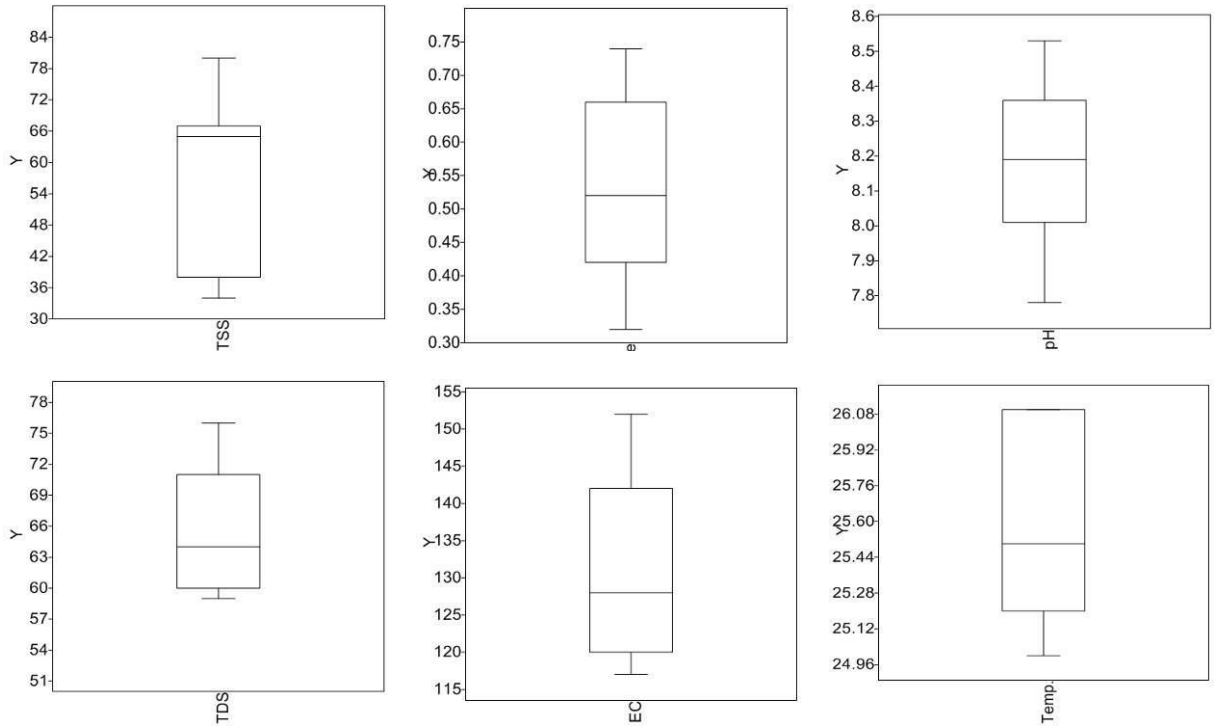


Figure 5: Box-plots of the mean water quality parameters (TSS, transparency, pH, TDS & EC) sampled by distance from Sondu Miriu River mouth to 6.3 km offshore of Lake Victoria

4.3.2 Spatial dispersal and settlement rate of sediments

Sondu Miriu River releases water at it mouth with a Total Suspended Solid estimated at an average of 75 mg/L. Extent of dispersal of sediment was traced as far as 6.3 km off the mouth of the river. Measurements of TSS by distance into the lake indicate gradual reduction in the amount of the parameter. Sediments transported by the river begin to settle at the bottom as the river encounter the lake water. Settlement of sediments from river mouth into the lake occurs slowly within the first 3 km; beyond this distance a rapid settlement is observed. This rapid settlement of sediments is probably due to the calmness of the lake water. The dispersal and settlement of sediment are more variable with distance from the mouth of Sondu Miriu River; however a tremendous reduction in dispersal and increase in settlement of sediment is observed. The average sediment settlement rate is estimated to be 22.5 $mgL^{-1}km^{-1}$. According the measurement taken, the lowest sediment settlement rate occur at the mouth of the river at a

rate of 7.5 mg/L within the first 1 km. Settlement of sediments is apparently higher by about 34 – 44 mg/L between 5 to 6 km away from the river mouth. The suspended sediments measured offshore were constituted more by phytoplankton which affect the Total Suspended Solids in the water. This implies the average rate of sediment settlement for is even faster than what was measured. Water transparency which highly correlates with the sediment settlement rate was also assessed by increasing distance into the lake.

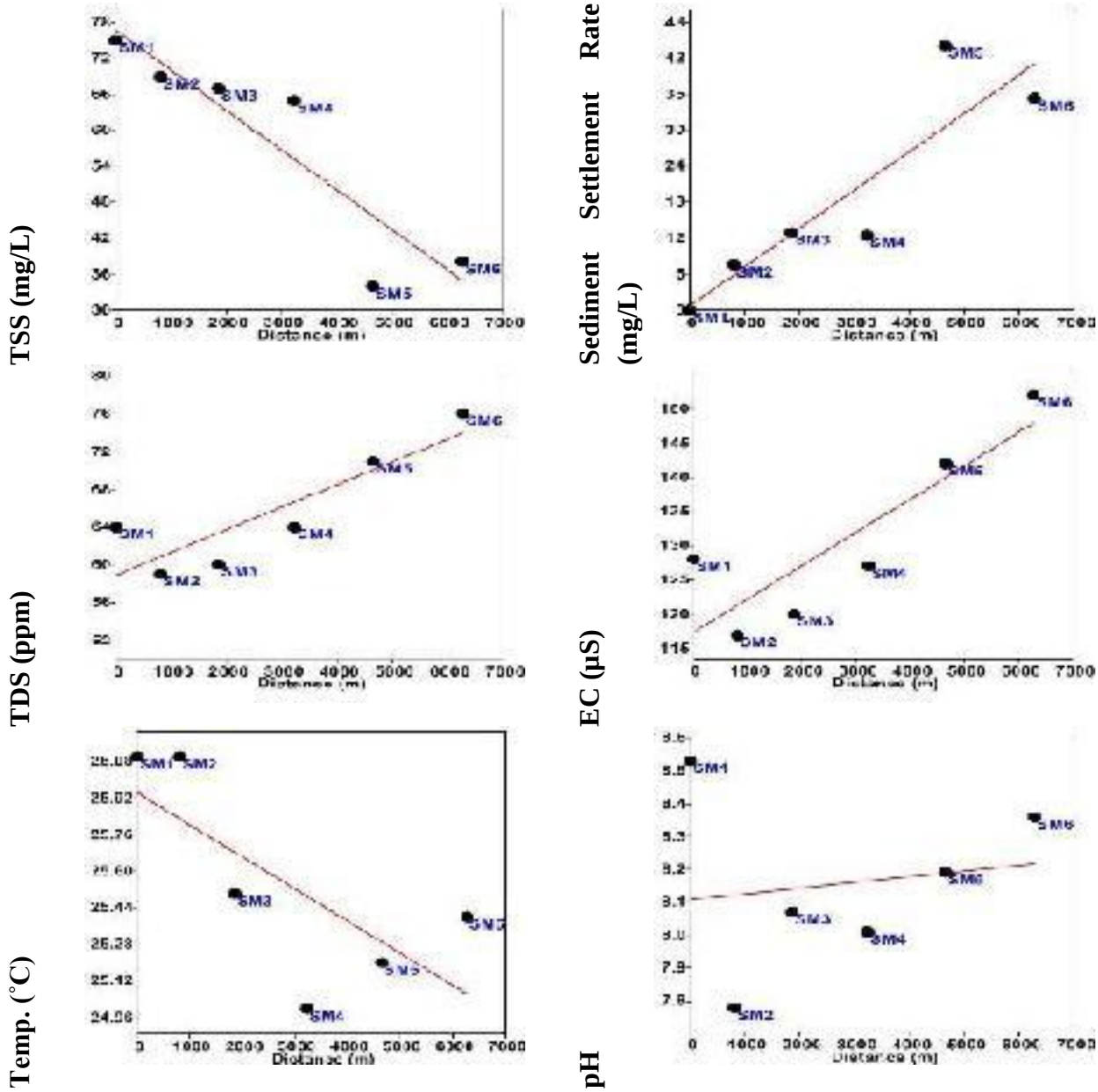


Figure 6: Relationship of water quality parameters with distance from the mouth of Sondu Miriu River to offshore of Lake Victoria

Distributions of other water quality parameters also show changes with increase in distance from the mouth of the river to the open areas of Lake Victoria. Amount of TDS, EC, increases strongly with distance from the mouth of the river; about 87% and 86% of spatial variation of the respective parameters positively correlate with increase of distance to the open lake. Temperature, however, decreases with the increase in distance to the open lake area (R=-73).

Spectral characteristic of satellite images covering rainy seasons (long and short) and dry seasons indicate positive correlation of the surface reflectance (Digital Number) from the red spectrum of visible light with the Total Suspended Solids (TSS). High positive correlation is observed in the months of September, October, November, January, February, March, April, May, June and July. Negative correlation is observed in the month of August; while very poor correlation is in December. The relationship of the surface reflectance with the surface water TSS provides an opportunity of predicting TSS and other correlates of water quality parameter with high level of certainty.

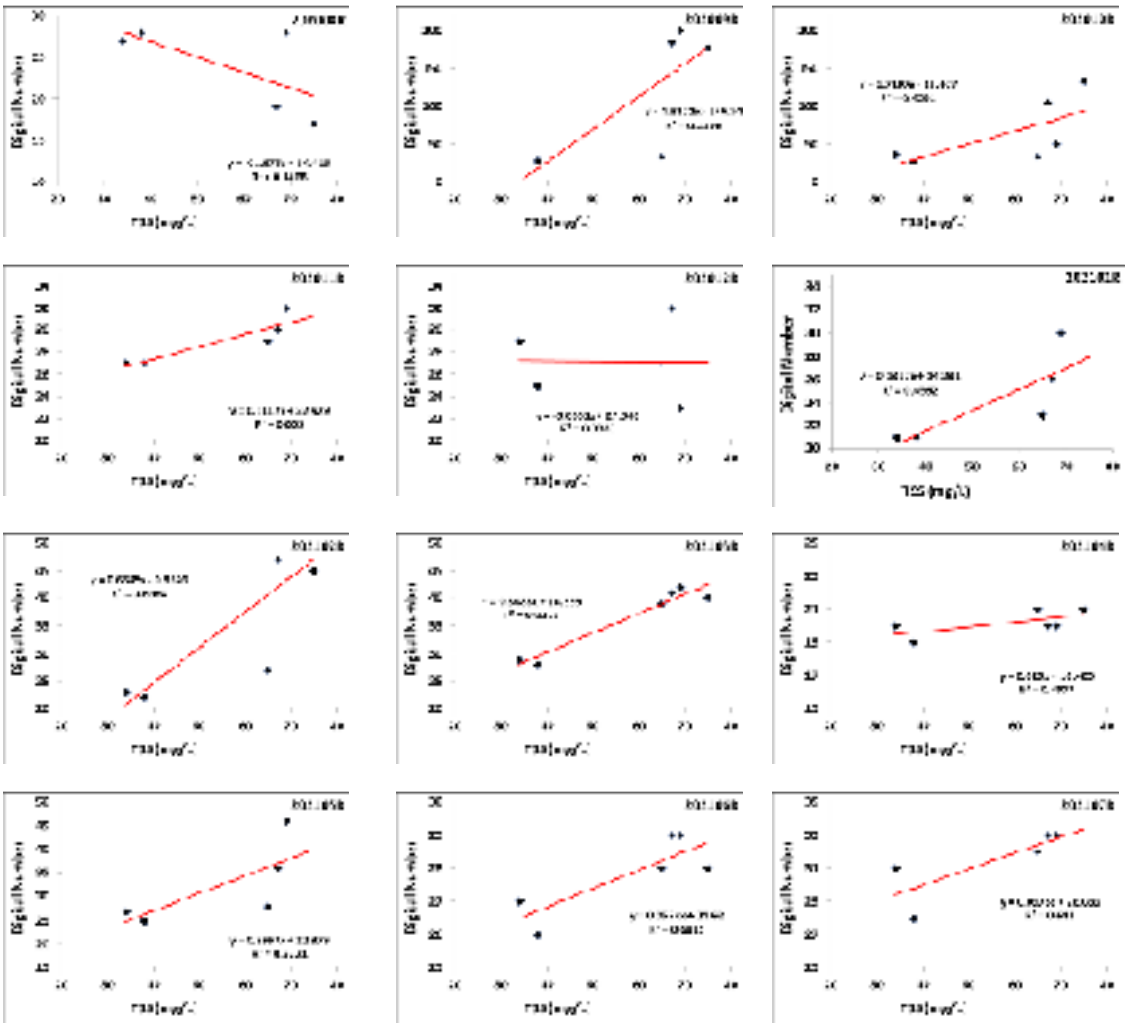


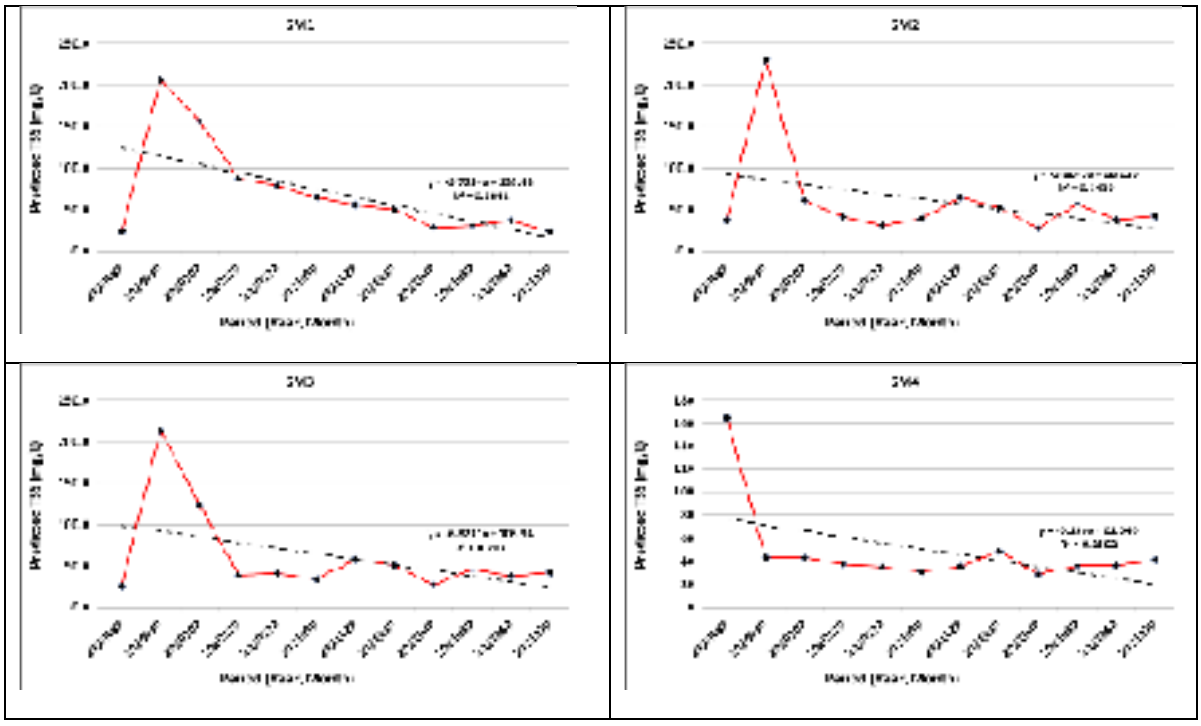
Figure 7: Relationship of surface reflectance (DN) of Lake Victoria TSS measured from the mouth of Sondu Miriu River to the open part of the waters, 6.3 km offshore

4.3.3 Temporal settlement rate of sediment

There is a general circle of sediment loading and settlement from the near mouth of Sondu Miriu River to the open part of the lake. This phenomenon is however very pronounced near the delta but low offshore. The low settlement of sediments offshore is probably due to relatively low amount of TSS in the far open water than near the mouth. However, there is an observed increase in settlement of sediments within certain months in a year. The average sediment settlement rate near the mouth of Sondu Miriu River (SM1) is estimated at 25.2 mg/L

(per month) between the months of October to April. Very high settlement rate occur in October and November at an average of 59 mg/L but low in February and March at an average of 7.3 mg/L.

More sediment is, however, discharged into the lake in May and June thereafter pronounced settlement of sediment begins in July at a rate of 12.4 mg/L. At about 1 km (SM2) from the delta in open lake water settlement of sediment is pronounced between October to December at an average of 15.2 mg/L, and March and April 18.6 mg/L. Relatively high sediments loading in October, February and May (Fig.). About 2 km away from the delta area (SM3) settlement of sediment is very high in September and October taking place at a rate of 87.2 mg/L; considerably low settlement occur in the months of January, March, April, and June. At survey point located 3.2 km away (SM4), settlement of sediment is pronounced in November to January at an average rate of 4.1 mg/L. Poor settlement of sediments is observed at this survey point in September and June. In 4.7km away (SM5), sediment settles at an average rate of 18.9 mg/L (per month). The highest settlement rate occurs in October, November and April. While the furthest point of survey located 6.3 km away from the delta (SM6) has relatively poor rate of sediment settlement though TSS levels are generally comparatively low spatially and temporally. Pronounced period of relatively high settlement rate of sediment is in December, January and April.



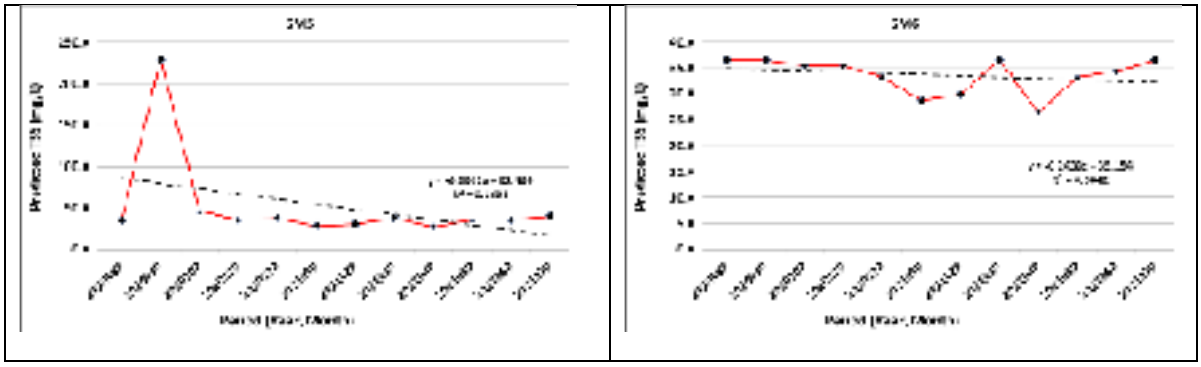
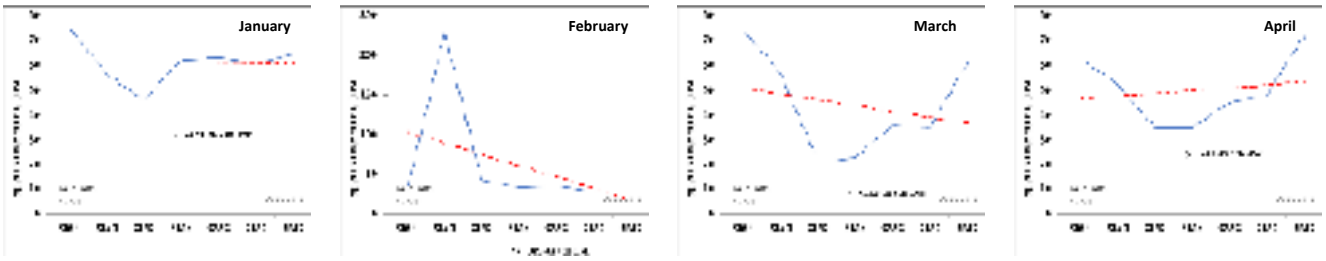


Figure 8: Amount of TSS in the proposed Dredging/De-Siltation and Sand Harvesting project in Sondu Miriu Delta from predicted from Sentinel image band 4 – red spectrum from visible light

4.3.4 Phytoplanktons

Phytoplanktons in Winum Gulf are represented by major groups of Cynaphyta, Chlorophyta, Bacillariophyta, Euglenophyta. The most diverse group of phytoplanktons are the Blue-green algae (Cyanophyceae), followed by diatoms (Bacillariophyceae), green algae (Chlorophyceae) and dinoflagellates (Dinophyceae). The blue-green algae dominate the gulf during dry season, while diatoms dominate in the open lake. The most common blue-green algal species is the *Microcystis aeruginosa.* This is followed by *Anabaena sp. Lyngbya sp. Chroococcus, Merismopaedia* and *Aphanocapsa spp*. In Chlorophyta, most species are *Oocystis, Staurastrum, Pediastrum spp. Scenedesmus, cosmarium and Staurastrum spp*. The group of diatoms are dominated by Nitzschia sp., which are the most abundant. Other diatoms are *Melosira sp. Synedra, Diatoma, and Surirella spp*.

The general spectral characteristic of the waters from band 1 near the delta shows shows relatively higher spectral values near the delta than towards the open lake. Phytoplanktons absorbs spectrum energy in this band which implies there are more phytoplanktons away from the delta area. However, this response changes in some months where there is apparently more absorption of the spectral energy (band 1) in the waters near the Delta. The spectral responses in the gulf are currently interfered by the Water Hyacinth that also interacts with the spectral energies in the visible light.



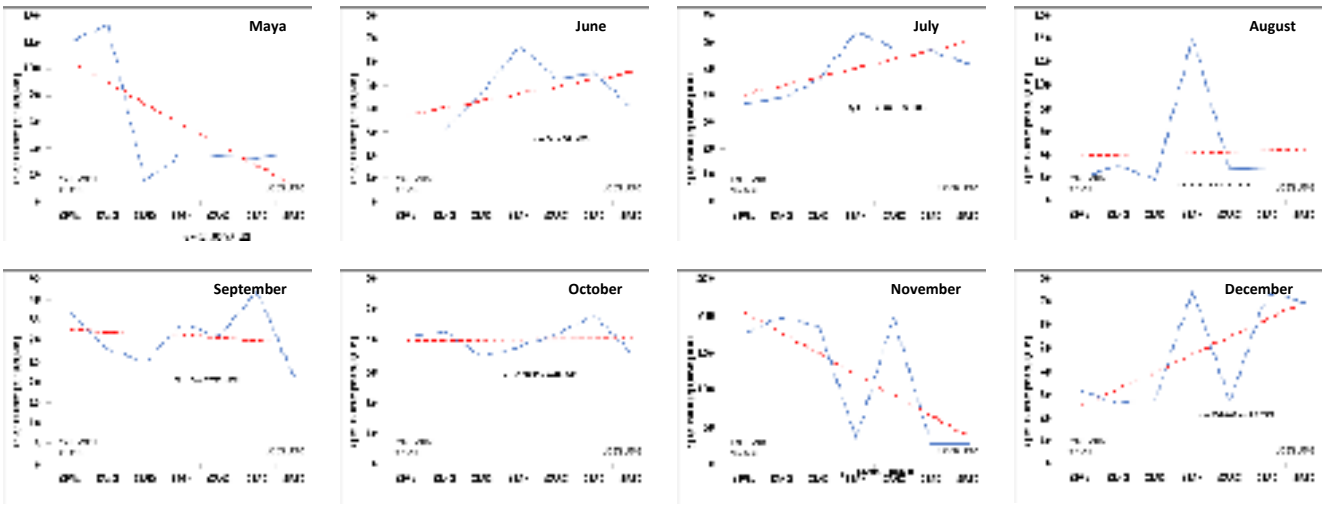


Figure 9: Spectral response of water from Band 1 of Landsat and Sentinel images. High absorption of energy by phytoplanktons is indicated by low spectral values in the graph. Spikes of spectral values are caused by Water Hyacinth

4.3.5 Fish Species and Fisheries

A total of 29 species of fish have been documented from the near shores of the delta, the channels in the delta and the upper part of the delta (below Nyakwere Bridge). Most of the species are classified into taxonomic class of Actinopterygii; while only one species, *Protopterus aethiopicus*, is in the class of Sacopterygii. Among the species recorded in the past in the project area, 48% of the species are from the Family Cyprinidae, followed by the Cichlidae at 14%, Clariidae 10%, Mochokidae 7%, others comprise of 3% each.

Interviews with the fisher folks indicate most of fish species have disappeared in the fishing grounds bringing the common fisheries species to only 20% of the total recorded in the past. These consist of *Clarias gariepinus, Protopterus aethiopicus, Synodontis victoriae, Schilbe intermedius, and Lates niloticus.* The latter is however overexploited in the waters; only small sizes of *L. niloticus* are currently caught by fisher folks.

Plate 5: Typical fisheries species landing dominated by *Synodontis victorianus* at Chuowe Beach

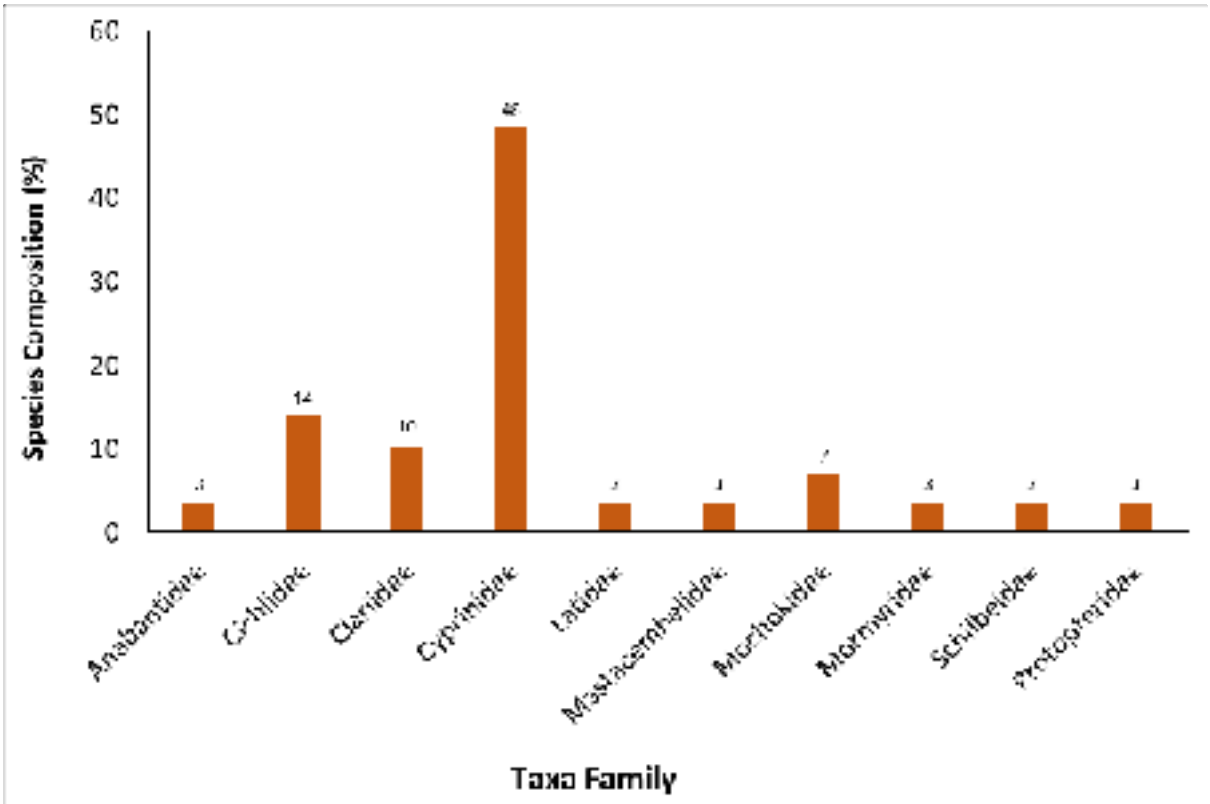


Figure 10: Fish Species Composition within the project area

Two species from the delta area and near waters are listed to the IUCN red list as Critically Endangered and Vulnerable is locally known as Ningu is an endemic fish of Lake Victoria basin and listed to the IUCN red list as Critically Endangered (A2acde). It population has been overfished due to their predictable migratory habits of the species. Its delicacy among the local communities have led to severe population declines (not less than 80% in 10 years) and shrinkage of its extent of occurrence (FishBase team RMCA & Geelhand, 2016). Its spawning grounds such as swamps and wetlands are deteriorated by agricultural activities, sedimentation from watershed. *Haplochromis nubilus* is enlisted to Vulnerable category (D2) due to increased threat of bybridisation as a result of decreased water transparency.

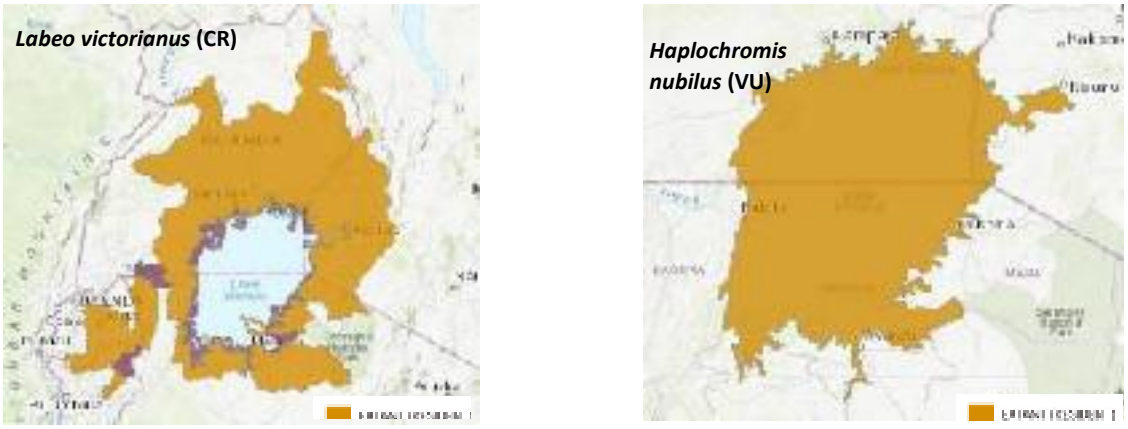


Figure 11: Global distribution of Labeo victorianus and Haplochromis nubilus. Source: IUCN Red list

Table 1: List of fisheries species recorded from the BMUs adjacent to the delta

Family	**Species**	**Ecology**	**IUCN Red List Status**
Cyprinidae	*Barbus radiatus*	benthopelagic	LC
	Enteromius apleurogramma	benthopelagic	LC
	Enteromius cercops	benthopelagic	LC
	Enteromius jacksoni	benthopelagic	LC
	Enteromius kerstenii	benthopelagic	LC
	Enteromius neumayeri	benthopelagic	LC
	Enteromius nyanzae	benthopelagic	LC
	Enteromius paludinosus	benthopelagic	LC

Family	Species	Ecology	IUCN Red List Status
	Enteromius stigmatopygus	benthopelagic; potamodromous	LC
	Enteromius yongei	benthopelagic	LC
	Labeo victorianus	benthopelagic; potamodromous	Critically Endangered (A2acde)
	Labeobarbus altianalis	benthopelagic	LC
	Brycinus sadleri		
	Rastrineobola argentea	Pelagic	LC
Mormyridae	*Marcusenius victoriae*	demersal; potamodromous	LC
Anabantidae	*Ctenopoma muriei*	benthopelagic	LC
Bagridae	*Bagrus docmac*		
Amphilidae	*Amphilus jacksonii*		
Cichlidae	*Astatoreochromis alluaudi*	benthopelagic	LC
	Haplochromis nubilus	benthopelagic	Vulnerable (D2)
	Oreochromis leucostictus	benthopelagic	LC
	Oreochromis niloticus	brackish; benthopelagic; potamodromous	LC
	Tillapia zillii		
Latidae	*Lates niloticus*	demersal; potamodromous	LC
Clariidae	*Clarias alluaudi*	demersal	LC
	Clarias gariepinus	benthopelagic	LC
	Clarias liocephalus	demersal	LC
Mochokidae	*Synodontis afrofischeri*	benthopelagic	LC
	Synodontis victoriae	benthopelagic	LC
Schilbeidae	*Schilbe intermedius*	pelagic; potamodromous	LC

Family	Species	Ecology	IUCN Red List Status
Mastacembelidae	*Mastacembelus frenatus*	demersal	LC
Protopteridae	*Protopterus aethiopicus*	demersal	LC

Definition Box:

Benthopelagic fish: Fish species living and feeding near the bottom as well as in midwaters or near the surface.

Potamodramous fish: (of a migratory fish) that migrates within fresh water for breeding or feeding.

Demersal fish: fish living and feeding on or near the bottom of lakes (or sea)

Pelagic fish: fish living neither close to the bottom nor near the shore

4.3.6 Bird Species

About 104 birds are partially or entirely dependent on wetland; hence Sondu Miriu delta forms an important habitat. Sondu Miriu delta support many bird species including terrestrial birds that have been observed in the habitat. These species are aggregated into 11 taxonomic Orders and 26 taxonomic families. Order with the highest number of family is the Charadriiformes. Charadriiformes include: waders, typical shorebirds, gulls, large birds that take fish from the water, and; auks coastal birds species which nest on sea cliffs and fly underwater to catch fish.

This group is followed by the Order Pelecaniformes which consist of 19% of the taxonomic orders. Pelecaniformes are fish-eating birds which either dives on the surface such as cormorants and anhingas (Anhingidae), or aerial divers, such as Pelicans.

Taxonomic family with the most common wetland bird species is the Ardeidae (herons and bitterns) from the Order Pelecaniformes. About 13% of wetland related birds recorded from the delta are from Ardeidae family. This is followed by Charadriidae (plovers, dotterels, and lapwings) from the Order Charadriiformes with 9% of the species. The family Rallidae consist of species known as rail, coot, crake, and gallinule has species forming 9% of the species in the area. Lastly, the family Scolopacidae are mainly the Sandpipers that are waders or shorebirds.

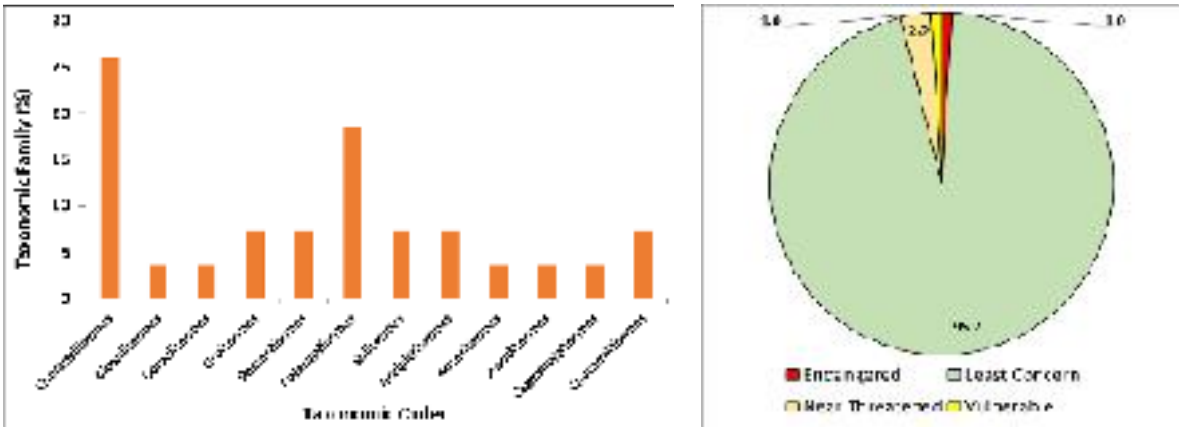


Figure 12: Left: the distribution of bird families recorded in Sondu Miriu delta among the taxonomic Orders. Right: Pie chart of IUCN Red List categories and percentage distribution of species

Wetland birds face environmental threats from human activities that cause habitat degradation. The International Union on Conservation and Nature (IUCN) has categorized species under the Red List of Threatened for purpose of conservation recognition. An approximated 4.9% of the species in the area are listed into categories under the IUCN Red List as Near Threatened (2.9 %), Vulnerable (1 %), and Endangered (1%). The Papyrus Yellow Warbler (*Calamonastides gracilirostris*) is a species from the family Acrocephalidae is globally Vulnerable (A2c+3c+4c). Its population is rapidly declining as a result of extensive habitat loss. Its extant is in Burundi; Congo, The Democratic Republic of the; Kenya; Rwanda; Tanzania, United Republic of; Uganda.

Only one species is listed to Endangered (A2acd+4acd), the Grey Crowned Crane (*Balearica regulorum*) from the family Gruidae. The Grey Crowned Crane has been up-listed to Endangered because of habitat loss and the illegal removal of birds and eggs from the wild. Three species are listed to the Near Threatened status; these include the Black-winged Pratincole, African Skimmer and Black-tailed Godwit. Black-winged Pratincole (*Glareola nordmanni*) has experienced moderately rapid overall declines which warrant the Near Threatened status. The African Skimmer (*Rynchops flavirostris*) from the Laridae family is listed as Near Threatened due to its moderately small population.

Black-tailed Godwit (*Limosa limosa*) is from the Scolopacidae family widespread and has a large global population. Its numbers have declined rapidly in parts of its range owing to changes in agricultural practices. The papyrus endemic Papyrus Gonolek (*Laniarius mufumbiri*) occur in the delta swamp in relative abundance. The species is listed to the IUCN red list as Near Threatened (NT) due to population decline owing to the on-going conversion and degradation of its wetland habitats.

Papyrus Yellow Warbler (VU)

Grey Crowned Crane (EN)

Black-winged Pratincole (NT)

African Skimmer (NT)

Black-tailed Godwit (NT)

Papyrus Gonolek (NT)

Figure 13: Global distribution of wetland birds listed in the IUCN Red List as Near Threatened (NT), Vulnerable (VU) and Endangered (EN). Source: IUCN Red list

4.3.7 Aquatic Plant Species

The aquatic plants are species that are adapted to growing in water logging conditions. Some of these plants are emerge from the surface of water but are rooted with stiff or firm stems standing above the water surface. Other plants grow in submergence to the surface of water, rooted with flexible stems and most part of their body mass is below the water surface; though small portions may appear above the water. There also the floating group of plant that floats freely on the water surface. The entire body of the plant is suspended in the water, making the plant to move by prevailing winds and water currents. Another group of aquatic plants are the floating leave plants; which are well rooted with flaccid stem that are flexible to avoid water currents.

There are a total of 15 plant taxonomic Orders represented in the Sondu Miriu delta. The taxonomic families of 24 are disaggregated among these Orders with the Order with the highest number of taxonomic families are Alismatales and Poales each having 3 families. The Orders Caryophyllales, Myrtales, Salviniales, Solanales has 2 families in each Order. Other Orders have one family in each. A total of 37 species of plants recorded from Sondu Miriu delta area. The emergent plant species forms 30% of the taxonomic family which has about 62% of the plant species in the delta. Submergent species are constituted by 8 % of the taxonomic family with an estimated 16% of the total species in the delta. Free floating plants consist of 8% taxonomic family with 11% being the composition of the species in this group. Lastly the floating leave group forms about 8% of taxonomic family which is constituted by 11% of the plant species in Sondu Miriu delta.

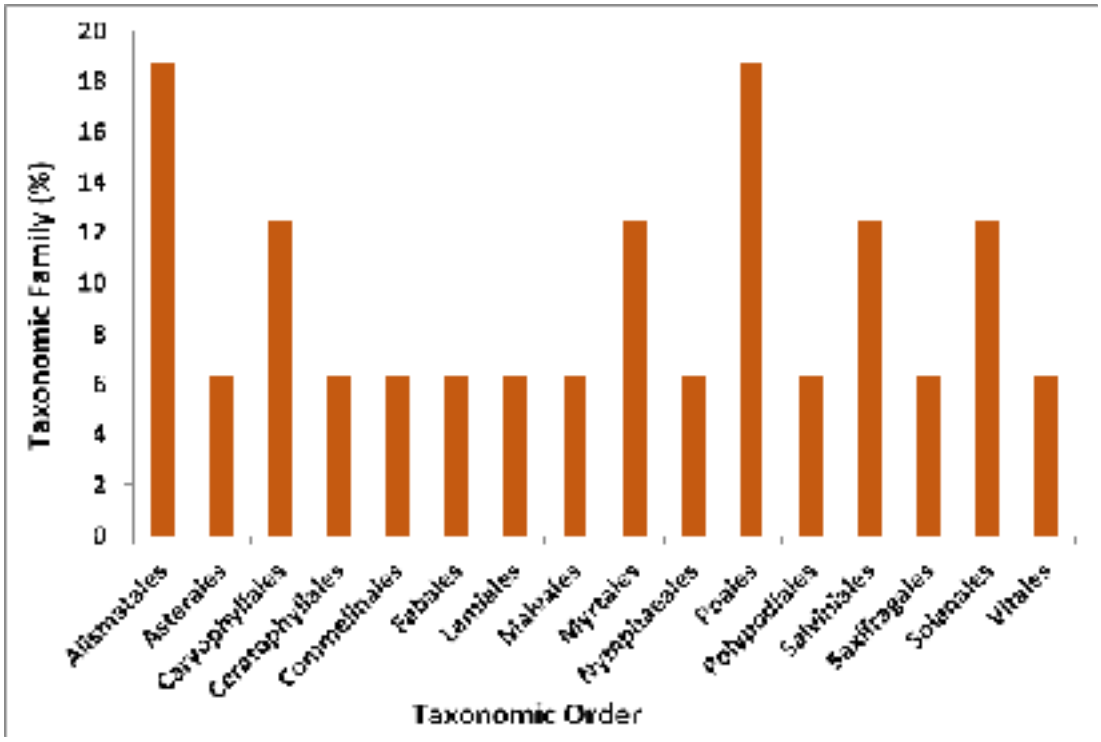


Figure 14: Aquatic plant families within the delta

4.3.8 Mammal Diversity

The papyrus and hippo grass in Sondu Miriu delta and it's environ provides habitat for foraging, breeding and protection of wetland adapted mammal species. There are few species of mammals inhabiting the delta; this includes the *Hippopotamus amphibius* and Sitatunga. African Otter, occur in the waters in the open and near the shores of the delta. Other species are formed by small mammals such as the rodents.

Hippos occur in shallow shore areas with vegetation that provide cover during day and foraging areas. The species is enlisted in the IUCN red list as vulnerable species (VU A4acd) but has relatively stable population. Their population is however affected by threat to their habitats and unregulated hunting.

The presence of Sitatunga (*Tragelaphus spekii*) in Sondu Miriu delta is accounted for by the local residents and KWS officials. Its foot prints have been observed by KWS during recent mammal count survey. Sitatunga is however enlisted to the IUCN red list as Least Concern but has a declining population. Despite the category in the red list the species locally faces a continuous habitat degradation and intensive meat hunting in parts of its range. Continuation of its present trends may cause the disappearance of the species from many areas where it still occurs. Two species of Otters are described by fishermen to be occurring in the delta channels and in the open lake waters. These include the African Clawless Otter (*Aonyx capensis*) and Spotted-Necked Otter (both Near Threatened). In much of their range, populations of are faced with habitat loss or degradation, polluted waters, and/or degraded water ecosystems due to the introduction of invasive alien species such as Water Hyacinth (*Eichhornia crassipes*) and marginal agricultural practices. This habitat disturbance is exacerbated by poor sanitation

infrastructure and growing industrial waste pollution. Additionally, regional human populations are poor and increasingly placing pressure on all resources including water, vegetation, the otter prey base, as well as reducing suitable resting and denning sites vital to survival of the species.

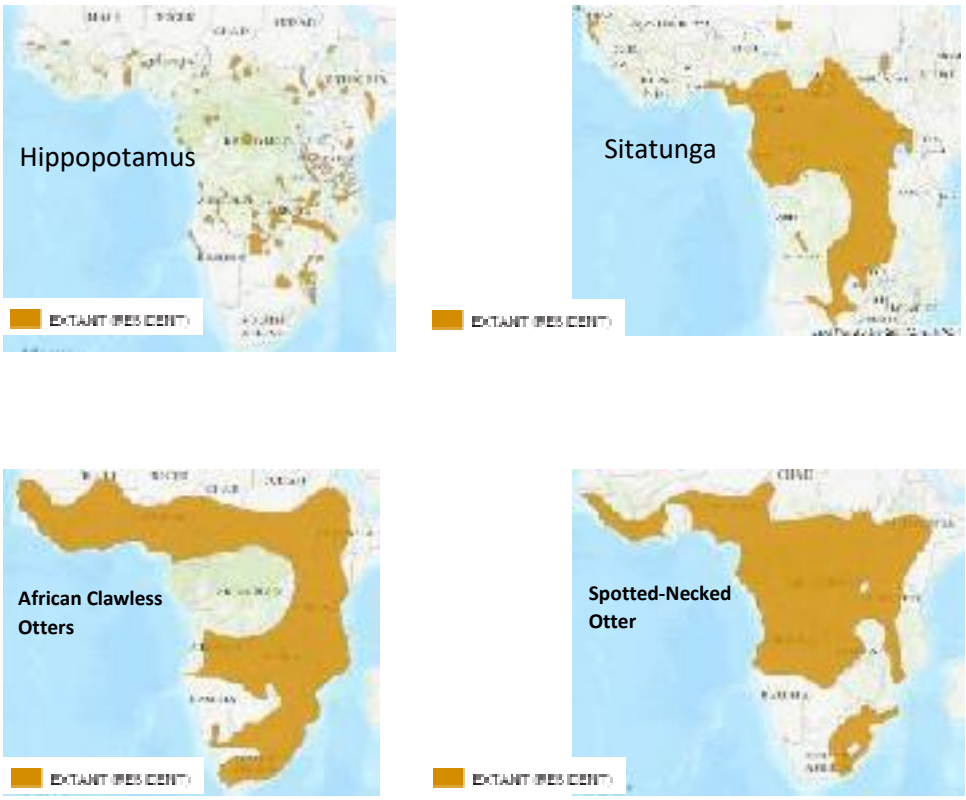


Figure 15: Global distribution of *Hippopotamus amphibious*, Sitatunga (*Tragelaphus spekii*), African Clawless Otter and Spotted-Necked Otter. Source: IUCN Red list

4.3.9 Reptiles and Amphibians

The delta habitat host several reptile and amphibian species. The most commonly seen and well known is the *Python sebae*. The largest size ever found individual of the species approaches or exceed 6m. The snake is not endangered but it currently faces threats from habitat reduction and killing by fishermen when it entangles on the net. The species is however, listed to the Convention of International Trade on Endangered Species (CITES) under Appendix II. Species in this category is not necessarily threatened with extinction, but its trade must be controlled in order to avoid utilization incompatible with their survival.

4.3.10 Alien Invasive Plant Species

Lake Victoria was seriously invaded by the Alien Invasive Plant Species (AIPS), Water Hyacinth, in the year 1994. This is the common invasive plant common in the delta and the open waters. The plant has invaded the channels and in between small channels in the papyrus in the delta. Since its invasion in the Winam Gulf, the vegetation cover of the species has been very dynamic and its management has been very intricate in the gulf. Mass of vegetation is

moved by prevailing seasonal winds from the open waters to the shore areas. Satellite image has been used in this study to illustrate the dynamic nature of Water Hyacinth in the open waters and interface with the delta. The image of 1973 and 1984 show the open waters and interface with delta had no floating vegetation. After the invasion of the lake, a floating vegetation mat is revealed by satellite image of 1995. Perhaps the invasive species might have docked on the shores and around the Sondu Miriu River delta earlier than this period. The presence of the invasive species around the delta is seen to the northern side which is tangent to the mouth of Nyando River delta. Penetration of Water Hyacinth into the delta area of Sondu Miriu is clearly observed in the year 2013 where the species docked at the delta covering the mouth (channels) of the river. Currently, according to satellite image of 2012 (July, 20th) and ground validation, the invasive species surrounds the delta and has penetrated the small channels in the delta up to the hinters of the delta vegetation, on the beach and river. Invasion of the Sondu Miriu Hyacinth cover has serious affected fisheries economy in the project location in delta area and transportation in other places.

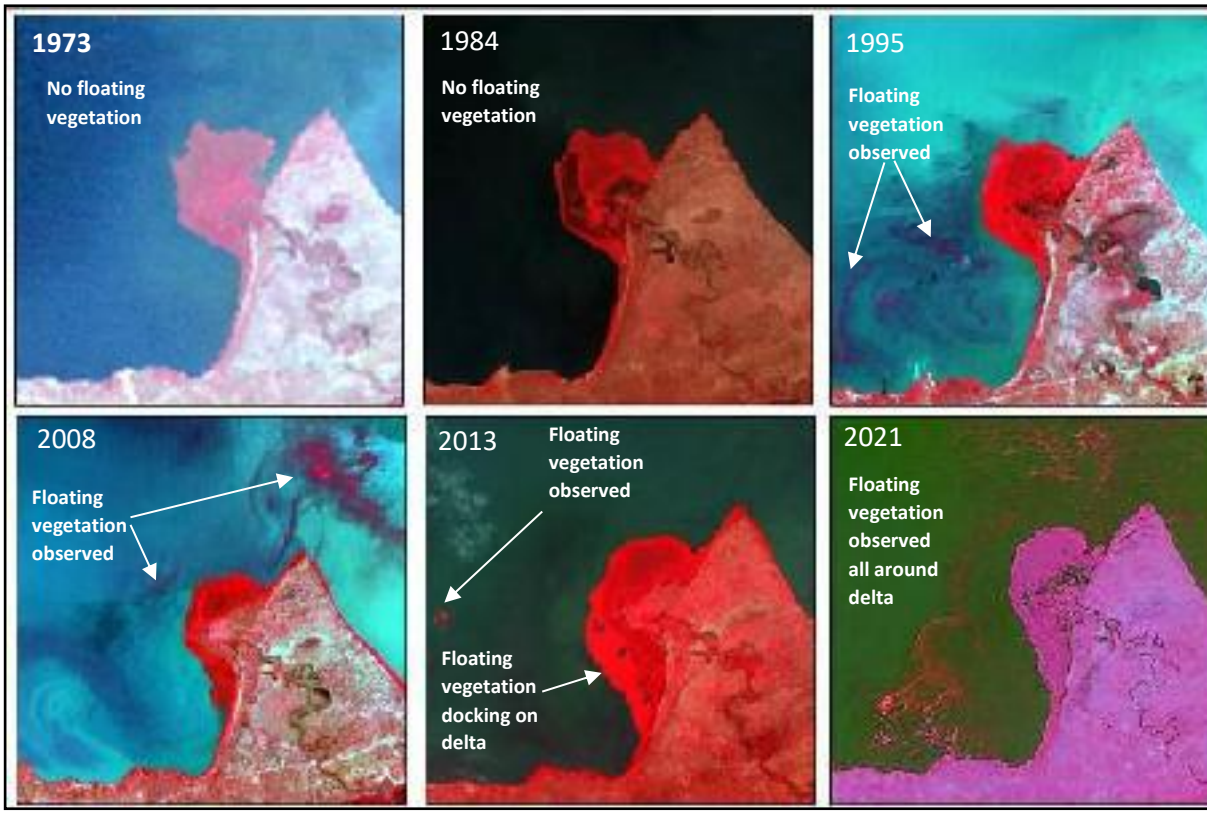


Figure 16: Demonstration of the spread and dynamics of the Alien Invasive Plant Species, Water Hyacinth around the Sondu Miriu River delta

4.3.11 Critical Habitats

Sondu Miriu is listed as an Important Bird Area (IBA) due to declining in habitat conditions. Critical habitats, which are by definitions consist of the protected areas designed to conserve certain characteristics of biodiversity. Critical habitat within the sub basin of Sondu Miriu and in proximity to the proposed project is the South Western Mau located 65 km upstream to the South east of Koguta Wetland. Maragoli Forest Reserve is located 37 km in the north 37 km.

Ruma National Park is 56 km in the south east of the proposed project site. Other protected areas are located far away in the upstream of the proposed project site.

Discussion with the BMU officials and the Sub-Counties Fisheries Officers highlights the gazetted 100m of shoreline for fish breeding area by the Fisheries Department of Kenya. The management of the fish breeding areas in the shoreline is managed by BMU members in coordination with the county fishery department. These areas are regarded as Critical Habitats that support turn-over of fisheries species and the economies.

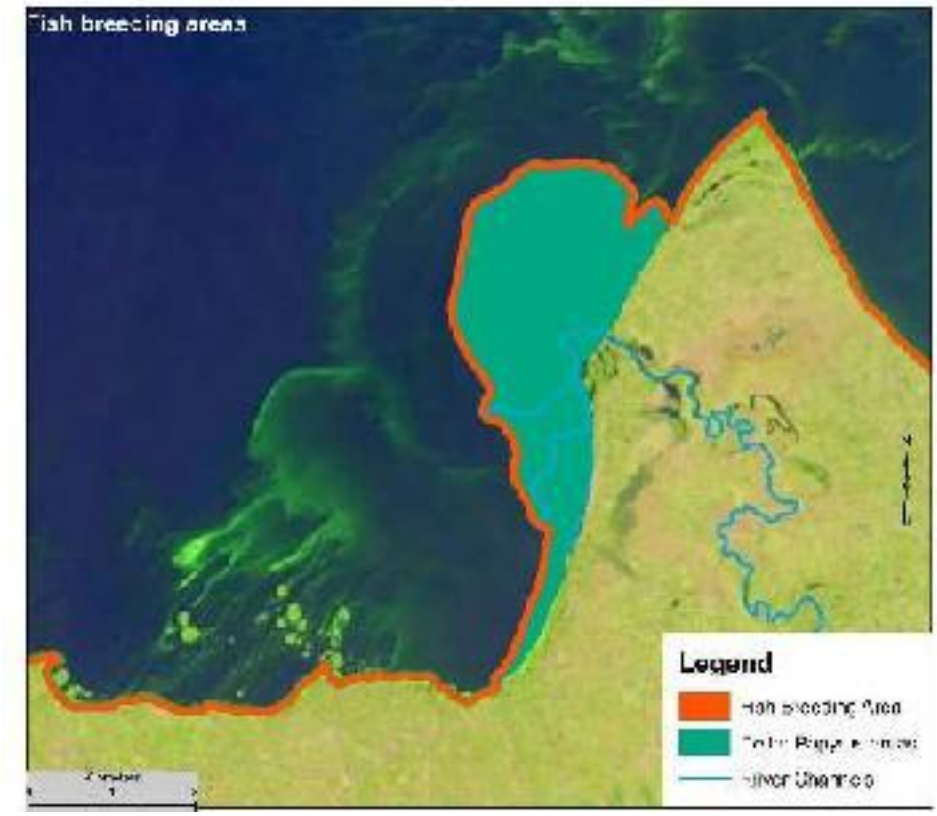


Figure 17: Fish breeding areas around the Sondu Miriu River delta

4.4 The Socio-Economic Survey Results of the Project Area

This section looks at the social terrain of the project area. It focuses on the demographic and socio-economic characteristics of people in the project area with a view to providing a picture of the baseline socio-economic situation. The primary data collected during the socio-economic survey has been used to evaluate the baseline status of the proposed project area community. A total of 38 respondents took part in the socio-economic survey with 22 respondents being drawn from Homa Bay County which had the major part of the project area while 16 respondents came from Kisumu County which had a smaller part of the project area.

4.4.1 Respondents by Gender

Majority of the respondents in the survey were males at 74% while females were at 26%.

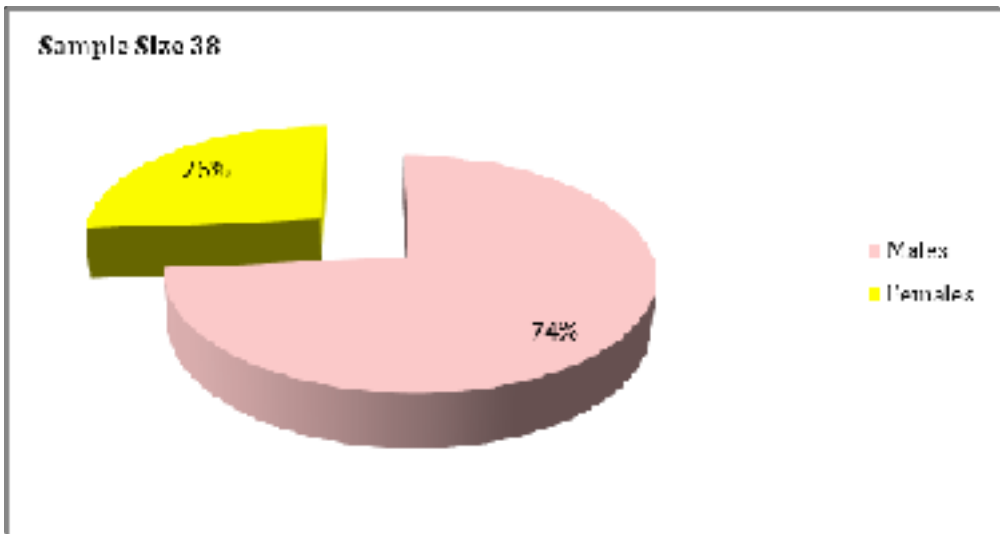


Figure 18: Respondents by gender
Source: *ESIA Study Socio-economic Survey, 2021*

4.4.2 Respondents by Age

Majority of the respondents are in the age bracket of 31- 50 years at 61%, followed by age bracket of 51 – 70 years at 26%. Those who were below the age of 30 years (10%) and over 71 years (3%) were the minority. This shows that the population is still within productive age.

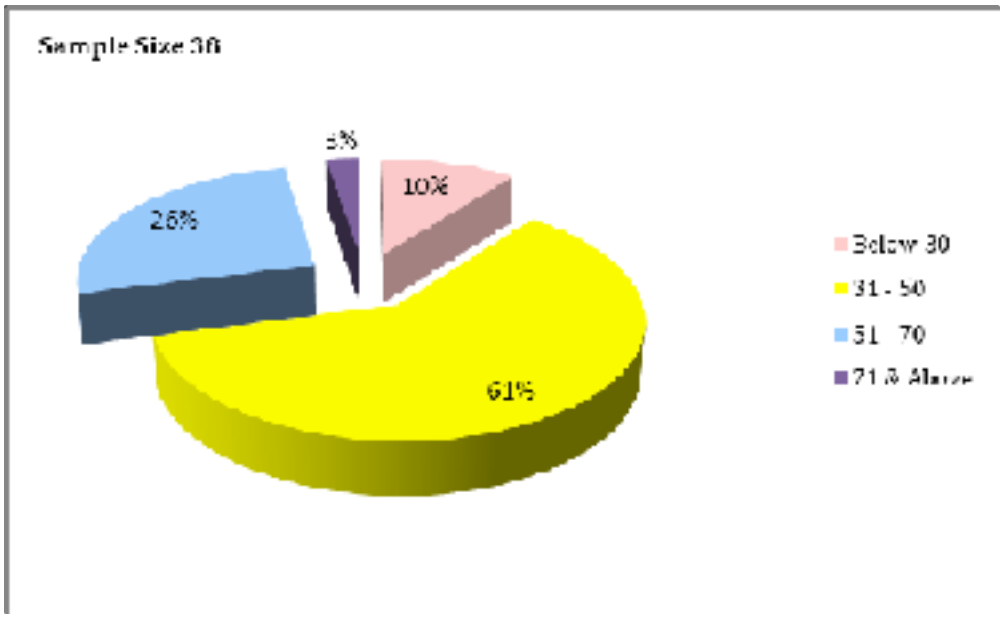


Figure 19: Respondents by age
Source: *ESIA Study Socio-economic Survey, 2021*

4.4.3 Livelihoods

Majority of the population within the area were found to be engaged in fishing at 58% of the respondents. Other sources of livelihoods in the project area includes subsistence farming at 13%, Small scale businesses and trade at 11% and *boda boda* transportation ventures at 10%. Formal employment only accounted for 8% of the respondents.

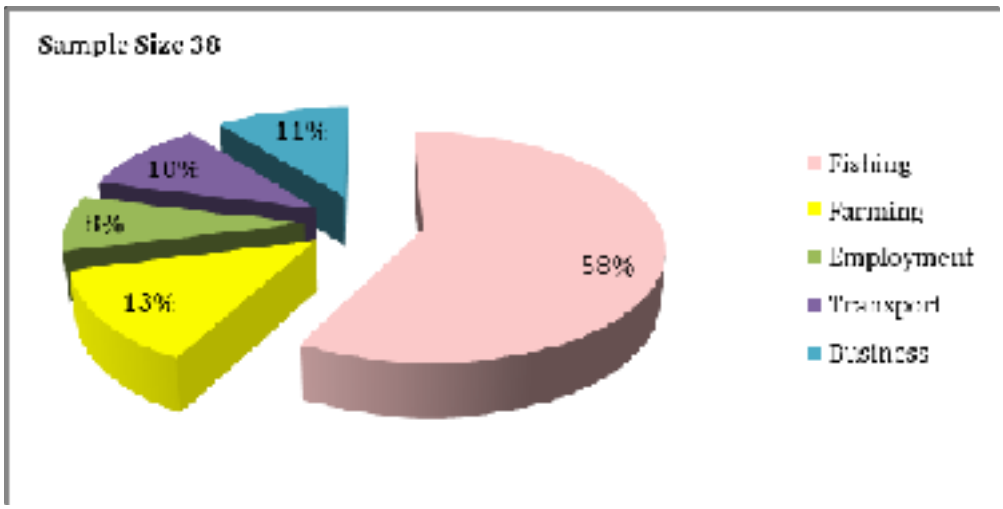


Figure 20: Livelihood in the Project Area
Source: *ESIA Study Socio-economic Survey, 2021*

<u>Impacts of proposed project on livelihoods after dredging</u>

Majority of the population within the area believe that the project will improve their livelihoods after the implementation since currently they are limited in their operations since the majority are fishermen. Others were however non-committal on the effect of livelihood after the project.

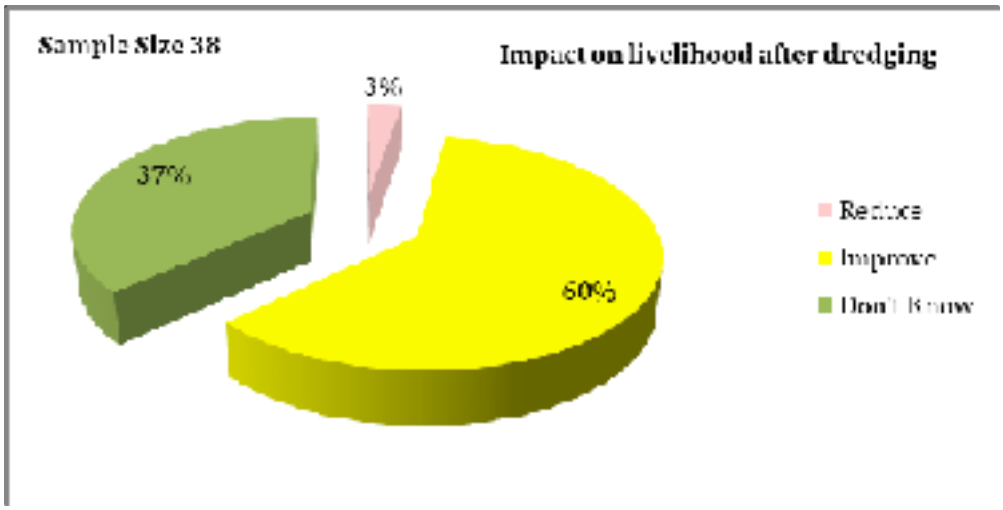


Figure 21: Impacts of proposed project on livelihoods after dredging
Source: *ESIA Study Socio-economic Survey, 2021*

4.4.4 Respondents on Domestic Water Sources

Majority of them draw water directly from the River for domestic use at 34%, followed by access from shallow wells dug within the area at 32% and lake water at 21%. Tap water only accounted for 13% of domestic water use in the area. Impact of the project on surface water quality is therefore critical to the community.

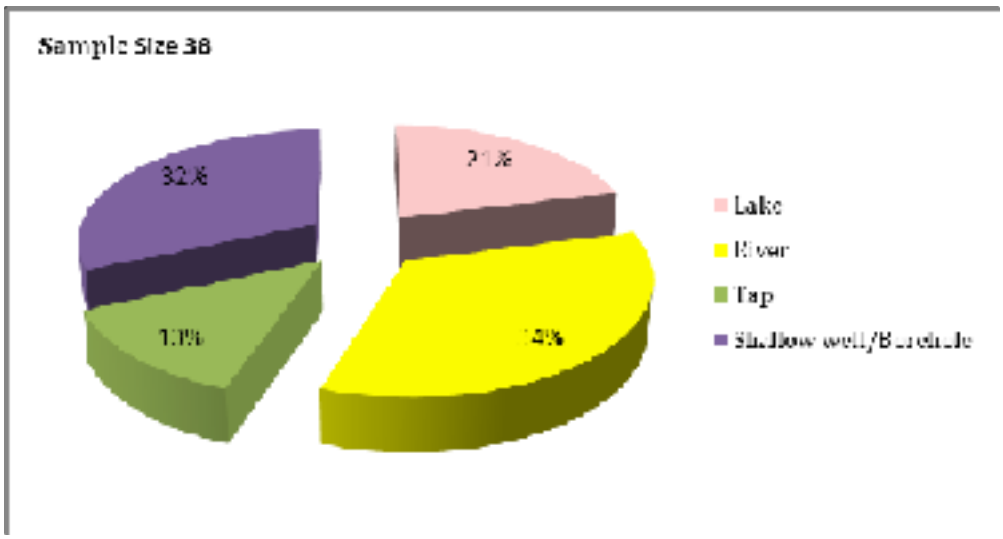


Figure 22: Sources of domestic water in the Project Area
Source: *ESIA Study Socio-economic Survey, 2021*

<u>Water Quality Test Results</u>

Water samples from the two points where the River enters the Lake were collected during the study and submitted to NEMA registered lab for analysis against Water Quality Regulation Third Schedule. Results showed that the two water samples were slightly turbid with good mineral content and may chemically be recommended for domestic use after treatment. The findings of the analysis are attached in **Appendix IX** of this report.

<u>Impact of project activities on access to domestic water sources</u>

When asked about the impact of the proposed project activities on the domestic water sources, majority of the respondents at 37% stated that there will be no impact or could not anticipate any negative impact of the same. However 24% of the respondents anticipated a negative impact on access to the domestic water sources due to the project activities especially during operation of the dredger.

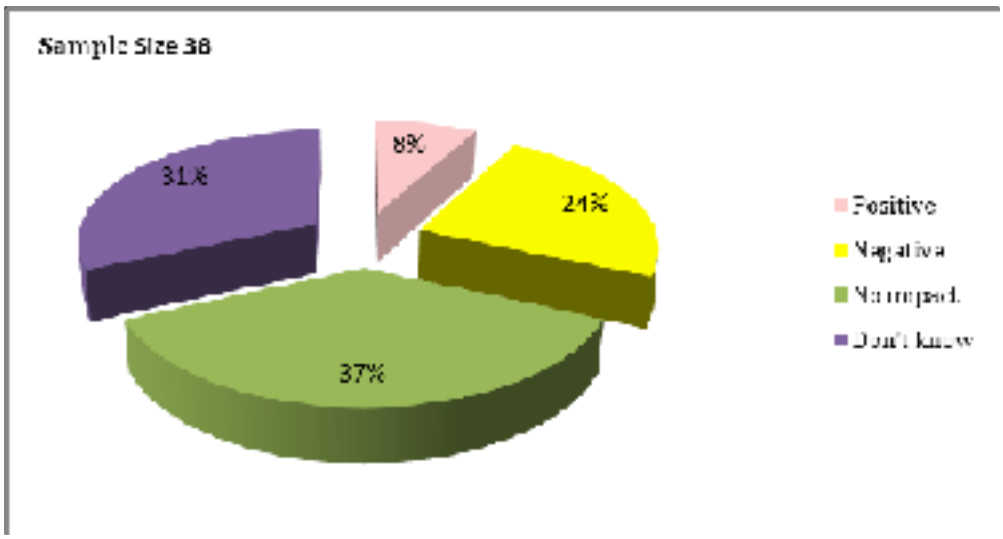


Figure 23: Impact of project activities on access to domestic water sources
Source: *ESIA Study Socio-economic Survey, 2021*

5. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Several laws and regulations that govern environmental and social issues have been developed. The main legislation is the Environmental Management & Coordination (Amended) Act (EMCA) of 2015. The Act emphases that every person in Kenya is entitled to a clean and healthy environment in accordance with the Constitution and relevant laws and has the duty to safeguard and enhance the environment. It also empowers stakeholders to participate in sustainable management of the natural resources. It calls for Environmental and Social Impact Assessment (ESIA) to guide the implementation of environmentally and socially sound decisions. There are other relevant local laws and regulations that have been looked into. They include but not limited to, the Constitution, Mining Act, 2016, the Water Act of 2016, and The County Government Act 2012 among others.

An outline of the legislative, policy and regulatory framework that the proponent will need to observe when implementing this project in order to comply with the environmental and social requirements are mentioned below.

5.1 The Constitution of Kenya

The Constitution of Kenya has taken onboard various issues that are related to environmental management. Article 42 of the Bill of Rights contained in the Constitution provides that 'every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures.

The need to establish systems of environmental impact assessment, environmental audit and monitoring of the environment and public participation is provided in Article 69.

5.2 The National Policy Framework

The Republic of Kenya has a policy, legal and administrative framework for environmental and social management. The broad objectives of the policy are: -

- To ensure optimal use of natural resources while improving environmental quality.
- To conserve natural resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same.
- To develop awareness that inculcates environmental stewardship among the citizenship of the country.
- To integrate environmental conservation and socio-economic aspects in the development process.
- To ensure that national environmental and social goals contribute to international obligations on environmental management and social integrity.

To achieve the above policy objectives, it is a policy directive that appropriate reviews and evaluations of all forms of developmental project plans and operations are carried out to ensure compliance with the environmental policy and legal frameworks.

The following section provides details on the relevant policies in the country.

5.2.1 Environment and Development (Sessional Paper No. 6 of 1999)

Kenya's policy paper on the Environment and Development was formulated in 1999. The policy defined approaches that will be pursued by the Government in mainstreaming environment into development. The policy harmonized environmental and developmental objectives with the broad goal of achieving sustainable development. The policy paper also provided guidelines and strategies for government action regarding environment and development. In regard to wildlife, the policy reemphasized government's commitment towards involving local communities and other stakeholders in wildlife conservation and management, as well as developing mechanisms that allow them to benefit from the natural resources occurring in their areas. The policy also advocated for the establishment of zones that allow for the multiple use and management of wildlife. This policy is relevant to the proposed development project in view of the potential impacts on the environment and involvement of the public in project planning.

5.2.2 Sessional Paper No. 10 of 2014 on the National Environment Policy

The policy seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also recommends strong institutional and governance measures to support achievement of desired objectives and goals.

5.2.3 The National Biodiversity Strategy of 2000

The National Biodiversity Strategy and Action Plan (NBSAP) was formulated to enable Kenya address national and international commitments defined in Article 6 of the Convention on Biological Diversity (CBD). The strategy is a national framework of action for ensuring that the present rate of biodiversity loss is reversed, and present levels of biological resources are maintained at sustainable levels for posterity.

The general objectives of the strategy are to conserve Kenya's biodiversity; to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders; and to enhance technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation. The proposed project will need to comply with the requirements of this strategy since the project may lead to loss of biodiversity at the delta.

5.2.4 Sessional Paper No. 3 of 2009 on National Land Policy

The Land Policy in Kenya is guided by the environmental management principles which are aimed at restoring the environmental integrity through introduction of incentives and encouragement of use of technology and scientific methods for soil conservation, among others. The policy further requires fragile ecosystems to be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. The policy also requires zoning of catchment areas to protect them from degradation and establishment of participatory mechanisms for sustainable management of fragile ecosystems. The policy also called for development of procedures for co-management and rehabilitation of forest resources while recognizing traditional management systems and

sharing of benefits with contiguous communities and individuals. Lastly, all national parks, game reserves, islands, front row beaches and all areas hosting fragile biodiversity are declared as fragile ecosystems under the policy.

The policy recognizes that sustainable management of land based natural resources depends largely on the governance system that defines the relationships between people, and between people and resources. To achieve an integrated approach to management of land-based natural resources, all policies, regulations and laws dealing with these resources need to be harmonized with the framework established by the Environmental Management and Coordination Act (EMCA Cap 387).

The policy also addresses land management on ecosystem protection (including wetlands). Measures for protection are required for fragile ecosystems. The policy also calls for the protection of watersheds, lakes, drainage basins and wetlands. The policy prohibits settlement and agricultural activities in water catchment areas and calls for identification, delineation and gazettement of all water courses and wetlands.

5.2.5 Wildlife Policy of 2011

The wildlife policy is aimed at promoting protection and conservation of wildlife in Kenya, both in protected and non-protected areas. The policy is implemented by the Kenya Wildlife Service (KWS). The proposed dredging project will need to be consistent with this policy. Where wild animals will be disturbed during dredging within the delta, appropriate mitigation measures must be implemented to minimize disturbance to wildlife.

5.2.6 Wetlands Policy of 2013

The wetlands policy is intended to promote protection of wetlands in Kenya. The policy sets out strategic measures for the protection of existing wetlands in Kenya. The proposed project has potential of impacting Koguta Wetland (Sondu Miriu Delta). It would be important to undertake appropriate mitigation measures to minimize or avoid degradation of wetlands.

5.2.7 Occupational Health and Safety Policy of 2012

This policy is intended to protect safety and health of workers in work places. The proposed dredging and sand harvesting project will provide employment opportunities to many workers in various categories. The proponent will be expected to comply with the requirements of this policy when engaging workers in various activities. The environmental management provides mitigation measures that can be undertaken to ensure compliance with the requirements of this policy.

5.2.8 The Kenya National Climate Change Response Strategy of 2010

This strategy provides measures that the Government of Kenya is taking to address issues related to the impact of climate change on various sectors of the economy. The proposed dredging and sand harvesting project will need to take onboard the effects of changing climate in the country and apply applied climate change mitigation measures.

5.3 Environmental Guidelines

In line with the Kenyan Constitution, NEMA has developed a number of guidelines which are part of a series of environmental management tools for environmental management under the

Environmental Management and Coordination Act, CAP 387 of the Laws of Kenya. Below is a highlight of the key project relevant guidelines;

5.3.1 National Solid Waste Management Strategy, NEMA, 2014.

NEMA developed the National Solid Waste Management Strategy in 2014 as a framework for implementing the Vision 2030 flagship project. The Strategy establishes a common platform for action between stakeholders to systematically improve waste management. It introduces a new approach for improved waste management in Kenya to create wealth, employment and reduce pollution of the environment. The proposed dredging and sand harvesting project is anticipated to produce waste; the proponent will be required to manage waste as guided by this strategy but in line with Waste Management regulations of 2006 and other relevant legislative frameworks. In general, the project proponent should ensure waste management activities are 7R oriented, by Reducing; Rethinking; Refusing; Recycling; Reusing; Repairing and Refilling waste.

5.3.2 Technical guidelines on the management of used oil and oil sludge in Kenya (NEMA, 2014)

The main objective of the guidelines is to ensure effective and efficient collection and transportation systems for used oil. These guidelines target government agencies (responsible for decision making, formulating policies and enforcing health and safety aspects of used oil and oil sludge management in the country), small generators, bulk generators of used oil and oil sludge, garages, used oil treatment plants, recycling and disposal facilities, and other interested stakeholders. The Proponent is envisioned to use dredger machinery which will require servicing hence producing used oil. These guidelines provide direction on safe management of used oil and oil sludge in Kenya and are a main regulatory reference material for management of used oil in Kenya and hence will be used as a key reference point to create awareness on hazards associated with handling used oil and to provide guidance on infrastructure for management of used oil.

5.3.3 National sand harvesting guidelines, 2007

These Guidelines apply to all sand harvesting activities in Kenya. This is deemed key to ensure sustainable utilization of the sand resource and proper management of the environment.

a) The Guidelines establish the Technical Sand Harvesting Committee (TSHC) whose main mandate is to be responsible for the proper and sustainable management of sand harvesting within the County, designate sand harvesting sites, ensure that sand dams and gabions are constructed in designated areas, designate sand transportation roads, ensure EIA/EA are undertaken, undertake dispute resolution, fix minimum sand prices, monitor restoration of sites and allocate areas to the Riparian Resource Management Association (RRMA).

b) The Guidelines further establish a Riparian Resource Management Association (RRMA) which comprises community leaders with the mandate to require EIA before sand harvesting operations start, annual environmental audits, sustainable management, provide access to sites, collection of revenues to be employed in rehabilitation of sites and revenue sharing with the community.

c) It places responsibilities on sand dealers and transporters to comply with the Guidelines and the law.

d) It identifies the social impacts of sand harvesting and bans child labour, requires fair wages, the organization of loaders for self-regulation and establishes a revenue sharing mechanism.

e) It requires sand harvesting to occur in designated areas only and under an environmental management plan.

f) The said guidelines provide for Farm, Lakeshore/Seashore and Riverbed sand harvesting as follows: it shall not exceed six (6) feet in depth, on-farm sand harvesting must be carried out at designates sites with a buffer zone of at least 50 metres from the riverbanks or dykes for, restoration will be undertaken concurrently with harvesting and under guidance from the Technical Sand Harvesting Committee, open-cast harvesting is recommended and underground tunneling must employ appropriate extraction technology to safeguard human safety.

g) Riverbed sand harvesting is banned on riverbanks, must be carried out in designated sites, must retain adequate reserves of sand to ensure water retention and maintain a buffer zone of 100 metres from any infrastructure.

h) The Guidelines require any person who wishes to remove and/or transport sand to obtain a written approval from the District Environment Officer, NEMA.

i) The Guidelines bar harvesting or transporting sand during the night.

It is expected that the Proponent's dredging and sand harvesting activities will be conducted in line with respective legal requirements and guided by these sand harvesting guidelines.

5.4 National environmental legal framework

The Republic of Kenya has numerous statutes that guide environmental management and conservation in the country. Most of these statutes are sector specific and cover a wide range of issues including public health, soil conservation, protected areas conservation, endangered species, public participation, water rights, water quality, air quality, excessive noise control, vibration control, land use, among others. The relevant legislations are described in the following sections.

5.4.1 Environmental Management and Coordination Act (EMCA, Cap 387)

Part II Article 3 of EMCA, Cap 387 states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. To achieve this goal, the projects listed under the Schedule No. 2 of EMCA must be subjected to Environmental Impact Assessment (EIA). The aim of EIA is to reduce negative environmental outcomes of the listed projects by implementing mitigation measures. The proposed project falls within the Second schedule and must therefore comply with EMCA requirements in as far as EIA is required. There are several other regulations that have been formulated within the framework of EMCA, that are applicable to the proposed project.

Under EMCA, NEMA has gazetted legal tools that govern conduct of EIAs and general environmental protection. The Proposed dredging and sand harvesting project has been screened against these tools with results outlined below.

5.4.1.1 EMCA (Environmental Impact Assessment and Audit) Regulations, 2019

189. The Environmental (Impact Assessment and Audit) Regulations provides ESIA process for preparation of the EIA Project or Study Reports that have to be submitted NEMA for review and issuance of EIA License. The regulations provide details on the aspects to be evaluated and ESMPs and Monitoring plans to be prepared. The proposed project must comply with the requirements of the regulations that also include conducting regular monitoring and annual audits. The project requires an EIA license from NEMA before commencement of any activity

5.4.1.2 EMCA (Water Quality) Regulations, 2006

The EMCA (Water Quality) Regulations, 2006 apply to water used for domestic consumption, industrial, recreation, fisheries, wildlife and irrigation, among others. The proposed project will need to comply with the requirements of this regulation to ensure water sources of the lake and river are protected from pollution. The regulation prohibits pollution of water bodies and requires that all substances discharged into the water bodies should meet the effluent discharge standards set under the Third Schedule of the regulation.

5.4.1.3 EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006

The EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006 provides that no person shall engage in any activity that may have an adverse impact on any ecosystem; may lead to the introduction of any exotic species or to unsustainable use of natural resources, without an Environmental Impact Assessment License issued by the Authority under the Act. The regulation requires NEMA in consultation with the relevant lead agencies, to impose bans, restrictions or similar measures on the access and use of any threatened species to ensure its regeneration and maximum sustainable yield. The proposed dredging and sand harvesting project is in a sensitive ecosystem which will need to be protected as per the requirements of this regulation.

5.4.1.4 EMCA (Waste Management Regulations, 2006)

The Waste Management Regulations are basically aimed at streamlining the handling, transportation and disposal of various types of wastes. The broad goal of the regulations is to protect human health, wildlife and the environment. The regulations will be critical during the dredging exercise when various dredged materials and other wastes will be generated. Since there will be both ordinary and hazardous (used oil and hydraulic fluid) wastes generated, the Proponent will be expected to engage a NEMA registered/approved waste collection firm to manage the transportation and disposal of waste.

5.4.1.5 EMCA (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009

The Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009 applies to all wetlands in Kenya whether occurring in private or public land.

The objectives of the regulations are to provide for the conservation and sustainable use of wetlands and their resources. The project area will be near Koguta Wetland. This is considered valuable wetland that needs to be protected.

5.4.1.6 EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

This regulation prohibits generation of excessive noise and vibration in habited areas. These Regulations determine the level of noise that will permissible in particular during the dredging process, the following factors will be considered:

- Time of the day;
- Proximity to residential area;
- Whether the noise is recurrent, intermittent or constant; and
- The level and intensity of the noise;

5.4.1.7 EMCA (Air Quality) Regulations, 2014

The objective of this regulation is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles). The Proponent will be required to observe the limits for Air Quality as provided in:

Schedule 1 – Ambient Air Quality Tolerance Limits

5.4.2 Mining Act, 2016

The Mining Act establishes a licensing regime which confers mineral rights to large scale, small scale and artisanal miners. The first two have different licenses for different phases of mining operations which are issued by the Cabinet Secretary on the advice of the Mineral Rights Board. The licenses have conditions that incorporate technical, reporting, local content, safety, environmental and other terms that must be complied with. Artisanal mining is authorized by the County Director of Mines on the recommendation of the Artisanal Mining Committee.

By virtue of Legal Notice No. 67 of 2017 and s. 6 (1) of the Mining Act, sand is vested in the government like other natural resources such as fisheries, minerals, geothermal resources, renewable energy sources, water and public forests. Under the Mining Act sand is vested in the government despite the ownership of the land where it is found. This is consistent with the Constitution and particularly Article 62(3) which vests minerals in the national government.

The Proponent will need to obtain sand harvesting/mining license from the government.

5.4.3 The Fisheries Management and Development Act, 2016

The Fisheries Management and Development Act provides the framework for the development, management, exploitation, utilization and conservation of fisheries and for connected purposes.

The project area is located off the shores of Lake Victoria, which supports a thriving fishery and local livelihoods.

The Proponent will have to implement measures to minimise pollution of the lake by dredging activities which would degrade water quality and affect fisheries.

5.4.4 The Wildlife Management and Conservation Act 2013

The Wildlife and Conservation Act deals with the conservation and management of wildlife in Kenya. The Act provides that wildlife should be conserved to yield optimum returns in terms of cultural, aesthetic, scientific and economic benefits. The Act requires that full account be taken of the interrelationship between wildlife conservation and land use. The Act controls activities within the national parks, which may lead to the disturbance of wild animals. Unauthorized entry, residence, burning, damage to objects of scientific interest, introduction of plants and animals and damage to structure are prohibited under this law.

The proposed dredging and sand harvesting project is located in a wildlife rich area including hippos, birds and other herbivores.

5.4.5 The Water Act 2016

The Water Act No. 43 of 2016 was assented to on 20th September 2016. The new Act repealed the water Act 2002. The Act provides for the establishment of the Water Resources Authority (WRA) who have the responsibility to regulate the management and use of water resources. The Act provides for the regulation, management and development of water resources and water and sewerage services in line with the Constitution. The enactment of this law aimed at aligning national water management and water services provision with the requirements of the Constitution of Kenya 2010 particularly on the devolving of water and sanitation services to the county governments.

The Act stipulates that a permit shall be required in all cases of proposed diversion, abstraction, obstruction, storage or use of water, with minor exceptions relating to use for domestic purposes (Section.36). A person shall not throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.

5.4.6 The County Governments Act 2012

The promulgation of the 2010 Constitution brought about devolution and the setting up of County Governments. This Act provides for the roles and functions of the County Government. The County Government will be in charge of all development activities within the County, as such will be a major stakeholder for the proposed project. The Proponent will be expected to carry out implementation of the project in consultation with the County Government of the respective counties of Homa Bay and Kisumu.

5.4.7 Occupational Safety and Health Act 2007

The Act provides for protection of workers during the dredging exercise. This Act will provide some of the mitigation measures for any negative impacts in particular those concerning the workers within the dredging area. Section 17 of the Act further highlights the importance of an employer or in this case the Proponent to ensure the health and safety of persons other than his/her employees. As such this Act also ensures the inclusion of community health and safety in this ESIA.

5.4.8 The Public Health Act (Chapter 242) of Revised Edition 2012

The Public Health Act (Chapter 242) is an Act of Parliament that provides for securing and maintaining good health of citizens. The Act contains directives that are focused on ensuring protection of human health. There are provisions within the Act that deal with water, air and noise quality as they pertain to human health.

An environmental nuisance includes the emission from premises of waste waters, gases and smoke which could be regarded as injurious to health. The owner and/or occupier of premises responsible for such nuisances are liable to prosecution under the Act. The proposed dredging and sand harvesting project has potential pollution risks related to water and air. The Proponent will need to ensure that air and water pollution is controlled and does not affect people living around the project area.

5.4.9 The Environment and Land Court Act, 2011

This is an Act of Parliament to give effect to Article 162(2) (b) of the Constitution to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of land. The Environment and Land Court is one of the Courts contemplated by article 162(2). It is a Superior Court and has the same status as the High Court. The court is established under section 4 of the Environment and Land Court Act No. 19 of 2011. It has jurisdiction to hear any other dispute relating to environment and land.

The jurisdiction of the court is provided under section 13 of the Act. The Court has original and appellate jurisdiction to hear and determine all disputes in accordance with Article 162(2) (b) of the Constitution and with the provisions of the Act or any other written law relating to environment and land. The court has powers to deal with disputes relating to land administration and management. The court is also empowered to hear cases relating to public, private and community land and contracts or other instruments granting any enforceable interests in land. The court also exercises appellate jurisdiction over the decisions of subordinate courts or local tribunals in respect of matters falling within the jurisdiction of the Court. The court further exercises supervisory jurisdiction over the subordinate courts, local tribunals, persons or authorities in accordance with Article 165(6) of the Constitution.

5.4.10 Community Land Act 2016

The Community Land Act, No. 27 of 2016 came into force on 21 September 2016. The Act aims at: 1. Giving effect to Article 63 of the Constitution of Kenya, 2010 which provides for a classification of land known as community land. To this end, the Constitution provides that community land shall vest in and be held by communities. 2. Providing for;

- The recognition, protection and registration of community land rights.
- The management and administration of community land.
- The role of county governments in relation to unregistered community land and related matters.

The Act repeals the Land (Group Representatives) Act (Chapter 287 of the Laws of Kenya) and the Trust Lands Act (Chapter 288 of the Laws of Kenya). This project shall uphold the requirement of all the relevant land legislations, involving key administrative stakeholders and the affected parties (i.e. the community) facilitating in coexistence with the surrounding

community. Most of the land within the delta is community land. Community consultations and consent will be critical during the dredging period.

5.4.11 The National Land Commission Act, 2012 (No. 5 of 2012)

The National Land Commission of Kenya is an independent government commission whose establishment was provided for by the Constitution of Kenya to, amongst other duties, manage public land on behalf of the national and county governments, initiate investigations into present or historical land injustices, recommend appropriate redress, monitor and have oversight responsibilities over land use planning throughout the country. It was officially established under The National Land Commission Act, 2012.

The mandate of the National Land Commission is drawn from the National Land Policy of 2009, Constitution of Kenya 2010, National Land Commission Act, 2012, the Land Act 2012 and the Land Registration Act of 2012. Under the National Land Commission Act, the Commission shall among other duties monitor the registration of all rights and interests in land and ensure that public land and land under the management of designated state agencies are sustainably managed for their intended purpose and for future generations. Also, the commission is required to manage and administer all unregistered trust land and unregistered community land on behalf of the county government and develop and encourage alternative dispute resolution mechanisms in land dispute handling and management. The Commission is also required in consultation and cooperation with the national and county governments, to establish county land management boards for the purposes of managing public land. This Act is extremely important since the project area is in default management of the NLC.

5.4.12 The Kenya Maritime Authority Act, 2012

KMA under the Incorporation Order is responsible for Port and Flag State implementation of various international instruments relating to maritime transport.

The Regulatory role of KMA therefore aims to broaden and modernize the institutional and legal framework for the implementation of maritime safety, security and the preservation of the aquatic environment. These dredging works have safety implications on navigation at the water body as well as potential pollution which KMA has a direct oversight obligation as follows:

- National maritime legislation i.e. the KMA and the Merchant Shipping Acts remain the primary tools for attaining international standards in safety and security and the preservation of the marine environment. Only through such regulations can the Government enforce international maritime conventions, especially those emanating from the International Maritime Organization (IMO). Such rules and regulations are also relevant for the implementation of national maritime safety, security and marine environment conventions /programmes.
- KMA is the designated national competent oil spill authority responsible for the development and provision of guidelines for the management of oil spills in the maritime environment. Under Section 5 (i) of the Act, KMA is required to enforce safety of shipping, including compliance with construction regulations, maintenance of safety standards and safety navigation rules.

6. CONSULTATION AND PUBLIC PARTICIPATION

6.1 Overview

The need for public involvement in development projects is in the Constitution particularly pertinent in the context of Article 35 of the Constitution of Kenya which, provides that 'every citizen has the right of access to information held by the state; and information held by another person and required for the exercise or protection of any right or fundamental freedom'. This is further set out in EMCA 1999 (Amended 2015). Community consultation and participation ensures that project stakeholders are part and parcel of the proposed development and in so doing ensures the sustainable management of resources. Evidence shows that projects that are subjected to a consultative and public participation process acquire higher level of acceptance and accrue benefits to a wider section of the society.

6.2 Aim of the Stakeholder Consultations

The aim of the public consultation process was to:

- Inform all the stakeholders about the proposed project and carry out public sensitization on the project, provide information on the potential impacts and proposed mitigation measures to eliminate or reduce these impacts;
- Collect additional socio-economic baseline data/information on the project area environment;
- Provide an opportunity to all the stakeholders in the project area to give comments, raise issues and concerns pertaining to the proposed project and allow for the identification of project alternatives, mitigations and implementation strategies and recommendations;
- Emphasize the importance of having all stakeholders being involved in the project implementation process.

6.3 Consultation Methodology

Questionnaires were prepared and administered to the public and to institutions identified during mapping of stakeholders. Stakeholder consultations were carried out between Friday 9th July, 2020 and Thursday 22nd July, 2021. Copies of the filled questionnaires are annexed to this report under **Appendix V**.

The study employed three main methods of consultations to get the data presented in this report. These are:

- Meetings and discussions with Key Stakeholders;
- Questionnaire administration and interviews;
- Convening of Public Consultation Meeting within the project area.

6.4 Focus Group Discussions (FGDs) and Public Consultation Meetings (PCMs)

Due to the COVID -19 pandemic, the consultant had put in place safety and precautionary measures to ensure the safety of both experts and the project stakeholders. This was guided by the NEMA guidelines on conducting of public consultation for EIA, EA and SEA during the pandemic.

The venues of the meetings were identified around the project area; where a total of 2 FGDs and 3 PCMs were carried out during the study process as shown in the table below:

Table 2: FGDs and PCM's schedule

#	Venue	County	Target Group	Date
1.	Rakwaro Chief's Camp	Homa Bay	FGD for Lead agencies	Fri, 9th July 2021
2.	Rakwaro Chief's Camp	Homa Bay	PCM for Wangchieng' Location	Wed, 14th July 2021
3.	West Nyakach Community Hall	Kisumu	PCM for West Nyakach and Thurdibuoro Locations	Wed, 19th August 2020
4.	Kobuya Chief's Office	Homa Bay	PCM for Kobuya Location	Wed, 21st July 2021
5.	Rakwaro Chief's	Kisumu	FGD for Lead agencies	Thur, 22nd July 2021

The meetings were facilitated by the Chiefs and Assistant Chiefs of the area where the project was to be implemented.

Minutes of the discussions at the FGDs and PCMs were recorded and form part of this ESIA Study Report. During the meetings, the proposed project was elaborated to the participants through a presentation that was conducted in Kiswahili to ensure participants understood all the issues related to the project. An interactive questions and answers session took place during the PCM immediately after the presentation on the proposed project. Participants finally filled in feedback forms/questionnaires. The questionnaires have been included in **Appendix V** while Minutes of Public Consultation Meeting and attendance register are provided in **Appendix IV**.

Plate 6: FGD with Lead Agencies on 9th July 2021

Plate 7: Site Visit with Lead Agencies on 9th July 2021

Plate 8: PCM for Wangchieng' Location Homa Bay County

Plate 9: PCM for West Nyakach and Thurdibuoro Locations in Kisumu County

Plate 10: PCM at Kobuya Location in Homa Bay County

6.4.1 Consulted Parties

The respondents were identified through simple random sampling technique. Most of those interviewed were also victims of the perennial flooding within the lower Sondu Miriu River and had prior knowledge of the proposed project. The public survey focused around economic, social, safety, health, environmental and welfare issues. Those interviewed were welcoming of the project since in their opinion, the project will create reduce the flooding of their lands currently experienced in the area in addition to improving their livelihood since most of them are fishermen and depend on access to the lake.

6.4.2 Summary of Responses

This section presents a brief compilation of the responses obtained from those interviewed.

6.4.3 Perceived Positive Impacts

Respondents acknowledged that the project will have some positive impacts which they enumerated as below:

- Improved navigation within the lake and the river;
- Control flooding in Sondu Miriu River Delta;
- Improved social amenities i.e. schools and hospitals due to reduced flooding;
- Creation of temporary employment;
- Increased living standards through economic empowerment;
- Reduced deaths and water borne diseases;
- Improved education since students can now attend school during long rains;
- Economic empowerment from sand harvested;
- Farming and other economic activities can resume uninterrupted by floods; and

- Reduced flooding hence minimizing human wildlife conflict due to the migration of wildlife during flooding

6.4.4 Perceived Negative Impacts

Majority of the people whose opinion was obtained during the ESIA consultations had no objection to the implementation of the project but agreed that the project has potential gains and costs. The negative impacts perceived by respondents have been highlighted in the subsequent section.

- Increased oil spillages leading to water pollution during the servicing of the dredger;
- Increased cases of COVID 19 and STIs due to increased interaction;
- Civil unrest-competition in sharing of revenue between the two counties;
- Increased water turbidity leading to extinction of certain animal and fish species;
- Foreign interference with the community members;
- The project will affect breeding sites and fish breeding patterns;
- Vibration from the machines will make fish travel far away this will reduce the daily livelihood of the area;
- Increased school drop outs due to availability of jobs;
- Interference with the natural habitats e.g. the catfish which thrive so well in muddy environment; and
- Air pollution from the smoke emitted from the dredging machine.

The respondents urged the proponent to look into the following issues to mitigate the negative impacts of the project:

- Ensure regular service of the dredger and the waste oil to be collected by a NEMA licensed oil transporter;
- Adhere with the fisheries Act;
- Create a taskforce and work with key stakeholders;
- Use the silt dredged to fill in the galleys created during sand harvesting to reclaim back the land;
- Only operate during the day with minimal noise;
- Building dykes to act as a long term solution to the floods;
- CSR of the road network and the affected schools from revenue that will be generated from sand;
- More sensitization to the community members about the proposed project;
- Ensure the fish breeding grounds are protected; and
- Sand harvested should be used to benefit the community

The table overleaf presents an analysis of some of the Key Stakeholder Questionnaires and PCM Feedback Forms. The Key Stakeholders and Feedback Forms filled in by PCM respondents are placed in **Appendix V.**

Table 3: Analysis of Stakeholder and PCM Participant's Feedback

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
1	Cosmas Ouma	Homa Bay County Government	27167280	0712022946	Environment officer	**Positive aspects** • Improved navigation within the lake and the river • Control flooding in Sondu Miriu River • Improved social amenities i.e. schools and hospitals due to reduced flooding **Concerns** • Increased oil spillages during servicing of the dredger • Increased cases of COVID 19 due to increased interaction and STIs • Civil unrest-competition in sharing of revenue from the two counties **Suggestions** • Ensure regular service of the dredger and the waste oil to be collected by a NEMA licensed oil transporter • Adhere with the fisheries Act
2	Donald Koech	Rachuonyo North Sub County	-	0724592852	SNR Assistant County Commissioner	**Positive aspects** • It will lessen the impacts of floods in the area **Suggestions** • Ensure the community is well sensitized.
3	George Okoth	Homa Bay County Fisheries	-	-	County Director of Fisheries	**Positive aspects** • It will improve navigation of fishing boats; • It will make landing at the beach by boats easier. **Suggestions** • Identify proper site for disposal of dredged materials; • Engage local non skilled labourers.

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
4	Benta A. Moses	Kobuya Primary School, Homa Bay County	9794466	0724365895	Head Teacher	**Positive aspects** • Reduced flooding; • Will reduce displacement of communities to occupy school compound; **Suggestions** • The byproducts should be used to build schools and other amenities; • Involve the community.
5	Peter A. Obilo	Kobala Primary School, Homa Bay County	13811962	0725980241	Head Teacher	**Positive aspects** • Reduced flooding; • Will reduce displacement of communities to occupy school compound; **Suggestions** • The byproducts should be used to build schools and other amenities; • Involve the community.
6	Walter N. Owino	Osodo Primary School	6371218	0723951938	Head Teacher	**Positive aspects** • Reduced flooding; • Will reduce displacement of communities to occupy school compound; **Suggestions** • Harvested sand should be used to backfill the gullies; • Construct classrooms, pit latrines and safe water points.
7	Wyckliffe Raore Otieno	Sangorota Health Centre	25236201	0726461589	In-Charge	**Positive aspects** • Reduced water bourne diseases; • It will ensure roads are passable and social amenities are accessible; **Suggestions** • Improve road network in the area;

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• The community should be able to benefit.
8	Steve Oyoga	Chuowe Dispensary	27078430	0711210231	Nurse In Charge	**Positive aspects** • Reduced flooding; **Suggestions** • Construct public toilet to manage fecal-oral infections.
9	Daniel Gaya Onyango	Osodo Mixed Secondary School	16092975	0721467540	Principal	**Positive aspects** • Reduced flooding; • Will reduce displacement of communities to occupy school compound; **Suggestions** • Use the harvested sand within the community to benefit them; • Use local labour.
10	Daniel O. Okuta	Rachuonyo North Sub County Fisheries	22421905	0729580162	Fisheries Officer	**Positive aspects** • Conserve the ecology of the lake; • Create jobs for the locals; • Enhance movement of larger vessels in the area; • The project will help minimize environmental degradation of the lake. **Suggestions** • Carry out water quality analysis;
11	Philip Juma Baraza	Kengen, Sondu Miriu Hydropower Station	21192463	0724455061	Chief Environmental Scientist – Western Region	**Positive aspects** • It will improve navigation; • Reduce sediment load; • Provide temporal jobs; • Mitigate perennial floods.

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						Suggestions • Adhere to the provisions of the National Sand Harvesting Guidelines, 2007; • County governments to replicate dredging along upper Sondu Miriu River, promote conservation and enhance awareness on sustainable land use practices.
12	Damiacus osano	Kobuya East	12505876	0721553899	Chief	**Positive aspects** • Dip water will provide space for aquaculture • Reduce migration to higher grounds during flooding • Will stop crops from being submerged during floods **Concerns** • Might kill animals inside the water • Increased water turbidity for the animals • Will interfere with alluvial soil **Suggestions** • Experts should be brought on board
13	Pancras oyieng’	Kobuya East	6008282	0726012742	SNR. Ass. Chief	**Positive aspects** • Reduced overflow /flooding in the surrounding • Universal gain without discrimination from all negative effects • Creation of employment **Concerns** • Disturbances to our aquatic life and destruction of habitat • Foreign interference with the community members **Suggestions** • Have project alternatives • Use of modern machines

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Deposit the silt to gullied farms
14	Emily Achieng	YEBO Africa	32103938	0714687752	Water and environment officer	**Positive aspects** • Increased environmental conservation • More income to the community hence improved livelihood • Improved agri-business **Suggestions** • Dredging the river should be 7km to the shoreline, 30m wide and 5m deep.
15	Willys Okeyo Omullo	Aluora Makare CBO	20401885	-	Chairman	**Positive aspects** • Flood control • Increased food production • Increased living standards through economic empowerment **Concerns** • Oil spills, noise pollution and water pollution • Fish production affected **Suggestions** • Create a taskforce and work with key stakeholders • Adaptation and mitigation measures to be put in place towards achieving the desired goal
16	Joseph Were	BMU	22728570		Chairman	**Positive aspects** • Easy management of the beach businesses **Concerns** • Oil spillage will reduce the oxygen intake for the fish **Suggestions** • Sand harvesting to continue

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
17	Licha Onyango Dan	BMU Rakwaro	11215158	0700225011	member	**Positive concerns** • Reduced flooding along the river • Reduced deaths and water borne diseases • School term dates not interrupted • Creation of job opportunities **Concerns** • The project will affect breeding sites and fish breeding patterns • Fishermen may resort to other economic activities • Reduced fish, reduced income **Suggestions** • Use the silt dredged to fill in the galleys created during sand harvesting to reclaim back the land
18	Erick Orinda	Kobuya West	13790416	0721888009	Political leader	**Positive concerns** • It will improve the levels of human around the locality • Reduced migration during flooding • Improved economic standards • Reduced handouts given to the locals by political leaders.
19	George Odhiambo Otieno	Kobuya West	20972615	0726525487	Ass. Chief	**Positive concerns** • Reduced floods • Provide clean water for domestic use • Unity among the community • Provision of job opportunities **Concerns** • Interference of the environment and old persons

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• May interfere with most useful natural resources which are most useful to the community.
20	Molline Akuku	BMU-Wikawere		0728479657	Member	**Positive concerns** • Clean and safe environment • Improved education since students can now attend school during long rains • Economic empowerment from sand harvested • clean and safe environment • Improved education since students can now attend school during long rains • Economic empowerment from sand harvested **Concerns** • Vibration from the machines will make fish travel far away this will reduce the daily livelihood of the area **Suggestions** • Only operate during the day with minimal noise
21	Francis Ombura Adero	Kobuya East	1542910	0717287526	Clan Elder	**Positive aspects** • Control of floods • Improvement of socio-economic activities especially farming • Real economic development
22	Reuben Ongus	Kobuya West	21945400	0701353929	Spiritual Leader	**Positive aspects** • Filling of the galleys caused during sand harvesting by the silt from the lake • Reduced flood and soil erosion
23	Joan Adongo	Kobuya East	36422543	0711611050	Community Member	**Concerns** • Increased school drop outs due to availability of jobs

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• The proponents will be able to pay the community good money since the sand belongs to them
24	Dimo Lawrence	Kobuya East	8628293	0788557649	Opinion leader	**Positive aspects** • Availability of clean water for domestic use • End of perennial floods in the area • Local job creations when the project will start **Concerns** • Interference with the natural habitats eg the catfish which thrive so well in muddy environment • Interference with the farming activities in some areas **Suggestions** • Building dykes to act as a long term solution to the floods
25	Simion Mbura	Wangchieng'	1541847	0716002183	Village elder	**Positive aspects** • Improved livelihoods **Concerns** • Fish deaths due to oil spillage
26	Romanus ogembo ogana	Kobuya East	2245437	0728348301	Secretary Wangchieng' Spiritual CBO	**Positive aspects** • Social impact improved due to the smooth flow of the river into the lake • Improved agriculture
27	Joseph Ogolla Oseko	Wangchieng'	154022	0726747917	Opinion leader	**Positive aspects** • Improved livelihood • Improved fish catchment later when the lake waters are deep • Reduced floods in Osodo area **Concerns**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Oil spillage resulting to increased fish deaths • Fear of the dredging contractor not giving back to the community.
28	Maurice Juma Okwaro	Kobuya East	7950881	0729456782	Farmer	**Positive aspects** • Creation of jobs • Promotion of unity and good relationship among community • Improved living standards for the community members **Concerns** • Environmental pollution • Economic activities interference • Disturbances by the people living around
29	Hellen Atieno Rudolph	Wangchieng’	5899957	0717629655	Opinion leader	**Positive aspects** • Reduced flooding disaster • Improved agriculture • Reduced family/social impacts of families who run away for shelter in the upper lands
30	Elias Dulo	Wangchieng’	1540040	0722835747	Farmer	**Positive aspects** • Improved ecology • Minimized perennial displacement of people • Reclamation of the farm lands hence increased yield **Concerns** • Fishing activities affected • Increased noise from the dredging machine **Suggestions** • CSR of the road network and the affected schools from revenue that will be generated from sand.

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
31	Collins Otieno Agira	Kobala	22518894	0726736418	Farmer/Opinion leader	**Positive aspects** • Humble breeding sites for aquatic life • Eradicate flood problems • Source of temporary employment t the locals • Farming and other economic activities can resume uninterrupted by floods. **Concerns** • Temporary disturb aquatic life • CSR to the community must be implemented.
32	Dan Oywana	Kobuya East	14550401	0705097618	Farmer	**Positive aspects** • Living things will benefit intensively as they will not be interfered with • Reduced migration to higher grounds **Concerns** • Dredging may affect the marine life negatively
33	Dan Agallo	Wangchieng', Kobala	6600180	0728161732	Opinion leader	**Positive aspects** • Reduced flooding • The economic activities will pick up • Easy school learning **Concerns** • Interfered fish breeding zones hence scarcity of fish • Cases of oil spillage • Increased water borne diseases since the water will be dirty • Fishing disruption **Suggestions**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Ensure the proponent dredges as suggested in the parliamentary report
34	Onyach Oyugo	Kobuya	1542905	0711678958	Village elder	**Positive aspects** • Reduced flooding hence minimizing the migration of wildlife • Relief from expensive repairs, migration to safe grounds • Limited threats to our animals and human beings **Concerns** • Foreign influence in the community • Lack of enough knowledge of the new project
35	Awuor Wickliffe Omondi	Wangchieng', Kobala	22729175	0718763222	Business community	**Positive aspects** • Improved conditions for fish and other aquatic life • Improved livelihoods among community members **Concerns** • Some aquatic life may perish in the process • Increased noise from the dredging machine • Mismanagement of received benefits of the project **Suggestions** • The programme should be extended upstream to Nyakwere Bridge for its effectiveness
36	William Odhiambo	Wangchieng', Kajiei	33093783		Ass. Secretary	**Positive aspects** • Improved fish catch later after dredging **Concerns** • Oil spillage hence oil pollution • Ensure good interaction of the ship workers and the community at large.

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
37	Samson Ongus	Wangchieng', Kobala	1529245	0720961814	farmer	**Positive aspects** • Breeding areas will be better after dredging • Reduced over flooding and displacement of people along the riparian • Farmlands will now be used for agriculture **Concerns** • Fish and lake animals will be affected during dredging • Noise and water pollution to the environment • Fish breeding areas will be affected **Suggestions** • Dredging should be the primary goal and sand harvesting is the secondary benefit
38	Benson Okello Dudi	Wangchieng', Rakwaro	11231033	0717937620	Business man	**Positive aspects** • Reduced perennial flooding • More time will be spend with families since there will be no displacement • Farmers can now farm **Concerns** • May affect fish business as the process continues **Suggestions** • Dredging should first take place then sand harvesting later.
39	Joseph O. Amuom	Wangchieng', Rakwaro	0988675	098867510	Pastor	**Positive aspects** • Improved economic status **Concerns** • Direct access of water to the community should be addressed

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						Suggestions • Dredging should take place to the expected standards.
40	Ros-Silvia Achar	Wangchieng', Kamwala	8468798	0714224531	Opinion leader	**Positive aspects** • Reduced fear of flood • Reduced diseases that are flood/water related • The community will benefit from the sand mining **Concerns** • If incase the operations will take place at night it will interfere with the animals • Reduced fish catch
41	Charles P. Komala	Wangchieng', Kamwala	1532630	0726747932	Pastor	**Positive aspects** • Reduced water flow back • Reduced camping in schools during flooding • Unnecessary movement that will affect economic activities will be reduced **Concerns** • The aquatic environment of the water animals will change • Increased turbidity • Reduced fishing along the shoreline of the lake
42	Lawrence Osano	Wangchieng', Kobala	34712466	0769517076	Community member	**Positive aspects** • Improved ecology of the area • Reduced displacement of people during floods • Improved farm productivity **Concerns** • Noise from the dredger • Stoppage of economic activities such as fishing.

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						Suggestions • Improve the road network and the schools in the area
43	Pius .R. Awich	Wangchieng', Kamwala	1545394	0725389242	Community Opinion leader	**Positive aspects** • Normalcy will be achieved • Improved agricultural harvesting since the farm lands will be reclaimed back **Concerns** • Pollution of the area • It may interfere with the aquatic life **Suggestions** • Dredge 12km not 7km
44	Joseph Gaya	Wangchieng', Kajiei YEBO Africa	9636615	-	Chairman	**Positive aspects** • Improved fish catch later after dredging **Concerns** • Oil spillage hence oil pollution **Suggestions** • Ensure good interaction of the ship workers and the community at large
45	Jacob Onyango Otieno	West Nyakach	6600603	0720858109	Chief	**Positive aspects** • This will enable the water easy flow into the lake thereby checking the flood menace which has for a long time affected the residents • Human wildlife conflicts will be addressed if channeling is done properly **Concerns** • It will affect the water sage since most of the water will be dirty.

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
46	Jairus Onyango	Thurdibuoro	20689206	0718244188	Ass. Chief	**Positive aspects** • It will control more floods • Reduced water borne diseases e.g. bilharzia **Concerns** • Reduced fish **Suggestions** • Ensure proper mitigation measures are put in place to reduce negative impacts of the dredging. • The sand harvested should be partly given to the community at a reduced price
47	Seth Agwanda	Nyongong'a	9927321	0725699682	Ass. Chief	**Positive aspects** • Improved water flow • Creation of employment during the project **Concerns** • Oil spillage • Noise from the dredger **Suggestions** • Ensure incase used oil is transported by licensed waste oil transporters • More sensitization to the community members about the proposed project
48		County Government of Kisumu	21103304		Fisheries Officer-Nyakach Sub County	**Positive concerns** • Ease fishing activities in the lake • Reduced flooding In the lower areas of Nyakach • People will have canal to do irrigation in their farms **Concerns**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• The fishing grounds will be affected. **Suggestions** • Reduce cultivation near the river banks • Afforestation and soil cover near the river banks should be improved • Ensure the fish breeding grounds are protected.
49	Reagan Otieno	West Nyakach	27059870	0705528579	Ass. Chief	**Positive aspects** • Reduced flooding • Agriculture will be effective **Suggestions** • Diking along Sondu Miriu River
50	Fibi Auma Obongo	Thurdibuoro, West Koguta	0943632	0792955690	Community Member	**Positive aspects** • Prevention of flooding • It will impact positively to the family life of people • It will prevent the displacement of families that was happening during the flood periods.
51	James Okeyo Abeka	Committee Floods, Disaster and Environment	6151028	0710768447	Chairman	**Positive aspects** • Increased food security • Improved health status because water borne diseases will be reduced • People won't cut down trees to re-build fallen down trees • Improved academics • Enhanced economic income **Suggestions** • Cover a longer distance more than 7km • Have gabions along the river banks to prevent future soil erosion
52	Moses Abraham Odera	Civil Society Nyakach	4010345	0715548334	Chair	**Positive aspects**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• It will reduce the damages it has caused **Suggestions** • Ensure dredging is done without any more interference with the river
53	Elsa Atieno Juma	West Nyakach, Lower Kadiang'	13386675	0715468323	C.H.V. and Farmer	**Positive aspects** • No displacements • Reduced spread of COVID19 cases • The people will be able to regain back their lands that were claimed by the floods **Concerns** • Even distribution of employment to the local communities too; • Increased noise levels during the machine operations; • Reduced fish due to the increased vibrations.
54	Pamela Adhiambo Otieno	West Nyakach, Lower Kadiang'	13788510	0729810184	C.H.V	**Positive aspects** • Reduced camping at the institutions • Land will be claimed back and hence improved agriculture **Concerns** • Air pollution • Reduced fish • Fear of the proponent not locally employing the locals
55	John Olang Odero	West Nyakach, Nyong'onga	16004149	0720227546	Farmer	**Positive aspects** • Reduced flooding • Availability of food due to farming sing people will get back their lands **Concerns** • Water pollution

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Sand harvested dumping site
56	Dan Okito	West Nyakach, Lower Kadiang'	-	0714570688	-	**Positive aspects** • Increased food • Reduced flooding in the area due to the back flow of water
57	Sylvanus Ogutu Odoyo	Thurdibuoro, Koguta	8974127	0725121011	Farmer	**Positive aspects** • Reduced overflowing water • Reduced human wildlife conflicts especially in crop destruction **Concerns** • Increased deaths • Reduced direct river fishing • The operation should only consume riparian land and not peoples land.
58	Redemption Achieng Otieno	Thurdibuoro, West Koguta	26200012	0728308224	Farmer	**Positive aspects** • Reduced flooding • Reduced animal human conflict • Improved farming and hence more harvest • Water utility for farming
59	Kamimba Samson	Thurdibuoro ,West Koguta	20720492	07235004840	Farmer	**Positive aspects** • It will be ecologically fit • Agricultural benefit **Concerns** • Water pollution • Noise vibrations would affect fish travelling distance • Reduced economic gain especially from the fishermen **Suggestions**

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						• Work only during the day
60	Pastor Joseph Oluoch	Thurdibuoro	6600631	0713671297	Pastor	**Positive aspects** • Reduced flooding **Concerns** • Residents' land will not be interfered with **Suggestions** • The proponents to kindly employ the locals
61	Silpa Anyango Odeny	West Nyakach	6600661	0717118355	Farmer	**Positive aspects** • Prevention of flooding • It will impact positively to the family life of people • It will prevent the displacement of families that was happening during the flood periods.
62	David Adhano Juma	Thurdibuoro, West Koguta	26703365	0726735538	Farmer	**Positive aspects** • Reduction of floods and stoppage of the hippos from destroying of the plants • Room for Farmers to do farming without any destructions • Flourished income and increased food generation from farming **Concerns** • Increased turbidity • The dredging company to do a good work to not allow for work to be redone
63	Wilfred Okonjo	West Nyakach, Nyong'onga	2243172	0722316933	Farmer	**Positive aspects** • Reduced flooding • Enhanced social interaction • Increased farming activities

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
						Suggestions • Building of gabions along the banks of the river
64	Hesbon Ramolo	West Nyakach, Nyong'onga	9497030	07082871080	Farmer	**Positive aspects** • Continued farm harvests • Better living • Proper tree development **Suggestions** • Plant more trees to avoid increased soil erosion that end up in the buildup of the silt in the river
65	Jairus Otieno Abong'o	West Nyakach, Lower Kadieng'	0867685	0726684743	Farmer	**Positive aspects** • More food security • More income yield from other Farmers **Suggestions** • Trees should be planted along the river and even in homes to reduce the chances of soil erosion
66	Joash Modi	Thurdibuoro, Kisumu County	3950926	0728565960	Farmer	**Positive aspects** • Reduced floods
67	Lucas Odhiambo Oreje	Thurdibuoro, West Koguta	4927084	0724913536	Farmer	**Positive aspects** • Reduced river back flow • Creation of employment • Increased economic income since people are now able to work **Concerns** • Aquatic life and ecosystem interference • When fishing grounds is interfered with, no enough fish will be found by the fishermen

#	Stakeholder Name	Organization/ Location	ID No.	Telephone	Involvement or Role in Project	Stakeholder Interest, Goals, and Concerns
68	Otieno Oriwo Okore	Thurdibuoro	6600555	0713194260	Farmer	**Positive aspects** • Creation of employment
	Zachary Okungu	Thurdibuoro	9597505	0712767246	Farmer	**Positive aspects** • No more destruction of crops and houses during flooding • Improved economic standards in the community • Reduced poverty levels **Suggestions** • Planting of bamboo trees along the river banks that can be used for commercial purposes later • Establishment of nature based enterprise to address the economic requirement of the community • Check dams along the river banks should also be de-silted • Sand harvested should be used to benefit the community
69	Simon Osiro	West Nyakach, lower Kadiang'a	2599157	0718161431	Farmer	**Positive aspects** • Prevention of floods • Improved farming/agriculture • Job creation **Concerns** • Air pollution from the smoke emitted from the dredging machine • Increased disease infections
70	Peter Okolo	Thurdibuoro, West Koguta	7019846	0705528805	Farmer	**Positive aspects** • Increased income **Concerns** • Fish will be affected by oil spillage • Economic unrest especially for the fishermen

7. IMPACT ANALYSIS AND PROPOSED MITIGATION MEASURES

7.1 Introduction

This section outlines the potential negative and positive impacts associated with the proposed dredging/de-siltation and sand harvesting.

7.2 Identification of environmental and social impacts

The potential environmental and social impacts identified as having significance effect was assessed using the methodology described below. First, the issues raised were described giving consideration to the associated activity and the aspect of that activity that is likely to result in an impact. The nature of the impact was also described. Once this has been undertaken the significance of the impact was determined. The following definitions apply:

- An **activity** is a distinct process or task undertaken by an organization for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organization.
- An **environmental aspect** is an element of an organizations activities, products and services which can interact with the natural or human environment. The interaction of an aspect with the environment may result in an impact.
- **Environmental and social impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. Receptors can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as aquifers, flora and paleontology. Impacts on the environment can lead to changes in existing conditions; the impacts can be direct, indirect or cumulative. Direct impacts refer to changes in environmental components that result from direct cause-effect consequences of interactions between the environment and project activities. Indirect impacts result from cause-effect consequences of interactions between the environment and direct impacts. Cumulative impacts refer to the accumulation of changes to the environment caused by the project and other ongoing or planned human activities.

7.2.1 Description of aspects and impacts

The accumulated knowledge and the findings of the environmental investigations form the basis for the prediction of impacts. Once a potential impact has been determined during the scoping process, it is necessary to identify which project activity that cause the impact, the probability of occurrence of the impact, and its magnitude and extent (spatial and temporal). This information is important for evaluating the significance of the impact, and for defining mitigation and monitoring strategies. The aspects and impacts identified were therefore described according to the definitions below:

a) Extent

The extent for each aspect, receptor and impact were defined. The geographical coverage (spatial scope) description took account of the following factors:

- The physical extent/distribution of the aspect, receptor and proposed impact; and
- The nature of the baseline environment within the area of impact.

For example, the impacts of noise are likely to be confined to a smaller geographical area than the impacts of atmospheric emissions, which may be experienced at some distance. The significance of impacts also varies spatially.

The **extent** of the impact was rated on the following scale:

Localized	1
Study area	2
Regional	3
National	4
International	5

b) Duration

Duration refers to the length of time that the aspect may cause a change either positively or negatively on the environment.

The environmental assessment distinguished between different **time periods** by assigning a rating to duration based on the following scale:

Very short (0 – 1 Years)	1
Short term (1 – 5 Years)	2
Medium term (5 – 15 years)	3
Long term (>15 years)	4
Permanent	5

c) Magnitude

The **magnitude** of an environmental or social aspect is determined by the degree of change to the baseline condition, and includes consideration of the following factors:

- The reversibility of the impact;
- The sensitivity of the receptor to the stressor;
- The impact duration, its permanency and whether it increases or decreases with time; Whether the aspect is controversial or would set a precedent; and
- The threat to environmental and health standards and objectives.

The magnitude of each of the impacts were rated on the following scale:

Small (will have no effect on the physical, biological or social environment)	0
Minor (will cause a minimal impact on physical, biological or social environment)	2
Low (will cause a slight impact on the physical, biological or social environment)	4
Moderate (will result in a physical, biological or social environment component or process continuing but in a modified way)	6
High (physical, biological or social environment or component or process is altered to the extent that they temporarily cease to exist or operate)	8
Very high (results in complete destruction of physical, biological or social environment components and permanent cessation of the processes)	10

d) Probability of impact

The **probability** or **frequency** of the impact occurring refers to how often the issue may impact either positively or negatively on the environment. After describing the frequency the findings were indicated on the following scale:

Highly improbable (<20% chance of occurring)	1
Improbable (20 – 40% chance of occurring)	2
Probable (>40% - 70% chance of occurring)	3
Highly probable (>70% - 90% chance of occurring)	4
Definite (>90% - 100% chance of occurring)	5

7.2.2 Method of assessing the significance of impacts

The purpose of impact evaluation is to assign relative significance to predicted impacts associated with the project, and to determine the manner in which impacts are to be avoided, mitigated or managed. The information presented above in terms of identifying and describing the aspects and impacts were summarized in a tabular form and significance was assigned with supporting rational. Significance was determined before and after mitigation, taking into consideration all the factors described above.

A definition of a "significant impact" for the purposes of the study is: "An impact which, either in isolation or in combination with others, could in the opinion of the specialist, have a material influence on the decision-making process, including the specification of mitigating measures."

7.2.3 Significance determination

The environmental significance rating is an attempt to evaluate the importance of a particular impact, the consequence and likelihood of which has already been assessed by the relevant specialist. The description and assessment of the aspects and impacts undertaken is presented

in a consolidated table below with the significance of the impact assigned using the process and matrix detailed below.

The sum of the first three criteria (extent, duration and magnitude) provides a collective score for the CONSEQUENCE of each impact. The last criteria determines the PROBABILITY of the impact occurring. The product of CONSEQUENCE and PROBABILITY leads to the assessment of the SIGNIFICANCE of the impact, shown in the significance matrix below.

Table 4: Significance Assessment Matrix

		CONSEQUENCE (Extent + Duration + Magnitude)																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
PROBABILITY	1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
	3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
	4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
	5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

In order to evaluate the mitigation threshold, the ratings in the table above are used.

Table 5: Mitigation Ratings Table

Low	<30	Where this impact would not have a direct influence on the decision to develop in the area
Medium	30-60	Where the impact could influence the decision to develop in the area unless it is effectively mitigated
High	>60	Where the impact must have an influence on the decision process to develop in the area

7.3 Potential Positive Impacts

7.3.1 Flood Control

The perennial flooding in the flood plain occurs due to heavy rains in the catchment as well as deforestation upstream as a result of poor land use practices, causing serious sedimentation and

forming deltas at the river mouth. In the recent past however, flooding is also occurring due to backflow of the lake waters attributed to climate change.

Mitigation to the impact of flooding has been made to dredge and unblock the river channel in the delta to ease the flow of water into the lake.

7.3.2 Availability of sand for construction industry

Development comes with growth of urban areas. Urban growth is achieved through sand and gravel mining for construction of modern, attractive and durable structures. Sand mining is important for economic development and to construct durable and modern structures.

7.3.3 Employment Opportunities

The proposed project will create employment opportunities for both skilled and unskilled personnel. The consulted stakeholders have urged the proponent to ensure that priority is given to the local community.

7.3.4 Gains in the Local and National Economy

Expected gains in the local and national economy from the sand harvesting/mining license from the government including levies by the county governments and income from business associated with the project.

7.3.5 Improved access by fishermen to the various landing beaches

Currently access to most beaches in the project area have been hampered by flooding of the area. Most beaches such as Chuowe are flooded making landing for fishermen boats challenging. The project will however reduce the impact of flooding that will cascade to benefit the local fishermen in accessing their fish landing sites.

7.4 Potential Negative Impacts

The following negative impacts are also associated with the proposed project.

7.4.1 Increased turbidity

Dredging/De-Siltation and Sand Harvesting will cause disturbance on the lake bed through extraction, rejection, and disposal of sediments which will result into increased turbidity and creation of sediment plumes. Sediment plumes can extend the impact of dredging to a wider area that was not affected physically. However, sediment plumes are short lived and they generally last for about five days, equivalent to four to five tidal cycles in marine environment (Hitchcock and Bell, 2004). This impact is mostly confined mainly to an area of a few hundred metres from the point of disturbance (Newell et al., 1998; Hitchcock and Bell, 2004).

7.4.1.1 Impact of increased turbidity and suspended sediments on phytoplankton bloom

Phytoplanktons depend on conducive environmental conditions for grow. The transparency of lake water is an important parameter that promotes penetration of light that support growth of phytoplanktons. Increased turbidity and suspended sediment in the open lake near the delta will adversely affect penetration of light hence poor establishment of phytoplanktons, and low chlorophyll-a. Management of separated sediments from dredging activity would influence the magnitude of turbidity and suspended sediment in the water.

Unmitigated impacts of increased turbidity and suspended sediments on phytoplankton bloom survival during dredging/de-siltation and sand harvesting		
Extent of impact	Few hundred meters from the point of dredging	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from dredging	8
Duration of impact	Most of turbid water and suspended sediment settles in less than 5 days from each dredging day. Activity will run for 1-5 years	2
Probability of impact	Penetration of light will be affected by increased turbidity and suspended sediments ultimately affecting growth.	5
Risk = (Extent + Magnitude + Duration) x Probability		60
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation Dredged materials should not be dumped in the lake. It should be taken outside to the terrestrial area for reclamation of derelict sand harvesting sites through the pipeline		
Mitigated impacts of increased turbidity and suspended sediments on phytoplankton bloom survival during dredging/de-siltation and sand harvesting		
Extent of impact	Few hundred meters from the point of dredging	2
Magnitude of impact	Moderately high turbidity and suspended sediments are envisaged from dredging with mitigation in place	6
Duration of impact	Most of turbid water and suspended sediment settles in less than 5 days from each dredging day	2
Probability of impact	Penetration of light in water will be improved moderate increase in turbidity and suspended sediments to sustain growth of phytoplanktons.	2
Risk = (Extent + Duration + Magnitude) x Probability		20
Mitigation Ratings		Low

7.4.1.2 Impact of increased turbidity and suspended sediments on fish survival

Response of fish to increased turbidity and suspended sediments have been studied in relation to potential effects of dredging. When fish encounter sediment plumes they always avoid the area for areas with low levels of turbidity and suspended sediments. Feeding response becomes highly sensitive in fish to increased suspended sediments partly due to irritation of gill tissues. Due to the stratification of suspended sediments in water bodies fish prefers the near surface of water where there is lighter and low amount of sediments (Servizi, 1990; McLeay et al., 1983). In higher turbidity and suspended sediment levels and longer exposure periods, loss of weight in fish and mortality has been observed. However, fisheries surveys conducted before and after dredging projects indicate the project have insignificant effect on the diversity of species and abundance. Effects of dredging commonly appear to be minor and local, but effects to vary widely among the aquatic habitats.

Unmitigated impacts of increase turbidity and suspended sediments on fish survival during dredging/de-siltation and sand harvesting		
Extent of impact	Few hundred meters from the point of dredging	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from dredging	8
Duration of impact	Most of turbid water and suspended sediment settles in less than 5 days. Activity will run for 1-5 years.	2
Probability of impact	Fish normally avoid areas with high turbidity and suspended sediments by horizontal or vertical movement	2
Risk = (Extent + Magnitude + Duration) x Probability		24
Mitigation Ratings		Low
Recommendation		N/A
Mitigation No mitigation measure required in regard to this potential impact		
Mitigated impacts of increase turbidity and suspended sediments on fish survival during dredging/de-siltation and sand harvesting		
Extent of impact	Few hundred meters from the point of dredging	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from dredging	8
Duration of impact	Most of turbid water and suspended sediment settles in less than 5 days	2

Probability of impact	Fish normally avoid areas with high turbidity and suspended sediments by horizontal or vertical movement	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low (<30)

7.4.1.3 Impact of increased turbidity and suspended sediments on fish breeding

The survival of fish eggs and larvae in elevated turbidity and suspended sediments is poorly recorded in experiments on effect of dredging. This is because the condition is associated with increase in other water quality parameters that goes beyond range of tolerance for fish eggs and larvae. The proposed dredging activity will occur in the delta which is vital for fish breeding and population turnover in Winam Gulf. The area of cover by sediment plumes generated by physical disturbance will likely to affect areas within a few hundred meters away. Very poor breeding and survival of fish eggs and larvae will occur within the affected areas. Breeding groups will avoid such places for waters with relatively low levels of suspended sediments and turbidity. However, with proper management of dredging activities, this impact can be reduced to a more sustainable level.

Unmitigated impacts of increased turbidity and suspended sediments on fish breeding during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	Few hundred meters from the point of dredging	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from dredging	8
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years. Turbidity and suspended sediment settles in less than 5 days	2
Probability of impact	The survival rates of fish eggs and larvae in very high turbidity and suspended sediments and longer exposure period is limited	5
Risk = (Extent + Magnitude + Duration) x Probability		60
Mitigation Ratings		Moderate
Recommendation		Mitigate

Mitigation

Dredging near the fish breeding areas should be avoided during the long and short rains. These are periods when fish breeding is pronounced in the gulf. Dredging should be stopped from mid of March/April – May/June and October to December in these areas. Hence, dredging should be planned for 6 months in a year for fish breeding sites. However dredging in the open lake can continue throughout the year.

Areas along the delta, 100m wide, should be avoided for dredging activities. Contact should only take place at the mouth of the channel to the lake. Dredging should focus only on the mouth of the river (2 channels), the near open lake waters and unblocking the old river mouth.

Mitigated impacts of increase turbidity and suspended sediments on fish survival during dredging/de-siltation and sand harvesting

Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	Few hundred meters from the point of dredging	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from dredging	8
Duration of impact	Dredging takes place 5hr/day. Activity is proposed for 6 months staggering in a year near fish breeding sites. Activity will run for 1-5 years. Turbidity and suspended sediment settles in less than 5 days.	2
Probability of impact	The survival rates of fish eggs and larvae in very high turbidity and suspended sediments and longer exposure period is limited. However, with the avoidance of dredging near fish breeding sites during rainy seasons, survival rates for eggs and larvae will be relatively high.	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

7.4.1.4 Impact of increased turbidity and suspended sediments on ecological behaviours of *Labeo victorianus*

Labeo victorianus is a benthopelagic – potamodromous fish. It is Critically Endangered in the waters and is rarely caught by fishermen's net. It migrates upstream of the river in search of fresh clean waters for breeding. This behaviour implies it has to pass through the delta to move upstream for breeding at the onset of rainy seasons. Increased turbidity and suspended

sediments, together with physical disturbance might halt migration of this species when project activities are timed with their migration patterns. In order to control negative impact on their migration, a proper management action is required.

Unmitigated impacts of increased turbidity and suspended sediments on ecological behaviours of Labeo victorianus breeding during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	Few hundred meters from the point of dredging	2
Magnitude of impact	Very high turbidity and suspended sediments are envisaged from dredging	8
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years. Turbidity and suspended sediment settles in less than 5 days	2
Probability of impact	The survival rates of fish eggs and larvae in very high turbidity and suspended sediments and longer exposure period is limited	5
Risk = (Extent + Magnitude + Duration) x Probability		60
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation Dredging near the fish breeding sites and 100m from the shoreline should be avoided during the long and short rains. These are periods when migration of *Labeo victorianus* takes place. Dredging near the breeding sites and 100m from the shoreline should be stopped from mid of March/April – May/June and October to December. Hence, dredging in these areas should be planned for 6 months in a year. However dredging in the open lake can continue throughout the year.		
Mitigated impacts of increased turbidity and suspended sediments on ecological behaviours of Labeo victorianus breeding during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	Few hundred meters from the point of dredging	2

Magnitude of impact	Very high turbidity and suspended sediments are envisaged from dredging	8
Duration of impact	Dredging takes place 5hr/day. Activity is proposed for 6 months staggering in a year. Activity will run for 1-5 years. Turbidity and suspended sediment settles in less than 5 days.	2
Probability of impact	Movement of *Labeo victorianus* across sediment plumes for upstream migration will stopped. However, with the avoidance of dredging near the breeding sites and 100m from the shoreline during rainy seasons, migration will be occasioned.	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

7.4.2 Physical damage/injury or mortality

This impact is associated with physical movements of dredgers. Components that are likely to affect habitats and aquatic organisms are the drag-head or cutter-head, transportation, and separation of sediments and disposal of dredged materials.

7.4.2.1 Impact of entrainment by suction of pipeline dredger on fish eggs and larvae

Entrainment of sediment at the bottom of the lake and river mouth will likely to cause uptake of organisms by the suction field generated at the drag-head or cutter-head during dredging operations (Reine et al., 1998). Entrainment results in the localized by-catch of fish eggs, larvae and even mobile juveniles and adult fish. However, fish eggs and larvae are more vulnerable to entrainment as most of them get damaged physically in the process. Pipeline dredges, however, causes more damage and mortality to fish egg and larvae than hydraulic dredgers.

Unmitigated impacts of entrainment by suction of pipeline dredger on fish eggs and larvae during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur in the area for dredging which include along the channels of the river in the delta, open water areas near the delta	2
Magnitude of impact	Sediments at the bottom of the river channels and in the near open waters will be removed physically	6

Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	The pipeline dredging causes more damage and mortality of fish eggs and larvae	4
Risk = (Extent + Magnitude + Duration) x Probability		40
Mitigation Ratings		Moderate
Recommendation		Mitigate

Mitigation

Dredging near the fish breeding sites and 100m from the shoreline should be avoided during the long and short rains. These are periods when fish breeding is pronounced in the gulf. Dredging near the breeding sites and 100m from the shoreline should be stopped from mid of March/April – May/June and October to December. Hence, dredging in these areas should be planned for 6 months in a year. However dredging in the open lake can continue throughout the year.

Mitigated impacts of entrainment by suction of pipeline dredger on fish eggs and larvae during dredging/de-siltation and sand harvesting

Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur in the area for dredging which include along the channels of the river in the delta, open water areas near the delta	2
Magnitude of impact	Sediments at the bottom of the river channels and in the near open waters will be removed physically	6
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	The pipeline dredging causes more damage and mortality of fish eggs and larvae. With adoption of the proposed mitigation of avoiding dredging during rainy seasons, more fish eggs and larvae will survive to a stage in life where they can avoid areas under dredging.	2
Risk = (Extent + Duration + Magnitude) x Probability		20
Mitigation Ratings		Low

7.4.2.2 Impact of entrainment by suction of pipeline dredger on demersal fish species

The rates of entrainment of mobile pelagic fish are normally low but high for benthic (demersal) species (Drabble, 2012; Reine et al., 1998). The potential for entrainment of demersal species can be relatively high but the overall mortality rates may be low. Mortality rates of demersal fishes from pipeline dredges are estimated to be as high as 60% of total entrained. However, fish may avoid repeatedly being dredged (Appleby & Scarratt, 1989). About 9 species of fish in the delta and near open waters are demersal species. These include the *Marcusenius victoria, Clarias alluaudi, Clarias liocephalus, Mastacembelus frenatus,* and *Protopterus aethiopicus*. These species are likely to be affected within the project area by dredging.

Unmitigated impacts of entrainment by suction of pipeline dredger on demersal fish species during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur in the area for dredging which include along the channels of the river in the delta, open water areas near the delta	2
Magnitude of impact	Sediments at the bottom of the river channels and in the near open waters will be removed physically	6
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	The pipeline dredging entrain most of demersal fish species causing relative high mortality	4
Risk = (Extent + Magnitude + Duration) x Probability		40
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation Dredging near the fish breeding sites and 100m from the shoreline should be avoided during the long and short rains. These are periods when fish breeding is pronounced in the gulf. Dredging near the breeding sites and 100m from the shoreline should be stopped from mid of March/April – May/June and October to December. Hence, dredging in these areas should be planned for 6 months in a year. However dredging in the open lake can continue throughout the year.		

Vegetation at the edge of delta facing the lake should not be destroyed. These are refuge for the demersal fishes. Dredging should focus on the mouth of the river (2 channels), the near open lake waters and unblocking the old river mouth. Dredging should be conducted on one channel at a time to allow displaced fish species with alternative channel route to the open lake water.

Mitigated impacts of entrainment by suction of pipeline dredger on demersal fish species during dredging/de-siltation and sand harvesting

Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur in the area for dredging which include along the channels of the river in the delta, open water areas near the delta	2
Magnitude of impact	Sediments at the bottom of the river channels and in the near open waters will be removed physically	8
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	The pipeline dredging causes more damage and mortality to most of demersal fishes that are entrained. With adoption of the proposed mitigation of avoiding dredging during rainy seasons, high turnover will occur in this group.	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

7.4.2.3 Impact of physical damages on water bird population

Water birds are most found occurring on the fringing vegetation of the delta. These areas are foraging and breeding areas for the water birds. Hence destruction of the fringing vegetation will deprive these birds foraging grounds at the edge of the delta. Thus, prevention of dredging activities should be a priority in dredging plan.

Unmitigated impacts of physical damages on waterbird population during dredging/de-siltation and sand harvesting

Nature of Impact	**Description of impact**	**Rating of impact**

Extent of impact	This impact will occur on the channels of the river in the delta, and open water areas near the delta	2
Magnitude of impact	Physical disturbance of pipeline dredging. Sediments at the bottom of the river channels and in the near open waters will be removed physically	4
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Dredging will temporarily deter movement of water birds along the delta fringes	3
Risk = (Extent + Magnitude + Duration) x Probability		24
Mitigation Ratings		Low
Recommendation		No mitigation
Mitigation No mitigation measure required		
Mitigated impacts of physical damages on water bird population during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur on the channels of the river in the delta, and open water areas near the delta	2
Magnitude of impact	Physical disturbance of pipeline dredging. Sediments at the bottom of the river channels and in the near open waters will be removed physically	4
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Dredging will temporarily deter movement of water birds along the delta fringes	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

7.4.2.4 Impact of dredging on aquatic habitat

There are different habitat in the delta area; the open water, river and lake bed, and swamp. Dredging is likely to affect the river and lake bed on spot of the activities than other habitats. The physical removal of the bottom sediment will destroy an already established benthic habitat. Even though pipeline dredging reduces introduction of sediments and turbidity in water, a relative amount is however released in water which potentially causes smothering effect on the adjacent benthic habitats. This assessment of impact is based on assumption that the deltaic vegetation or the swamp will not be dredged. The project will only focus on the channels and the bottom of the near open lake water.

Unmitigated impacts of dredging on aquatic habitat during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur on the channels of the river in the delta, and open water areas near the delta	2
Magnitude of impact	Dredging will physically affect channels in the delta and the bottom of the near open lake.	4
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Physical disturbance of benthic habitat will take place once the project starts. Smothering of benthic habitat by sediments in the near open waters	4
Risk = (Extent + Magnitude + Duration) x Probability		32
Mitigation Ratings		Moderate
Recommendation		Mitigate
Mitigation		
Mitigated impacts of dredging on aquatic habitat during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**

Extent of impact	This impact will occur on the channels of the river in the delta, and open water areas near the delta	2
Magnitude of impact	Dredging will physically affect channels in the delta and the bottom of the near open lake.	4
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Physical disturbance of benthic habitat will take place once the project starts. Smothering of benthic habitat by sediments in the near open waters	2
Risk = (Extent + Duration + Magnitude) x Probability		24
Mitigation Ratings		Low

7.4.2.5 Impact of laying dredging pipeline on large reptiles

The laying of pipeline for transporting dredged materials to the derelict lands will take place along the river channels in the delta. This is the habitat of the Central African Rock Python (*Python sebae*) and other snake species. Chances of encountering pythons during laying of the pipeline are very high in the delta. Incidences of killing of pythons and other large snakes are accounted for by the local fishermen. Killing of snakes in the area is a normal reaction for local resident on encounter. Even though, this species is not listed to the IUCN as endangered, it is in the CITES Appendix II. Hence, unscrupulous killing should be avoided by any dredging personnel.

Unmitigated impacts of laying dredging pipeline on large reptiles during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur along the alignment of pipeline running along one of the channel.	2
Magnitude of impact	Potential killing of pythons and other snakes might occur but in limited incidences	4
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	3

Probability of impact	There will be encounter with python. However the animal is likely to avoid places with human disturbance.	3
Risk = (Extent + Magnitude + Duration) x Probability		27
Mitigation Ratings		Low
Recommendation		No Mitigation
Mitigation No mitigation required		
Mitigated impacts of laying dredging pipeline on large reptiles during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur along the alignment of pipeline running along one of the channel.	2
Magnitude of impact	Potential killing of pythons and other snakes might occur but in limited incidences	4
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	3
Probability of impact	There will be encounter with python. However the animal is likely to avoid places with human disturbance.	3
Risk = (Extent + Duration + Magnitude) x Probability		27
Mitigation Ratings		Low

7.4.3 Impact of Oil spill on aquatic life and habitats

Accidental and/or operational oil spills from the vessel during dredging/dumping and the may affect aquatic life due to direct toxic effects and/or habitat alteration.

Unmitigated impacts of accidental and/or operational oil spills from the vessel during dredging/de-siltation and sand harvesting		
Nature of Impact	**Description of impact**	**Rating of impact**

Extent of impact	This impact will occur around the dredging vessel within the project area.	2
Magnitude of impact	Potential killing of aquatic life due to limited oxygen supply	6
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	There will be instances where the vessel will handle oil during its operation. However care will be taken to minimize oil spills. Most of the potentially affected organisms are widely distributed in the region	3
Risk = (Extent + Magnitude + Duration) x Probability		30
Mitigation Ratings		Moderate
Recommendation		Mitigate

Mitigation

Seek to reduce probabilities of accidental and/or operational spills through enforcement of oil spill management systems.

Mitigated impacts of accidental and/or operational oil spills from the vessel during dredging/de-siltation and sand harvesting

Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur around the dredging vessel within the project area.	2
Magnitude of impact	Most of the potentially affected organisms are widely distributed in the region	4
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	There will be instances where the vessel will handle oil during its operation. However care will be taken to minimize oil spills.	3
Risk = (Extent + Duration + Magnitude) x Probability		28
Mitigation Ratings		Low

7.4.4 Impact of Noise during dredging/dumping activities

Noise from the dredging / dumping activity may disturb some aquatic and land mammals. But in the worst-case scenario the noise impact has a potential radius of few hundred metres from the source.

Unmitigated impacts of Noise during dredging/dumping activities		
Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur around the dredging vessel and is localised.	1
Magnitude of impact	Aquatic and land mammals have a wide distribution range and should move away from source of noise	2
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Depends on whether any mammal may migrate towards the source of noise	3
Risk = (Extent + Magnitude + Duration) x Probability		15
Mitigation Ratings		Low
Recommendation		No Mitigation
Mitigation Not necessary due to low significance		

7.4.5 Impacts of dredging/de-siltation and sand harvesting on the community

The affected persons by the dredging project may raise their grievances and dissatisfactions about actual or perceived impacts in order to find a satisfactory solution. These grievances, influenced by their physical, situational and/or social losses, can emerge at the different stages of the project cycle. Not only should the affected persons be able to raise their grievances and be given an adequate hearing, but also satisfactory solutions should be found that mutually benefit both the affected persons and the project.

Unmitigated impacts of dredging/de-siltation and sand harvesting on the community		
Nature of Impact	**Description of impact**	**Rating of impact**

Extent of impact	This impact will occur during dredging/de-siltation and sand harvesting within the project area.	2
Magnitude of impact	Potential disruption of the dredging exercise	6
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Many grievances arise because of misunderstandings; lack of information; or delayed, inconsistent or insufficient information.	3
Risk = (Extent + Magnitude + Duration) x Probability		30
Mitigation Ratings		Moderate
Recommendation		Mitigate

Mitigation

Provide sufficient and timely information to communities. Accurate and adequate information about the dredging project and its activities, plus an approximate implementation schedule, shall be communicated to the communities, especially affected parties, regularly.

Meaningful community consultations shall be conducted. The proponent shall continue the process of consultation and dialogue throughout the implementation of the dredging project.

Mitigated impacts of dredging/de-siltation and sand harvesting on the community

Nature of Impact	**Description of impact**	**Rating of impact**
Extent of impact	This impact will occur during dredging/de-siltation and sand harvesting within the project area.	2
Magnitude of impact	Potential disruption of the dredging exercise	2
Duration of impact	Dredging takes place 5hr/day. Activity will run for 1-5 years.	2
Probability of impact	Many grievances arise because of misunderstandings; lack of information; or delayed, inconsistent or insufficient information.	3
Risk = (Extent + Duration + Magnitude) x Probability		18
Mitigation Ratings		Low

8. HEALTH AND SAFETY PROVISIONS

All occupational health and safety measures will comply with Government of Kenya regulations, and good practice. The Proponent will ensure as far as practicable that the health, safety and welfare of employees and all other persons on site are secured and are protected from hazards created by the Project. Such precautions include Environmental, Social, Health & Safety Management Plan that are reasonably to prevent unauthorized entry upon the dredging site and to protect members of the public from any activities under the control of the Proponent.

8.1 General

8.1.1 Policy Statement

The Proponent recognizes the importance of Occupational Health and Safety for all employees and other stakeholders potentially affected by her operations and services. The proponent is committed to providing and maintaining a safe working environment for all her staff.

This policy informs the company employees and other stakeholders as to her objectives in ensuring a commitment to maintaining and improving on Health and Safety practices in the workplace. The primary means which the proponent employs to direct Health and Safety Policy are as follows:

- Using risk based objective analysis to set targets and improve Health and Safety Management that informs the overall strategic goals;
- Fostering a culture of Health and Safety awareness and proactive engagement by providing participatory training and open communication lines for all staff;
- Ensuring open and inclusive methods of working so all staff are aware of their responsibilities for their own and others' health and safety;
- Providing professional and financial resources to ensure a safe working environment which include; capacity building and supervision, monitoring and measuring of company own Health and Safety standards and records maintenance; and
- Implement and, where reasonably practicable, continuously improve effective health and safety standards which reflect the best industry practice.

The proponent is committed to adopt all necessary measures to reduce the Health and Safety risk to all involved in this project.

8.2 Emergency Response plans

8.2.1 Emergency Preparation

The proponent shall:

- Establish an Emergency preparation unit and make sure number of personnel involved;
- Train the personnel to deal with emergency regularly and make sure the emergency reaction program carried is out smoothly;
- Avail the equipment for emergency at site, checked and tested regularly; and
- Train the workers to prevent and protect themselves in case of emergency.

8.2.2 Emergency Times

The proponent shall not work in times of emergency. Emergency scenarios at the worksites are mainly accidents, injuries to staff or public, property damage, community unrest, public disturbances, fuel leakage and other disasters. In the case of no warning emergencies, the proponent proposes to implement the following reactive emergency action plans to avoid fatalities, injuries and property damage:

Communications:

- All Emergency situations shall be immediately reported to the PM of the proponent by phone. The emergency telephone numbers will be displayed on notice board at all site offices; and
- Emergency situations and the reactive measures instituted by the proponent shall be recorded and reported immediately (within 24 hours of occurrence) to the relevant authorities.

Medical Services and First Aid:

- The proponent shall maintain at all active sites completely equipped and clean first aid kits accessible to all works at all times and to all staff.
- The content of first aid kits shall be well labeled in language readable and comprehensible to the users.
- A trained first aider shall be on site with knowledge on the proper usage of the first aid kits, emergency telephone numbers and emergency procedures.
- Minor injuries shall be treated with the first aid kits and later to the nearest Government hospital/clinic; major injuries must be referred directly to the nearest Government hospital/clinic.

8.2.3 Fire Prevention, Fighting and Equipment

The proponent shall:

- Store flammable material in approved areas having adequate fire protection systems;
- Display sufficient warning signs;
- Train selected personal on how to use these fire extinguishers and inspect the fire extinguishers regularly and have replacements done where required;
- Contract a fire extinguisher servicing company to periodically inspect the fire extinguishers;
- Install fire alarm wherever required and test them regularly.

8.2.4 Incident and Accident Investigations

- Carry out incident/accident investigations as quickly as possible;
- Check all the log books, stock registers, issue registers, movement registers, on site safety regulation parameters, traffic signals and signal men activities, signage, as well as other field positions and keep a record of all investigations through audio visual electronic medium for presentation an evaluation of the incidents
- After completion of investigation and enquiry a summary of the facts recorded, sequence of happening, persons in charge, persons examined, equipment and machineries tested,

follow of action as per legal requirements, copy of station diary entry, hospital entry, safety regulations to be prepared with a comparative analysis for proper assessment.

8.2.5 First Aid Facilities, Equipment and Materials

- The proponent will provide and maintain fully stocked and staffed first aid stations throughout the extent of the works; the first aid personnel shall have valid certificates.
- The proponent will be responsible for all work and site welfare arrangements and requirements to the satisfaction of the Engineer.
- It is pertinent to provide first aid facilities for all the dredging workers, at site office and at all workplaces;
- Adequate transport facilities for moving the injured persons to the nearest hospital will also be provided in readiness at strategic locations to move at the call of emergency;
- The proponent will provide portable fire Safety Equipment to be installed at places of inflammable materials, site office, to douse any accidental fire that may occur at any time and at any place; and
- The notice boards at site office, and work places will have the telephone numbers of the nearest police station, PM, headquarters hospitals, fire stations and ambulance supply units for immediate contact in case of emergency.

8.3 Personal Protective equipment (PPE)

The following minimum protective clothing shall be made available to all workers at the projects sites: Life jackets, Hand gloves, Safety boots, Reflective vest, Nose mask and Helmet.

The proponent shall consider the provision of personal protect equipment only after all measures for elimination, removing or controlling safety hazards have been proved reasonably impractical. The proponent shall ensure that appropriate and sufficient personal protective equipment is provided and that they are readily available for every person who may need to use them and that all persons make full and proper use of the personal protective equipment provided. The proponent shall provide instruction and training in the proper use and care of any specific protective equipment where necessary.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

9.1 Scope and Objectives of the Proposed ESMP

9.1.1 Scope

The Proposed ESMP identifies the potential impacts of the proposed project on the environment and proposes how to mitigate the adverse impacts. The mitigation measures have been devised in line with various legal and regulatory requirements that are relevant to the project. This ESMP is a dynamic document that can be updated with changing project conditions.

9.1.2 Objectives of the Proposed ESMP

The objectives are to:

- Enable detection of changes in environmental conditions by highlighting anticipated impacts;
- Prescribe preventive measures that the proponent should institutionalize to mitigate adverse environmental and social impacts;
- Respond to adverse changes during the dredging process through monitoring and control programmes in consultation with NEMA;
- Ensure that corrective actions are implemented appropriately and in a timely manner;
- Bring the project into compliance with applicable legal environmental policies and procedures, more so EMCA, 2015;
- Outline the mitigating and monitoring measures required to enhance the positive project impacts;
- Prescribe procedures that cause minimum environmental degradation, especially implementation of best environmental practice in the sector;
- Spell out practices to ensure all personnel engaged in the works comply with the prescriptions of the ESMP;
- Ensure that no change is made to the ESMP without the prior written permission of West Kenya, or its nominated representative(s);
- To ensure environmental mainstreaming during the implementation of the project;
- To enable for a systematic and proactive approach to addressing environmental and social issues during the project's implementation;
- Ensure compliance with, among others: NEMA regulations, County By-laws; and
- Provide guidelines for record keeping on site.

This ESMP framework constitutes attendant sub-plans that will be responsive to the prevailing environmental and social circumstances during the dredging process. The ESMP will therefore remain an active document that can be continuously upgraded.

9.2 Implementation and Monitoring of the ESMP

In executing its responsibilities during dredging/de-siltation and sand harvesting, the Proponent remains committed to environmental management. The proponent and any sub contactors are bound to comply with legal and regulatory environmental requirements of Kenya.

This ESMP implementation covers dredging/de-siltation and sand harvesting. Even though other parties may be brought on board to attend to various project aspects, the oversight and responsibility for implementation of this ESMP in accordance with best industry practices as well as workplace health, safety and environmental (HSE) standards still remains with the proponent.

The proponent will allocate adequate budget and a proper implementation schedule for all mitigation measures specified in the ESMP. In addition, the specific roles and responsibilities will be assigned to project personnel, such as safety and health management roles.

9.3 Implementation of Corrective Action(s)

There are several mechanisms for implementing corrective action during dredging/de-siltation and sand harvesting. The main mechanisms to address non-conformances include verbal instruction (in the event of minor deviation from established procedure, usually following a site inspection); written instruction (identifying sources of problems, usually following an audit) and issuance of contract notice (following possible breach of contract).

9.4 Environmental and Social Management Plan Matrix

This matrix presents the proposed measures comprising individual sub-plans to address specific environmental and social concerns. The information provided in this chapter and summarized in the matrix constitutes the ESMP. The implementation of this ESMP should be carried out within the provisions of the law and for the ultimate benefit of all project stakeholders. The effectiveness of this ESMP shall be monitored and assessed during periodic checks, inspections and at the end of the Project when an overall audit shall be carried out.

Table 6: Environmental and Social Management Plan Matrix

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
Environmental and Safety Aspects					
Increased turbidity	Reduced phytoplankton bloom	- Avoid dumping of dredged materials inside the lake; - Recycle sand as building material; - Transport other non-utilised dredged materials such as mud and clay through the pipeline to reclaim the derelict former sand harvesting sites within the area.	Proponent	Dredging period	Part of dredging costs
	Effects on fish survival	- Carry out spot dredging to allow fish to move from high turbidity and suspended sediments areas by horizontal or vertical movements	Proponent	Dredging period	Part of dredging costs
	Effects on fish breeding	- Avoid dredging near the fish breeding areas during the long and short rainy period; - Avoid dredging activities in areas along the delta and 100m wide from the shoreline; and - Limit the dredging on the mouth of the river (2 channels), the near open lake waters and unblocking the old river mouth.	Proponent	Dredging period	Best Environmental Practice
	Impact on ecological behaviours of *Labeo victorianus*	- Avoid dredging near the fish breeding areas during the long and short rainy period; - Avoid dredging activities in areas along the delta and 100m wide from the shoreline; and - Limit the dredging on the mouth of the river (2 channels), the near open lake waters and unblocking the old river mouth.	Proponent	Dredging period	Best Environmental Practice

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
Physical damage/injury or mortality	Impact on fish eggs and larvae	- Avoid dredging near the fish breeding areas during the long and short rainy period; - Avoid dredging activities in areas along the delta and 100m wide from the shoreline; and - Limit the dredging on the mouth of the river (2 channels), the near open lake waters and unblocking the old river mouth.	Proponent	Dredging period	Best Environmental Practice
	Impact on demersal fish species	- Avoid dredging near the fish breeding areas during the long and short rainy period; - Avoid dredging activities in areas along the delta and 100m wide from the shoreline; - Vegetation at the edge of delta facing the lake should not be destroyed; and - Limit the dredging on the mouth of the river (2 channels), the near open lake waters and unblocking the old river mouth.	Proponent	Dredging period	Best Environmental Practice
	Impact on aquatic habitat	- Limit the dredging on the mouth of the river (2 channels), the near open lake waters and unblocking the old river mouth.	Proponent	Dredging period	Best Environmental Practice
Oil Spill Hazards	Pollution of water resources	- Collect the used oils and re-use or dispose of appropriately using expertise from licensed waste handlers; and - Seek to reduce probabilities of accidental and/or operational spills through enforcement of oil spill management systems.	Proponent	Dredging period	500,000 Best Environmental Practice
Occupational Health and Safety	Health and Safety risks	- Ensure the dredger is licensed by the IMO and KMA; - Create awareness among Lake users on the presence of the dredger and its activities as well as the require safety precautions; - Dredger should have an early warning system for local fishermen within the delta to prevent navigational accidents and loss of life in case of potential collision with the fishing boats;	Proponent	Dredging period	1,000,000

Aspect	Anticipated Impact	Management and Mitigation/enhancement measures	Responsibility	Monitoring Timeframe	Mitigation Costs
		- Hire qualified and well-trained personnel for the dredging works; - The proponent to obtain insurance cover for employees of the dredger site and ensure appropriate compensation in the event of accidents; - Provide Personal Protective Equipment (PPE) for ship crew, workers and visitors to the dredging site; - Contractor to recruit qualified and experienced Occupational Safety Officers to train and enforce compliance with safety measures; - Comply with the Occupational Safety and Health Act, 2007; and - All accidents should be reported, investigated and corrective action taken to prevent reoccurrence.			
Socio-Economic Aspects					
Social Grievances	Misunderstandings; lack of information; or delayed, inconsistent or insufficient information	- Provide sufficient and timely information to communities about the dredging project and its activities, plus an approximate implementation schedule; - Employ locals in liaison with local leaders and administration in unskilled and semi-skilled duties; and - Carry out regular meaningful community consultations and dialogue throughout the implementation of the dredging project.	Proponent, community liaison officers and local administrators	Dredging period	2,000,000

10. CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The perennial flooding at Sondu Miriu River flood plain occurs due to heavy rains in the catchment as well as deforestation upstream as a result of poor land use practices, causing serious sedimentation and forming deltas at the river mouth. The dredging/de-siltation and sand harvesting project should therefore be undertaken to forestall human suffering during floods among other things opening up of canals, drainages, streams and water channels to reduce siltation.

Views gathered from stakeholders point to the anticipation that the Dredging/De-Siltation and Sand Harvesting Project will help to control flooding within the Sondu Miriu River Delta while reducing displacements, water borne diseases and deaths. In addition the project will also improve navigation within the lake and the river and resuscitate livelihoods such as farming and other economic activities that were previously been interrupted by floods. Respondents mentioned that the project will also help in mitigating against human-wildlife conflict especially the menace of hippos who during floods find their ways to people homes that becomes extension of riparian due to flooding. In spite of the consulted parties airing a few concerns and suggestions over how certain aspects of the project should be handled, they indicated support for the proposed development and look forward to its implementation.

The adverse elements notwithstanding, the benefits that will be realized from the proposed dredging/de-siltation and sand harvesting outweigh most of the inconveniences and negative impacts that have been categorized in this ESIA Study as temporary, moderately significant and limited to the project area. The ESIA Study determined that if the project is implemented with due attention to the mitigation and monitoring measures entailed in this document, most if not all, adverse environmental and social impacts will be manageable. Overall, the Proposed Dredging/De-Siltation and Sand Harvesting Project is deemed timely, highly beneficial and should therefore be allowed to proceed within the given framework.

10.2 Recommendations

It is recommended that for the prevention and mitigation of potentially adverse environmental and socio-economic impacts, the following should be done:

- The operation and maintenance of the proposed project must comply with the best management practices and the principles of environmental management including the principles of sustainability, intergenerational equity, prevention and precaution;
- Ensure the views expressed by the public during the consultation exercise are integrated in the design and implementation plan of the project, especially where aspects of social interest are concerned;
- Regular environmental and social safeguard monitoring and auditing should be undertaken and any identified shortcomings addressed. This will ensure that all projects are in conformance with established laws and regulations for the management of environment, safety and health;

- Institute effective communication, education and awareness raising for project workers and neighbours for enhanced acceptability and social harmony;
- The proponent should ensure the local community benefits from employment opportunities during the implementation of the project that is being executed; and
- The proponent should expedite on the works to minimize adverse livelihood impacts and inconveniences to the community due to the perennial flooding.

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APPENDICES

APPENDIX I: APPROVED TERMS OF REFERENCE

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Mobile Lines: 0724-253 398, 0723-563 210, 0735-013 046
Telkom Wireless: 020-210 370, 020-2183718
Incident Lines: 0786-101100, 0741-101100

P.O. Box 67839, 00200
Popo Road, Nairobi, Kenya
E-mail: dgnema@nema.go.ke
Website: www.nema.go.ke

NEMA/EIA/5/2/305 **30th June 2021**

The Director
Mango Tree Marine Limited
P. O. Box 3300 - 40100
KISUMU

RE: ACKNOWLEDGEMENT AND APPROVAL OF TERMS OF REFERENCE (TOR) FOR ENVIROMENTAL IMPACT ASSESSMENT

We acknowledge the receipt of TOR for the above subject.

Pursuant to the Environmental Management and Coordination Act, 1999 the second schedule and the Environmental (Impact Assessment and Audit) Regulations 31 and 35, your terms of reference for the Environmental Impact Assessment (EIA) for the proposed **DREDGING/DE-SILTATION AND SAND HARVESTING AT SONDU MIRIU RIVER DELTA** has been approved.

You shall submit ten (10) copies, a soft copy summarised version of the ESMP in **WORD** form and one electronic copy of your report prepared by a registered expert to the Authority.

ZEPHANIAH OUMA
AG. DIRECTOR COMPLIANCE, ENFORCEMENT AND FO

TERMS OF REFERENCE FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED DREDGING/DE-SILTATION AND SAND HARVESTING AT SONDU MIRIU RIVER DELTA

PREPARED FOR APPROVAL BY THE NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

PROJECT PROPONENT:

MANGO TREE MARINE LTD
P.O BOX 3300-40100
KISUMU, KENYA

JULY, 2021

Document Authentication

This term of Reference for the above mentioned project has been prepared by Gomake Consultancy Company Ltd; NEMA registered and licensed EIA/EA Firm of Experts.

This ToR has been done with reasonable skills, care and diligence in accordance with the Environmental Management and Coordination Act Cap387 and the Environmental (Impact Assessment and Audit) Regulations 2003.

We the undersigned, certify that the particulars given in this ToR are correct and righteous to the best of our knowledge and will be sufficient to provide adequate and informative Environmental and Social Impact Assessment on the Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta

PROJECT PROPONENT

MANGO TREE MARINE LTD
P.O BOX 3300-40100
KISUMU, KENYA

Signature.....Date 26TH JUNE, 2021

MANGO TREE MARINE LTD
28 JUN 2021
P.O BOX 3300 - 40100, KISUMU

Stamp.....

EIA/EA FIRM OF EXPERTS

NAME:	GOMAKE CONSULTANCY COMPANY LTD
ADDRESS:	5540-00100, NAIROBI
TEL:	0720964333
Email:	info@gomakeltd.co.ke

Signature.....Date 26th June 2021

GOMAKE CONSULTANCY COMPANY LTD.
28 JUN 2021
P.O. Box 5540 - 00100, NAIROBI-KENYA
TEL: 0720964333
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1.0 Introduction

The rapid rise in urbanization and construction of large-scale infrastructure projects are driving increasing demands for construction materials globally. United Nations Environment Programme (UNEP; 2014) estimated that between 32 and 50 billion tonnes of sand and gravel are extracted globally each year with demand increasing, especially in developing countries (Schandl et al., 2016). Economic development is one of the main objectives of developed and developing nations worldwide. Development comes with growth of urban areas. Urban growth is achieved through sand and gravel mining for construction of modern, attractive and durable structures. Mining is important for economic development, to construct durable, modern structures, employment creation and revenue collection.

Sand is a loose, non-cohesive 'granular' material whose size varies between 0.063 mm and 2 mm (Pettijohn et al., 1972). The term 'sand' is used to cover almost any comminuted rock or mineral, but technically it is restricted to quartz sand with minor impurities of feldspar, mica and iron oxides (Jensen and Bateman, 1979). Sand and gravel occur as sedimentary beds, lenses and pockets lying at or near the surface or inter-bedded with other sedimentary formations. They occur as river channel and floodplain deposits, fluvioglacial deposits, seashore deposits, wind-blown deposits along and near water bodies, desert sand dunes and marine and freshwater sedimentary beds.

The Proponent, Mango Tree Marine Ltd has proposed to carry out Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta for commercial purposes and in doing so reduce the impact of flooding due to sedimentation at the river mouth by easing the flow of water to the lake.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta Project including its associated components is categorized a **high risk** project mining and other related activities including harvesting of aggregate, sand, gravel, soil and clay and is required to undergo a **full ESIA study**.

The environmental consultant on behalf of the Proponent will undertake Environmental and Social Impact Assessment as will be guided by these Terms of Reference.

2.0 Project Justification

Sondu Miriu River is one of the six major rivers in the Lake Victoria basin. It is the fourth largest river in Kenya, originating from the western slopes of Mau Escarpment and flowing through Nakuru, Bomet, Kericho, Nyamira, Homa Bay and Kisumu Counties before discharging into Lake Victoria.

The perennial flooding in the flood plain occurs due to heavy rains in the catchment as well as deforestation upstream as a result of poor land use practices, causing serious sedimentation

and forming deltas at the river mouth. In the recent past however, flooding is also occurring due to backflow of the lake waters attributed to climate change.

A petition regarding perennial flooding of River Sondu Miriu was presented to the National Assembly by the Hon. Speaker, on behalf of Mr. Fredrick Gaya, on 12th August, 2020. Mr. Fredrick Gaya was acting on behalf of residents from Osodo Kobala, Kobuya, West Koguta and West Nyakach areas of Rachuonyo North and Nyakach Sub-counties of Homa Bay and Kisumu Counties.

The Parliamentary Departmental Committee on Environment and Natural Resources conducted an inspection visit to Sondu Miriu River on Saturday 10th October, 2020. During the visit, the Committee made a courtesy call to the Deputy County Commissioner for Rachuonyo North Sub County then visited the following sites: Osodo Primary School, Chuowe Beach, Kobuya Secondary School, Sangoro Primary School, Rota Beach, Nyadina Primary School, and Nyongonga Primary School. During the inspection visit, the Committee observed that there was a back flow of River Sondu Miriu at Chuowe Beach due to siltation.

The Committee through its report dated December 2020 urged the National Assembly to recommend to the Government of Kenya to urgently undertake the following among others in order to permanently mitigate flooding and its effect in the region:

- In conjunction with other stakeholders, spearhead the dredging/de-siltation of Sondu Miriu River and unblocking the river deltas in Adera, Nyalmera and Chuowe around Winam Gulf to ease the flow of water to the lake.
- The County Governments of Homa Bay and Kisumu, as a matter of policy, in conjunction with other stakeholders, should undertake to forestall human suffering during floods among other things carry out desilting, dredging and opening up of canals, drainages, streams and water channels to reduce siltation.

3.0 Scope Objective and Criteria of the Environmental and Social Impact Assessment (ESIA)

Gomake Consultancy Company Ltd, a NEMA registered and licensed Firm of Experts in Environmental and Social Impact Assessment has been contracted as the Environmental Consultant firm to conduct the Environmental and Social Impact Assessment for the Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta. The scope of work entailed the independent verification of all environmental, cultural, planning and social aspects of the project components and identifying the gaps with applicable Performance Standards of all the dredging and sand harvesting works within the delta region.

The consultant on behalf of the proponent will conduct the study by incorporating but not limited to the following terms of reference:

- Description of the location of the proposed development project.

- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The objectives of the proposed project.
- The technology, procedures and processes to be used, in the implementation of the project.
- The materials to be used in the construction and implementation of the project.
- The products, by-products and waste to be generated by the project.
- A description of the potentially affected environment.
- The environmental effects of the project including the traffic, infrastructural, social, aesthetics, and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- Undertake a comprehensive public and stakeholders' consultation and participation process through stakeholder analysis and appropriate identification of applicable consultation methodology.
- To recommend a specific environmentally sound and applicable wastewater management system.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- Analysis of alternatives including project site, design and technologies.
- Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out development activities.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties, which were encountered in compiling the information.
- An economic and social analysis of the project.
- Traffic Impact Assessment
- An environmental management and monitoring plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe, responsibility to implement the measures and monitoring mechanisms.

4.0 Baseline Data Collection

4.1 Introduction

The study will involve literature review and fieldwork to collate relevant environmental data for ecological impact assessment. Scope of study will be refined to enable proper planning for gathering of baseline information and contextualization of the ecological impact assessment.

4.2 Desktop Analysis

a) Literature Review

This will involve review of background information on fisheries, aquatic invertebrates, wetland birds, vegetation, invasive species, and herpetofauna; including water quality and ecosystem services. Scientific publications and technical reports will be reviewed for developing background information.

b) Sediment Plume Assessment

The potential extent of sediment loads by Sondu Miriu River will be determined by assessing satellite images for dry and wet season. It is assumed that sediment plumes are generated during wet season due to high erosion in the catchments. The plume phenomenon affects the colour of water in the lake which can be ultimately affects the reflectance properties of water. The plumes travel far during rainy season due to high energy with which the river water enters the lake. Reflectance of lake water will be analysed in False Colour Composite of satellite images. The reflectance for sediment plumes will be used to determine potential plume extent in the lake. Sediment settling rate will be conducted using high temporal satellite images. Field data collection on the Total Suspended Solids will be used in combination of satellite data for upscaling and derivation of sediment settling rate.

4.3 Fieldwork

a) Water quality Parameter

Dredging activity will cause disturbance of the bottom sediments that will cause sediment plumes that can travel far from the project site. The sediment plumes will affect the physico-chemical and biological parameters of the water quality. These parameters are important in assessing habitat conditions for fish and planktonic organisms. Water quality parameters that will be measured will include pH, Temperature, Total Dissolved Substance (TDS), Electrical Conductivity (EC) and Total Suspended Solid (TSS). Sampling will be done by distance from the proposed dredging site in order to determine baseline water quality condition that will provide basis for future monitoring of the dispersal sediment plumes to the open lake area and along the shores on the eastern and western side of the river mouth. Priority will be given to areas identified as fish breeding sites on either side for about 5 km.

5.0 Anticipated Environmental and Social Impacts

The Proposed Dredging/De-Siltation and Sand Harvesting project has potential to cause positive and adverse impacts as outlined below. The impacts will be investigated in detail during the ESIA study using the systematic impact assessment methodology described in preceding sections of this document.

The environmental baseline information and the project characteristics that will be identified during the study will form the basis for impact identification and evaluation. The impacts that are expected to arise from the project will be described by their nature as positive, or negative, direct or indirect, short-term or long- term, temporary or permanent depending on their area of cover and their lifespan in the environment.

This assessment will be done for all the project phases namely; pre-dredging, dredging and post-dredging phases.

5.1 Anticipated Positive Impacts during Dredging and Sand Harvesting

- Reduced cases of flooding within the delta
- Creation of employment
- Availability of sand as a raw material for building and construction
- Improved Access of lake to fishermen
- Increased business opportunities for local traders
- Increased revenue to the Government through tax and duty payment

5.2 Anticipated Negative Impacts during Dredging and Sand Harvesting

- Increased turbidity on Lake and River Water;
- Increased bioavailability of heavy metals from dredging activities that might affect aquatic life;
- Loss of biodiversity due to unavailability of phytoplankton;
- Impact of dumping of dredged material;
- Oil spills and bioaccumulation of polycyclic aromatic hydrocarbons (PAHs) from dredging activities;
- Impact dredging on fisheries and livelihoods; and
- Increased human-wildlife conflicts;
- Compromised Health and Safety among others.

5.3 Anticipated Positive Impacts after Dredging and Sand Harvesting

- Reduced water turbidity;
- Improved biodiversity;
- Improved fisheries due to improved water circulation; and
- Reduced cases of flooding.

5.4 Anticipated Negative Impacts after Dredging and Sand Harvesting

- Unemployment;
- Reduced access to building materials such as sand;
- Reduced income to the proponent and to the government in form of revenue.

6.0 Draft Environmental Management Plan for the Project

The following is the draft environmental management plan for the negative impacts that were identified for the Proposed Dredging/De-Siltation and Sand Harvesting project.

Impact	**Mitigation Measures**
Increased turbidity on Lake and River Water	• Procure and deploy silt curtains during dredging to reduce turbidity in adjacent environments; • Determine the acceptable critical limits for water quality during dredging based on the baseline values in consultation with NEMA; and

Impact	Mitigation Measures
	• Develop and implement a Water Quality Monitoring Plan for dredging and sand harvesting activities.
Increased bioavailability of heavy metals	• Procure and install silt curtains to hold sediments within the dredging and dumping areas; • Develop and implement a sediments quality monitoring plans focusing on heavy metals and health risks; • Share results of sediment quality monitoring plan with stakeholders; and • Notify NEMA and potentially affected communities if high levels of heavy metal concentrations are reported in the monitoring plan for discussion on suitable intervention measures.
Loss of biodiversity	• Use of silt curtains to localize turbidity to the dredging area; and • Develop and implement a biodiversity monitoring plan for both the areas to be dredged, dumping sites and the other critical wetlands identified in the baseline.
Impact of dumping of dredged material	• No dumping should occur in the lake at this option is not sustainable. This is due to the shallow nature of the area which averages -3m, impact on fisheries resources, biodiversity and livelihoods; • Dumping on land in designated areas in Kisumu and Mbita where the proponent is currently operating from; • The project area farms near the project area has derelict lands occasioned by sand harvesting are options.
Oil spills	• Prevent oil spills from occurring through effective maintenance of the dredger and precautionary measures; • Ensure that the dredger is serviceable and licensed to operate by International Maritime Organization (IMO) and the Kenya Maritime Authority (KMA); • Procure an oil spill response boom, equipment and train personnel on its use in the event of oil spills. Use of degreasers to dissolve localized oil spills during ship/equipment maintenance

Impact	Mitigation Measures
	• Waste oil from the ship to be collected and disposed by NEMA Licensed contractors only; • Keep records of all pollution incidents and notify NEMA and the proponent within 24 hours of occurrence; • Comply with the provisions of the Marpol Convention 73/78, The Environmental Management and Coordination Act Cap 387 of the Laws of Kenya and The Kenya Maritime Act, 2012.
Impact dredging on fisheries and livelihoods	• Procure and use silt curtains to prevent sediment dispersal from the dredging areas; • Establish a liaison committee between the proponent, the community, County Governments, Beach Management Units, Kenya Fisheries Service and KWS; • Develop and implement a Grievance Redress Mechanism; • In case of restricted access to traditional fishing grounds, the proponent should consider compensation to the local fishermen.
Increased human-wildlife conflicts	• In collaboration with Kenya Wildlife Service, develop a hotline/helpline on wildlife e.g. hippo sighting within human settlements to allow to expedite response and action to deal with stranded or risky wildlife.
Health and Safety risks	• Ensure the dredger is licensed by the IMO and KMA; • Create awareness among Lake users on the presence of the dredger and its activities as well as the require safety precautions; • Dredger should have an early warning system for local fishermen within the delta to prevent navigational accidents and loss of life in case of potential collision with the fishing boats; • Hire qualified and well-trained personnel for the dredging works; • The proponent to obtain insurance cover for employees of the dredger site and ensure appropriate compensation in the event of accidents; • Provide Personal Protective Equipment (PPE) for ship crew, workers and visitors to the dredging site;

Impact	Mitigation Measures
	• Contractor to recruit qualified and experienced Occupational Safety Officers to train and enforce compliance with safety measures; • Comply with the Merchant Shipping Act, 2009 (Part VII Section 117-168 on Safety, Health and Welfare of Seafarers); • Comply with the Occupational Safety and Health Act, 2007; and • All accidents should be reported, investigated and corrective action taken to prevent reoccurrence.

7.0 Stakeholder Consultations

Regulation 35-2 of the Environmental (Impact Assessment and Audit) Regulations, 2003 requires that an ESIA should examine and seek views from the local community and other potentially affected persons. The welfare of human societies and the quality of life is directly linked to sustainable use of natural resources.

As much as possible the views of all Key Stakeholders and Project Area Community will be collected through the following forum:

- Oral interviews;
- Administration of Questionnaires;
- Key Informant Interviews with key stakeholders;
- Public Consultation Meetings: Public Consultation Meetings (PCM) will be convened within the project area.

The intention of the Public Consultation Meeting will be to;

  - Inform all the stakeholders about the proposed project and carry out public sensitization on the project, provide information on the potential impacts and proposed mitigation measures to eliminate or reduce these impacts;
  - Collect additional baseline data/information on the project area environment;
  - Provide an opportunity to all the stakeholders in the project area to give comments, raise issues and concerns pertaining to the proposed project and allow for the identification of project alternatives, mitigations and implementation strategies and recommendations;
  - Emphasize the importance of having all stakeholders being involved in the project implementation process;
- The venue of the meetings will be identified within the project area; there will be at least 3 public consultation meetings carried out during the study process.
- Due to the COVID -19 pandemic, the consultant has put in place safety and precautionary measures to ensure the safety of both experts and the project stakeholders. This was

guided by the NEMA guidelines on conduct of public consultation for EIA, EA and SEA during the pandemic.

7.1 Public Consultation and Disclosure Plan (PCDP)

The PCDP shall provide the strategy and timetable for sharing information and consulting each of the key stakeholders group during various phases of the project. The PCDP will guide;

- The Regulations and Requirements related to the ESIA legislation;
- Identification of key stakeholders who will be informed and consulted;
- Public Consultation and Disclosure programme;
- Timetable/schedule detailing when consultations and disclosure activities will take place;
- Grievance redress mechanism in an appropriate manner; and
- Appropriate reporting in the ESIA Report.

The following stakeholders have been identified for consultation in line with the PCDP:

- Project Planners;
- National Environment Management Authority;
- National Land Commission;
- Kenya Wildlife Service;
- Water Resources Authority (WRA);
- Fisheries Department;
- State Department for Mining;
- County Governments of Homa Bay and Kisumu;
- National Government Administration;
- Other Project Affected Persons;
- Local community.

8.0 Time Schedule for Executing the ESIA

Activity	Timelines (Weeks)		
	1-2	2-3	4-5
Undertake screening and scoping. TOR approval by NEMA			
Site visits and Stakeholder analysis and consultation to further refine and/or optimize alternatives and mitigations identified during the Study Report Preparation			
Document the ESIA Study Report: • Description of the project, • Baseline studies, • Legislative and regulatory framework, • Determination of impacts, • Mitigation, • Analysis of alternatives, • Prescription of Environmental and Social Management Plan			
Presentation of the ESIA to the proponent for ownership			
ESIA Report compilation and submission to NEMA			

9.0 Team of Experts

All partners coming from different disciplines and experiences have spearheaded the implementation of innovative and appropriate approaches to development thinking, namely scientific and well researched outcomes, participatory approaches that enhance dialogue, forge partnerships and encourage conflict management and resolution. The team's diverse disciplines are consistent with the multi/inter/trans– disciplinary nature of the environmental management tools and the code of practice for the registered EIA/EA firm of experts.

Name	**Expertise**
1. Kennedy Kijana **(Principal Consultant)**	EIA/EA Lead Expert
2. Dickens Onyango Odeny, PHD **(Research Scientist)**	Biodiversity and Aquatic Ecology Expert
3. Dorcas Thomas Awuor **(Sociologist)**	Social Scientist and Community Development Expert
4. Flora Mitchel Akinyi **(Associate Expert)**	Environmental Associate Expert
5. Fred Maseno **(Health & Safety Expert)**	Occupational Safety and Health Specialist.

10.0 Approval by NEMA

The Authority has reviewed the Terms of Reference and is satisfied with the content and scope to guide the ESIA for the Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta.

APPROVED BY: Zephania O. Ouma

SIGN..

DATE: 30/6/24

STAMP..

APPENDIX II: PARLIAMENTARY REPORT ON SONDU MIRIU FLOODING

REPUBLIC OF KENYA

THE NATIONAL ASSEMBLY

12TH PARLIAMENT - FOURTH SESSION - 2020

DEPARTMENTAL COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

REPORT ON A PETITION REGARDING EFFECTS OF FLOODING AND ITS MITIGATION ALONG RIVER SONDU MIRIU

DIRECTORATE OF DEPARTMENTAL COMMITTEES,
CLERK'S CHAMBERS,
PARLIAMENT BUILDINGS,
NAIROBI

DECEMBER, 2020

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CHAIRPERSON'S FOREWORD

The petition regarding perennial flooding of River Sondu Miriu was presented to the House the Hon. Speaker, on behalf of Mr. Fredrick Gaya, on 12th August, 2020. Mr Fredrick Geya was acting on behalf of residents from Osodo Kobala, Kobuya, West Koguta and West Nyakach areas of Rachuonyo North and Nyakach Sub-counties of Homa Bay and Kisumu Counties.

Pursuant to Standing Order 227 (1), the petition was committed to the Departmental Committee on Environment and Natural Resources for consideration and reporting to both the House and the petitioners according to Standing Order 227 (2).

The Petitioners had prayed that the Departmental Committee on Environment and Natural Resources, pursuant to Standing Order 216 (5) (a):

a) Dispenses with the petition immediately in view of the urgency of the matters canvassed therein.
b) Investigates and makes recommendations with regard to: number of those affected, number of deaths and rate of diseases, cumulative funds used in disaster response during floods, social-economic audit on losses incurred by residents in terms of destroyed farms, livestock deaths, and marooned grazing lands, and water and sanitation facilities affected.
c) Enacts the National Disaster Management Bill and consider compensating affected families.
d) Ensure sufficient mobilization, allocation and accountability of funds for the permanent mitigation of floods and their effects along Sondu Miriu River through the FY 2020/2021 budget.

The Committee consequently got seized of the matters canvassed in the Petition and processed it, pursuant to Standing Order 227, through deliberative meetings with the petitioners, the Ministry of Water, Sanitation and Irrigation and its various SAGAs, the County Governments of Homabay and Kisumu and conducted an inspection visit to the Sondu Miriu River with a view to responding to the prayers sought.

After an analysis of the oral and written submissions made, the Committee observed as follows:

1. Sondu Miriu River drains into Lake Victoria from the slopes of Mau Escarpment. During heavy rains, it causes intense flooding in parts of Kisumu and Homabay Counties particularly the low-lying areas where it drains into the Lake. It breaks its banks hence flooding occurs in adjoining settlements causing displacement and loss of property. Rising lake levels also cause flooding in areas bordering the shores of Lake Victoria. This perennial problem needs a lasting solution. Apart from the heavy rains in the catchment area, degradation of upstream vegetation as a result of poor land use practices causes flooding.

2. An inspection visit to the area revealed that flooding in the region had led to disruption of power supply due to falling electricity poles, destruction of the road network in the area and water borne diseases among the locals.

3. Whereas floods are natural disasters, the impacts on residents depend very much on community land use practices, adherence to early warning systems and quick implementation of advisories.

4. The Water Resources Authority has installed a Telemetry Station in the flood plain at Nyakwere Village to monitor the water levels. The station provides near real time data for early warnings. During the periods approaching the two main rain seasons that cause floods in the area, Water Resources Authority, based on the data collected from the station, issues flood warnings to alert communities living in the flood plain to vacate.

5. The National Water Harvesting and Storage Authority conducted a flood situation assessment in the L. Victoria basin during the March-April-May, 2020 long rains which established that the long rains were heavier compared to the previous years. This led to more destruction and disruption of livelihood of the communities living within the Lower lake region that is usually affected by floods.

6. In 2020, apart from the high flows that broke the river banks, the water levels in L. Victoria had increased significantly leading to a backflow that submerged over 700 Acres of farmland and homes, causing much destruction of property and other livelihoods, displacing about 2,258 people in the area. Other infrastructure damaged include; roads, bridges, beaches, electric poles, sand harvesting mines, gabion boxes, destruction of the Awach-Kimilo Irrigation infrastructure and blockage of the river delta.

7. Dredging the river and unblocking the river delta would go a long way in easing the flow of water to the lake. However, it is a major environmental activity requiring major investment and integrated approach by the government, and would form part of long term strategy for controlling floods on River Sondu Miriu. This would be coupled by construction of dams upstream to store water and control flood flows during heavy rains, establishment of a modern early warning system based on a functional telemetric network and identification of permanent evacuation centers. The sediment load of rivers in the whole lake basin are very high due to deforestation upstream, causing serious sedimentation and forming deltas at the river mouths. This is a major cause of floods.

8. The Ministry was considering a proposal to construct a 2-kilometer dyke on the left bank of River Sondu Miriu from Sang'oro power station and a 5-kilometer dyke on either side of the river after Kendu Bay-Katito road towards the lake. The works are estimated to cost about Ksh 360 million.

9. In order to increase area under irrigation and boost food security in the region, the Government through National Irrigation Authority had planned a major project called Great Wang'cheng' Irrigation Project in Rachuonyo North Sub-County, Homa Bay County. The project is estimated to cost Ksh 879 million and will bring 1,820 acres of land under irrigation to grow maize and other high value horticultural crops. It will benefit about 1,000 farmers, thereby boosting socio-economic development of the community. Feasibility study and detailed design are completed and government was seeking funds for implementation.

10. The Ministry of Water, Sanitation and Irrigation intended to assess and determine suitable sites for construction of water pans, small dams and boreholes to assist the communities' access safe water for domestic use. The projects will then be prioritized for implementation under the various programs targeting improvement of rural water supply.

11. The Ministry of Water, Sanitation and Irrigation was further addressing water and sanitation challenges in Homabay County through implementation of the following projects:
    a) Homa Bay Cluster Water Supply and Sanitation Project at a total cost of Ksh 1.1[illegible] billion. The project commenced in January, 2019 and is expected to be completed in June, 2021.

    b) Kendu Bay Water and Sanitation Project at a total cost of Ksh 690 million. The project commenced in April, 2019 and is expected to be completed in October, 2021.

    c) Oyugis Water Supply and Sanitation Project at a total cost of Ksh 716.6 million. The project commenced in April 2019 and is expected to be completed by October 2021.

12. There are no flood mitigation works that have been done along the Sondu Miriu River. Mitigation of flooding along the river requires a multi-sectoral approach from the energy, transport, water & sanitation sectors among others.

13. The County governments of Homabay and Kisumu counties have major roles to play in flood mitigation in their respective jurisdictions in conjunction with other counties in the upstream areas of River Sondu Miriu.

14. The fishing community had suffered repercussions of the flooding both from the river and Lake Victoria backflow. For instance, Sango Rota Beach Management Unit avers that the landing bay has been destroyed, shore land reduced by the back flow from Lake Victoria, beach latrines flooded and destroyed, beach tree and aquatic plants planted dried, beach fish ponds destroyed.

15. The education sector was adversely affected by the flooding of River Sondu Miriu. There was destruction of school infrastructure (classrooms, fences, playing grounds, toilets), loss of books and other learning materials, students being affected by water borne diseases, being used as evacuation centres hence stalling of educational activities, school dropouts by students, increase in promiscuity during times of disaster that result in early pregnancies, increase in cases of child labour, loss of valuable education man hours due to displacements, increase in cases of delinquency and absenteeism, and compromised health of learners during floods.

16. Although the petitioners had prayed that the Committee establishes facts with respect to the following aspects, the Committee did not access comprehensive data on them: number of those affected, number of deaths and rate of diseases, cumulative funds used in disaster response during floods, and social economic audition losses incurred by residents.

17. There was need for the National Assembly to consider prioritizing the consideration and passing of the National Disaster Management Authority Bill, 2019 by Hon Kimani Ichungwa currently awaiting Committee Stage consideration.

18. There was need for the National Assembly to consider urgent mobilization, allocation and accountability of funds for the permanent mitigation of floods and their effects along Sondu Miriu River through the FY 2021/2022 budget.

Consequent to the foregoing submissions and observations, the Committee made the following recommendations:

1. The Ministry of Water, Sanitation and Irrigation as a matter of policy adopt and implement the following, namely:

   a) expedite the construction of a 2 kilometer dyke on the left bank of River Sondu Miriu from Sang'oro power station and a 5-kilometer dyke on either side of the river after Kendu Bay-Kanito road towards the lake in the 2021/2022 Financial Year.

   b) issue necessary guidelines to ensure the River Sondu Miriu bank is preserved and the catchment area is protected since it has the mandate of regulation of the river by demarcating the riparian area.

   c) conduct emergency response during floods and particularly at the evacuation centers by digging or desilting in the natural drains to unblock the water ways, unblock or rehabilitate culverts, supply and install water tanks in learning institutions being used as evacuation centers, build pit latrines and mobile toilets, supply water treatment chemicals and household filters, and supply hand wash facilities.

   d) expedite implementation of the Great Wang'cheing' Irrigation Project in Rachuonyo North Sub-County, Homa Bay County to boost food security in the region.

   e) expedite the assessment of suitable sites for construction of water pans, small dams and boreholes to assist the communities' access to safe water for domestic use. It should then prioritize the projects for implementation under the various programs targeting improvement of rural water supply.

   f) ensure timely completion of the following ongoing projects to address water and sanitation challenges in Homabay County: Homa Bay Cluster Water Supply and Sanitation Project, and Kendu Bay Water and Sanitation Project, Oyugis Water Supply and Sanitation Project.

   g) in conjunction with other stakeholders, spearhead the dredging of River Sondu Miriu and unblocking the river delta to ease the flow of water to the lake. A multi sectoral engagement should then ensure construction of dams upstream to store water and control flood flows during heavy rains, establishment of a modern early warning system based on a functional telemetric network and identification of permanent evacuation centers, construction of water pans and check dams to control water velocity.

2. **The County Governments of Homabay and Kisumu counties**, as a matter of policy, in conjunction with other stakeholders, should undertake the following to forestall human suffering during floods.

   a) Immediate measures: mapping and identification of affected areas and people, supply of water to the affected, providing food and non-food items to the affected, evacuating the affected, and conducting public health outreaches, having trenches dug around schools to prevent water from flooding them, and by carrying out desilting, dredging and opening up of canals, drainages, streams and water channels, construction of fish landing areas, construct toilet to improve sanitation at the beach, construct gabions along the beach to reduce siltation and finance aquaculture along the beach

   a) Medium term interventions: develop a flood management strategy, building evacuation centres for nearby communities to avoid usage of schools as evacuation centres, institute reforestation programs, river training, and sustainable land use practices in the upstream area of Sondu Miriu River to reduce erosion and consequent sedimentation of rivers in the lake basin which is a major cause of floods, engage in inter-sectoral collaborations, and revise existing policy or formulate county level policy, if none exists, on engagements during flooding events.

   b) Long term interventions: enter into public private partnership with the possible investors/ donors to assist in projects such as: tree planting; rain water harvesting in each home. The County Government should also engage with the national government for the construction of Koru-Soin Multi-Purpose Dam, construction of several water pans and rehabilitation of water catchment areas within the region, and capacity building local communities to change behavior for better adaptation.

3. The National Assembly prioritizes the consideration and passing of the National Disaster Management Authority Bill, 2019 by Hon Kimani Ichungwa currently awaiting Committee Stage consideration.

4. The National Assembly ensures sufficient mobilization, allocation and accountability of funds for the permanent mitigation of floods and their effects along Sondu Miriu River through the FY 2021/2022 budget.

5. The National Government Ministries responsible for education, roads, health, energy and disaster management should take measures to address the devastation and destruction wrought by floods along Sondu Miriu River particularly in Rachuonyo North and Nyakach Sub Counties.

The Hon. Kareke Mbiuki, M.P

1.0 PREFACE

1.1 Committee Mandate

1. The Departmental Committee on Environment and Natural Resources is established under the National Assembly Standing Orders No. 216 (1). The functions and mandate of the Committee are also contained under the National Assembly Standing Orders, No. 216(5) as:-
   a) Investigate, inquire into, and report on all matters relating to the mandate, management, activities, administration, operations and estimates of the assigned Ministries and departments;
   b) Study the program and policy objectives of the Ministries and departments and the effectiveness of the implementation;
   c) Study and review all legislation referred to it;
   d) Study, access and analyze the relative success of the Ministries and Departments as measured by the results obtained as compared with its stated objectives;
   e) Investigate and inquire into all matters relating to the assigned Ministries and departments as they may deem necessary, and as may be referred to them by the House;
   f) Vet and report on all appointments where the constitution or any law requires the National Assembly to approve, except those under Standing Order 204; and
   g) Make reports and recommendations to the House as often as possible, including recommendation of proposed legislation.
2. The subject matter of the Departmental Committee on Environment and Natural Resources are stated in the Second Schedule of the National Assembly Standing Orders No. 216 (1) as follows: climate change, environment management and conservation, forestry, water resource management, wildlife, mining and natural resources, pollution and waste management.

1.2 Oversight

3. In executing its mandate, the Committee oversees the following Government Ministries and Departments namely: The Ministry of Environment and Forestry; The Ministry of Water & Sanitation and Irrigation; The State Department for Wildlife; and The State Department for Mining.

1.3 Members of the Committee

4. The Committee comprises the following Members:

Chairperson
Hon. Kareke Mbiuki, M.P.
MP for Maara Constituency
Jubilee Party

Vice-Chairperson
Hon. Sophia Abdi Noor, M.P
MP for Ijara Constituency
Party of Development and Reforms (PDR)

Members

Hon. David Kangogo Bowen, MP for Marakwet East Constituency
Jubilee Party

Hon. Francis Chachu Ganya, MP for North Imenti Constituency
Frontier Alliance Party (FAP)

Hon. Bernard Shinali, M.P. for Ikolomani Constituency
Jubilee Party

Hon. Ali Wario Guyo, MP for Garsen Constituency
Wiper Party

Hon. George Macharia Kariuki, MP for Ndia Constituency
Jubilee Party

Hon. Charity K. Chepkwony, MP for Njoro Constituency
Jubilee Party

Hon. Kingara, Simon Nganga, MP for Ruiru Constituency
Jubilee Party

Hon. Peter Kimari Kihara, MP for Mathioya Constituency
Jubilee Party

Hon. Benjamin Dalu Tayari, MP for Kirango Constituency
Orange Democratic Movement (ODM)

Hon. Charles Ong'ondo Were, MP for Kasipul Constituency
Orange Democratic Movement (Odm)

Hon. Nasri Sahal Ibrahim, MP - Nominated
Forum for Restoration of Democracy-K

Hon. Rozaah Buyu, MP for Kisumu County
Orange Democratic Movement (ODM)

Hon. Hassan Oda Hulufo, MP for Isiolo North Constituency
Kenya Patriots' Party (KPP)

Hon. Amin Deddy Mohamed Ali, MP for Laikipia East Constituency
Jubilee Party

Hon. Said Hiribae, MP for Galole Constituency
Forum for Restoration of Democracy – K

Hon. Rehema Hassan, MP for Tana River County
Maendeleo Chap Chap Party (MCC)

Hon. (Eng.) Paul M. Nzengu, MP for Mwingi North Constituency
Wiper Party

1.4 Secretariat

The Committee is serviced by the following Members of Staff.

Ms. Esther Nginyo
Second Clerk Assistant
Lead Clerk

Mr. Dennis Mogare Ogechi
Second Clerk Assistant

Mr. Fredrick Muthengi
Chief Fiscal Analyst

Mr. Sydney Luganga
Legal Counsel I

Mr Eugene Apaa
Research Officer

2.0 INTRODUCTION

5. The petition regarding perennial flooding of River Sondu Miriu was presented to the House the Hon. Speaker, on behalf of Mr. Fredrick Gaya, on 12th August, 2020. Mr. Fredrick Gaya was acting on behalf of residents from Osodo Kobala, Kobuya, West Koguta and West Nyakach areas of Rachuonyo North and Nyakach Sub counties of Homa Bay and Kisumu Counties.

6. Pursuant to Standing Order 227 (1), the petition was committed to the Departmental Committee on Environment and Natural Resources for consideration and reporting to both the House and the petitioners according to Standing Order 227 (2).

7. The petitioners drew the attention of the House to the following: -

   i) **THAT** due to the persistent perennial floods along River Sondu Miriu in Rachuonyo North and Nyakach Sub counties which continues to havoc Osodo Kobala, Kobuya, West Koguta and West Nyakach areas since 1963.

   ii) **THAT** the residents have bone the far-reaching effects of floods which has never been permanently mitigated by the Kenyan government as per its mandate by the laws governing our country.

   iii) **THAT** this abdication of responsibility has therefore denied, violated, infringed and threatened the people's rights as stipulated in Chapter Four, Par. 2 of the Kenyan constitution.

   iv) **THAT** the residents have made several efforts to have the perennial disaster addressed permanently by both County and National Government and no satisfactory response have been effected.

   v) **THAT** on 12/05/2018, the community presented their requests for permanent mitigation to CS Devolution Hon. Eugene Wamalwa when he visited victims of floods at Osodo Primary school in Kobala Sub location Wangieng Location in the presence of several local leaders but no satisfactory feedback to the resident have been communicated.

   vi) **THAT** currently over 3000 people are displaced since early April and the government is yet to give a permanent solution as requested above.

   vii) **THAT** in respect of our prayer for a lasting solution to mitigation of floods and its effects along River Sondu Miriu, they were not aware of any such case pending before any court of law or other constitutional or legal body.

8. In recognition of Powers, Responsibilities and Privileges of the National Assembly delegated to the Standing Committee on Environment and Natural Resources, and in view of this escalating humanitarian and human rights situation, the petitioners called on the

National Assembly to recommend to the Government of Kenya to urgently undertake the following in order to permanently mitigate flooding and its effect in the region:

i) Dredging/desiltation of the River Sondu Miriu and opening the blocked deltas in Aliera, Nyalunera and Chuowe around Winam Gulf.

ii) Construction of standard Dykes along the banks of River Sondu Miriu.

iii) Implementation of the Great Wang'chieng' Integrated Irrigation and Water project which had been designed and only awaits procurement at the NIB. This will address food, nutrition & water security plus floods control.

iv) Addressing the sanitation challenges and building water secure institutions e.g. Schools, health facilities, churches, homes, markets. Provision of complete WASH facilities e.g. toilets/latrines, water harvesting, treatment and storage, tanks for the roof catchment, community water pans, dams, channels plus hand washing equipment/materials.

v) Promoting tree growing (fruit farming) alongside the river bank and its basin catchment plus reclamation of sand mines in Kobala Sub location which highly supported the government with levy collection. These are mosquito breeding zones and environmentally disastrous.

vi) Provide alternative source of livelihood i.e. fish farming, dairy horticulture, poultry, bee keeping to the youths and women.

vii) Construct two bridges and roads; Chuowe – Sunda Bridge at Udhi area to link and open the over 700 acres of fertile, arable land for agribusiness, food security and eco-tourism; Nyadho-Nyadinn Bridge at Akoko Beach that links Kisumu and Homabay Counties. Chuowe – Nyakwere Road that is eroded; Kobala – Osodo-Nyadho Road that is damaged by erosion.

viii) Last mile power connection to all homes, schools, churches, markets, and health facilities.

ix) Improving, equipping and staffing of learning institutions and health facilities.

10. The Petitioners therefore prayed that the Departmental Committee on Environment and Natural Resources pursuant to Standing Order 216 (5) (a):

a) Dispenses with the petition immediately in view of the urgency of the matters canvassed therein.

b) Investigates and makes recommendations with regard to: number of those affected, number of deaths and rate of diseases, cumulative funds used in disaster response during floods, social-economic audit on losses incurred by residents in terms of destroyed farms, livestock deaths, and marooned grazing lands, and water and sanitation facilities affected.

c) Enact the National Disaster Management Bill and consider compensating affected families.

d) Ensure sufficient mobilization, allocation and accountability of funds for the permanent mitigation of floods and their effects along Soudu Mitin River through the FY 2020/2021 budget.

3.0 SUBMISSIONS

11. The Committee consequently got seized of the matters raised in the Petition and processed it, pursuant to Standing Order 227, through deliberative meetings with: the petitioners, the Ministry of Water, Sanitation and Irrigation and its various SAGAs, the County Governments of Homabay and Kisumu and conducted an inspection visit to the Sondu Miriu River in a bid to deliberate on the matters canvassed in the Petition with a view to responding to the prayers sought. The evidence adduced is recorded hereunder:

3.1 Submission by the Petitioners

12. Mr. Fredrick Gaya, the petitioner, appeared before the Committee on Monday 28th September, 2020 and briefed it that he was acting on behalf of citizens of Kenya residing in Kobala Sub Location, Wang'chieng' Location of Homa - Bay County, directly and indirectly affected by floods.

13. They drew the attention of the House to the fact that there were persistent perennial floods along River Sondu Miriu in Rachuonyo North and Nyakach Sub counties which continues to wreak havoc on Osodo Kobala, Kobuya, West Koguta and West Nyakach areas since 1963.

14. The Kenyan government had essentially abdicated its responsibility and in the process has denied, violated, infringed and threatened the people's rights as stipulated in Chapter Four, Part 2 of the Kenyan constitution.

    a) Article 26: Right to Life has been deprived by deaths occasioned by drowning in floods water, water & vector borne diseases.

    b) Article 27: Equity and Freedom from Discrimination the government's success in the Budalang'i floods menace affirms its ability to mitigate the River Sondu Miriu floods disaster which has been unjustifiably delayed for over 57 years.

    c) Article 28: Human Dignity the continuous displacement of these residents by uncontrolled perennial floods has forced them to lead undignified lifestyle of begging for food relief and nonfood items to survive in the overcrowded camps. They are subjected to psychological torture, treated in an inhuman and degrading manner by the floods.

    d) Article 29: Freedom and Security of the Person the people's freedom have always been deprived arbitrarily since they can't live, move, and socialize normally. Rampant thefts and robberies, snake bites hippo attacks and invasion has precariously risked the security of the people's lives and property.

    e) Article 31: Privacy of the Families private affairs has been unnecessarily revealed and privacy of their communications infringed through eavesdropping by subjecting them to crowded camping classrooms & tents during floods.

f) Article 42: Environment every person has the right to a clean and healthy environment unlike to residents of these areas whose environment get contaminated by the affluent from latrines washed by flood water into their River Sondu Miriu and Lake Victoria. There is high rate of open defecation. Sand mines are mosquito breeding zones which are environmentally disastrous.

g) Article 43: Economic and Social Rights during the floods' the people cannot access the highest attainable standard of health, the people cannot access adequate housing and reasonable standard of sanitation as depicted in the camping sites, the people have inadequate food of unacceptable quality since floods affect their farms, grain stores and have to survive on relief food supplements from the government and other non-state actors. Equally, the people have no access to clean and safe water.

15. Learners at Osodo, Kobuya, Dataja, Kobala, Konyach, Burlum, Nyamanyinga, Nyong'ong'a, Obange, Seng'oro, Sango Buru, Nyawalo and Nyadina schools never get quality education since their classrooms are used to accommodate the displaced families thereby disrupting learning & hindering provision of free basic education by the government.

16. The residents have made several efforts to have the perennial disaster addressed permanently by both County and National Government without any satisfactory response.

17. A lasting solution to mitigation of floods and their effects along River Sondu Miriu be found through:

a) Dredging/desiltation of the River Sondu Miriu and opening' the blocked deltas in Adara, Nyahmero and Chuowe around Winam Gulf.

b) Construction of standard Dykes along the banks of River Sondu Miriu.

c) Implementation of the Great Wang'chieng' Integrated Irrigation and Water project which had been designed and only awaits procurement at the NIB. This will address food, nutrition & water security plus floods control.

d) Addressing the sanitation challenges and building water secure institutions e.g. Schools, health facilities, churches, homes, markets. Provision of complete WASH facilities e.g. toilets/latrines, water harvesting, treatment and storage, tanks for the roof catchment, community water pans, dams, channels plus hand washing equipment/materials.

e) Promoting tree growing (fruit farming) alongside the river bank and its basin catchment plus reclamation of sand mines in Kobala Sub location which highly supported the government with levy collection. These are mosquito breeding zones and environmentally disastrous.

f) Provide alternative source of livelihood i.e. fish farming, dairy horticulture, poultry, bee keeping to the youths and women.

g) Bridge and Road Network: construct two bridges and roads,
   - Chuowe - Sanda Bridge at Udhi area to link and open the over 700 acres of fertile, arable land for agribusiness, food security and eco- tourism.
   - Nyadiro-Nyadina Bridge at Akoko Beach that links Kisumu and Homabay Counties.
   - Chuowe – Nyakwere Road that is eroded
   - Kobala – Osodo-Nyadiro Road that is damaged by erosion

h) Last mile power connection to all homes, schools, churches, markets, and health facilities.

i) Improving, equipping and staffing of learning institutions and health facilities.

18. The petitioner prayed that the National Assembly:
   a) Dispenses with the petition immediately in view of the urgency of the matters canvassed therein.

   b) Investigates and makes recommendations with regard to: number of those affected, number of deaths and rate of diseases, cumulative funds used in disaster response during floods, social-economic audit on losses incurred by residents in terms of destroyed farms, livestock deaths, and marooned grazing lands, and water and sanitation facilities affected.

   c) Enacts the National Disaster Management Bill and consider compensating affected families

   d) Ensure sufficient mobilization, allocation and accountability of funds for the permanent mitigation of floods and their effects along Sondu Miriu River through the FY 2020/2021 budget.

3.2 Submissions by the Cabinet Secretary, Ministry of Water, Sanitation and Irrigation.

19. Dr. Andrew Tuimur, Chief Administrative Secretary in the Ministry appeared before the Committee, on behalf of the Cabinet Secretary, on Wednesday 4th November, 2020 and briefed it as follows.

20. Sondu Miriu River is one of the six major rivers in the Lake Victoria basin. It is the fourth largest river in Kenya, originating from the western slopes of Mau Escarpment and flowing through Nakuru, Bomet, Kericho, Nyamira, Homa Bay and Kisumu Counties before discharging into Lake Victoria.

21. The perennial flooding in the flood plain occurs due to heavy rains in the catchment as well as degradation of upstream vegetation as a result of poor land use practices. In the recent past however, flooding is also occurring due to backflow of the lake waters, which scientists are yet to satisfactorily explain, but is attributed to climate change. Whereas floods are natural disasters, the impacts on residents depend very much on community land use practices, adherence to early warning systems and quick implementation of advisories

22. Water Resources Authority, an institution of the Ministry has installed a Telemetry Station in the flood plain at Nyakwere Village to monitor the water levels. The station provides near real time data for early warnings. During the periods approaching the two main rain seasons that cause floods in the area, Water Resources Authority, based on the data collected from the station, issues flood warnings to alert communities living in the flood plain to vacate. In this year, five (5) flood warning have been issued.

23. The Ministry through National Water Harvesting and Storage Authority conducted a flood situation assessment in the L. Victoria basin during the March-April-May, 2020 long rains with a view to establishing the flood situation in the basin, effectiveness of the structures constructed and proposal of new interventions. The assessment study established that the long rains were heavier compared to the previous years and led to more destruction and disruption of livelihood of the communities living within the Lower lake region that is usually affected by floods.

24. Apart from the high flows that broke the river banks, the water levels in L. Victoria had increased significantly leading to a backflow that submerged over 700 Acres of farmland and homes, causing much destruction of property and other livelihoods, displacing about 2,268 people in the area. Other infrastructure damaged include; roads, bridges, beaches, electric poles, sand harvesting mines, gabion boxes, destruction of the Awach-Kimilo Irrigation infrastructure and blockage of the river delta.

25. The recommendation to dredge the river and unblock the river delta would go a long way in easing the flow of water to the lake. However, it is a major environmental activity requiring major investment and integrated approach by the government, and would form part of long term strategy for controlling floods on River Sondu Miriu. This would be coupled by construction of dams upstream to store water and control flood flows during heavy rains, establishment of a modern early warning system based on a functional telemetric network and identification of permanent evacuation centers. The sediment load of rivers in the whole lake basin are very high due to deforestation upstream, causing serious sedimentation and forming deltas at the river mouths. This is a major cause of floods. Reforestation programs and sustainable land use practices in the upstream to reduce erosion and sedimentation must therefore be initiated and sustained at the County level.

26. The construction of flood control measures such as earth dykes, river training, planting bamboo to protect the river banks from erosion and construction of gabions can be implemented to reduce flooding in the area. The Ministry was considering a proposal to construct a 2-kilometer dyke on the left bank of River Sondu Miriu from Sang'oro power station and a 5 kilometer dyke on either side of the river after Kendu Bay-Kaito road towards the lake. The works are estimated to cost about Ksh 300 million. Considering the urgency of the matter, the Ministry will seek funding from National Treasury in 2021/2022 financial year for implementation.

27. In order to increase area under irrigation and boost food security in the region, the Government through National Irrigation Authority had planned a major project called Great Wang'cheing' Irrigation Project in Rachuonyo North Sub-County, Homa Bay County. The project is estimated to cost Ksh 879 million and will bring 1,820 acres of land under irrigation to grow maize and other high value horticultural crops. It will benefit about 1,000

farmers, thereby boosting socio-economic development of the community. Feasibility study and detailed design are completed and government is seeking funds for implementation.

28. The ministry will assess and determine suitable sites for construction of water pans, small dams and boreholes to assist the communities' access safe water for domestic use. The projects will then be prioritized for implementation under the various programs targeting improvement of rural water supply. The Ministry was further addressing water and sanitation challenges in Homabay County through implementation of projects key among which are;

a) Homa Bay Cluster Water Supply and Sanitation Project at a total cost of Ksh 1.14 billion. The project will increase the water supply capacity of Homa Bay Town from the existing 1,200 cubic meters of water per day to 4,800 cubic meters and improve the reticulation system in the town. A population of 120,000 people will benefit. The project commenced in January, 2019 and is expected to be completed in June, 2021. It is currently at 55% completion.

b) Kendu Bay Water and Sanitation Project at a total cost of Ksh. 690 million. On completion, the project will add 5,000 cubic meters per day of water for Kendu Bay Town. It also includes construction of ablution blocks to improve sanitation. About 70,000 people will benefit from improved water & sanitation services in the town going forward. The project commenced in April, 2019 and is expected to be completed in October, 2021. It is currently at 40% completion.

c) Oyugis Water Supply and Sanitation Project at a total cost of Ksh. 716.6 million. Once completed the project will add 5,700 cubic meters of water per day to Oyugis Town and will include ablution blocks to improve sanitation. The project commenced in April 2019 and is expected to be completed by October 2021. It is currently at 20% completion.

29. The Ministry has a role in the regulation of the river by demarcating the riparian area to ensure protection of the river and its catchment. The Ministry will therefore, through Water Resources Authority, issue necessary guidelines to ensure the river bank is preserved and the catchment area is protected.

30. The other concerns of the petitioner fall within the mandate of either the county government or other government MDAs.

3.3 Inspection Visit to River Sondu Miriu

31. The Committee conducted an inspection visit to Sondu Miriu River on Saturday 10th October, 2020. During the visit, the Committee made a courtesy call to the Deputy County Commissioner for Rachuonyo North Sub County then visited the following sites: Osodo Primary School, Chuowe Beach, Kobuya Secondary School, Sangore Primary School, Kota Beach, Nyadina Primary School, and Nyongonga Primary School.

32. During the inspection visit, the Committee observed that there was a back flow of River Sondu Miriu at Chuowe Beach due to siltation.

33. The Committee also noted that the flooding menace requires a multi sectoral approach to handle. The sectors to be involved include energy, water, roads and emergency relief (disaster management) services.

34. It was also noted that the schools in the area had suffered damages to their infrastructure – buildings, latrines etc. and there was need for repairs to ensure normal learning continued.

35. It was further observed that there was extensive damage to the road network and electricity supply networks (posts) in the area.

3.4 Public Baraza at Nyakwere Market

36. After the inspection visit, the committee held a Public Baraza at Nyakwere Market on Saturday 10th October, 2020 and received both written and oral submissions as recorded hereunder;

3.4.1 Submission by Lake Victoria South Water Works Development Authority

37. The Lake Victoria South Water Works Development Authority made its submission as follows.

38. During heavy rains, intense flooding is experienced in parts of Siaya and Homa Bay Counties particularly the low-lying areas at the estuary of main rivers draining into Lake Victoria. Rivers Nzoia and Sondu Miriu break their banks hence flooding occurs in adjoining settlements causing displacement and loss of property. Rising lake levels also cause flooding in areas bordering the shores of Lake Victoria.

39. As an emergency response, affected people are evacuated and temporarily accommodated in designated camps, schools and churches while other flood affected persons join relatives and friends leaving on higher grounds. There are eight pronounced evacuation centers in Siaya County while Homa Bay County has seve... Some of the effects of floods include displacement of families, and loss of life, properties and livelihoods.

40. The proposed long-term intervention measures include construction of dykes along the river banks and desilting/excavation of earth dams and earth pans.

41. As an emergency response during floods and particularly at the evacuation centers, the authority plans to intervene by digging or desilting in the natural drains to unblock the water ways, unblock or rehabilitate culverts, supply and install water tanks in learning institutions being used as evacuation centers, build pit latrines and mobile toilets, supply water treatment chemicals and household filters, and supply hand wash facilities. Although there are a number of identified evacuation camps, intervention should focus on the main centers Osodo Primary and Secondary Schools. The proposed budget for immediate interventions covering various items is about Ksh. 8,900,000.

3.4.2 Submission by National Water Harvesting and Storage Authority

42. The National Water Harvesting and Storage Authority submitted that Sondu Miriu River is one of the main rivers draining its waters into Lake Victoria in from the slopes of Mau Escarpment and is located in the Western Flank of the Rift Valley.

42 The Authority conducted a flood situation assessment in the Lake Victoria basin during the March-May, 2020 long rains with a view to establish the flood situation in the basin, effectiveness of the structures constructed and proposal of new structures where needed.

44. It was established that the March-April/May 2020 rains were especially heavier compared to the previous years and led to more destruction and disruption of livelihood of the communities living within the Lower lake region that is usually affected by floods. It is noteworthy that besides the river flows that broke the banks there were reports of increased water levels in the L. Victoria leading to backflows and therefore a double effect of the floods to the communities. River Sondu-Miriu was noted as one of the rivers that floods especially at the delta as it joins the lake.

45. The flood destruction along the area of interest require multi-sectoral approach i.e. energy, transport and water & sanitation among others. There are no flood mitigation works that have been done along the river.

46. The proposed long term solutions to mitigating the effects of floods in the area include building new dykes, river draining and dredging, building gabions, will cost about Ksh. 430,000,000.

47. All of the mitigation measures are urgent and significant to mitigate floods in the affected villages and are therefore proposed to be implemented wholesomely. However, the work can be phased and implemented from upstream towards Lake Victoria by starting with 2 Km from Sang'oro Power Station to Katito—Kendu Bay Road costing approximately Kshs. 30 Million.

3.4.3 Submission by the County Government of Kisumu

48. A representative of the County Government of Kisumu submitted that there had been floods in parts of the County in the recent past leading to lose of lives and properties, displacement of people and contamination of some water supplies which has highly disrupted the economic and social activities in the affected areas leading to negative impact on human lives.

49. In 2020, approximately 15 lives have been lost, with another 13,021 households displaced in 70 evacuation centers, major rural roads and major water supply schemes in the county, have also been destroyed.

50. Nyakach sub county is one of the Sub Counties that usually experience floods with two of its wards mostly affected, North Nyakach and West Nyakach Wards which the major cause of flooding being rising of water levels of River Miriu and backflow of water from Lake Victoria.

51. In an effort to alleviate the effec. of floods on the citizenry of Kisumu, the Department of Water, Environment, Climate Change and Natural resources conducted assessment with an aim of establishing a strategy for management of floods and storm water. The assessment identified areas within the county that are susceptible to flooding which included the two wards of Nyalenda Sub-County and area specific activities that could help in managing floods and storm water.

52. The key activities identified for managing floods and storm water includes construction of water pans, construction of check dams within major water ways to control water velocity, damming of small size rivers, desilting of streams and, canals, construction of drainage culverts across the roads, diking of major rivers, dredging and desilting of major rivers and opening up of blocked water ways and channels.

53. In response to the flooding challenge, coupled by the COVID-19 19 Pandemic, the County Government of Kisumu, through its Department of Water, Climate Change, Environment and Natural Resources in Collaboration with Special Programme Unit, Department of Health and Sanitation, Roads, Transport and Public Works, other Government Agencies, Development Partners, the private sector and well-wishers has put in the following:

54. Immediate measures include: mapping and identification of affected areas and people, supply of water to the affected, providing food and non-food items to the affected, evacuating affected families, disinfection of public areas, conducting health outreaches, desilting, dredging and opening up of canals, drainages, streams and water channels.

55. Medium term interventions include: setting up a team of experts to develop a Flood Management Strategy that will be based on reliable climatic and hydrogeological data. The data will be analyzed and solution for different climatic scenarios designed/ modelled for use as scenarios arise. In the era of climate change, flooding will occur in different ways and solutions must be tailor made through modelling of the different scenarios.

56. The County has already capacity built relevant staff on climate resilient water safety planning that will ensure climate change is factored in, in designing and planning for new water infrastructure. Inter-sectoral collaborations and planning for future events that brings on board all the relevant stakeholders; at local, regional and international levels, governmental and non governmental. Policy revision and formulations, at county and national levels; that will address and define the terms of engagement and actions during flooding events.

57. The long-term solutions require massive investments in green infrastructure, capacity building of experts and communities to better adapt to the changing scenarios; this calls for a major donor involvement to finance the implementation. The county government will ensure this through proposal writing to the possible investors/ donors. In the meantime, the County is encouraging tree planting; more so in the flood prone low-lying zones, rain water harvesting in each home, green infrastructure. The County also intends to work with neighboring Counties through LREB, for collective action since the challenge is transboundary. In the long term, the county government should engage with the national government for

the construction of Koru-Soin Multi-Purpose Dam, construction of several water pans and rehabilitation of water catchment areas within the region, and capacity building local communities to change behavior for better adaptation; will ensure reduced flood incidents in the region.

4.4.4 Submission by Sango Rota Beach Management Unit

57. The Sango Rota Beach Management Unit (BMU) submitted that the Unit was registered in the year 2006 and its main activities include fishing, Aquaculture, issuing of license to fishermen, boat owners and traders, protection of fish breeding areas, protection of all BMU assets and any other duties that may be assigned to them by the department and any other government ministry.

58. In the previous years the beach had a wide space for boat landing of more than 50 meters wide by 2,000 meters long away from the shore up to the year 2019, which was finally eroded by the lake overflow and the river reducing the beach shore land to its current state.

59. The beach had 10 fish ponds with 1500 finger links each ready for harvest, the beach had well maintained pit latrines, good floor of the fish Banda and office over 2500 trees planted along the shore and several aquatic plants providing good habitat for fish.

60. Currently the landing bay has been destroyed, shore land reduced by the lake wave to less than 10 meters by 2,000 meters long, beach latrines flooded and destroyed, beach tree and aquatic plants planted dried, beach fish ponds destroyed and finger links swept away, and lake water is contaminated due to pollution by hyacinth pollution and industrial waste.

61. They proposed that the government to help finance the construction of fish landing, provision of water tanks to harvest rain water for drinking and other domestic use by fishermen and the entire community, construct toilet to improve sanitation at the beach, construct gabions along the beach to reduce siltation of the lake by controlling soil erosion of the shore land, and finance aquaculture in the beach.

62. In case the proposals are implemented fully, the potential impacts will include a well conserved environment and increased lake shore vegetation, increased fish catch in the lake, controlled erosion, improved health, easy access to the beach landing site, and improved livelihoods to members of the BMU and the community at large.

4.4.5. Submission by Sango Rota Business Community

63. Sango Rota Business Community submitted that floods have affected the people of West Nyakach for the past many years. That, recently, one of the worst floods have hit West Nyakach which caused the level of water in the River Sondu Miriu and Lake Victoria rose. The incessant rains further deteriorated the flood situation.

64. Floods posed major problem to the business fraternity and community at large that include damage of business premises, staff absenteeism, poor power supply, destruction of roads, delayed deliveries, loss of income, and job losses.

65. The government should intervene and put in place flood control measures to avert the next disaster and provide starter funds to the business fraternity which suffered losses during the flooding periods.

4.4.6 Submission by Kadiang'a Development Group

66. Kadiang'a Development group, submitted that it is a Community Based Development Organization established through local initiative with the aim of furthering the Developmental and Welfare needs of Kadiang'a Clan.

67. In recognition of importance of networking and collaboration for efficient and effective delivery of services, they have always collaborated with Nyakach Constituency Office and Strategic Nyakach, (a Sub-county Wide Community Based Organization (CBO) established by local professionals).

68. In 2020, the affected communities in Sango were faced by unprecedented sufferings occasioned by flooding from two different fronts of the Lake Victoria and Miriu River.

69. Some immediate mitigation opportunities for sustainable solutions are to provide Proper Shelter to the displaced families, upgrade Reta Dispensary to a fully-fledged Health Center (Level 3) with requisite Staffing and basic drugs, reconstruction of destroyed infrastructures like electricity lines, Roads and bridges, include the affected families in the special Government Income Support programmes including Cash Transfers for at least 1 Year to cushion them against inevitable livelihood challenges, intensive community sensitization to collaborate with anticipated Flood mitigation plans, restructuring the Disaster Committee Governance Structure and strengthening their operations, and provide financial support to Learning Institutions used as temporary camps to enable them undertake requisite repairs since significant damages were recorded in some of the institutions.

70. Some of the long term solutions include turning the disaster into opportunity aimed at transforming flood disaster into an Economic Development and food Security, implementation of Nyakach Plains Irrigation Infrastructure, provision of agronomic extension services, construction of water canals channeling excess rain water into the Lake, construction of Dykes and Canals at strategic locations, reclamation of Lake front, and extend support to include solutions for Wasare and Gem Rae Areas.

4.4.7 Submission by Education Sector Stakeholders

71. Nyawalo Primary School submitted that it is public school situated in Nyong'onga, Nyakach Sub-County in Kisumu County.

72. The school is usually affected by floods twice or even thrice every year which can interrupt learning, lead to destruction of school infrastructure, loss of books and other learning materials, and may lead to students being affected by water borne diseases.

73. The school can be assisted by having a trench dug around the school to prevent water from flooding the school and by controlling the flooding by river Sondu Miriu.

74. A lot of funds are required to rebuild the school infrastructure and buy lost books.

75. Nyong'ong'a Primary School submitted that it serves as an evacuation Centre to about 300 families during the floods.

76. During flooding, water passes through the school and destroys the school fence and this makes fencing poles fall. The poles are used as fire wood by the surrounding community.

77. The school has 10 classes and their floors are depleted and destroyed leaving them with trenches and in a deplorable state because of inhabitation by evacuees.

78. The school playing grounds are destroyed by domestic animals that graze all over while classroom, windows/doors and walls, desks, cupboards, paints are peeled off due to effects of floods.

79. Some of the proposed solutions include construction of concrete chain fence to keep the school facilities out of interference by outsiders, repair of classrooms floor, building evacuation centre for nearby communities so that they don't interfere with the school facilities during the rainy seasons, building of new toilets before schools resume full learning, and buying additional desks to replace those which were destroyed during the floods.

80. KNUT West Nyakach branch submitted that West Nyakach location has experienced floods for the last over sixty (60) years which are experienced during the long and short rains. During these periods, there are movements of the people and their animals.

81. The floods have caused havoc in the entire location with the human-animal conflict becomes a normal and daily occurrence due to hippos that move freely in the villages.

82. The floods ravage the area, the schools are destroyed by both the flood victims and their animals. This destruction causes a lot of untold problems to the learners. The floods always cut the transport and communication in the location.

83. Some of the effects on education include school dropouts by students, lack of enough food and proper nutrition for students, destruction of school infrastructure, increase in immorality and promiscuity during times of disaster that result in early pregnancies, increase in cases of

child labour, loss of valuable education man hours due to movements due to displacements, increase in cases of delinquency and absenteeism, and the health of the learners during the floods is seriously affected.

84. The government needs to bring the floods in the area to an end by either building dykes or water dams. Once the floods are brought to an end, learning will improve, so that our children can equally compete with those in other areas. The end to floods will improve economic activities that will impact positively on the area residents.

4.0 COMMITTEE OBSERVATIONS

85. After an analysis of the submissions received, the Committee made the following observations:

86. Sondu Miriu River drains into Lake Victoria from the slopes of Mau Escarpment. During heavy rains, it causes intense flooding in parts of Kisumu and Homabay Counties particularly the low-lying areas where it drains into the Lake. It breaks its banks hence flooding occurs in adjoining settlements causing displacement and loss of property. Rising lake levels also cause flooding in areas bordering the shores of Lake Victoria. This perennial problem needs a lasting solution. Apart from the heavy rains in the catchment area, degradation of upstream vegetation as a result of poor land use practices causes flooding.

87. An inspection visit to the area revealed that flooding in the region had led to disruption of power supply due to falling electricity posts, destruction of the road network in the area and water borne diseases among the locals.

88. Whereas floods are natural disasters, the impacts on residents depend very much on community land use practices, adherence to early warning systems and quick implementation of advisories.

89. The Water Resources Authority has installed a Telemetry Station in the flood plain at Nyakwere Village to monitor the water levels. The station provides near real time data for early warnings. During the periods approaching the two main rain seasons that cause floods in the area, Water Resources Authority, based on the data collected from the station, issues flood warnings to alert communities living in the flood plain to vacate.

90. The National Water Harvesting and Storage Authority conducted a flood situation assessment in the L. Victoria basin during the March-April-May, 2020 long rains which established that the long rains were heavier compared to the previous years. This led to more destruction and disruption of livelihood of the communities living within the Lower lake region that is usually affected by floods.

91. In 2020, apart from the high flows that broke the river banks, the water levels in L. Victoria had increased significantly leading to a backflow that submerged over 700 Acres of farmland and homes, causing much destruction of property and other livelihoods, displacing about 2,268 people in the area. Other infrastructure damaged include; roads, bridges, beaches, electric poles, sand harvesting mines, gabion boxes, destruction of the Awach-Kimila Irrigation infrastructure and blockage of the river delta.

92. Dredging the river and unblocking the river delta would go a long way in easing the flow of water to the lake. However, it is a major environmental activity requiring major investment and integrated approach by the government, and would form part of long-term strategy for controlling floods on River Sondu Miriu. This would be coupled by construction of dams upstream to store water and control flood flows during heavy rains, establishment of a modern early warning system based on a functional telemetric network and identification of

permanent evacuation centers. The sediment load of rivers in the whole lake basin are very high due to deforestation upstream, causing serious sedimentation and forming deltas at the river mouths. This is a major cause of floods.

93. The Ministry was considering a proposal to construct a 2-kilometer dyke on the left bank of River Sondu Miriu from Sang'oro power station and a 5 kilometer dyke on either side of the river after Kendu Bay-Katito road towards the lake. The works are estimated to cost about Ksh 360 million.

94. In order to increase area under irrigation and boost food security in the region, the Government through National Irrigation Authority had planned a major project called Great Wang'chieng' Irrigation Project in Rachuonyo North Sub-County, Homa Bay County. The project is estimated to cost Ksh 879 million and will bring 1,820 acres of land under irrigation to grow maize and other high value horticultural crops. It will benefit about 1,000 farmers, thereby boosting socio-economic development of the community. Feasibility study and detailed design are completed and government was seeking funds for implementation.

95. The Ministry of Water, Sanitation and Irrigation intended to assess and determine suitable sites for construction of water pans, small dams and boreholes to assist the communities' access safe water for domestic use. The projects will then be prioritized for implementation under the various programs targeting improvement of rural water supply.

96. The Ministry of Water, Sanitation and Irrigation was further addressing water and sanitation challenges in Homabay County through implementation of the following projects:

a) Homa Day Cluster Water Supply and Sanitation Project at a total cost of Ksh 1.14 billion. The project commenced in January, 2019 and is expected to be completed in June, 2021.

b) Kendu Bay Water and Sanitation Project at a total cost of Ksh 690 million. The project commenced in April, 2019 and is expected to be completed in October, 2021.

c) Oyugis Water Supply and Sanitation Project at a total cost of Ksh 716.6 million. The project commenced in April 2019 and is expected to be completed by October 2021

97. There are no flood mitigation works that have been done along the Sondu Miriu River. Mitigation of flooding along the river requires a multi-sectoral approach from the energy, transport, water & sanitation sectors among others.

98. The County governments of Homabay and Kisumu counties have major roles to play in flood mitigation in their respective jurisdictions in conjunction with other counties in the upstream areas of River Sondu Miriu.

99. The fishing community had suffered repercussions of the flooding both from the river and Lake Victoria backflow. For instance, Sango Rota Beach Management Unit avers that the landing bay has been destroyed, shore land reduced by the back flow from Lake Victoria.

beach latrines flooded and destroyed, beach tree and aquatic plants planted died, beach fish ponds destroyed

100. The education sector was adversely affected by the flooding of River Sondu Miriu. There was destruction of school infrastructure (classrooms, fences, playing grounds, toilets), loss of books and other learning materials, students being affected by water borne diseases, being used as evacuation centres hence stalling of educational activities, school dropouts by students, increase in promiscuity during times of disaster that result in early pregnancies, increase in cases of child labour, loss of valuable education man hours due to displacements, increase in cases of delinquency and absenteeism, and compromised health of learners during floods.

101. Although the petitioners had prayed that the Committee establishes facts with respect to the following aspects, the Committee did not access comprehensive data on them: number of those affected, number of deaths and rate of diseases, cumulative funds used in disaster response during floods, and social-economic audit on losses incurred by residents.

102. There was need for the National Assembly to consider prioritizing the consideration and passing of the National Disaster Management Authority Bill, 2019 by Hon. Kimani Ichungwa currently awaiting Committee Stage consideration.

103. There was need for the National Assembly to consider urgent mobilization, allocation and accountability of funds for the permanent mitigation of floods and their effects along Sondu Miriu River through the FY 2021/2022 budget.

5.0 COMMITTEE RECOMMENDATIONS

104 Pursuant to the prayers in the Petition, submissions tabled and observations, the Committee resolves to recommend and urges that:

105. **The Ministry of Water, Sanitation and Irrigation** as a matter of policy adopt and implement the following, namely:

a) expedite the construction of a 2-kilometer dyke on the left bank of River Sondu Miriu from Sang'oro power station and a 5-kilometer dyke on either side of the river after Kondu Bay-Katito road towards the lake in the 2021/2022 Financial Year.

b) issue necessary guidelines to ensure the River Sondu Miriu bank is preserved and the catchment area is protected since it has the mandate of regulation of the river by demarcating the riparian area.

c) conduct emergency response during floods and particularly at the evacuation centers by digging or desilting in the natural drains to unblock the water ways, unblock or rehabilitate culverts, supply and install water tanks in learning institutions being used as evacuation centers, build pit latrines and mobile toilets, supply water treatment chemicals and household filters, and supply hand wash facilities.

d) expedite implementation of the Great Wang'cheing' Irrigation Project in Rachuonyo North Sub-County, Homa Bay County to boost food security in the region.

e) expedite the assessment of suitable sites for construction of water pans, small dams and boreholes to assist the communities' access to safe water for domestic use. It should then prioritize the projects for implementation under the various programs targeting improvement of rural water supply.

f) ensure timely completion of the following ongoing projects to address water and sanitation challenges in Homabay County: Homa Bay Cluster Water Supply and Sanitation Project, and Kendu Bay Water and Sanitation Project, Oyugis Water Supply and Sanitation Project.

g) in conjunction with other stakeholders, spearhead the dredging of River Sondu Miriu and unblocking the river delta to ease the flow of water to the lake. A multi sectoral engagement should then ensure construction of dams upstream to store water and control flood flows during heavy rains, establishment of a modern early warning system based on a functional telemetric network and identification of permanent evacuation centers, construction of water pans and check dams to control water velocity.

106. The **County Governments of Homabay and Kisumu** counties, in conjunction with other stakeholders, as a matter of policy should undertake the following to forestall human suffering due to floods:

a) Immediate measures: mapping and identification of affected areas and people, supply of water to the affected, providing food and non-food items to the affected, evacuating the affected, and conducting public health outreaches, having trenches dug around schools to prevent water from flooding them, and by carrying out desilting, dredging and opening up of canals, drainages, streams and water channels, construction of fish landing areas, construct toilet to improve sanitation at the beach, construct gabions along the beach to reduce siltation and finance aquaculture along the beach.

c) Medium term interventions: develop a flood management strategy, building evacuation centres for nearby communities to avoid usage of schools as evacuation centres, institute reforestation programs, river training, and sustainable land use practices in the upstream area of Sondu Miriu River to reduce erosion and consequent sedimentation of rivers in the lake basin which is a major cause of floods, engage in inter-sectoral collaborations, and revise existing policy or formulate county level policy, if none exists, on engagements during flooding events.

d) Long term interventions: enter into public private partnership with the possible investors/ donors to assist in projects such as: tree planting; rain water harvesting in each home. The County Government should also engage with the national government for the construction of Kora-Soin Multi-Purpose Dam, construction of several water pans and rehabilitation of water catchment areas within the region, and capacity building local communities to change behavior for better adaptation.

107. The National Assembly prioritizes the consideration and passing of the National Disaster Management Authority Bill, 2019 by Hon Kimani Ichungwa currently awaiting Committee Stage consideration.

108. The National Assembly ensures sufficient mobilization, allocation and accountability of funds for the permanent mitigation of floods and their effects along Sondu Miriu River through the FY 2021/2022 budget.

109. The National Government Ministries responsible for education, roads, health, energy and disaster management should take measures to access the devastation and destruction wrought by floods along Sondu Miriu River particularly in Rachuonyo North and Nyakach Sub Counties.

Signed: ..... Date: 03/12/2020

HON. KAREKE MBIUKI, MP
CHAIRPERSON, DEPARTMENTAL COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

APPENDIX III: PROPONENT DOCUMENTS

No. PVT/2016/000058

CERTIFICATE OF INCORPORATION

I hereby CERTIFY that -

MANGO TREE MARINE LIMITED

is this 25th day of January 2016 incorporated under the Companies Act, 2015 and that the Company is PRIVATE LIMITED BY SHARES

Registrar of Companies

I Certify that this is the true likeness of the applicant

F. M. O. KADIMA
P. O. Box 90216 - Mombasa

KENYA REVENUE AUTHORITY

PIN Certificate

Contact KRA Call Centre
Tel: +254 (020) 4999 999
Cell: +254(0711)099 999
Email: callcentre@kra.go.ke

www.kra.go.ke

Certificate Date : 14/08/2019

Personal Identification Number

P051781043W

This is to certify that taxpayer shown herein has been registered with Kenya Revenue Authority

Taxpayer Information

Taxpayer Name	MANGO TREE MARINE LIMITED
Email Address	MANGOTREEAFRICA@GMAIL.COM

Registered Address

L.R. Number :	**Building** N/a
Street/Road Kisumu West	**City/Town :** Kisumu
County : Kisumu	**District** Kisumu West District
Tax Area Kisumu West	**Station** Kisumu
P. O. Box 3300	**Postal Code** 40100

Tax Obligation(s) Registration

Sr. No.	Tax Obligation(s)	Effective From Date	Effective Till	Status
1	Income Tax - PAYE	12/08/2019	N.A.	Active
2	Value Added Tax (VAT)	12/08/2019	N.A.	Active
3	Income Tax - Company	08/02/2019	N.A.	Active

The above PIN must appear on all your tax invoices and correspondences with Kenya Revenue Authority. Your accounting end month is December unless a change has been approved by the Commissioner-Domestic Taxes Department. The status of Tax Obligation(s) with 'Dormant' status will automatically change to 'Active' on date mentioned in "Effective Till Date" or any transaction done during the period. This certificate shall remain in force till further updated.

F. M. O. KADIMA
ADVOCATE
AND
COMMISSIONER FOR OATH

I Certify that this is the true likeness of the applicant

F. M. O. KADIMA
P. O. Box 90716 - Mombasa

Disclaimer : This is a system generated certificate and does not require signature.

HOMA BAY COUNTY OFFICE

When Replying Please Quote:

The County Coordinator,
National Land Commission,
P.O. Box 890-40300
Homa Bay, Kenya

Our Ref: TCC/NLC/2021/08

Date: 15th July, 2021

County Director of Environment
NEMA

Dear Sir,

REF: CONFIRMATION OF PUBLIC LAND – SONDU MIRUI RIVER DELTA AT OSODO BAY

The National Land Commission is a Constitutional Commission established in accordance with *Article 67 of the Constitution of Kenya 2010* to, inter alia, manage public land on behalf of the National & County Governments.

Reference is made to the correspondence dated 13th **July, 2021** from **Gomake Consultancy Company Limited**.

We hereby confirm to you that the referred land parcel is public property located in **Rachuonyo North** and Nyakach Sub-Counties **in Homa Bay and Kisumu** Counties.

Any assistance offered to the company is appreciated.

Thank you.

NATIONAL LAND COMMISSION
COUNTY CO-ORDINATOR
19 JUL 2021
HOMA BAY COUNTY
P.O. BOX 890 - 40300 HOMA BAY

Ochuodho Peter
County Coordinator - National Land Commission

Copy: **Ag. Secretary/CEO**
National Land Commission

✓ **Gomake Consultancy Company**

Our Land, Our Wealth, Our Heritage

GOMAKE CONSULTANCY COMPANY LTD.
28/7/2021
JUL 2021
P.O. Box 5560 – 00100, NAIROBI-KENYA
TEL: 0780964 333
Email: info@gomakeltd.co.ke

HOMA BAY COUNTY

REPUBLIC OF KENYA

DEPARTMENT OF AGRICULTURE, LIVESTOCK AND FISHERIES
DIVISION OF FISHERIES

SUB- COUNTY FISHERIES OFFICER
RACHUONYO NORTH SUB COUNTY
P.O BOX 193-40222,
KENDU BAY

TO

MANGO TREE MARINE LTD
P.O BOX
HOMA BAY

RE: THE PROPONENT OF THE PROPOSED DREDGING/DE-SILTATION OF RIVER SONDU MIRIU AND UNBLOCKING THE RIVER DELTA (MANGO TREE MARINE LTD)

Having been briefed of your planned activities we on behalf of Rachuonyo North Sub county fisheries department have accepted the proposed dredging/ deslitation of River Sondu-Miriu unblocking.

We would also like to appreciate the public awareness of the proposed project to communities where the implementation of the said project will take place.This will be suojected to Environmental and Social Impact Assessment (ESIA) report and any other body authorized by the Government.

We look forward to hearing from your office and we are always willing to support should our assistance be needed in any capacity.

Thank you.

FISHERIES OFFICER
KARACHUONYO SUB-COUNTY
DATE...14/04/2021

Daniel Okuta

GOMAKE CONSULTANCY COMPANY LTD.
28/4/2021
P. O. Box 5540 00100,NAIROBI-KENYA
TEL: 0730964 333
Email: info@gomakeltd.co.ke

APPENDIX IV: PCM MINUTES AND ATTENDANCE REGISTERS

MINUTES OF A JOINT SITE VISIT HELD IN RAKWARO CHIEFS' CAMP ON 8TH JULY 2021 FOR PROPOSED DREADGING /DE-SILTATION AND SAND HARVESTING ON SONDU MIRIU RIVER DELTA.

MEMBERS PRESENT:

See Attached attendance register

ABSENT WITH APOLOGY

1. Mr. Wafula Water Resources Authority, Mara Sondu Basin
2. Peter Agunga - Chief Wangchiong' Location

AGENDA

1. Preliminaries
2. Project Scope
3. Comments
4. Way Forward

MIN 1: PRELIMINARIES

The team was welcomed by the assistant chief of Wangchiong' Location who also lead in the opening prayer. Self-introduction was made by the various lead agencies there after the meeting was officially opened for discussions before the actual site visit.

MIN2: SCOPE OF THE POJECT

There was a project description/scope presentation of the proposed project by the EIA Consultants. It was made clear that the proponent was Mango Tree Marine LTD. The Company wanted the lead agencies to have an institutional memory during the review process of the EIA that was to be submitted.

Dredging of Sondu Miriu River delta was brought up by a parliamentary report submitted to the parliamentary Environment and Natural Resources Committee as one of the mitigation measures to curb the continuous flooding of Sondu Miriu River delta

Attached find an extract of the parliamentary report.

MIN 3: LEAD AGENCIES COMMENTS

NEMA HOMA BAY CDE: Brought to the attention of the other agencies that the company that was to de-silt was once in the limelight of the Takawiri Island row and urged members to take this exercise seriously.

Public participation is an important process that involves the economic, social and ecological effects and the effects are usually ripple in nature. He stressed that he will be keen on the mitigation measures that the Consultant will propose in the EIA report.

Response by the Consultant: The Consultant thanked NEMA Director Homa Bay for pin pointing environmental issues within the County that has also lead to the proponent in adhering to the environmental regulations in her current operations in Kisumu and Mbita.

RACHUONYO NORTH SUBCOUNTY FISHERIES: He urged for proper public participation on the fisher folk community. He brought to our attention that there were 5 beaches which are usually affected by the flooding and urged the sociologist to interview the BMU chair persons and the fishermen through them. The officer was also concerned of the method that was to be used for dredging since it was going to affect the traditional and gazetted breeding sites of fish.

Response by the Consultant: The consultant is keen on carrying out comprehensive public participation in all the project affected areas in consultation with the relevant stakeholders considering that currently the two counties are under COVID-19 restrictions hence all the proposed meetings will follow strict adherence to the COVID-19 protocol. In addition the Consultant shall carry out socio-economic assessment within the project area including Focus Group Discussions (FGD) with fishermen within the targeted BMUs

The Consultant was also carrying out specialised studies in consultation with the local fishermen to identify and map traditional breeding sites in order to protect them from adverse project impacts.

KWS:

a. What is the distance of operation of the dredger in relation to the shoreline?
b. How will the delta and the ecosystem be catered for since species such as catfish thrives so well in muddy environment?
c. What really causes flooding siltation or increased lake level?
d. Are there project alternatives?

Response by the Consultant:

The dredger will begin from the lake as it comes to the river mouth.

The dredger has mechanisms and technology to prevent the suction of the catfish and will only be limited to sucking the silt through pressure.

Increased siltation is the major cause of flooding. The siltation is majorly brought by the anthropogenic activities of the people upstream and the increased sand harvesting on shore

The Consultant will also use a drone to identify the plume generation during the rainy season and how far they travel and the effect that will be generated as a result of the dredging.

Project alternatives include vegetating upstream, awareness creation and construction of dykes. This however would be a long term solution.

NEMA HOMA BAY:

a. What is the volume of extraction?
b. Will it be spot dredging?
c. What is the project period?
d. Water quality analysis.

Response by the Consultant:

The volume to be dredged and extracted will depend on the amount of silt available within the area after geotechnical survey has been carried out.

Baseline water sampling will be done and analysis done in a NEMA registered laboratory and the results submitted to NEMA.

MIN 4: WAY FORWARD

- NEMA Kisumu and WRA Mara-Sondu Basin was to be brought on board for the joint site visit.
- Proper public participation was to be done and minuted by the Consultant.
- National Lands Commission to avail a confirmation of public land approval to be used as an attachment for the land document.
- The proponent to ensure they get an approval from the fisheries department to undertake the project.

The meeting was closed by a word of prayer and the team then headed to the field which was at the River Sondu Miriu Delta and one of the affected beaches (Chuowe beach)

Signed by:

GOMAKE CONSULTANCY COMPANY LTD.

Date:

SIGNATURE and STAMP:

GOMAKE CONSULTANCY COMPANY LTD.
28 JUL 2021
P.O Box 5540 - 00100, NAIROBI-KENYA
TEL: 0780984333
Email: info@gomakeltd.co.ke

Attendance Register

Project Name: Proposed dredging/de-siltation of River Sondu Miriu and unblocking the river delta

Venue: KAJWARO CHIEFS CAMP (WANGCHIENG LOCATION) **Date:** 8th JULY 2021

No.	Name	Location/Institution	ID Number	Address/Mobile No.:	Signature
1.	Kennedy Kijanya	Gamaks Co. Co Ltd	21914800	0720964333	
2.	Akinyi Flora Mitchel	Gamake Co. Co Ltd.	31644816	0701393789	
3	Collins Ochieng	KMFS - Kisumu	22550921	0721327327	
4	Dennis O. Okuta	Fisheries - Kisumu Office	22421005	0729580062	
5	JACOB O. OTIENO	WEST NYAKACH	6606603	0720558529	
6	GEORGE G. OBURU	WANGCHIENG	13895582	0725229267	
7	CAIRUS G. ONGOM	WANGCHIENG/SOKO	20557996	~~0718~~ 0718244158	
8	CHRISPINE OGEGA	RUMA NP/KWS WELL	21660166	0723822830	
9	JOHN NYAMWA	RUMA NP	8453697	0710791362	
10	Nyandiko Joseph	NEMA	14593526	0728126055	
11	OTIENDE BRIAN	NEMA	22133204	0722526331	
12	JULIET MUNALA	NLC	27225730	0724361472	
13	Dickens Odhiambo	Gamake Co. Ltd	-	0725757801	

MINUTES OF PUBLIC PARTICIPATION HELD IN RAKWARO CHIEFS' CAMP, WANGCHIENG' LOCATION ON THE PROPOSED DREDGING/DE-SILTATION AND SAND MINING OF SONDU MIRIU RIVER DELTA.

MEMBERS PRESENT:

See Attached attendance register

ABSENT WITH APOLOGY

AGENDA

1. Preliminaries
2. Project Scope
3. Comments/Questions
4. Way forward

MIN 1: PRELIMINARIES

The meeting was started by an opening prayer from one of the spiritual leaders of the community and thereafter the community members were welcomed by the area chief. Local leadersand other community members with offices that they represented introduced themselves and the meeting was officially open for discussion.The consultant observed that different sectors in the community were represented in the meeting for public participation.

Sub County Environment officer Comment: He explained the meaning and benefits of dredging as reducing cases of flooding.He mentioned that Wangchieng' Ward has suffered several challenges of flood as result of both human and natural cause. He mentioned farming by the river banks and cutting down trees as the cause of siltation and eventually flood.

He observed that there will be habitat destruction and noise from the vibration.He urged the dredging company towork out mitigation measures on that. He informed the meeting that they are supplying seedlings for planting as other means of preventing flooding.

He also created awareness on sand harvesting policy.He observed that it is a common activity in Wangchieng' and therefore urged the community to do it sustainably by following the due process including conducting an environmental impact assessment.

MIN2: SCOPE OF THE POJECT

There was a project description/scope presentation of the proposed project by the Consultant. It was made clear that the proponent was Mango Tree Marine LTD. The consultant gave a background on the severity of the flooding cases in the area.

Dredging of Sondu Miriu River delta was brought up by a report submitted by the Parliamentary Environment and Natural Resources Committee as one of the mitigation measures to curb the continuous flooding of Sondu Miriu River delta.The community members were informed that it is a government policy to seek for the public opinion before any project in conducted in a community.

The consultant also gave an explanation on how the dredging of Sondu Miriu will be done in terms of depth and width. Members were also informed the Company (Mango Tree) that is to do the dredging had successfully done a similar work in Kisumu Port and Mbita Causeway.A clear strategy on the handling of the dredged materials such as sand will be given in terms of benefit to the community and to the local government.The meeting was then opened for discussion.

MIN 3: PARTICIPANTS COMMENTS/QUESTIONS

P1 question:

Where will the dredging take place?

What materials can be dredged by the machine?

Consultant comment: Dredging will take place from the lake towards the original river mouth. The Dredger in this case, the Vacuum Suction Dredger can only dredge silt since it has a gauze that prevents stones and trees from being sucked into the pipe.Another dredger, the Cutter Section Dredger will be employed where there are boulders

P2 question: How will the breeding sites be taken care of?

Consultant response: The Consultant has touched base with the fisheries department and has known the various gazetted and traditional breeding sites. Fish species found in the area were also mentioned to the Consultant by the locals. The biodiversity expert in the team had also interviewed experienced fishermen in the beaches of the delta and come up with a comprehensive report on the same

As requested by the community members, the company will dump the silt from the river into the gulley formed during sand harvesting to enable the community members reclaim back their agricultural land.

P3 Question: will the community benefit from the sand harvested?

Consultant response: The Company before dredging starts will have a mutual understanding with the technical sand harvesting committee on how best the two parties will benefit from the natural resource.

P4 comment: A participant reminded the community that the main objective of the project was to help the community on the flooding problem. He pleaded with the meeting to have attention on the main objective instead of focusing on the commercial aspect of the project.

P5 comment: a participant gave background information on the origin of the project. He emphasised that the project's main objective is to mitigate flooding by dredging and desiltation. He gave an explanation on the agreements that have made with company on the means and process of doing this. He also gave a justification on why they picked on the dredging company to do the project.

He also mentioned that there is already a sand harvesting act of Lamu Day County which guides the formation of the sand harvestings technical committee. He reminded the community participants that their role in the meeting is to give their opinion concerning the project. He also mentioned that the whole flood mitigation project is multi-sectorial involving almost 5 governmental ministries.

P6 Comment: Another member highlighted some of the effects that have been experienced due to Sondu Miriu River flooding.He mentioned that loss of land, property,territory conflicts and even loss of life. He told the community to embrace the project to solve this problem.

P7 question:

How will the trees and fish be prevented from being sucked into the dredger?

How will oil spillage,be dealt with?

Will the institutions benefit from the project?

Consultant Comment: The consultant mentioned that the dredger will only suck the silt and sand through the pipe which filters whatever goes into the compartments of the dredger.

There is mitigation measures for possible spillage has been put in place and a NEMA licensed oil waste transporter will be engaged to transport the waste to a designated place.

The Schools will directly benefit from the project since there will be reduced cases of flooding and this will now not disrupt the school calendar and the school infrastructural destruction. The consultant clarified that there are not going to construct the roads in the community. The Consultant added that if there is need for the CSR then they will call for special sitting with community to agree on the strategy. The company will give back to the community according to its ability in the process of undertaking the dredging project.

MIN 4: WAY FORWARD

The participants were taken through the questions in the questionnaire before filling individually which were later collected by the Consultant. The meeting was closed by a word of prayer and the team then dispersed.

Signed by:

1. CHIEF WANGCHIENG' LOC

DATE: 28/8/2021

SIGNATURE and STAMP:

CHIEF WANG'CHIENG' LOC
P.O. BARKWARO VIA KENDU BAY

2. GOMAKE CONSULTANCY COMPANY LTD

Date:

SIGNATURE and STAMP:

GOMAKE CONSULTANCY COMPANY LTD.
28 JUL 2021
P. O. Box 5540 - 00100, NAIROBI-KENYA
TEL: 0780964 333
Email: info@gomakeltd.co.ke

Attendance Register

Project Name: Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta

Venue: WANGCHIENG CHIEF CAMP

Date: 14/7/2021

No.	Name	Location/Institution	ID Number	Address/Mobile No.:	Signature
1.	JOSHUA WERE	WANGCHIENG	22728576	0742453662	
2.	DAN AGGELO	WANGCHIENG	6800150	0725161739	
3.	RESSINA J. ACHAR	WANGCHIENG	8468773	0714224531	
4.	MOLLINE A. AKUKU	WANGCHIENG	23177058	0728479657	
5.	Pius K Awich	Wang Chieng	1546394	0725389482	
6.	LAWRENCE OSANO	Wangchieng	34712466	0764517076	
7.	COLLINS D. AGURA	WANGCHIENG	23812894	0726731412	
8.	AWUOR W. DAWADI	WANGCHIENG	22229121	0718263222	
9.	Jane Obiero	Wangchieng	1522412	0720213556	
10.	Jane Oloo	Wangchieng	9432439	0710242691	
11.	Hellen A. Rudolph	Wangchieng	5899057	0717629655	
12.	LUCIA O. [illegible]	Rakwaro [illegible]	11215158	0700022501	
13.	Cosmas O. Ouma	SC Environment Office	27137280	0712022946	
14.	JOSEPH O. ATANDA	Wangchieng Spiritual	27577 [illegible]	0788675 [illegible]	
15.	OSEKO JOSEPH	Faith Base Org.	[illegible]40221	0722747917	
16.	SAMSON ONGUS	WANG CHIENG	15242145	0720961812	
17.	ELIAS DULO	Wangchieng Green Farm	3540940	0722835245	
18.	SIMON O. MBURA	WANGCHIENG	1541847	0715002183	
19.	MATHEW O. OBAYA	RAKWARO B/Loc	9645919	0723335843	
20.	GEORGE G. OBUKU	KOBALA Sub Loc	13895582	0725227227	
21.	COSMAS OSIEWO D.D. Co	[illegible]	10593343	0723100598	
22.	Peter O. Agunda	Wangchieng	6600676	0725903820	
23.	Kennedy Kobima	Gwatake [illegible]	21914800	0720964333	
24.	Dorcas Akinyi	Gomoke	27743525	0723362330	
25.	BERNARD O. ODERO	KAR WALA S/Loc	13187170	0793427389	
26.	GAYA FREDRICK	YEGO AFRICA	22729580	0729430123	

Attendance Register

Project Name: *Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta*

Venue: KANG'CHENG CHIEF CAMP

Date:

No.	Name	Location/Institution	ID Number	Address/Mobile No.:	Signature
27.	Rausen Okello Dadi	Kamwala Sihlos	11231033	0717937620	[signature]
28.	CHARLES PAULO KOMALU	KARANWALA	1532650	0726757932	[signature]
29.	OBAMANRO CONSLATA AMUNG	KARANWALA	6477085	0720238263	[signature]
30	EMILLY ACHIENG'	TEBO, AFRICA	32103438	0714627752	[signature]
31.	Akinyi Flora Mitchel	Gorake	3164816	0701303749	[signature]

Kaun

MINUTES OF PUBLIC PARTICIPATION HELD IN WEST NYAKACH COMMUNITY HALL FOR THE PROPOSED DE-SILTING/DREDGING AND SAND HARVESTING OF SONDU MIRIU RIVER DELTA

MEMBERS PRESENT:

See Attached attendance register

ABSENT WITH APOLOGY

AGENDA

1. Preliminaries
2. Project Scope
3. Comments/Questions
4. Filling of Questionnaires

MIN 1: PRELIMINARIES

The team was welcomed by the Chief of West Nyakach Location who also led the opening prayer. Self introduction was made by the various consultants and other local leadership there after the meeting was officially opened for discussions.

MIN2: SCOPE OF THE POJECT

There was a project description/scope presentation of the proposed project by the ESIA Consultants. It was made clear that the proponent was Mango Tree Marine LTD.

Dredging of Sondu Miriu River delta was brought up by a parliamentary report submitted to the parliamentary Environment and Natural Resources Committee as one of the mitigation measures to curb the continuous flooding of Sondu Miriu River delta.

The Consultant informed the participants that they were holding the meeting having secured administration's good will of the said Area by the Deputy County Commissioner. The consultant added that it is the responsibility of those who attended the public participation to disseminate information to their neighbours.

The consultant also gave an explanation on how the dredging of Sondu Miriu will be done in terms of depth and width. Members were also informed the Company (Mango Tree) that is to do the dredging had successfully done a similar work in Kisumu Port and Mbita Causeway. The meeting was then opened for discussion.

MIN 3: PARTICIPANTS COMMENTS/QUESTIONS

Participant comment: The first participant opened the discussion by thanking God for bringing a solution to flooding problem that they have been having every year. She asserted that they are fully in support of the project as women .She added the company should think of involving women in unskilled jobs i.e even preparing food for the labourers so that they can earn living.

P2 question

How will the company take care of the ecosystem?

Response by the consultant: We have a biodiversity expert as part of the team who is taking into keen consideration of the ecosystem as a whole in the report. The report will indicate how the different species of the ecosystem will be affected and the mitigation measures that should be undertaken by the proponent during dredging.

P3 comment

The participant pleaded with the community members to desist from politicking such projects as they have done in the past .She mentioned that "Dauma" company had tried to dredged the river but failed due to a lot of community politics, the government also constructed dykes but the people complained that the dykes led to severe flooding .She wanted to know whether the construction of dykes will scare away the Hippopotamus or they will be left to roam in their farms.

P4 Question: Is this the team that came to work on the dykes of the same Sondu Miriu?

Consultant Comment: The consultant clarified that there is a different team working on the dykes and that Mango Tree Marine Ltd will undertake the dredging as one of the mitigation measures of the parliamentary report

The consultant inquired whether there have been cases of death caused by Hippopotamus during flooding in the Area.

Participants comment: Participants unanimously answered that there are cases of death caused by Hippopotamus even without flooding. In fact there was even a case of Hippopotamus bite even on the day of the Meeting

P5 comment: A participant added that in the past about 1950, the river was so deep and there was no flooding cases .He added that dredging up the river will surely help in preventing the flooding and he was even willing to give apportion of his land if need be. He also wanted to know how the company will prevent further widening of the river bans during heavy rains .A history indicating that siltation of Miriu is a continuous process over the years .He added that the solution to the flooding must also be continuous .He also emphasized that Dyking will also be very important.

P6 Comment and question:

How will the company deal with turbidity?

Will the sand harvested be left to the community or exported?

Consultants response. Effects on the turbidity of the water will be temporary during dredging.

The sand harvested would be used for commercial purposes and before dredging starts there will be a mutual understanding with the company on how to both benefit from the natural recource.

Comment of the participant participant gave an account of the frustration they have gone through as a result of siltation. They have lost their farmlands and are always afraid of wild animals .She ended by supporting the project. A participant informed the meeting that company that there is a heap of silt at the vent of Miriu inside the lake .He also requested if the Ministry of Environment can reclaim the forest lands to avoid siltation .He also asked if the soil from the dredging and de-silting can be used to reclaim swamps around River Miriu.

P7 Question. Has Kengen been involved as part of the team?

Consultant comment: Kengen is also affected during flooding .The company has no dam and therefore can't hold water as assumed by the community members

P8 comment: one of the participants reminded the community on the process that has been followed in involving the community concerning this project .He reminded them that chiefs and village elders took their signatures that were used in placing the request to the government which is finally successful .He informed them of a plan to have River Sondu Miriu basin integrated development strategy which will be inter-sectoral including wildlife .He added that he will not relent in seeking for solution to the community. He added that the sand extract from the dredging will be harvested and used somewhere. He added that the dredging will be 7 km from the lake 5m depth and 30m wide .He emphasised that

this meeting was just for environmental assessment and other questions will be handled by other sector like natural resource, wildlife and water

He added that they are having discussions on supplying water to the schools. He emphasized that the people should plant trees. He urged the chiefs to enhance compliance and enforcement on tree planting. He urged the BMU chairs to protect the reeds from being cleared by fishermen around the lake shore. He also informed the meeting, that Lyke will not prevent them from using their canoes along the river. However he discouraged farming along the river banks since they lead to siltation

Fisheries Department Comment: He gave a background of the causes of the flood as having origin from up the rift valley. He informed the community that water is the main natural resource that they have and they should use it wisely. He added that the excess water should even be directed into canals for irrigation to enhance food security. The water can be used to construct fish ponds which can open up roads and even bring factory to the community. The mentioned that there has been destruction of the breeding sites of fish and that's why there is reduction of fish in the lake.

Area MCA Comments: He welcomed the dredging company and everyone to be part of the project. He informed the meeting that he has been part of the several meetings held by the company concerning the project. He urged the attendants to disseminate the information to the people in the community who could not attend the meeting. He pleaded with the community to support the project since this will solve the problem of displacement and the frustration that comes with it. He desired that the sand extract from the dredging process could be used to benefit the community.

Area Chief: The chief thanked the community for attending and participating in the public participation meeting and for supporting the project. He thanked the Fisheries office for coming and for making important comments. He also joined the other speakers in emphasising on the importance of tree planting.

MIN 4: FILLING OF THE PUBLIC PARTICIPATION QUESTIONAIRES

The Consultant informed the public about participant's questionnaire. The participants were taken through the questions in the questionnaire before filling individually. The questionnaires were then distributed for filling and filled questionnaire were collected by the Consultant

MIN5: WAY FORWARD

The consultant thanked the community members for participating in the process and assured them that their views will be analysed and taken care of by the proponent. The meeting was closed by a word of prayer from one of the spiritual leaders and thereafter members left.

Signed by:

1. CHIEF WEST NYAKACH

DATE 28/07/2021

SIGNATURE and STAMP:

CHIEF
WEST NYAKACH LOCATION
P. O. Box 12 - 40111, KISUMU

2. GOMAKE CONSULTANCY COMPANY LTD

Date:

SIGNATURE and STAMP:

GOMAKE CONSULTANCY COMPANY LTD.
28 JUL 2021
P.O. Box 5540 - 00100, NAIROBI-KENYA
TEL: 0780964 333
Email: info@gomakeltd.co.ke

Attendance Register

No.	Name	Location/Institution	ID Number	Address/Mobile No.:	Signature
Project Name: Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta					
Venue: WEST NYARACH COMMUNITY HALL				**Date:** 15th July 2021	
1	OKUNDU ZACHARY	THURDIBUORO	9517525	0712767246	[signature]
2	JOASH MODI	THURDIBUORO	3950926	0722856596	[signature]
3	OTIENO ORIND OKORE	THURDIBUORO	6600555	0713194250	[signature]
4	PASTOR JOSEPH OLUOCH	THURDIBUORO	6600631	0713671297	[signature]
5	PETER AKUMU	THURDIBUORO	4712647	0717109237	[signature]
6	SAMSON KAMWEBA	THURDIBUORO	20120442	0723560485	[signature]
7	PETER OTIENO OKOTH	THURDIBUORO	4014846	0705500005	[signature]
8	HESRON RAMOGI	NYAMONGA	9477050	0700227103	[signature]
9	OTIENO REDEMPTER	THURDIBUORO	26200012	0722508227	[signature]
10	SILAS A ODENY	NYAMONGORA	660661	0717118366	[signature]
11	FIBI ADHIAMBO OBONGO	THURDIBUORO	9443632	0792955690	[signature]
12	SILVANUS OGUTU ODAYO	THURDIBUORO	8974127	0725121011	[signature]
13	LUKA OBIAMBO OREJO	THURDIBUORO	4927024	0749135536	[signature]
14	DAN OKETO	NYAMONGONGA	2592458	0716570658	[signature]
15	JOHN O. ODERO	NYAMONGA	16004147	0720232754	[signature]
16	AMOS ORIA	THURDIBUORO	2592205	0796085946	[signature]
17	WILLYS OKEYO OMULLO	ALKOHA MAZADE	20453581	0754535780	[signature]
18	OKOTH JAMES ABEKO	[illegible]	6151028	0710768447	[signature]
19	PETER ORANGA	WEST NYARACH	9041613	0707133704	[signature]
20	DANIEL OLOO OTIENO	[illegible]	23858574	0728561511	[signature]
21	JACOB O. OTIENO	CHIEF - W/NYARACH	6600605	0725858109	[signature]
22	[illegible] O. [illegible]	Ass. chief - [illegible]	22057880	0705575579	[signature]
23	[illegible] ONGOW	A/CHIEF THURDIBUORO	20685000	0718240188	[signature]
24	SETH O. NYAMOLA	ASST CHIEF	4977823	0725617682	[signature]
25	EZRA ATIENO ISUMA	WEST NYARACH	13286675	0715463323	[signature]
26	PAMELA ADHIAMBO OTIENO	WEST NYARACH	13785516	0723354184	[signature]

MKM

Attendance Register

Project Name: Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta

Venue: WEST NYAKACH COMMUNITY HALL

Date: 15th July 2021

No.	Name	Location/Institution	ID Number	Address/Mobile No.:	Signature
27	GAYA FREDRICK	YEBE AFRICA	22729680	0729430123	
28	EMILY ACHIENG'	YEBE AFRICA	38103438	0714 087 752	
29	MOSES ABRAHAM KOGA ODERA	ECTP NYAKACH	40103405	0755148334	
30	WILFRED OR. OKOTHSO	WEST NYAKACH	2243172	0722316933	
31	GEORGE O. Mokua	FISHERIES	21103304	0724 505133	
32	[illegible] ONGWAL	THURDIBUORO	30669206	0718524166	
33	Kennedy Kizine	GOMAKE	21914800	0722964333	
34	Akiny Rose Mitchel	GOMAKE	31624816	0701378129	
35	Hon. George O. Olwech	KCA	[illegible]	0722711432	
36	SIMON ODODO OSIRO	WEST NYAKACH	2559151	0738161731	
37	GEORGE Kore	West Nyakach	[illegible]7	0736-[illegible]	
38	Francis Onyango	West Nyakach	2360412	0720 [illegible]	
39	JAIRUS OTIENO ABONYO	WEST NYAKACH	0867685	0726664743	
40	GEORGE O. JUMA	THURDIBUORO	1019241	0725319152	
41	DAVID ASHANO JUMA	THURDIBUOR	26703265	0726733538	

MINUTES OF PUBLIC PARTICIPATION HELD IN KOBUYA CHILDS' CAMP ON 21ST JULY 2021 FOR THE PROPOSED DE-SILTATION/DREDGING AND SAND MINING ON SONDU MIRIU DELTA RIVER.

MEMBERS PRESENT:

See Attached attendance register

ABSENT WITH APOLOGY

AGENDA

1. Preliminaries
2. Project Scope
3. Comments/Questions
4. Way forward

MIN 1: PRELIMINARIES

The team was welcomed by the Chief of Kobuya Location who also led the opening prayer and the meeting was officially opened. Self introduction was then made by the various community members and local administration.

MIN2: SCOPE OF THE POJECT

There was a project description/scope presentation of the proposed project by the Consultant. It was made clear that the proponent was Mango Tree Marine LTD

Dredging of Sondu Miriu River delta was brought up by a parliamentary report submitted to the Parliamentary Environment and Natural Resources Committee as one of the mitigation measures to curb the continuous flooding of Sondu Miriu River delta. The proponent, Mango Tree Marine Ltd, is to dredge around the delta from inside the lake.

The Consultants informed the participants that they were holding the meeting have secured permission from the Deputy County Commissioner of the area. The consultant added that it is the responsibility of those who attended the public participation to disseminate information to their neighbours.

MIN 3: PARTICPANTS COMMENTS/QUESTIONS

PI Questions

a. Where will you deposit the waste?
b. Will the dredging increase the size of the river and how will that affect those with land around the river?
c. How will you deal with the effect on fishing and the aquatic life?
d. The process makes the water muddy and dirty; how will you deal with this?
e. How will you deal with noise from the dredging?

Response by the Consultant: The consultant thanked participant 1 for raising the concerns. It was clarified that the sound from the excavation during dredging is a mild one which will not affect them as they may perceive. The consultant explained that dredging will only be within the riparian land. She also discouraged river bank farming and added that it should not be practised at all since it is one of the causes of increased siltation of the river.

The Consultant also informed the meeting that they have a biodiversity expert as part of the team to look at ecological impact of the dredging exercise and propose mitigation measures.

MN 4: FILLING OF THE PUBLIC PARTICIPATION QUESTION

The Consultant informed the public about participant's questionnaire. The participants were taken through the questions in the questionnaire before filling individually. The questionnaires were then distributed for filling and filled questionnaires were collected by the Consultant.

MIN 5: WAY FORWARD

The Consultant thanked the community members for participating in the process and assured them that their view will be analysed and taken care of by the Proponent. The meeting was closed by a word of prayer from one of the spiritual leaders and thereafter members left.

Signed by:

1. CHIEF KOBUYA

DATE 28/07/2021

SIGNATURE and STAMP

CHIEF
KOBUYA LOCATION

2. GOMAKE CONSULTANCY LTD

Date:

SIGNATURE and STAMP

GOMAKE CONSULTANCY COMPANY LTD.
22 JUL 2021
P.O. Box 5540 - 00100,NAIROBI-KENYA
TEL: 0780964 333
Email: info@gomakeltd.co.ke

Attendance Register

Project Name: *Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta*

Venue: KOBUYA CHIEF'S CAMP

Date: 21st July 2021

No	Name	Location/Institution	ID Number	Address/Mobile No.:	Signature
1.	DORCAS THOMAS AWUOR	GO-MAKS	27743527	0728 362330	
2.	Akinyi Flora Mitchel	Sonrake	31644816	0701393729	
3	[illegible]	[illegible]	[illegible]	0728348351	
4	[illegible]	[illegible]	5370695	0704047474	
5	Maurice [illegible]	[illegible]	9933283	0729456782	
6	[illegible]	[illegible]	[illegible]	0713491755	
7	[illegible] OCHIENG' OYWAYA	[illegible]	14550401	0705047618	
8	TOM [illegible] OMONDO	Nangchuthe	13519606	0788093495	
9	George [illegible]	Kobuya	[illegible]	0724694537	
10	PANCRAS ONYANGO	[illegible]	[illegible]	0786-012-742	
11	ERICK O ORINDA	KOBUYA (WEST)	13790416	0721888069	
12	Frances Oriema Adero	Kobuya East	[illegible]	0717287526	
13	George O. Okello	[illegible]	[illegible]	[illegible]	
14	Emily Akinyi	IFRO AFRICA	32103938	0714687752	
15	James [illegible]	[illegible]	[illegible]	[illegible]	
16	[illegible] O. [illegible]	WEST NYAKACH	[illegible]	0718161431	
17	GAYA FREDRICK	YAGO AFRICA	22729580	0729430123	
18	[illegible]	[illegible]	[illegible]	0714997366	
19	DIMO LAWRENCE	KOBUYA	8628293	0718107342	
20	[illegible] Onyo	Kobuya East	28922081	0723809045	
21	PETER OGADA	DISASTER	3361780	0788891510	
22	JOSEPH SOKO OGOLLA	Kobuya West	10962878	0722258070	
23	Moses Aroon	KOBUYA	20911527	0713175543	
24	LYNDON [illegible]	Kobuya East	[illegible]	0705472205	
25	CAXTON OKUMU	WEST KOBUYA	31644109	0710811162	
26	Margaret Vieta Otieno	Kobuya West	22768110	0726015274	
27	[illegible] [illegible]	Kobuya West	91615102	0705947871	Emil

MINUTES OF A JOINT SITE VISIT HELD IN RAKWARO CHIEFS' CAMP ON 22nd JULY 2021 FOR PROPOSED DREADGING /DESILTATION AND SAND HARVESTING ON SONDU MIRIU RIVER DELTA(NEMA KISUMU AND WRA MARA-SONDU BASIN)

MEMBERS PRESENT:

See Attached attendance register

AGENDA

1. Preliminaries
2. Project Scope
3. Comments
4. Way Forward

MIN 1: PRELIMINARIES

The team was welcomed by the consultant representative who also led in the opening prayer. Self-Introduction was made by the various lead agencies there after the meeting was officially opened for discussions before the actual site visit.

MIN2: SCOPE OF THE POJECT

There was a project description/scope presentation of the proposed project by the EIA Consultants. It was made clear that the proponent was Mango Tree Marine LTD. The Company wanted the lead agencies to have an institutional memory during the review process of the EIA that was to be submitted.

Dredging of Sondu Miriu River delta was brought up by a parliamentary report submitted to the parliamentary Environment and Natural Resources Committee as one of the mitigation measures to curb the continuous flooding of Sondu Miriu River delta.

MIN 3: LEAD AGENCIES COMMENTS

WRA MARA-SONDU BASIN:

- Appreciated the fact that we had the first stop over at Chiowe beach the most affected by floods
- The EIA consultant to have the water quality tested in the government chemist
- The flooding is a long term effect and needs long term solutions e.g. vegetation of the upstream. He mentioned that dredging is short term but is the most immediate mitigation measure for the people
- Have a biodiversity expert on board to have proper study of the area since the delta was so rich in biodiversity
- Have a GIS expert to know the quantity of silt caused by flooding
- Do research on dredging for desiltation technology; its impacts on biodiversity since most of the dredging around have only been for navigation at the different ports and bays.
- The people in the area to have a modern technology on building; maybe rising the foundation of the houses
- Have a proper engineering design during dredging to avoid lake water flowing back to the river due to the gradient. Since any slight elevation would lead to a silt trap. The consultant made it clear that dredging was to have a lake approach but not main land approach
- Have a conservation effort of the riparian/wetland since they are natural checks

NEMA CEO:

- Have a sand/mud dam to contain the silt before it enters the lake
- Dredging is a continuous process which is not economically effective but short term

- Where will the company take the silt? Consultant response: the community proposed that the gullies formed due to the sand harvesting be filled with the silt in order for the people to reclaim back their agricultural land.

NEMA CODE:

- The onsite visit had revealed a lot of the presence of biodiversity in the area. Emphasis were made that a serious inventory be done on biodiversity
- Have an up stream approach since after some time the area will go back to the same scenario
- Ensure people know the disadvantages of river bank cultivation since this was also leading to siltation
- The fisheries and KWS agencies to give their zest on the biodiversity expert
- Indigenous knowledge of the different fish species that have emerged or disappeared due to the flooding effects
- Have heavy metal sampling done in a NEMA registered laboratory

MIN 4: WAY FORWARD

- Proper public participation was to be done and coordinated by the Consultant.

The meeting was closed by a word of prayer from the EIA consultant representative.

Signed by:

1. GOMAKE CONSULTANCY COMPANY LTD

Date:

SIGNATURE and STAMP

GOMAKE CONSULTANCY COMPANY LTD.
23 JUL 2021
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Attendance Register

Project Name: *Proposed Dredging/De-Silitation and Sand Harvesting at Sondu Miriu River Delta*

Venue: RAKWARO CHIEF'S CAMP

Date: 22ND JULY 2021

No.	Name	Location/Institution	ID Number	Address/Mobile No.:	Signature
1.	Akoi Hera Mitchel	Gonda	3104816	0701393729	[illegible]
2.	Tom Togo	NEMA	11284838	0722 526645	[illegible]
3	Christinus Wafula	Kericho / WRA	2782/661	0734294585/0704982544	[illegible]
4	Moses Cuboso	NEMA	2093554	0727278338	[illegible]
5	Teddy Amino Ochola	NEMA	36057672	0+45574431	[illegible]
6	Kevin Odhiambo	WRA	2027495	0707 1074	[illegible]
7	Josiah Sunya	NEMA	21677946	0721 718715	[illegible]

Attendance Register

Project Name: *Proposed Dredging/De-Siltation and Sand Harvesting at Sondu Miriu River Delta*

Venue: INSTITUTIONS RACHUONYO NORTH & NYAKACH SUB COUNTY **Date:** 10th July 2021

No.	Name	Location/Institution	ID Number	Address/Mobile No.:	Signature
1.	[illegible]	[illegible]	[illegible]	072[illegible]	[illegible]
2.	Gordon Ojal Lasera	Nyagoregu Sec (boi)	27999259	0721795311	[illegible]
3	Daniel Gaga Onyango	Osodo Mixed Sec.	16092975	0721467540	[illegible]
4.	Steve Onyango Ogoga	[illegible]	2[illegible]0 78450	0711 [illegible] 281	[illegible]
5	GENGA A. MOSES	KOBITA PR. SCHOOL	9794466	0724365315	[illegible]
6	WALTER N. OWINO	OSODO PR. SCHOOL	6371218	0723951938	[illegible]
7	PETER A. OTIENO	KOBALA PR. SCH	13519162	0725980241	[illegible]