

PARLIAMENT  
OF KENYA  
LIBRARY

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE



P.O. BOX 81651, 80100

MOMBASA

Tel: 254-020-2353904

Email: [director@kmfri.co.ke](mailto:director@kmfri.co.ke)

REPORT TO THE NATIONAL ASSEMBLY  
DEPARTMENTAL COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

MOMBASA, 24<sup>TH</sup> AUGUST 2015

1  
2  
3  
4  
5



6

7

## Foreword

This report is as a result of a request by the National Assembly's Departmental Committee on Environment and Natural Resources vide a letter ref.NA/DC/ENR/40/2015, dated 17th August 2015 addressed to KMFRI:

- i) To submit KMFRI's position on the on-going sand harvesting in Diani.
- ii) The role/involvement of KMFRI as key stakeholder before issuance of the license to China Road & Bridge Company for sand harvesting by NEMA.
- iii) The effects of sand harvesting on the Marine Ecosystem in Diani area and mitigation measures.

In compliance to the request, a multidisciplinary team of KMFRI's marine scientists was tasked to compile the report. The team was composed of the following scientists:

1. Dr. Renison Ruwa PhD; Marine Ecologist/Ecosystem Based Management
2. Dr. James Kairo PhD; Marine Ecologist/Mangrove Specialist
3. Dr. Melckzedek Osore PhD; Biological Oceanography/ Marine Biodiversity
4. Dr. James Mwaluma PhD; Biological Oceanography/ Marine Biodiversity and Mariculture
5. Dr. Joseph Kamau PhD; Chemical Oceanography/ Marine Pollution
6. Dr. Charles Magori PhD; Physical Oceanography/ Sediments Distribution, Shoreline stability, Sea level rise and Ocean Currents
7. Mr. Patrick Gwada, MSc; Marine Ecologist/Seagrass/Environment Impact Assessment (EIA) Specialist
8. Ms. Esther Wairimu Magondu MSc; Mariculture
9. Mr. Harrison Onganda MSc; Marine Ecologist/ Geographical Information Systems (GIS) Specialist
10. Mr. Johnstone Omukoto MSc; Marine Ecologist/Fisheries Management
11. Mr. Jelvas Mwaura MSc; Marine Ecologist/Coral Reefs Specialist.

In addressing the requests from the Departmental Committee, KMFRI Team used its diverse professional background, long term research work results and experiences in the Kenyan Marine waters and additionally included experiences gained by its scientists in regional and global assessments in research of similar nature. An executive summary of the report is included as well summary of the detailed report is given herein.



Dr Renison Ruwa PhD, MBS.  
AG. DIRECTOR/KMFRI



## Executive Summary

The Parliamentary Committee on Environment and Natural Resources requested KMFRI to submit information regarding sand harvesting at Diani Beach.

KMFRI recognize the importance of the Standard Gauge Railway (SGR) Project to the various sectors of economy at the local, national and regional level. However, it is critical to integrate all environmental concerns into the project implementation to ensure sustainability.

KMFRI maintains that based on the comments it submitted to the EIA Consultant and the report sent to NEMA in this regard, the license issued should be cancelled and the sand harvesting activities in Diani stopped.

The advice of KMFRI is based on its role and involvement as a key stakeholder, participation in completing questionnaires, and attending public meetings on diverse dates, as well as her mandate of research and advising the government on the wise use of aquatic resources. The potential effects of sand harvesting on the marine ecosystem in the Diani are many, including: physical alterations and destruction of critical habitats, changes in oceanographic hydrodynamics and biogeochemistry, altered marine biodiversity, disrupted fisheries and socioeconomics of the area.

Further KMFRI recommends for a full EIA be undertaken to include implementation of a comprehensive environmental monitoring plan (EMP) and compensation mechanism to the affected local stakeholders are the main recommended mitigation measures towards addressing activity impacts.



## Table of Contents

Foreword.....	ii
Executive Summary.....	iii
List of acronyms.....	v
List of Figures.....	vii
1.0 About Kenya Marine and Fisheries Research Institute .....	1
1.1 Regional and International Linkages .....	2
1.2 KMFRI's achievements in the 2013-14 national Medium Term Plan -II .....	2
1.3 ISO-Certification .....	4
2.0 KMFRI Position on the ongoing sand harvesting in Diani.....	5
3.0 The role / involvement of KMFRI as a key stakeholder before issuance of the license to China Road and Bridge Company for sand harvesting by NEMA.....	6
3.1 Participation in public meeting for sea sand harvesting on 16/12/2014 .....	6
3.2 The meeting between parliamentary committee in charge of environment and natural resources with stakeholders for the ongoing sea sand harvesting 14/8/1015 .....	6
3.3 KMFRI's comments to the Questionnaire provided by the Consultant AWEMAC dated 30/1/2015.....	7
3.4 KMFRI's response on EIA report to NEMA.....	8
4.0 Effects of sand harvesting on the marine ecosystem in Diani area and mitigation measures..	10
4.1 Effects of sand harvesting on mangrove ecosystem .....	11
4.2 Effects of sand harvesting on Seagrass ecosystem .....	11
4.3 Effects of sand harvesting on coral reef ecosystem.....	12
4.4 Effects of sand harvesting on marine fisheries .....	14
4.5 Effect of sand harvesting on metal mobilization.....	16
5.0 ANNEXES.....	18

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100





## List of acronyms

ASCLME	-	Agulhas Somali Current Large Marine Ecosystem
CMA	-	Community managed Marine areas
EAC	-	East African Community
EAFRO	-	East African Freshwater Fisheries Research Organization
EAMFRO	-	East African Marine Fisheries Research Organization
EEZ	-	Exclusive Economic Zone
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
ESIA	-	Environmental and Social Impact Assessment
FADs	-	Fish Aggregation Devices
FAO	-	Food and Agricultural Organization
FSA	-	Fish Spawning Aggregations
IAEA	-	International Atomic Energy Agency
IFS	-	International Foundation for Science
IMO	-	International Maritime Organization
IMS	-	Institute of Marine Science
IOC	-	Intergovernmental Oceanographic Commission
IOI	-	International Ocean Institute
IPCC	-	Intergovernmental Panel on Climate Change
IUC-EA	-	Inter-University Council East Africa
IUCN	-	International Union for Conservation of Nature
KCDP	-	Kenya Coastal Development Project
KMFRI	-	Kenya Marine and Fisheries Research Institute
KPA	-	Kenya Ports Authority
KWS	-	Kenya Wildlife Service
LOICZ	-	Land-Ocean Interactions in the Coastal Zone
LVEMP	-	Lake Victoria Environment Management Programme
LVFO	-	Lake Victoria Fisheries Organization



Management

- NEMA - National Environmental Management Authority
- SAPPHIRE- Strategic Action Programme for Sustainable Management of the Western Indian Ocean Large Marine Ecosystems
- SAREC - Swedish Agency for Research Cooperation
- SEM - Southeast monsoon
- SGR - Standard Gauge Railway
- SIDA - Swedish International Development Agency
- SIDA-SAREC - Swedish International Development Agency/ Swedish Agency for Research Cooperation
- SWIOFP - South West Indian Ocean Fisheries Programme
- TAFIRI - Tanzania Fisheries Research Institute
- UDSM - University of Dar-es-Salaam
- UNCLOS - United Nations Convention on Law of the Sea
- UNDP - United Nations Development Programme
- UNEP - United Nations Environment Programme
- UNESCO - United Nations Education Scientific and Culture Organization
- WIOLAB - Western Indian Ocean Land Based Program
- WIOMSA - Western Indian Ocean Marine Science Association
- WWF - World Wildlife Fund



List of Figures

Fig. 1 Map of Waa-Tiwi-Diani showing sand harvesting area..... 10

---

## 1.0 About Kenya Marine and Fisheries Research Institute

The Kenya Marine and Fisheries Research Institute (KMFRI) is a non-commercial state corporation mandated to undertake research in marine and freshwater fisheries, aquaculture, environmental and ecological studies, and marine research including chemical and physical oceanography, so as to provide scientific data and information to enhance sustainable exploitation, management and conservation of Kenya's fisheries resources, and promote aquatic environmental protection, food security, poverty alleviation, and employment creation. KMFRI was established by an Act of Parliament (**Science and Technology Act, Cap 250 of the Laws of Kenya**) in 1979 after the collapse of the East African Community. Previously, marine and fisheries research was undertaken by the two organizations of the Community: the East African Marine Fisheries Research Organization (EAMFRO) in Mombasa and the East African Freshwater Fisheries Research Organization (EAFPRO) in Kisumu.

Besides Mombasa and Kisumu Centres, KMFRI infrastructure capacity also expanded from the two mentioned research centres by establishing six additional stations at Lake Naivasha, Lake Baringo, Lake Turkana for fisheries and limnology, and Sagana, Kegati and Sangoro for aquaculture. Over the years, KMFRI has also developed many collaborations research programmes with different Institutions worldwide as will be highlighted further in this document. Among the significant infrastructures are four research vessels, one research vessel for deep sea research stationed in Mombasa and 3 research vessels stationed in Kisumu for regional lake-wide research in Lake Victoria. Before the donation of the marine research vessel by the Government of Belgium in 2014, KMFRI depended on ships of opportunity supported by international initiatives through FAO, Netherlands, Norway and World Bank, and local Public Private Partnerships.

The vision of KMFRI is to be a centre of excellence in aquatic research and promotion of sustainable utilization of marine and freshwater resources. Towards this end, KMFRI has the following strategic objectives:

- To undertake research aimed at increasing fisheries production for wealth creation and food security
- Increase production of fish and other aquatic resources through aquaculture to ensure food security, increased income and wealth creation
- To develop and transfer innovative technologies for value addition and reduction of post-harvest losses for employment creation, increased incomes and food security
- To conduct research to reduce environmental degradation and enhance the productivity of aquatic systems
- Conduct research on the social and economic aspects of the utilization of aquatic resources towards enhanced community participation, optimal exploitation and improved benefits at all levels
- Package and disseminate scientific information to stakeholders

Elaborately, the roles of KMFRI include;

- (a) Conducting multidisciplinary and collaborative research on fish ecology, population dynamics, stock assessment and general aquatic ecology;

---



- (b) Collecting and disseminate scientific information on fisheries and other aquatic resources and related natural products;
- (c) Studying and identify suitable species for culture including development, adoption and transfer of rearing technology and procedure;
- (d) Studying chemical and physical processes that affect productivity of aquatic ecosystems;
- (e) Monitoring water quality and pollution in fresh and marine water environments;
- (f) Carrying out socio-economic research on aspects relevant to fisheries, environment and other aquatic resources;
- (g) Establishing a marine and freshwater collection for research and training purposes;
- (h) Offering training facilities to aquatic scientists and students;
- (i) Conducting research on fish quality control, post harvest preservation and value addition technologies.

### 1.1 Regional and International Linkages

To maximize on research output, KMFRI has collaborative research programs with a number of regional and international institutions. These include WIOMSA, LVFO, TAFIRI, FIRRI, IUC-EA, IUCN, IOC-UNESCO, FAO, IOI, GOOS, GOOSE..., ODINAFRICA, and foreign universities e.g. Free University of Brussels, Belgium; State University of Gent, Belgium; McGill and Dalhousie University, Canada; University of Bremen, Germany; University of Hull, Britain; Edinburgh Napier; Bangor University, Wales; University of Wageningen, The Netherlands; University of Florence, Italy; University of Gothenburg, Sweden; University of Boston, University of Hawaii, USA; United Nations University in Iceland; University of Nagasaki, Japan; Choson University, South Korea; University of Mauritius, University of Johannesburg, Oceanographic Research Institute (ORI); Rhodes University, South Africa; EAC – UDSM, IMS, Univeristy Edwardo-Mondlane, Mozambique, Wetland International, WWF, Earth-watch institute,

KMFRI has also worked on a number of research projects funded by some leading development partners including: the World Bank (LVEMP, SWIOFP, KCDP, ), UNDP (ASCLME, SAPPHIRE) , European Union, GEF, NIOZ, NORAD, UNEP, UNESCO, IFS and SIDA-SAREC, CIDA, GIZ, VLIR, NIO – Goa, India. KMFRI scientists who participate on these international initiatives receive specialized and advanced training and other professional recognitions.

### 1.2 KMFRI's achievements in the 2013-14 national Medium Term Plan -II

#### a. Enhance research in the territorial waters and the Exclusive Economic Zone (EEZ)

Fish stocks are declining in the traditional fishing grounds and there is need to explore the feasibility of up-scaling production from Kenya's territorial waters on the Indian Ocean and the Exclusive Economic Zone (EEZ). Research strategies undertaken include mapping of new fishing grounds and commercially exploitable fish-stocks using suitable fishing gears. It is noted that the potential fisheries production in our EEZ is about 150,000 tons and that the inshore and territorial waters (upto 12 nautical miles) can produce 20,000 tons by use of bottom fishing lines and seine nets from the current annual production 7000 tons caught by artisanal fishermen and that with use of appropriate deep sea fishing vessels industrial commercial fishing can produce about 50,000 tons annually.

---

Higher catches are anticipated when the proposed surveys are undertaken using the KMFRI research vessel R.V. Mtafiti which was commissioned in January 2014.

**b. Conduct research in aquaculture to enhance fish production**

KMFRI has successfully produced fish feed formula and fish seed or fingerlings to support current demand of 100 million fingerlings. Breeds improvement is being undertaken through selection, and hybridization, to increase supply of seed to meet the projected increase in demand which is estimated to be about 250 million fingerlings. Species diversification is also carried out to increase the aquaculture resource base. Marine Seaweed production is ongoing and is targeted to be raised from the current 100 metric tons to 4,000 metric tons in the medium term. Commercial Artemia production has been successful and will be promoted through collaboration with cooperate salt producers, CBOs and artisanal salt framers with a target production of 100 kilograms for the medium term. Additionally KMFRI is piloting community based production of milkfish, prawns and crabs along the coast.

**c. Enhance research in inland water fisheries:**

Stock assessment surveys is continuously undertaken in the freshwater bodies in order to predict sustainable fisheries production under different levels of exploitation and provide information for formulation of management plans and policies that would ensure food security, income generation and employment creation. Fish breeding and nursery grounds in Lakes Victoria, Turkana, Baringo and Naivasha have been mapped out ready for zoning and implementation of the maps in managing the resources. Further mapping will be undertaken on the rest of the lakes, rivers and dams to support development and conservation of fisheries resources to improve catches in these water bodies to avoid the decline of the fish resources. More effort will be directed to exploring the Lake Turkana fisheries which have a big potential for development, and to support rehabilitation and sustainable use of the declining Lake Victoria fisheries. In this regard, environmental surveys will be carried out to monitor pollution in the fishing grounds and the impact of water hyacinth on fisheries within the Kenyan part of Lake Victoria, and the impact of damming of River Omo on Lake Turkana.

**d. Develop and transfer innovative technologies for value addition and reduction of post-harvest losses for employment creation, increased incomes and food security**

KMFRI has developed innovative technologies for reducing post harvest losses such as solar dryers and improved fish smoking ovens have been developed for capture fisheries. The technology is being used in Lake Victoria, Lake Turkana and the coast and transferred to the users and besides these technologies are at advanced stage of patenting process. Further innovative technologies will be developed along the fisheries value chain and transferred through strategic public-private partnerships to reduce post harvest losses in the fisheries sector (capture fisheries and aquaculture) and support employment creation, increased incomes and food security. Already the solar tunnel drier developed by KMFRI won an innovative award, and was exhibited during the Africa Public Service Day Celebrations in Brazzaville Congo.

**e. Develop and improve research infrastructure**

During the year, through a memorandum of understanding with the government of Belgium, KMFRI acquired a modern research vessel, RV Mtafiti, that will enable her to conduct research in territorial

---

waters and the EEZ. The vessel will also support mapping and monitoring of fisheries resource and other deep water non-living resources such as minerals, oil and gas in those areas. The ship was commissioned by H.E. The President on January 27, 2014.

Through KCDP, KMFRI has acquired state of the art laboratory infrastructure and specialized equipment that will support the laboratory operations in terms of efficient and dependable sample analysis and processing time. This has enabled the organization to match her laboratory operations to the level of being internationally recognized by her partners for sub-contracting laboratory services. This will be a source of income in the coming years as the laboratory operations will generate A-I-A. Both issues will contribute to the perpetuation of KMFRI as a Centre of Excellence which was also acquired in the last financial year through a formal recognition by the Commission of the East African Heads of States.

### 1.3 ISO-Certification

KMFRI is ISO-9001-2008 Certified. Through this the organization implements and maintains her operations to internationally recognized standards and best practices. This includes research operations and laboratory services.

---

## 2.0 KMFRI Position on the ongoing sand harvesting in Diani

KMFRI makes the following observations based on the issues surrounding sand harvesting along Waa-Tiwi-Diani area.

KMFRI submitted comments to the EIA Consultant and a report to NEMA to inform her position on these matters

1. The area is endowed with critical marine ecosystems, rich in biodiversity hotspot and supports local economy and livelihood. The potential negative impacts of the sand harvesting activity outweigh the positive ones as highlighted in the KMFRI's comments to Consultant (Annex 1), Stakeholders (Annex2), and to NEMA (Annex 3). Therefore KMFRI recommends that full EIA study should be undertaken;
2. The approved ToR for the sand harvesting activity of the Standard Gauge Railway (SGR) was not made available to KMFRI prior to, during and after the engagement process. Under this circumstance, the scope of the activity is obscure and the appropriate methodology and analytical tools required for executing a successful EIA Study were not readily available for review and concurrence;
3. KMFRI's comments and concerns were not taken into consideration in the final EIA report despite presenting elaborate comments about the impacts of sand harvesting activity to the Consultant. Through the stakeholder's questionnaire forms, KMFRI also raised fundamental concerns on potential negative impacts required to be addressed during EIA study;
4. Further, despite KMFRI submitting EIA Project review comments to NEMA and raising fundamental concerns on potential negative impact and gaps not addressed in the EIA Report, these concerns have not been taken into consideration in the final Environmental Management Plan (EMP);
5. Others alternative potential sites for sand harvesting were neither explored nor documented in the EIA Report;

Based on issues raised above, KMFRI maintains that the EIA Project Report is inadequate, and therefore recommends that the EIA license issued be cancelled and the sand harvesting activity should be stopped.

We herewith attach the following documentation in support of KMFRI's position:

1. Annex 1: KMFRI's comments to the Questionnaire provided by the Consultant AWEMAC
2. Annex 2: Minutes of Stakeholders meeting held at Kaskazi Beach Hotel, Ukunda in April 2015.
3. Annex 3: KMFRI's response on EIA report to NEMA.





### **3.0 The role / involvement of KMFRI as a key stakeholder before issuance of the license to China Road and Bridge Company for sand harvesting by NEMA**

KMFRI role before issuance of the license to China Road and Bride Company for sand harvesting by NEMA is discussed in the following sections of the document:

#### **3.1 Participation in public meeting for sea sand harvesting on 16/12/2014**

KMFRI attended a public meeting for Environmental Impact Assessment (EIA) which was held at Kaskazi hotel in Diani on 16<sup>th</sup> Dec 2014. The purpose of the meeting was for key stakeholders and parties likely to be affected by the project to be aware of the existence of the project and to air their concerns. In this meeting the lead consultant informed members present that official letters had been sent out to relevant Government agencies including (KMFRI KPA KWS among others) to get their scientific opinion on the proposed project. The consultant assured members present that marine scientists would be engaged to conduct extensive studies in the proposed project area and also the impacts the proposed project will have on the marine environment. This however was not done as the consultant conducted the study solely on their own without consultations with KMFRI.

In the same meeting marine ecologists from KMFRI raised concerns that the proposed sand harvesting would have immense negative environmental impacts which include destruction of mangroves and sea grass ecosystems, the projects would also lead to destruction of fish breeding grounds and the ecosystem destruction of coral reefs and emissions from the dredging process would affect the environment. Advice given by KMFRI was that sand harvesting was an environmental disaster in the making citing negative environmental impacts including impact on hydrology of the area, coral destruction, increased speed and turbidity of the water and destruction of marine habitats for nesting and breeding that would result from the sea sand harvesting.

#### **3.2 The meeting between parliamentary committee in charge of environment and natural resources with stakeholders for the ongoing sea sand harvesting 14/8/1015**

KMFRI attended a stakeholders meeting at Diani Reef Hotel, on 14th Aug 2015. The purpose of the meeting was to receive stakeholder's contributions regarding the petition by Kenya Association of Hotel Keepers and Caterers concerning illegal sand harvesting at the Diani Beach by China Road and Bridge Corporation Kwale County, Kenya.

The Parliamentary Departmental Committee on Environment and Natural Resources asked a number of presentations and submissions, including that from KMFRI, to help them understand and decide on whether:

- The EIA Project Report should be revoked or otherwise;
- The NEMA license should be revoked or otherwise;
- The marine sand harvesting should be revoked or otherwise;
- The professional contributions and positions by Lead Agencies on the entire process from project conceptualization, through scoping, reviews and public participations, and culminating in the EIA process was adequate;

---

- The correct EIA study was undertaken or otherwise;

The Secretariat on Parliamentary Departmental Committee on Environment and Natural Resources committed to formally contact KMFRI, in order for KMFRI to provide the following:

- KMFRI's comments on the stakeholder engagement processes towards the realization of the EIA report;
- KMFRI's official written submissions on NEMA request for the agency comments on issues raised on, or incidental to, the EIA Project report;
- KMFRI's official written submissions on previous monitoring of similar works undertaken in marine environment, especially those done by KPA dredging works at the Port of Mombasa;
- Any other matter that will be requested by the secretariat on Parliamentary Departmental Committee on Environment and Natural Resources.

### 3.3 KMFRI's comments to the Questionnaire provided by the Consultant AWEMAC dated 30/1/2015

KMFRI participated in the filling of the Environmental Impact Assessment questionnaire for the proposed sea sand dredging/harvesting activity issued by the lead consultant.

In the questionnaire, KMFRI raised a number of negative social economic and environmental impacts anticipated from the sand harvesting activity which were as follows;

- Disruption of the fishing activities in the area during the period of sand harvesting.
- Negative effects on fish aggregation sites for grouper fisheries in the Waa-Tiwi-Diani area
- Increase in turbidity of water due to dredging of sediments impacting on coral reefs and sea grass beds.
- Destruction of near shore marine ecosystems due to sediment alterations causing corollary ecosystem change.
- Increased vulnerability of coastal infrastructure to storms and rising sea levels.
- Increased shoreline erosion rates.

The suggested measures provided by KMFRI that the proponent needed to put in place before, during and after the activities were to.

- Seek for numerous alternatives of sand available such as Malindi area near River Sabaki where there is massive deposition of sediments land accretion.
- Compensate sand harvested at proposed sites by provision of jobs, motorized fishing boats to enable fishers venture further offshore and/or monetary support to the affected fishers.
- Conduct sand harvesting during the Northeast monsoon as the sea is fairly calm, compared to the South east monsoon season to minimize movement of turbidity plumes.
- Engage experts to map out ecologically sensitive areas/ habitats in Mombasa/Tiwi areas.



- Put in place environmental monitoring plan (EMP) to continuously monitor the state of the environment in nearby ecologically sensitive areas/critical habitats (corals, sea grass beds and mangrove areas including mudflats during the period of sand harvesting).

#### 3.4 KMFRI's response on EIA report to NEMA

KMFRI received through NEMA, the ESIA project report on the above subject for review. The report was prepared by Africa Waste and Environmental Management Centre.

Key issues that were raised about the activity site were:

- Dredging would disturb the seafloor and degrade critical habitats such as sea grass, mangroves and corals thus negatively impacting on fisheries and as such these ecological sites were to be avoided with close consultation with local fishermen and KMFRI technical experts on sea grass, mangroves and corals (see details in Section 4).
- Considering the connectivity nature of the marine system there was high likelihood that the neighboring critical habitats and conservation areas will be irreparably impacted during and after the operation (see details in Section 4).
- Based on concerns raised during the Stakeholder's meeting in Diani, issues on habitat degradation, and impacts to fisheries and tourism were raised. It was unanimously agreed that NO sand harvesting should take place in Diani Beach (tourist area).

Potential negative environmental impacts identified were

- Increased sediment load leading to accelerated shore line change.
- Impacts from long term changes in the rates of sediments discharge at the coast have been known to cause social, economic and environmental impacts that affect the shoreline change leaving coastal assets at a vulnerable state. These assets include coastal communities, buildings, infrastructures, supporting environments or ecosystems (e.g. mangroves and sea grass meadows) and other resources (recreational and cultural). Field estimates of river bed deposits indicate that annual volume of sand reaching the shore via rivers could be 50,000 to 100,000 m<sup>3</sup> less than would be expected without sand mining
- Release of carbon from the sediment to the atmosphere (see details in section 4)

#### Alternative project site

- It was suggested that Implementation of the project must avoid the Diani Beach otherwise it would throw away the gains made by the National and county Government in marketing Diani as a touristic destination as well as an ecologically distinct area. The Diani-Chale area earns over US\$1.41 billion a year, contributing 55% and 17% of the total coastal and national tourism earnings respectively. This accounts for over 90% of tourism within Kwale District. The south coast has 68-registered hotels of which 37 are star rated (with over 6500 beds), as well as apartment villas, guesthouses and cottages. Of these star rated hotels 30 are within the Diani-Chale area.

---

- Suggested alternatives were backfilling materials which should be sourced from hinterlands. Other options would be to make use of concrete columns in the construction rather than block filling.

#### Environmental Management Plan

- The report did not take into consideration implementation period in close corroboration with KMFRI for monitoring the recovery of the impacted habitats. Implementation of the project might lead to shore line change that will need adequate monitoring by relevant agencies with proven competence. This should be captured in the EMP framework or taken into consideration during the project implementation.

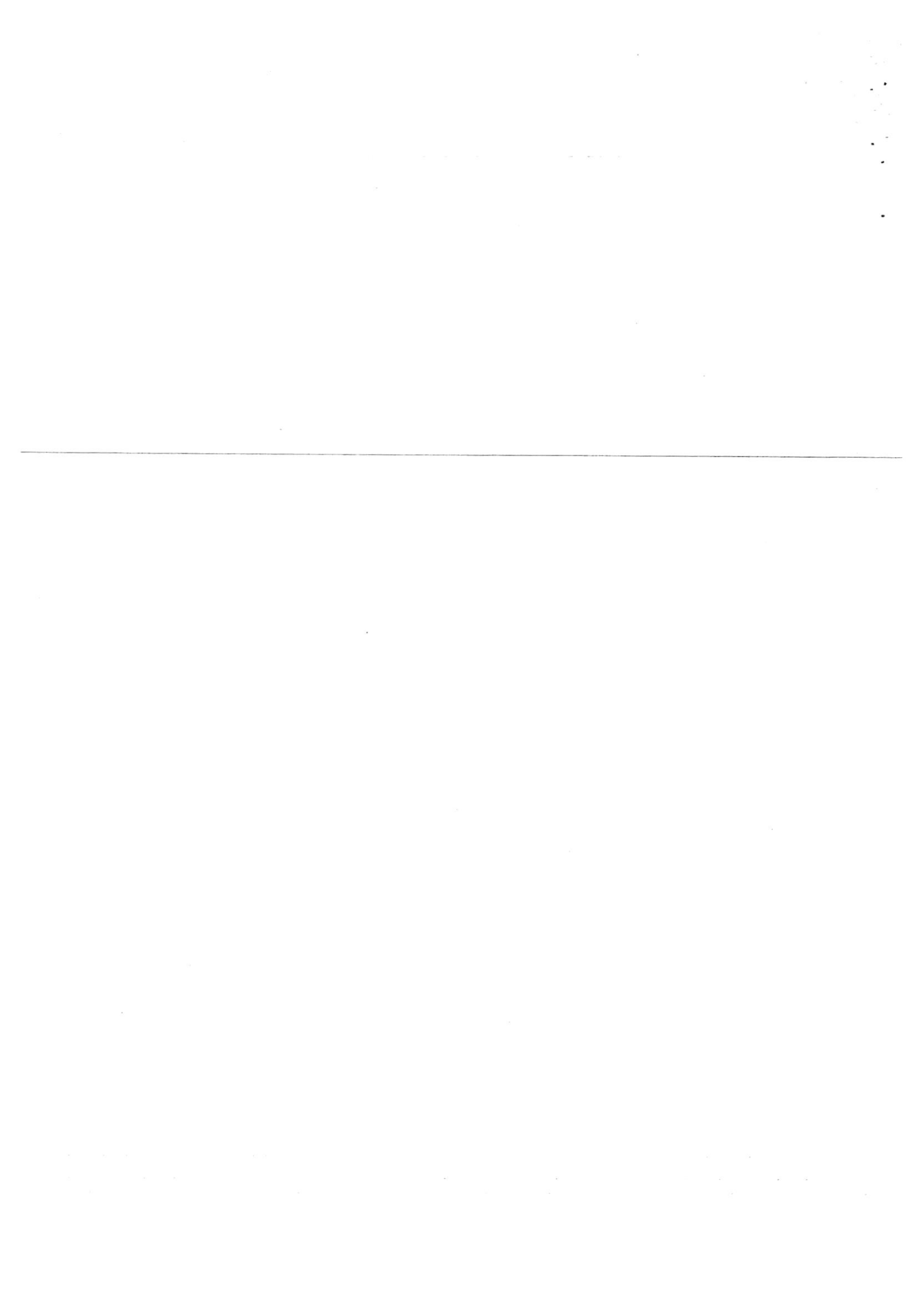
#### Sectoral concerns

- Sectoral concerns including; Ecosystem connectivity, degradation of critical habitats, loss of livelihood and use of alternative materials and technology were issues identified that needed consideration during project implementation. Kwale District contributes about 10% of the total annual landings of marine fisheries catches. It is estimated that there are 2000 full time fishermen in Kwale District who make 1/3 of the estimated total number of fishermen along the entire Kenyan coastline (see details in Section 4).

#### Additional Information

- The composition of the ESIA team should have consisted of marine ecology scientists to prepare the report and that the lead expert was short of trained fisheries experts as well as system ecologists who would have added more value and salient features of marine system including system connectivity and function.
- It was advised that before commencement of the project, the proponent needed to take into consideration issues raised by the public especially compensation of the fishermen likely to be affected by the project and avoiding of all the ecological sensitive areas.

#### Annexes (1-3)





#### 4.0 Effects of sand harvesting on the marine ecosystem in Diani area and mitigation measures

Area earmarked for dredging/harvesting of sand for the SGR project lies between Waa in the north to Tiwi area close to Diani Beach in the south (Fig. 1). The designated area is located 1-2.0 km from the shoreline and stretches for about 10km parallel to shoreline, enclosing an area of 15km<sup>2</sup>. The site experiences offshore currents which flow mainly northwards with rates of up to 4 knots during the southeast monsoon and 3 knots during the northeast monsoon. These are relatively strong currents and can potentially disperse sediment plumes over an expansive marine area.

A distinctive feature of the designated sand harvesting area is the fringing reef running parallel to the coastline. Other unique features are the opening of River Mwachema with its heavy sediment deposition, and deep lagoons near the mainland.

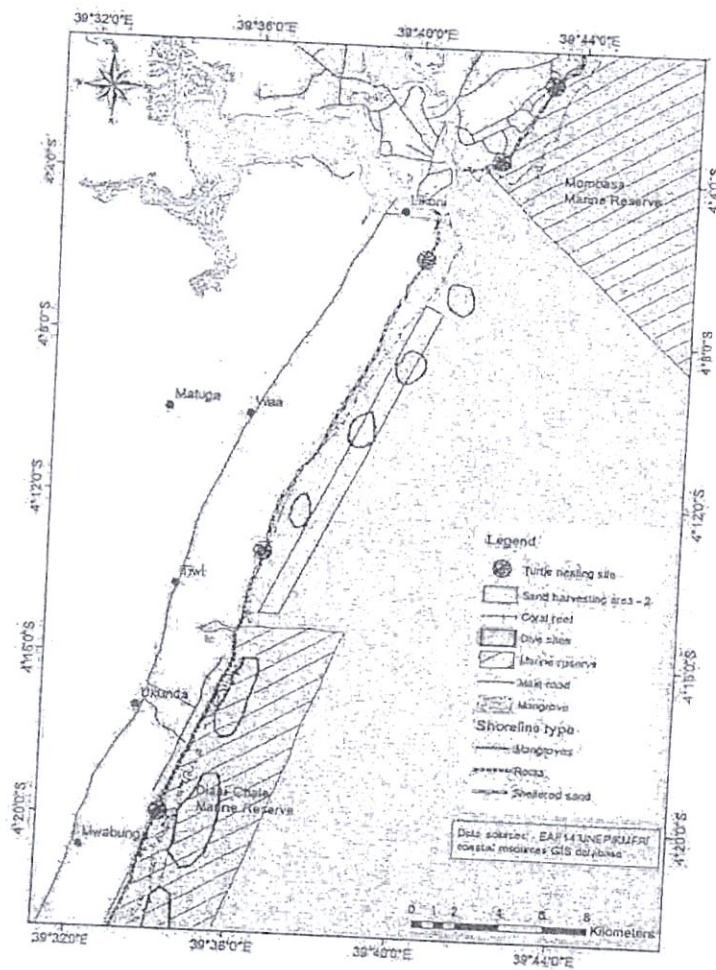


Fig. 1. Map of Waa-Tiwi-Diani showing sand harvesting area

Key marine ecosystems in the area include mangrove swamps, coral reefs, seagrass beds, rocky shores, and sand beaches. These ecosystems are intrinsically interconnected among themselves and

100  
100  
100  
100  
100

---

even with more distant ones. The ecological integrity of each ecosystem directly and indirectly depends on the status of other ecosystems. These linkages ensure ecological exchanges among the different coastal and marine ecosystems through various biotic and abiotic fluxes. A wide variety of fish and other marine organisms migrate from one ecosystem to another during their life cycle.

The biodiverse marine ecosystem in Waa-Tiwi-Diani area provide critical socio-economic and ecological services, such as; protection from storm surges; and food, wood, fuel and livelihoods for local communities. Economic activities in the area ranges from tourism, fishing, to cottage industries. These activities are based, in one way or another, on the rich natural resources in the area.

For the purpose of this report, we discuss major marine habitats in Tiwi-Waa-Diani area, and how they would likely be impacted by sand harvesting activities.

#### 4.1 Effects of sand harvesting on mangrove ecosystem

Close to the site designated for sand harvesting are riverine mangroves of Mwachema river. The forest is dominated by three species of mangroves; with *Rhizophora mucronata* and *Avicennia marina* fringing the waterline; whereas *Ceriops tagal* occupy the landward side less inundated by tides. Mangroves are rainforest of the ocean. They provide goods and services that are of ecological, environmental and economic benefits to the people. In Tiwi area, mangroves stabilize sediment brought down by River Mwachema as well as providing habitat for fish and harvestable wood products to the adjacent local community. Stability of mangroves is controlled by freshwater input from Mwachema river, the sediment, and the tidal regime in the area. Illegal harvesting as well as heavy sedimentation has led to poor growth and death of mangroves in Tiwi. The proposed dredging close to the river mouth will disturb already unstable sediment in Mwachema; leading to the death of mangroves and associated ecosystem. In addition, death of mangrove will lead to carbon emissions in excess of 800tCO<sub>2</sub> equivalent/ha into the atmosphere. Experience has shown that it will take a long time for a degraded mangrove to recover naturally.

##### Mitigation:

Dredging activities should be preceded by mangrove assessment in the area. No dredging should be carried out at river mouth, as this will disrupt hydrological regime leading to shoreline change. Compensation restoration should be effected in mangroves areas directly or indirectly affected by sand harvesting. Long term monitoring of replanted mangrove areas is necessary to ensure successful recovery.

#### 4.2 Effects of sand harvesting on Seagrass ecosystem

Seagrasses are a major component of the rich marine environment in Waa-Tiwi-Diani area. At least 8 seagrass species have been encountered during several studies conducted by KMFRI in the area. The most spread species are, *Syringodium isoetifolium*, *Thalassodendron ciliatum*, and *Enhalus acoroides*, and *Thalassia hemprichii*.

The seagrass beds in Waa-Tiwi-Diani area, as indeed elsewhere, harbor a diverse array of associated plant and animal species. Detailed studies on seagrass associates in the area have identified over 40



species of macroalgae and 15 species of algal epiphytes at least 75 species of benthic invertebrates - especially gastropods and bivalves – several species of sea cucumbers and at least seven sea urchin species, various shrimp, lobster and crab species, and over 100 fish species in association with seagrass beds. This clearly underscores the importance of seagrass meadows for biodiversity conservation.

Seagrass beds in the sand harvesting area also support sizeable populations of endangered species that are listed in the IUCN's Red list, including green turtle (*Chelonia mydas*) and dugong (*Dugong dugon*); both of which feed on seagrasses. In addition, there have been recent sightings of whale shark in Tiwi-Waa area. This highly migratory species forage in seagrass area.

World over, the seagrass are endangered environment; from both human and natural induced stresses. The proposed dredging activities will adversely affect seagrass beds through physical alterations and destruction of their habitat. Direct impact of this will be loss of harvestable marine resources and loss of income to the people.

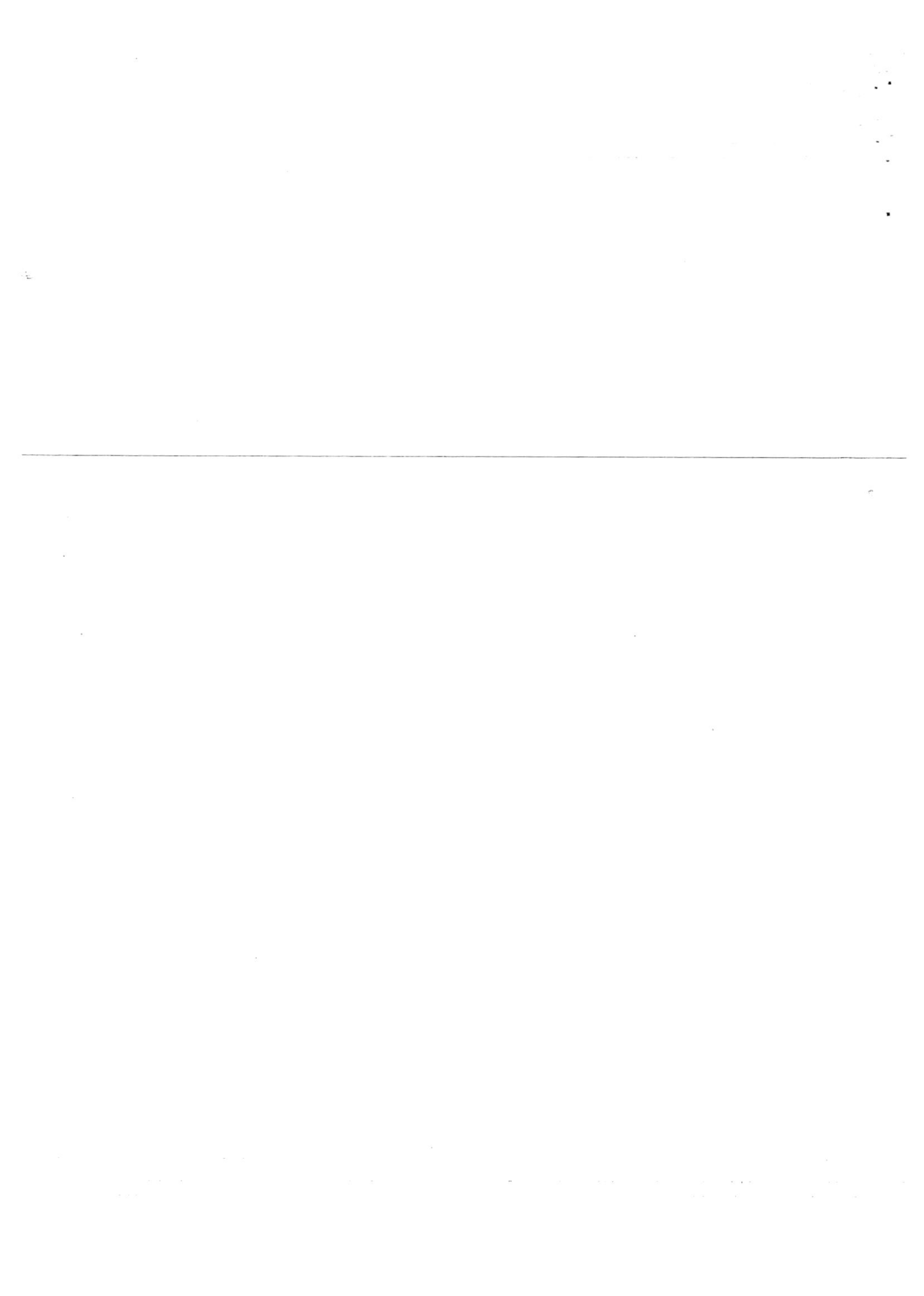
#### *Mitigation measures*

Although the EMP recommends avoidance of seagrass beds during sand harvesting activities, there is need for a prior mapping of the area to identify these critical sites. In particular measures need to be made to preserve fish breeding areas, protected area, and community managed marine areas (CMA). Similarly to mangroves, compensation restoration should be carried out in seagrass areas impacted by sand harvesting operations. It is important to institute long term monitoring of seagrass beds.

#### 4.3 Effects of sand harvesting on coral reef ecosystem

The fringing reef of Waa-Tiwi-Diani area is located 0.5-1.5km offshore and is part of the extensive Vanga-Likoni system. Within the reef there is a shallow lagoon, and a reef flat that is partially exposed during the low tide. Similarly to seagrasses, coral reefs are characterized by high species diversity; and coexistence of species plays an important role in maintaining ecological integrity of this marine ecosystems. The reef supports artisanal fishery, and plays a critical role in coastal tourism and protects the beach from erosion. The proposed sand harvesting activity envisages to harvests sand 0.4-1 km offshore. These would likely destroy the reef system in Waa-Tiwi-Diani area causing irreversible impacts.

Recent surveys by KMFRI have revealed that there are 11 coral species in Waa-Tiwi-Diani area. The reef structure is mainly composed of massive hard corals *Porites* spp., and broad array of other species including *Acropora*, *Pocillopora*, *Galaxea* etc. The most common reef fish are damasel fish and wrasse, which together contribute 60% of the estimated coral fish biomass of 60 kg/ha. Fishing by small scale fishers is mainly within the enclosed shallow lagoon reefs but usually extends to 5km offshore during northeast monsoon (kaskazi) when the sea conditions are calm. Currently, use of Fish Aggregation Devices (FADs) in open sea is being embraced by many fishing communities as a new fishing technology for enhancing fish catch in the area. Although Diani is classified as having the most degraded reefs along Kenyan coast, the reef support an active tourism industry and a large artisanal fishery compared to the north coast areas in Mombasa and Malindi.

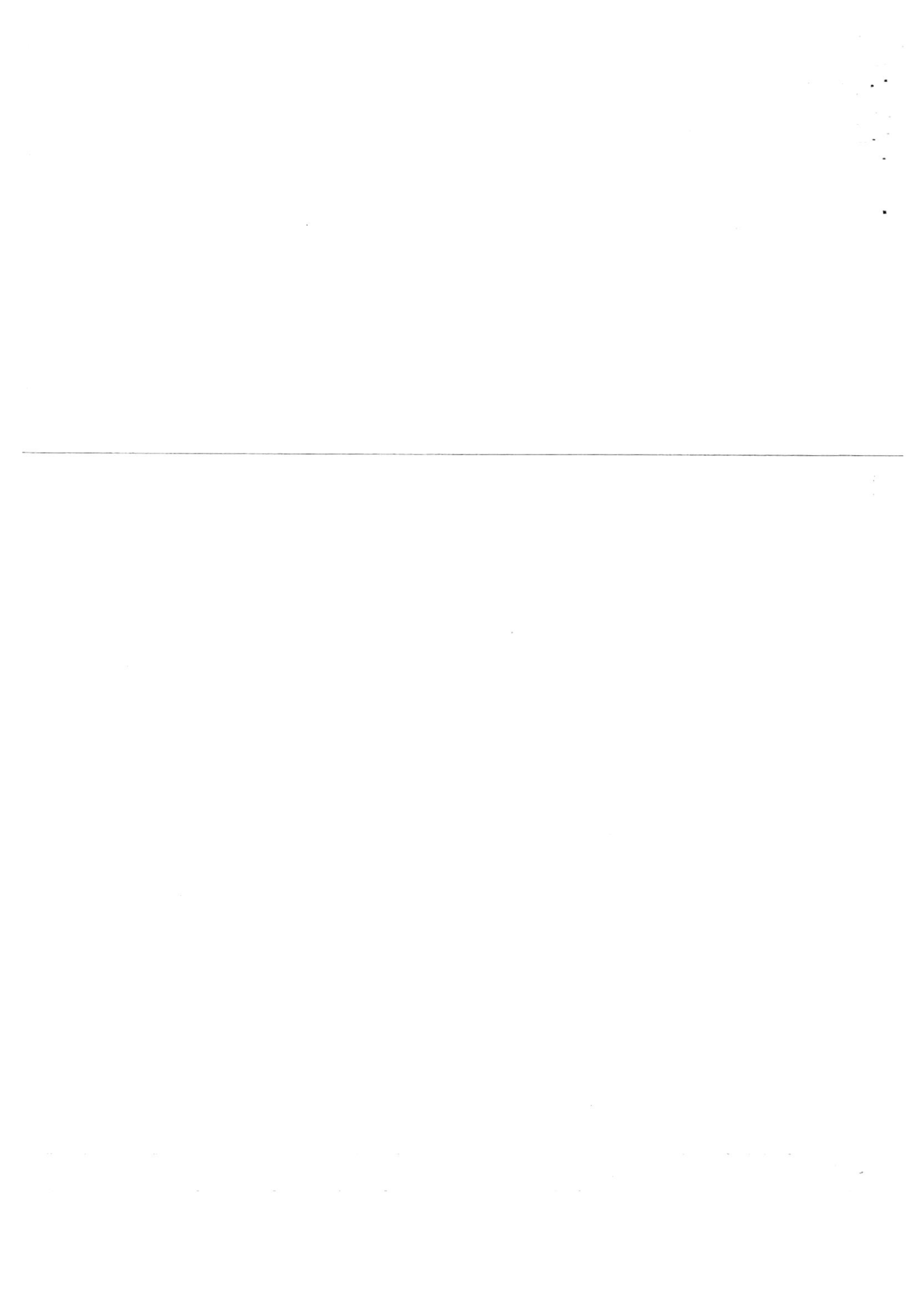


### *Effects of ongoing sand harvesting near the coral reef ecosystem*

- Sand harvesting activity that would involve dredging/scraping sand off the sea-bottom would result in a cumulative coral sedimentation and probably death. Smothering of corals and associated organisms would have severe short and long-term impacts including death of corals. This would negatively impact on fisheries and community livelihood.
- Sediment plumes are likely to cause increased turbidity resulting in light attenuation critical for survival of autotrophic organism, including corals.
- Benthic organism will be dislodged if the dredging activity happens to plough on the reef area. The impact will be more catastrophic having far-reaching implications on large marine mammals that occasionally frequent the reef systems.
- Poor water column visibility could also affect the fishermen fishing in the area of operation as they will be adversely affected while searching/hunting for fish such as lobster, fish and consequently reduce their catch/income.
- Increased turbidity due to sediment suspensions would likely affect fish behavior during spawning, and also cause death/mortality of fish eggs during spawning aggregations. Through research and monitoring, several fore reef sites in Waa-Tiwi-Diani area have been identified as spawning aggregations sites for some fish species such as groupers, lethrinids, and Siganids. The dredging and resuspension of sand particles will cause increased sediment plumes and most likely disrupt successful spawning. A long-term effect/impact is likely to be reduction in fish catch as successful recruitment of fish will be reduced during this dredging operation.
- Depending on the season of the proposed dredging activities/operations; re-suspended sand particles are likely to be carried by sea currents to other sites and effects could spread as far as the gazetted marine protected areas (MPAs), including Mombasa and Diani-Challe (Fig 1).
- Indirect impact on fish and large mammals that swim or reside just offshore of the reefs- noise pollution during the dredging activity is likely to cause serious disturbance/noise as they are known and affect their movement and hence their feeding (fish like turtles, dolphins and are known to be sensitive to noise).
- Diani-Chale area was gazetted in 1983 as a marine reserve to protect the reef and enhance sustainable marine resource use. Although it is not actively protected for many years, the core objective of its establishment was for protection of nearshore coral reefs to support tourism and fisheries; which are the main source of income and livelihoods for local communities. The implementation of dredging activity is likely to undermine this government strategy of conservation of marine area and thereby further impoverish the already poor fishing communities.

### *Mitigation measures*

- Mapping of critical habitat should precede any dredging activities to be able to track the impact progress and advice whether the project should go on or stop at some point. More importantly, a study of the area is critically important to inventory the fauna and flora species found in the





- dredging areas as some could be rare, threatened and endangered species. Biodiversity inventory of the designated dredging area would serve very useful in either advocating for the activity or total cancellation or locating alternative areas. The assessment of those critical marine ecosystems should be conducted and monitored by marine expert in coral and seagrass ecology.
- Locations and timing of fish spawning aggregations (FSA) should be taken into account before the initiation of this dredging activity. Alternatively, a buffer zone should be put in place around the spawning aggregations area to minimize the impacts.
  - The monsoon winds are critically important conditions to consider and therefore as a mitigation measure, the dredging activity should not be done during SEM when the sea is windy and wavy as the resuspensions of the sediments are likely to be transported to sites outside operation areas.
  - In general, the ESIA should use some way of ranking the various aspects of impacts considered above in form of direct vs indirect, short vs long-term, reversible vs irreversible, localized vs spread to arrive at suitable level of judgement that will guide final ESIA decision.

#### 4.4 Effects of sand harvesting on marine fisheries

The area proposed for dredging and sand harvesting is rich in fisheries, both artisanal and commercial. The main fish caught in the Tiwi-Waa-Diani area are Emperors, rabbitfish, and parrotfish although numerous other species have also been taken including sea cucumbers, crabs, lobsters, squid and octopus that are of high economic value. Most of these fishes are demersal and resident within the inshore and offshore marine habitats.

With the marine artisanal fishery directly employing between 13,000 – 15,000 fishers and contributing up to 80% (7,000 – 12,000 metric tons) of the national marine fisheries production, this sector is very significant for the livelihoods of coastal populations. The Tiwi-Waa-Diani fisheries support at least 570 fishers who catch on average between 2 - 3.2 kg/fisher/day and produce a total of 403 tons of fish per year. This translates to average income of between Kshs. 300 – 1000 per fisher per day (approximately Kshs. 9,000 – 30,000 per month) depending on the type of species caught. The fishers employ different types of fishing methods to catch fish. For the entire Kwale County, these include 2,420 basket traps, 362 gillnets, 1,874 handlines, 420 spearguns, 43 beach seines that are used inshore and 22 ringnets and 39 reef seines that are used offshore. The selection of which method to use depends on historical and preference factors for individual fishermen and these changes with environmental conditions, social and economic pressures over time. The area where on-going sand harvesting has over 10 artisanal fish landing sites, including; Kikadini, Nyari, Tiwi, Mwakamba, Tradewinds, Mwaepe, Mvuleni, Mgwani, Mwanyaza, Chale and Gazi.

Aquarium fish collection, sports fishing, beach operations, boat operations, tourism (hotels, windsurfing, diving and snorkeling) mangrove timber harvesting and shell collection are other marine dependent socio-economic activities in the area that are likely to be impacted by changes in the marine habitats due to sand dredging and harvesting activities.

#### *Effects on fisheries*

---

- *Damage to bottom habitat due to removal of sand substrate:* This would result in entrainment mortality (either partial or full mortality) for fish due to benthic disturbance/damage. These will mainly impact the demersal fishes that constitute over 60% of the catches by fishers thus reducing their catch rates and incomes.
- *Avoidance behavior and change in distribution of sensitive fish (Endangered, Threatened, Red-listed species) including effects on migration of fish:* This would impact negatively on the status of fish and may cause increased fishing costs for fishers who may relocate to fishing grounds away from the sand mining areas.
- *Impacts on marine whales and other marine mammals, and marine turtles that frequent the site:* Most of these cetaceans are either endangered or threatened and need protection in line with IUCN-red listing recommendations. The Diani area is known for the marine "Big 5"-dolphins, whales, whale sharks, manta rays and dugong that are a major tourist attraction and thus of high economic value to dive and boat operators. White tip shark and manta rays found in the Diani are IUCN Red listed. Impacting negatively on these species will cause declines in earnings from the tourism sector that they support.
- *Shading effect due to increased turbidity will impact negatively on phytoplankton and macrophytes leading to reduced primary production, thus disrupting the trophic energy base.* This will have negative impacts on herbivorous fish species such as rabbit fishes and surgeon fishes that are targeted by artisanal fishers.
- *Sub-lethal and lethal effects of suspended overflowing sediment plumes to eggs and larvae:* This area is spawning grounds for some fish such as groupers and snappers. Interruption of spawning aggregation of the groupers and snappers in the area will impact negatively on the fishery for these species.
- *Loss of prey and subsequent loss of large predatory fish species:* mortality to food resources would cause fish migrations, reduce fish biomass on-site and thus reduce the catches and associated income by fishers and fish traders.

*Socio-economic impacts:*

- a) *Disruption of fishing activities:* The fishers in the affected area, numbering to over 500, may have their fishing activities impacted especially the ring net and reef seine fishers. In the short-term there will be lost catch of legal-sized fish during dredging and recovery of excavated seabed habitat while in the long-term there will be subsequent lost catch through the time to recovery for all harmed species.
- b) Potential migration of fishers to other adjacent fishing grounds that may result in fisher conflicts due to fishing pressure transferred to other sites. This may occur as a response of fishers avoiding the sand harvesting areas and searching for alternative fishing grounds.
- c) *Impact on sports fishing:* Sports fishing is a popular activity in the Diani area. Over 22 licensed boats have been recorded in Kwale County. The targeted species include tuna (41%), Sailfish (30%), Kingfish (17%), Marlins (8%), and the Carangids (5%) all of which are pelagic offshore species. The sand mining activity may therefore cause relocation of sports fishing activities from this site to other sites that may be away from the current locality and hence a loss of



income by the boat operators and possible increase in costs as they move to newer sites that may be far.

- d) Impact on Fish Aggregating Devices (FAD) and drop line fishery development initiatives: These are innovative fishing enhancement methods that KMFRI is promoting in the offshore waters targeting mainly the local community hand line fishers. The location of the sand mining activities would hinder such developments in the Tiwi-Waa-Diani areas.

#### *Mitigation measures*

- Develop a biological impacts monitoring program to reduce the environmental damages from sand harvesting because changes in the seabed at the mining area have a direct and significant impact on fishery resources through damage to benthic communities and their trophic levels.
- Establish an intensified monitoring program of fish catches at the Beach Management Units between Waa-Tiwi-Diani.
- Initiate compensation mechanisms for the fishers and any other stakeholders whose livelihood may be negatively impacted by the sand harvesting activities.
- Review and update of the Kenya National Sand Harvesting Guidelines (2007) to have these applicable to marine sand harvesting and to County Government structures.

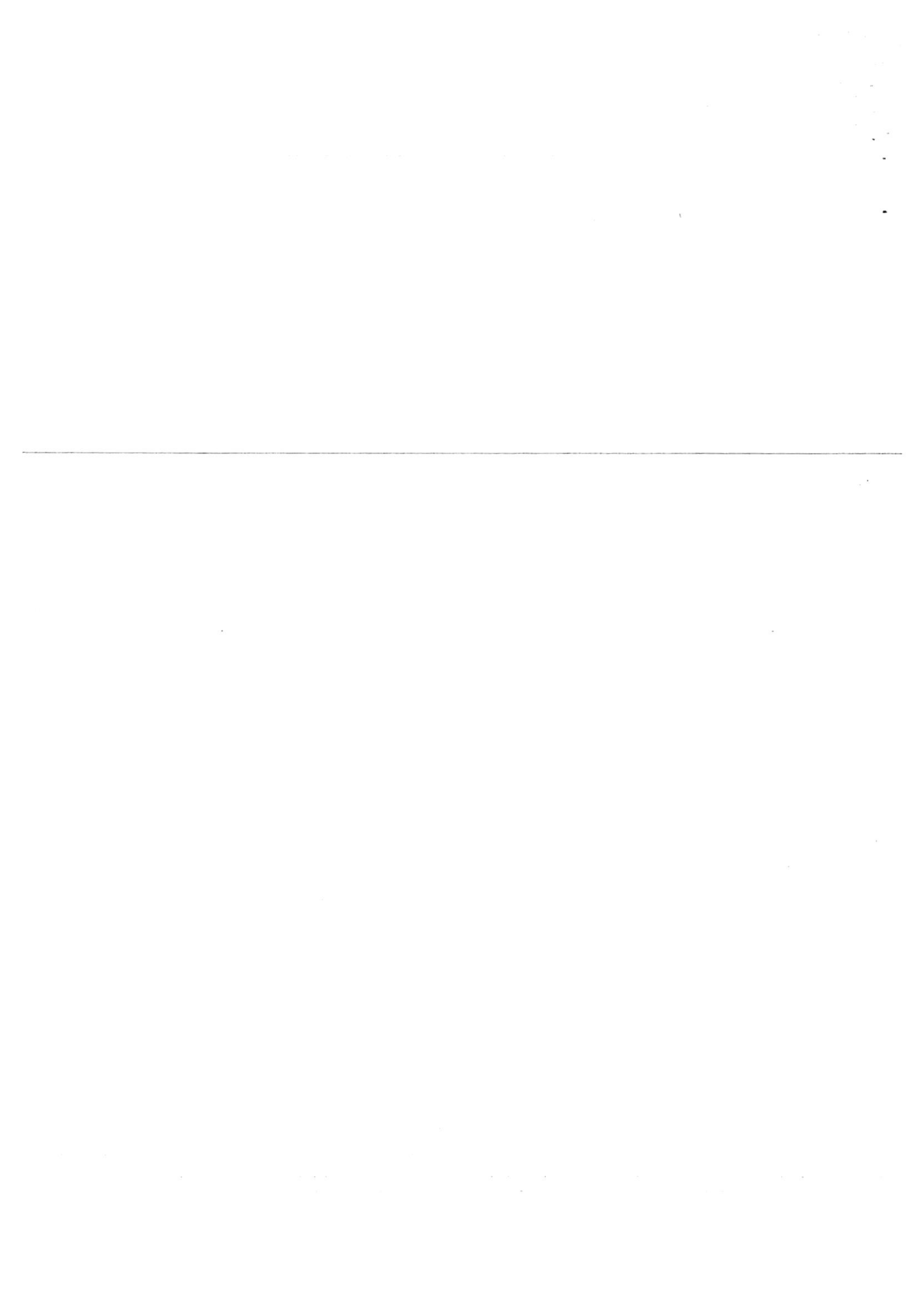
#### 4.5 Effect of sand harvesting on metal mobilization

The proposed sand harvesting activity will involve dredging of the sediment to harvest sand. This activity will alter the physicochemical parameters within the dredged sediments. Such an alteration in physicochemical parameters may alter the dynamics of immobilized metals. Of concern is the oxidation of anoxic sediments releasing the immobilized reduced metals, these will also result in lowering of the pH further assisting in metal mobilization.

Pollution poses a serious risk to the ecological balance of inshore coral reef systems. Heavy metals can result in acute or chronic toxicity causing lethal effects or long-term impacts to key biological processes of corals such as respiration, fertilization, and metamorphosis and larvae settlement. Heavy metals can also result in physiological stress, loss of zooxanthellae, reduced growth, enhanced mortality and reduced biodiversity.

Over time KMFRI, has conducted research to investigate the dynamics of heavy metals at the Killindini creek and nearshore ecosystems in Kenya and the region. Based on these studies the following conclusions are made:

- Metal concentrations in sandy nearshore sites are relatively low compared to terrigenous sediments. Copper, cadmium and zinc are metals of health and environmental concern, these have been detected at concentrations of 5.5  $\mu\text{g/g}$  dry weight for Copper, and 0.5 Cd, 23.3 Zn at Likoni.
- Flux studies in the Makupa creek give indicative scenarios of metal efflux between the sediment water interface. Research on directly measured benthic fluxes range from +1680 to +8000  $\mu\text{ moles cm}^{-2} \text{ h}^{-1}$  for iron (Fe), - 599 to +370  $\mu\text{ moles cm}^{-2} \text{ h}^{-1}$  for manganese (Mn), -1.1



to  $-0.0045 \text{ p moles cm}^{-2} \text{ h}^{-1}$  for cadmium (Cd),  $-33$  to  $+1.2 \text{ p moles cm}^{-2} \text{ h}^{-1}$  for lead (Pb),  $+174$  to  $+432 \text{ p moles cm}^{-2} \text{ h}^{-1}$  for copper (Cu) and  $+74$  to  $+361 \text{ p moles cm}^{-2} \text{ h}^{-1}$  for nickel (Ni). Positive fluxes indicate metal mobilization from the sediment into the water column, while negative fluxes indicate metal immobilization from the water column into the sediment. The fluxes are influenced by changes in physicochemical parameters.

- Research conducted by KMFRI in Kenya and the Eastern Africa region has provided insights of concern on the fate and pathway of Cd in sandy environments. It was observed that Cadmium (Cd) is highly labile and is preferentially associated with carbonates. Changes in physicochemical parameters strongly influence the fate of sediment-hosted Cd.

#### *Mitigation measures*

- Taking into consideration the aforesaid heavy metals dynamics and impacts it is clear that dredging should not be allowed to continue at the current site next to the reef.
- The sand mining activity should in principle only be allowed if guided by hydrological research and depth profile to determine allowable safe distance from the reef.

---



5.0 ANNEXES



Annex 1: KMFRI's comments to the Questionnaire provided by the Consultant AWEMAC

**AFRICA WASTE AND ENVIRONMENT MANAGEMENT CENTRE**  
 Top Plaza, 4<sup>th</sup> Floor Office Suite 8,  
 Kilimani, Along Mandaruma Road, Off Ngong Road,  
 P.O. Box 14385-00100, NAIROBI  
 Tel: +254 (0) 202 812 402 (0) 704 333 166,  
 E-mail: [awemac@awemac.co.ke](mailto:awemac@awemac.co.ke),  
 Website: [www.awemac.co.ke](http://www.awemac.co.ke)

**AWEMAC**

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED SEA SAND DREDGING/HARVESTING ACTIVITY IN THE INDIAN OCEAN FOR THE PROPOSED MOMBASA - NAIROBI STANDARD GAUGE RAILWAY PROJECT

Kenya Railway Corporation (project proponent) and China Road and Bridges Corporation (project contractor) are proposing to undertake sea sand dredging/harvesting in an area 4 km south of Likuni along the south coast to Tiwi through Waa area, Kwale County. This will be done in areas which are between 19 - 50 meters deep in the Indian Ocean to get sand materials for a proposed SGR railway station/terminal at Port Reitz Beach, Mombasa.

As a stakeholder or an interested/affected party, we request for your comments on the expected socio-economic and environmental impacts of the proposed project activity. As a requirement of EMCA 1999 section 59, on environmental impact assessment, public participation is an important exercise for achieving fundamental principles of sustainable development.

1). What is the distance between your area of jurisdiction/office/house/enterprise/residence and the projectsite? (Tick where applicable)  
 (A) Less than 100m     (B) Between 100-500m     (C) Between 500-1000m     (D) over 1km

2). What positive socio-economic and environmental impacts do you anticipate from the proposed project?

- Creation of jobs

3). What negative socio-economic and environmental impacts do you anticipate from the proposed project?

- Disruption of fishing activities at the area during the period of sand harvesting.
- Waa-Tiwi area is a fish aggregation site for groupers fisheries. Sand harvesting activities will negatively affect this fisheries.
- Dredging of sediments increases the turbidity of water, which can impact on coral reefs and seagrass beds.
- Destruction of nearshore marine ecosystem. Anytime the nature of nearshore bottom sediment is changed, there is a corollary ecosystem change. Many marine organisms are adapted to a particular substrate.
- Increased vulnerability of coastal infrastructure to storms and rising sea levels.
- Increased shoreline erosion rates.

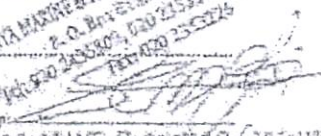
AWEMAC, 2015



4). Make suggestions on the measures the proponent needs to put in place before, during and after the activity?

- There are numerous alternative sources of sand available. The proponent should explore the possibility of sand harvesting from other sources (eg. Malindi area near River Sabaki where there is massive deposition of sediments, land accretion as well as coastal sand dunes.
- If sand is harvested at the proposed site, then proponent to compensate affected fishermen in that area with alternative livelihood (jobs, Provision of motorized fishing boats to enable fishers venture further offshore and/or monetary support for the affected fishers).
- Conduct sand harvesting during the northeast monsoon (as the sea is fairly calm) as compared to south east monsoon season to minimize movement of turbidity plumes.
- Engage experts to map ecologically sensitive areas/habitats in Mombasa-Tlwi area.
- Put in place Environmental Monitoring Plan (EMP) to continuously monitor the state of environment in nearby ecologically sensitive areas/critical habitats (corals, seagrass beds, and mangrove areas including mudflats) during the period of sand harvesting.

Name: DR. CHARLES MAGORI  
Full address: KMFAI P.O. BOX 81651  
Tel: 0722 985803 MOBASA

Signature/Official Stamp:   
Position/Designation: ASSISTANT DIRECTOR (DEVELOPMENT)  
Date: 30-01-2015 MOMBASA

MOMBASA  
P.O. BOX 81651  
TEL: 020 250000  
TEL: 020 250000



 **AFRICA WASTE AND ENVIRONMENT MANAGEMENT CENTRE**  
Top Plaza 4<sup>th</sup> Floor, Office Suite 3,  
Kilimani, along Kindaruma Road, off Ngong Road,  
P.O. Box 14385-00100, Nairobi  
Tel: +254 (0) 202 012 308/ (0) 794 333 186  
E-mail: awemac\_ken@yahoo.com  
Website: www.swanuco.co.ke

## **AWEMAC**

---

**MINUTES FOR PUBLIC MEETING FOR PROPOSED SEA SAND HARVESTING AND DUMPING ACTIVITIES IN THE INDIAN OCEAN FOR CONSTRUCTION OF THE PORT REITZ CARGO TERMINAL FOR THE MOMBASA - NAIROBI STANDARD GAUGE RAILWAY PROJECT HELD ON TUESDAY 16<sup>TH</sup> DECEMBER, 2014 AT KASKAZI BEACH HOTEL, DIANI, KWALE COUNTY**

### **AGENDA**

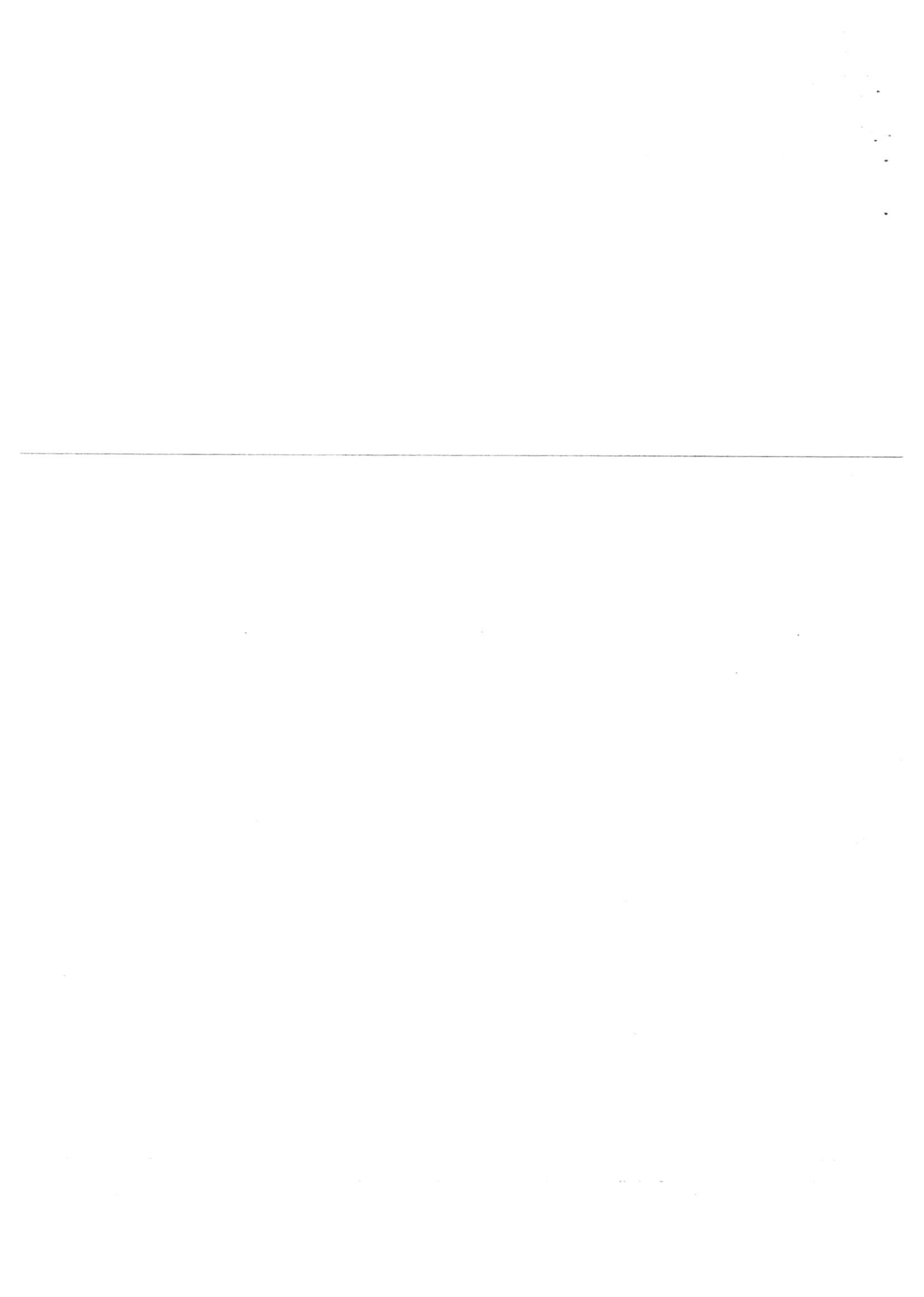
1. Introduction
2. Purpose of the meeting
3. Project Brief
4. Concerns/ Q&A session for the communities' opinions/ questions
5. Response by the Lead Environmental Consultant
6. Way forward and Recommendations
7. A.O.B

### **PRELIMINARY**

The meeting began at 10:30 am with an opening prayer from a local Resident at the Kaskazi Beach Hotel, Diani. The lead environmental consultant welcomed and thanked all the guests in attendance.

### **MIN: 1/7/2014: INTRODUCTION**

The Lead Environmental Consultant, Prof. Kibwage, introduced his team and thereafter opened the floor for general introductions whereby the resident community participants introduced themselves according to their areas of residence and occupation/area of interest. The Lead Consultant stated that it was important for such a meeting to be held so that the affected parties can be aware of the project before it commences. He also briefed the participants on the importance of environmental issues, hence the need for the participants to give their views without fear.





#### MIN. 2/7/2014: PURPOSE OF THE MEETING

The Lead Consultant explained to the participants the purpose of the meeting. He explained that the law requires that public meetings should be held for the stakeholders and parties likely to be affected by the project to be aware of the existence of the project and to air their concerns. He explained the Environmental Impact Assessment (EIA) process, acknowledging the fact that public meeting is an important part of the process. He explained how Environmental Impact Assessment is a tool for environment conservation and a key component in any new project implementation (in this case the proposed Mombasa -Nairobi Standard Gauge Railway project). He stated that the consultation and public participation process is a policy requirement by the Kenya Constitution and a mandatory procedure as stipulated in EMCA 1999 section 58 No. second schedule 9 (1), and Environmental (Impact Assessment and Audit) regulation, 2003. According to section 58 of the Environmental Management and Coordination Act (EMCA) No.8 of 1999 second schedule 9 (1), and Environmental (Impact Assessment and Audit) regulation, 2003, new projects like the proposed one, must undergo Environmental Impact Assessment. The Report of the same must be submitted to National Environment Management Authority (NEMA) for approval and issuance of relevant certificates. He indicated that many forms of development activities cause damage to the environment and hence the greatest challenge today is to achieve the fundamental principles of sustainable development without interfering with the environment.

The main objective of the consultation and public participation was to disseminate and inform the stakeholders about the project with special reference to its key component location, gather comments, suggestions and concerns of the interested and affected parties and incorporate the information collected in the EIA report. The consultant gave a breakdown of the procedures involved in capturing their views, presenting professional recommendations in the report which will be submitted to NEMA.

#### MIN. 3/7/2014: PROJECT BRIEF

The Lead Consultant gave a brief description of the Standard Gauge Railway project, the benefits and socio-economic and environmental impacts of the project. He also gave a detailed description with aid of a power point presentation of the proposed sea sand harvesting along Diani beach area, Kwale County and dumping of spoil and soil wastes at Likoni area, Mombasa County and the socio economic and environmental benefits would have as well as the anticipated negative impacts.

---

MIN 4/7/2014: CONCERNS/ Q&A SESSION FOR THE COMMUNITIES OPINIONS/  
QUESTIONS

The Lead Consultant invited members of the community to raise their concerns and questions about the proposed sea sand harvesting along Diani Beach, Kwale County and spoil dumping in Likoni, Indian Ocean, Mombasa County. He also took time to urge those in attendance to use the meeting as a platform to express their views and concerns about the proposed project. Community members present pointed out their concerns which included the following:

1. Public Participation

The members present raised concern that they were not consulted fully about the proposed sea sand harvesting along Diani Beach area and spoil and mud dumping in Likoni. Members raised an issue on how the decision was reached to use the area for sand harvesting and what scientific information was relied on when making that decision. Mr. Elias Kijaru of World Wildlife Fund (WWF) was concerned that inadequate information on the project was provided to stakeholders and there was need to furnish members with adequate information on the project including scientific data on studies undertaken on the proposed project. The Lead Consultant explained that public participation was conducted through questionnaires and consultations were still ongoing. He also indicated that the purpose of the public meeting was to carry out further consultation with more residents of the area, marine experts as well as government agencies and present their views to the National Environment Management Authority (NEMA) before any decision is made. The lead consultant also informed members present that official letters had been sent out to relevant government agencies including KEMRI, KPA, KWS among others to there get scientific opinions on the proposed project. He also assured the members present that marine scientists would be engaged to conduct extensive studies on the proposed project area and the impacts the proposed project would have on the marine environment.

2. Use of sea sand for construction of standard gage railway

Most of the residents present in the meeting were concerned about the use of sea sand for construction of the standard gage railway. They raised the issue that the sea sand is saline and could not be used for construction purposes. They were also concerned that the quantity of sand extracted from the proposed site would be immense and would lead to

---

an environmental disaster. The Lead Consultant clarified that sand harvested from the Diani Beach area would not be used in construction of the standard gage railway, and that the purpose of the sand was only for reclamation of part of the ocean at the Proposed Terminal construction site at Port Reitz.

### 3. Environmental Impacts of sea sand harvesting

Marine ecologist from the Kenya Marine Research Institute raised concerns that the proposed sea sand harvesting would have immense negative environmental impacts which included destruction of mangroves and sea-grass ecosystems, the project would also lead to destruction of fish-breeding grounds and ecosystems, destructions of corals and also emissions from the dredging process would also affect the environment. These sentiments were also reiterated by fisheries officer Mr. Hassan who also said that these negative impacts would affect local fishermen that rely on the ocean for their livelihoods. The proposed activities would therefore lead to displacement and loss of livelihoods. Mr. Shazack Ammani a local businessman, also raised the issue of the proposed sea sand harvesting area being a marine protected area (Diani Chale National Marine Park GPS coordinates latitude 4.249S Longitude 39.500E - 39.623E) and therefore the proposed project would be illegal if approved as no sand harvesting activities are allowed within a marine protected area. Mr. Patrick Gwada of Kenya Marine and Fisheries Research Institution (KEMFRI) also warned that the proposed project was an environmental disaster in the making, citing the negative environmental impacts including impact on hydrology of the area, destruction of coral, increased speed and turbidity of the water and destruction of marine habitats for nesting and breeding that would result from the sea sand harvesting along Diani Beach area, dumping in Likoni and reclamation of the Port Reitz area. The lead consultant assured members present that the proposed project would not be conducted within sensitive marine ecosystems and the proponent would work closely with Kenya Wildlife Service and other relevant government agencies to ensure that no marine protected areas would be encroached on by the proposed project. The lead consultant also assured members present that scientific studies were already underway on the environmental impacts of the proposed project and findings would be availed to members of the public, key stakeholders and local community.

### 4. Kwale County Tourist destination

There were concerns raised on how the proposed sea sand harvesting and dumping project would affect the local tourism sector. Members present including Minister for Tourism Investment and ICT - Kwale County informed the meeting that Kwale County



Government has been engaged in promoting Kwale County as a tourist destination. Ms. Luciana the Chairlady of the South Coast Residents Association (SCRA) also informed those present that Diani Beach had in the recent past been selected as one of the best beaches in the world and therefore the proposed project would lead to loss of all gains that had been put in place towards promoting Diani Beach area as a world class tourist destination. The Lead Consultant informed members present that the proponent was aware of all efforts that had been put in place to promote tourism in the area and that the contractor would ensure that no marine ecosystems would be destroyed during the project. He also assured the members present that all legal procedures would be followed before, during and after approval of the proposed project by relevant authorities. He assured members that an environmental management plan would also be put in place to mitigate the negative impacts of the proposed project.

#### 5. Compensation of displaced fishermen

The Sub Chief raised the issue of compensation for the fishermen that would be displaced due to the sand harvesting activities. A Local fisherman present at the meeting complained that in the past they had been assured of compensation by the Kenya Ports Authority but were never compensated. The fishermen were also promised 2 boats and employment opportunities for the youth, this also never happened. Members present were concerned that the contractor CRBC would also do the same. The lead consultant explained that the public participations meeting purpose was to collect views and concerns of all that would be affected by the activities of the project and formulate solutions to the problems which includes compensation of the fishermen that would be displaced.

#### 6. Alternative Project Site and materials

Members present proposed use of an alternative site for the extraction of the sea sand. They also suggested use of quarry dust for the reclamation of the sea at the Port Reitz site. Members present also suggested that the waste that was being proposed for dumping in Likoni could be used to fill up decommissioned quarries used during construction of the standard gage railway project instead of dumping it in the Ocean. The Lead Consultant explained that the quarry dust which is a byproduct of the crushing process in quarries could not be used as an alternative as it would negatively affect the marine life and ecosystems at the Port Reitz site. He also explained that the spoil and mud from the Port Reitz reclamation site could not be used on land to fill up decommissioned





quarries. He explained that everything extracted from the ocean must be returned to the ocean and not deposited on land.

#### Min 5/7/2014: RECOMMENDATIONS

- \* EIA Consultant to involve and work with Government lead agencies in the project to avoid conflict in their opinions
- \* Avoid the Thyi-Diani Coastal/ South Coast beach due to important tourism activities and its international importance
- \* Dredging to be done in close consultation to the County Government and local fishermen to reduce the negative impacts

#### Min 6/7/2014: A.O.B

A member in attendance asked about previous similar projects i.e. KPA sea sand harvesting and commented that their projects had affected the community adversely in the past before the new constitution. The member informed those present that local communities were still struggling to recover from negative environmental impacts left behind by the Kenya Ports Authority sand harvesting activities. Members present were also concerned that if the project was allowed to proceed those displaced by the project activities i.e. the fishermen would not be compensated as was the case with the previous project conducted by Kenya Ports Authority (KPA). The Lead Consultant assured members present that the new constitution was in force and such incidents would not occur due to strict EHS monitoring and implementation of the SGR project ESIA EMP approved by NEMA.

#### ADJOURNMENT

There being no other business for discussion the meeting was adjourned at 2.30 pm with a vote of thanks from the area Sub Chief and a word of prayer from one of the local residents.

Signed by:



Prof Jacob K. Kibwage, PhD  
SGR Project EHS Lead Consultant  
NEMA Reg. No. 0126

Date: 23<sup>rd</sup> December 2014



**KENYA MARINE AND FISHERIES RESEARCH INSTITUTE**

Telephone: 020-50215607  
020-2153904  
Mobile: 0712603854  
FAX: 020-2153226  
E-mail: director@kmfri.co.ke  
When replying please quote  
Ref: no:  
and date: 6 May 2015  
If calling or telephoning ask  
For: Dr. Magori  
Please address your reply to:  
The DIRECTOR



HEADQUARTERS  
P.O. Box 8165  
MOMBASA  
KENYA

OUR REF: KMF/RES/146/135

YOUR REF: NEMA/PR/5/2/13,462

Director General  
National Environment Management Authority  
P.O. Box 67839 - 00200  
**NAIROBI**

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT FOR THE PROPOSED OFFSHORE SEA SAND HARVESTING FROM OFF-LIKONI TO NORTH OF TIWI IN SOUTH COAST OF THE INDIAN OCEAN FOR CONSTRUCTION OF THE PORT REITZ CARGO TERMINAL OF THE MOMBASA-NAIROBI STANDARD GAUGE RAILWAY PROJECT.

KMFRI received, through NEMA, the ESIA project report on the above mentioned project for review. The Report was prepared by Africa Waste and Environmental and Management Centre (Ref. No. 0527).

The report provides a good summary of expected benefits from the SGR project. There is no doubt about the value of this mega project to the national and regional economy. The project will lead to increased revenue, creation of employments, decongestion of road network, increased lifetime of the road network due to reduction in heavy cargo being transported by road, as well as reducing emissions of greenhouse gases currently emanating from heavy uses of lorry trucks. Further, SGR would strengthen Mombasa as the gateway to East and Central Africa region. However, it is important to integrate all environmental issues into its activities to ensure its sustainability.

**1. Project Site for dredging:-**

The value of marine ecosystem services- particularly their supporting role to fisheries, livelihood, and shoreline stability is very important. Sea sand takes millions of years to build. Depending on geomorphic nature of a given site, you will find depositional and erosional areas. The site proposed for this Project experiences the two extremes - areas approaching Likoni are erosional sites, while areas extreme south as far as Challe are depositional sites. These biophysical settings are key

---

determinants of functionality of the marine system – in terms of fishery productivity, shoreline stability etc.

Considering the nature of connectivity existing in marine system, an impact on one site will affect the other. *This demands that the proponent must put in place an adequate environmental monitoring system and resources during the implementation of the proposed activity. KMFRI, as a leading agency in this area, it should be involved in the environmental monitoring process due to its legal mandate and technical capacity.*

The economy of the proposed area is driven mainly fishery and some tourism in the South in Diani area. Despite the recent slump in coastal tourism in Kenya, fishery remains a major socio-economic activity. Dredging might disturb sea floor, degrade critical habitats (seagrass, mangroves and corals), this impacting directly on fisheries. All such ecological sites must be avoided with close consultations with local fishermen and KMFRI technical experts on seagrass, mangroves and corals.

The site proposed for harvesting sea sand is in between two important marine protected areas- Mombasa in far north and Diani-Challe Marine Protected Area in the far south. Although the actual operation area has been relocated in response to public consultations held in Diani (as in Section 8.3), adequate environmental monitoring should be undertaken during project implementation to determine how far the currents would disperse the plumes. Considering the connectivity nature of marine system there is a high likelihood that the neighbouring critical habitats and conservation areas will irreparably impacted during and after the operations. *Hence, there is need for adequate environmental monitoring with a competent authority or with qualified marine ecological experts.*

Similar concerns were raised during the well attended Stakeholders public consultation meeting in Diani (see appendix) in which issues of habitat degradation, impacts to fisheries and tourism, and poor consultation were raised. *NEMA must ensure that no sand harvesting shall take place in the Diani Beach (Tourist Area) since the proponent has relocated to the area between Tiwi and Likoni. A safe distance of about 4Km from Tiwi river mouth is also recommended. As per the chapter on public consultations and EMP, the fishermen should be compensated for the period that the activity should take place. In the long-term, the Government must support the fishermen with modern equipment required for deep sea fishing. This will improve the livelihoods of the fishermen in the long term.*

### 2.8.3: Potential negative environmental impacts and mitigation measures

The report has largely identified the expected environmental impacts. Some of the mitigation measures will require strict monitoring during and after the project. For instance in 7.2.9 (iv) - *contractor will take action against major changes in sediment load and turbidity... Any major change in sediment load might lead to accelerated shoreline change which must be monitored very closely. Marine system are dynamic system, activity on one side will lead to impact on another - and the changes can be catastrophic if no precautions and monitoring are undertaken. In 7.2.10 (2) - select a site that has been used previously for sand mining... Since the proposed area between Likoni and Tiwi has been used recently by the Kenya Ports Authority in construction of Terminal II of the JICA project, the proponent must put in place adequate monitoring system as emphasised above to reduce negative impacts.*

While it might have been expensive for the proponent to undertake a long-term study on the enhanced GHG emissions to emanate from impacts and transformation of carbon rich marine habitats, the activity should undergo environmental auditing periodically to ascertain this. Seagrass and associated ecosystem are known to be carbon rich ecosystems; storing huge stocks of carbon compared to their terrestrial counterparts. Most of this carbon is in the sediment, and has taken



# KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

Wireless: 020-8021560/1  
: 020-235 3904  
: 020-235 3894/5/6/7  
Mobile: 0712 003853  
FAX: +020-235 3226  
E-mail: [director@kmfri.co.ke](mailto:director@kmfri.co.ke)  
When replying please quote  
Ref.No. and date: If calling or  
telephoning ask  
For:  
Please address your reply to  
THE DIRECTOR



HEADQUARTERS  
P.O. Box 81651  
CODE 80100  
MOMBASA  
KENYA

REF: KMF/CON/AD/85/22

Date: 24<sup>th</sup> August 2015

Clerks C Chamber  
National Assembly  
Parliament Buildings,  
P O Box 41842- 00100  
NAIROBI,

Attention: Mrs. Florence Atenyo – Abonyo

**CONFIDENTIAL**

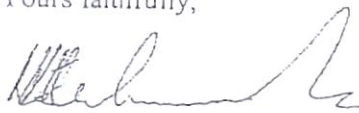
Dear Madam,

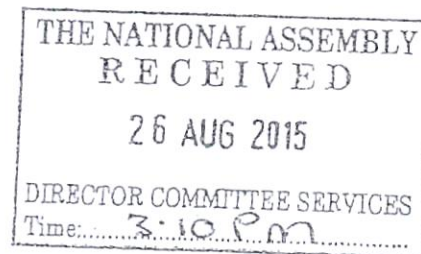
SUBJECT: SUBMISSION OF INFORMATION REGARDING SAND HARVESTING AT  
THE DIANI BEACH AREA

This is to acknowledge receipt of your letter Ref: NAS/DC/ENR/40/2015, dated 17<sup>th</sup> August 2015.

Attached herewith, please find the compiled report from KMFRI on the ongoing Sand Harvesting in Diana beach areas as requested for the Departmental Committee on Environmental and Natural Resources for your further necessary action.

Yours faithfully,

  
Dr. Renison Ruwa, PhD, MBS  
Ag. DIRECTOR/KMFRI



C.C: Prof. Micheni Ntiba CBS  
Principal Secretary  
Ministry of Agriculture, Livestock and Fisheries  
The State Department of Fisheries  
Kilimo House, Cathedral Road,  
P.O Box 58187 – 00200  
NAIROBI

*EMERJEN*  
*ple deaf*  
*FA*  
*26/8*





# KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

Telephone 020-8021560/1  
020-2353904  
Mobile: 0712003853  
FAX: 020-2353226  
E-mail: director@kmfri.co.ke  
When replying please quote  
Ref: no:  
and date: 6 May 2015  
If calling or telephoning ask  
For: Dr. Magori  
Please address your reply to:  
The DIRECTOR



HEADQUARTERS  
P.O. Box 81651  
MOMBASA  
KENYA

OUR REF: KMF/RES/146/135

YOUR REF: NEMA/PR/5/2/13,462

Director General  
National Environment Management Authority  
P.O. Box 67839 – 00200  
NAIROBI



RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROEJCT REPORT FOR THE PROPOSED OFFSHORE SEA SAND HARVESTING FROM OFF-LIKONI TO NORTH OF TIWI IN SOUTH COAST OF THE INDIAN OCEAN FOR CONSTRUCTION OF THE PORT REITZ CARGO TERMINAL OF THE MOMBASA-NAIROBI STANDARD GAUGE RAILWAY PROJECT.

KMFRI received, through NEMA, the ESIA project report on the above mentioned project for review. The Report was prepared by Africa Waste and Environmental and Management Centre (Ref. No. 0527).

The report provides a good summary of expected benefits from the SGR project. There is no doubt about the value of this mega project to the national and regional economy. The project will lead to increased revenue, creation of employments, decongestion of road network, increased lifetime of the road network due to reduction in heavy cargo being transported by road, as well as reducing emissions of greenhouse gases currently emanating from heavy uses of lorry trucks. Further, SGR would strengthen Mombasa as the gateway to East and Central Africa region. However, it is important to integrate all environmental issues into its activities to ensure its sustainability.

## 1. Project Site for dredging:-

The value of marine ecosystem services- particularly their supporting role to fisheries, livelihood, and shoreline stability is very important. Sea sand takes millions of years to build. Depending on geomorphic nature of a given site, you will find depositional and erosional areas. The site proposed for this Project experiences the two extremes - areas approaching Likoni are erosional sites, while areas extreme south as far as Challe are depositional sites. These biophysical settings are key

determinants of functionality of the marine system – in terms of fishery productivity, shoreline stability etc.

Considering the nature of connectivity existing in marine system, an impact on one site will affect the other. *This demands that the proponent must put in place an adequate environmental monitoring system and resources during the implementation of the proposed activity. KMFRI, as a leading agency in this area, it should be involved in the environmental monitoring process due to its legal mandate and technical capacity.*

The economy of the proposed area is driven mainly fishery and some tourism in the South in Diani area. Despite the recent slump in coastal tourism in Kenya, fishery remains a major socio-economic activity. Dredging might disturb sea floor, degrade critical habitats (seagrass, mangroves and corals), this impacting directly on fisheries. All such ecological sites must be avoided with close consultations with local fishermen and KMFRI technical experts on seagrass, mangroves and corals.

The site proposed for harvesting sea sand is in between two important marine protected areas- Mombasa in far north and Diani-Challe Marine Protected Area in the far south. Although the actual operation area has been relocated in response to public consultations held in Diani (as in Section 8.3), adequate environmental monitoring should be undertaken during project implementation to determine how far the currents would disperse the plumes. Considering the connectivity nature of marine system there is a high likelihood that the neighbouring critical habitats and conservation areas will irreparably impacted during and after the operations. *Hence, there is need for adequate environmental monitoring with a competent authority or with qualified marine ecological experts.*

Similar concerns were raised during the well attended Stakeholders public consultation meeting in Diani (see appendix)- in which issues of habitat degradation, impacts to fisheries and tourism, and poor consultation were raised. *NEMA must ensure that no sand harvesting shall take place in the Diani Beach (Tourist Area) since the proponent has relocated to the area between Tiwi and Likoni. A safe distance of about 4Km from Tiwi river mouth is also recommended. As per the chapter on public consultations and EMP, the fishermen should be compensated for the period that the activity should take place. In the long-term, the Government must support the fishermen with modern equipment required for deep sea fishing. This will improve the livelihoods of the fishermen in the long term.*

### 2&3: Potential negative environmental impacts and mitigation measures

The report has largely identified the expected environmental impacts. Some of the mitigation measures will require strict monitoring during and after the project. For instance in 7.2.9 (iv) - *contractor will take action against major changes in sediment load and turbidity.... Any major change in sediment load might lead to accelerated shoreline change which must be monitored very closely. Marine system are dynamic system, activity on one side will lead to impact on another - and the changes can be catastrophic if no precautions and monitoring are undertaken. In 7.2.10 (2) - select a site that has been used previously for sand mining... Since the proposed area between Likoni and Tiwi has been used recently by the Kenya Ports Authority in construction of Terminal II / the JICA project, the proponent must put in place adequate monitoring system as emphasised above to reduce negative impacts.*

While it might have been expensive for the proponent to undertake a long-term study on the enhanced GHG emissions to emanate from impacts and transformation of carbon rich marine habitats, the activity should undergo environmental auditing periodically to ascertain this. Seagrass and associated ecosystem are known to be carbon rich ecosystems; storing huge stocks of carbon compared to their terrestrial counterparts. Most of this carbon is in the sediment, and has taken

millions of years to build. Seabed disturbance, through dredging, is likely to release this carbon into the atmosphere. *Therefore, the project activities must avoid areas with seagrass habitats.*

#### 4. Alternative project site, technology and materials...

In reference to Section 8.1, the study has focused more on the entire railway project. The study justification of the dredging activity is strong on economic gains of the whole project than on ecological stability and livelihood impacts caused.

The value of healthy marine ecosystem to local and national economy must be emphasised in this project. The County Government of Kwale has been out promoting Destination Kwale.... Further Diani beach has been voted as among the leading beach destinations in the world. Implementation of the project *MUST avoid the Diani Beach* otherwise it will throw the gains made by National Government and County government in marketing Diani as well as impact on ecological integrity. *The EIA licence should restrict the activity to Likoni-Tiwi area to avoid negative impacts to the tourism sector concentrated in Diani. Despite the limited tourism activities in the proposed project area, sand harvesting should also be restricted to low tourism seasons only.*

There are alternatives that the project proponent could also consider to reduce the fragile marine environment. For example, back filling materials could be sourced from the hinterlands depending on their quality. For instance, the current expansion of the Likoni Ferry lumps used materials sourced from the hinterlands. Similar approaches could be used to source backfilling materials for the current project. This proposal was also raised during Stakeholders workshop in Diani for consideration if quality of the materials and the cost will not be prohibitive to the proponent (ref. appendix).

Another option for consideration would be to make use of concrete column in the construction, rather than block filling. Such an approach would not only be aesthetically pleasing but more so would require less materials as well as causing less habitat disturbance. This will however depend on the engineering design of the project.

#### 5. Environmental Management Plan

The EMP has broadly captured Project's environmental impacts, mitigation and monitoring. This has, however, focussed so much on operation phase of the project. The long term monitoring should be factored. As stated above, implementation of the project might lead to shoreline change that will needs adequate monitoring by KMFRI and other concerned agencies. Recovery of the impacted habitats will also need to be monitored beyond project time frame in the long-term. This should be captured in the EMP framework or taken into consideration during the project implementation period with close collaboration with KMFRI as a competent authority in this area.

#### 6. Sectoral concern

One of the issues raised during stakeholders' workshop in Diani, in which KMFRI attended, was consultations of key agencies, which the report reveals that it was adequately done through the Kenya Maritime Authority (KMA). While KMFRI supports government effort in providing efficient transport system through SGR project, some environmental safeguards will need special attention to ensure sustainability of the proposed activity. Ecosystem connectivity, degradation of critical habitats, loss of livelihood, and use of alternative materials/technology are some of the issues that requires considerations during the project implementation stage.

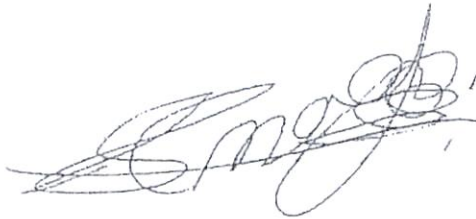
## 7. Other information

According to EMCA (1999), all projects require an approved ESIA prior to commencement. While KMFRI appreciate the steps and time taken to prepare the current report, the concerns raised during Stakeholders workshop should be taken into consideration. Further, though the composition of the ESIA team had marine ecology scientists that prepared this report, they were short of trained Fisheries Expert as well System Ecologist that would have added more value on salient features of marine ecosystem including; system connectivity and functioning.

In conclusion, KMFRI should be involved in environmental monitoring of the proposed activity during and after the implementation period due to its legal mandate and its technical capacity in marine sciences. This will ensure the negative environmental impacts are controlled and minimal. The issues raised by the public must also be taken into consideration by the proponent before commencement of the activity, especially compensation of the fishermen likely to be affected by the project and avoiding of all ecological sensitive areas. There is also need to work closely with the Kwale County Government and local fishermen organisations like BMUs to avoid any conflicts.

Sincerely,

---



Dr. Charles Magori  
For: DIRECTOR / KMFRI.

## Environmental and Socioeconomic Impacts of Sand Harvesting

A policy position prepared by the Kenya Association of Hotel Keepers and Caterers (KAHC) and stakeholders in Kwale County

The Standard Gauge Railway (SGR) will bring immense benefits to the economy and the people of Kenya. It will expedite the movements of goods, create more employment, decongest roads and improve the usability of roads whilst reducing the emissions of greenhouse gasses from heavy trucks. Further, SGR would strengthen Mombasa as the gateway to East and Central Africa region. However, the proposed harvesting of sand on Diani Beach in Kwale County poses untold threats to the environment and to the livelihoods of the residents of the county and the country at large. It thus will cause irreversible impact on a fragile marine ecosystem including in marine conservation areas and affect livelihoods of thousands of people and local/national economy. KAHC recommends that the proposed sand harvesting be subjected to a full Environmental and Social Impact Assessment study and not a project report as has been done.

### Background

KAHC members have huge investments along South Coast beaches including Hotels cottages and other tourism related business, employing over 4000 people directly and a further 10,000 indirectly who derive their livelihood from the beach operations. These members have been involved in conservation programs that have enabled Diani Beach to be awarded the prestigious slot among the best beach in the world.

On the 5<sup>th</sup> May, 2015, the National Environment Management Authority (NEMA) invited comments from the public on:

- I. Environmental and Social Impact Assessment project report for the proposed offshore sea sand harvesting from off Likoni to north of Tiwi in South Coast of the Indian Ocean for construction of the Port Reitz cargo terminal of the Mombasa–Nairobi standard gauge railway project
- II. Environmental and Social Impact Assessment project report for the proposed dumping of excavated beach material (mud, soil and few hard shells) into the Indian Ocean for the Mombasa–Nairobi standard gauge railway project.

The above quoted reports indicate that sea sand harvesting and subsequent waste dumping will not be undertaken within the gazetted Diani-Chale Marine National Reserve.

### The Issue

The Environmental and Management Coordination Act (EMCA) 1999 requires that a project of this magnitude should be subjected to a full EIA study report with extensive stakeholder involvement. In this case, the EIA prepared through stakeholder involvement was not done.

The following are the key concerns raised by industry stakeholders in the region:

1. Eco-system: To start with the destruction of marine life and how marine life and the beach are an attraction to people from all over the world therefore the significance of this beach is not only to livelihoods of 'wanjiku' but also for foreign exchange and development of tourism sector.

The ongoing illegal dredging is causing destruction of the marine ecosystem by destroying sea grass, fish breeding sites, corals and turtle nesting sites. These have a direct impact on fish stocks, impacting on the live hoods of fishermen and damage the attractive value of diving sites.



2. Due process: The dredger has been noted collecting sand within the Diani- Chale marine National Reserve even before the elapse of the 30 days notice to submit comments to NEMA on the project report. This is in violation of the Environmental Management and coordination Act (EMCA), 1999, and against the stated commitment in the cited report that this would not take place within Diani- Chale Marine National Reserve.
3. As per the above cited reports, one of the major negative impacts is the destruction of the coral reef. The investments along the beach will be exposed to damage owing to the destruction of coral reef that offers a protection barrier from strong ocean currents. This will also expose the beach users to possible shark attacks because of the increased depth of the excavated areas.
4. The project reports submitted are not very specific and do not adequately describe the effects of dredging to the environmental and socioeconomic well-being. The report does not address the standard terms of reference for ESIA/EIA studies.
5. The continued illegal sea sand harvesting, exposes the beaches to erosion as strong ocean currents replace harvested sandpits with sand from the shoreline leaving behind a rocky beach.
6. The proponents concede that the sediments dumped into the ocean are likely to be washed back to the South Coast beach by ocean currents. This will inevitable downgrade the award winning status of Diani Beach, leading to further decline in the tourism industry.
7. The proposed mitigation in the reports cited above are inadequate and unrealistic within the proposed project period i.e the proponents having proposed to compensate fishermen up to kshs. 3m within 6 Months. This is not practical considering the process of compensation against proposed project time.

*The Kenya Association of Hotelkeepers and Carters (KAHC) is a representative body established since 1994 that brings together duly registered hotels, lodges, camps and the leading Restaurants that operate in Kenya. It's Mandate includes promoting the growth and development of the Kenyan hospitality industry to world-class status through advocacy, regular engagement with it's membership as well as other associations and bodies both in the public and private sectors.*

## Recommendations

1. The stakeholders in Kwale county call for immediate halting of the ongoing illegal sea sand harvesting in Waa/Tiwi/Diani areas pending the undertaking of a full ESIA/EIA study.
2. The submitted reports require further analysis to adequately address the standard terms of reference for ESIA/EIA studies. For example, the current status of the marine ecosystem has not been documented sufficiently. Therefore, for a project to be undertaken in such sensitive environment. It is recommended that a full ESIA/EIA study be undertaken to ensure that all the sensitive areas are adequately addressed.
3. The proponents should look for alternative sand harvesting sites away from coastal shoreline. "The cautionary principle" under the London Protocol 1996 as cited on page 44 and 45 (of the above cited reports) should apply even without scientific evidence of negative impacts.

Upon implementation of the above recommendations, KAHC notes that it will make it possible for the tourism industry to recover from the current worse ever slump, which has affected the lives of over 40,000 direct and indirect employments in the Coastal region. It will further help to maintain the socio-economic benefits of the beach to the region and the nation. Any negative impacts on the tourism industry have a direct negative impact on security, and other social vices due to loss of livelihoods and income.

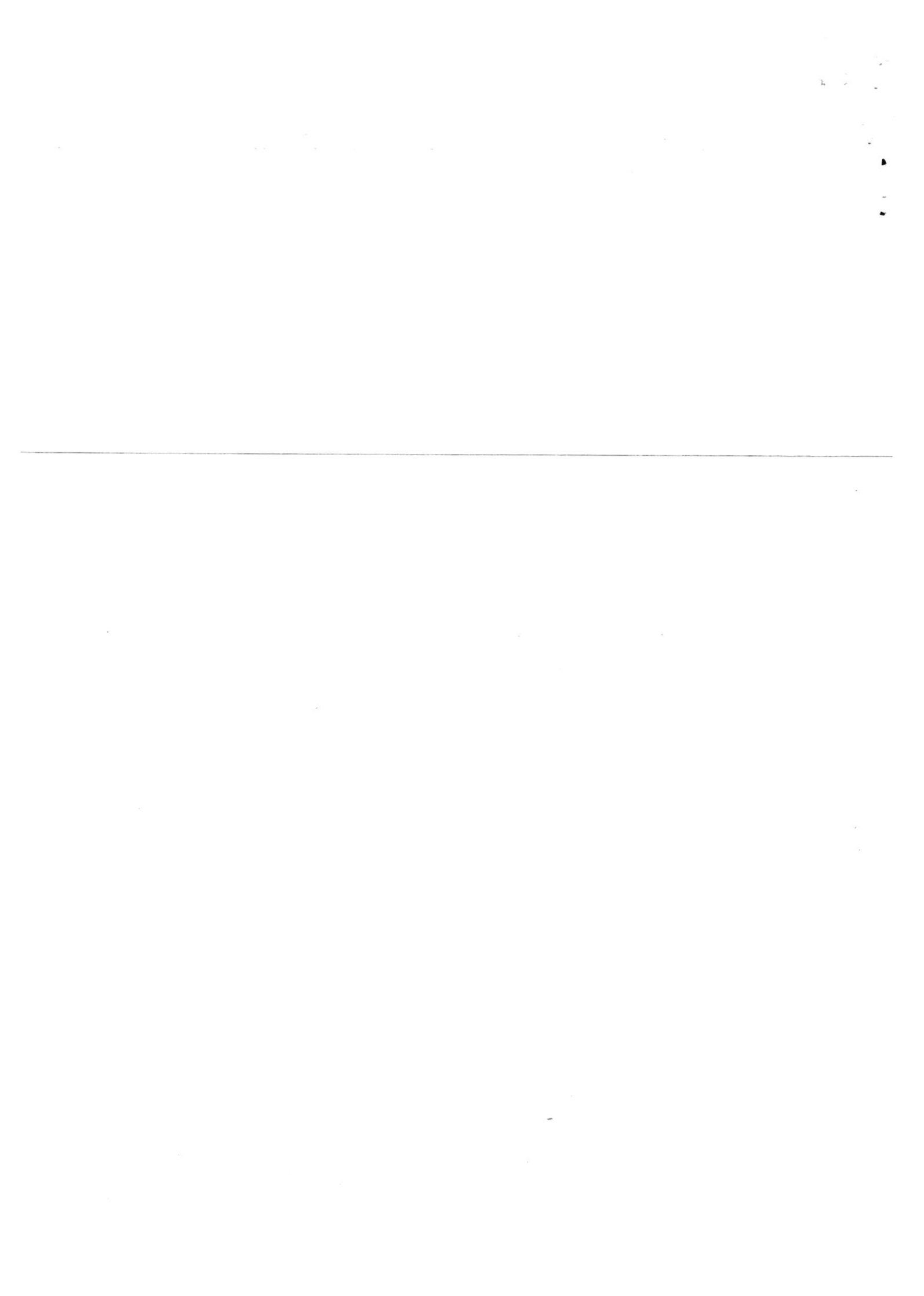
A policy position on the environmental and socio-economic impacts of sand harvesting



Making Kenya's hospitality globally competitive



South Coast Residents Association







中国路桥工程有限责任公司  
 HEAD OFFICE OF MOMBASA-NAIROBI SGR PROJECT  
 CHINA ROAD & BRIDGE CORPORATION

Ref: CRBC-MNSGR-NEMA-SQ/008/2015

*Chumya*  
*Deal as discussed*  
*Obtain Comm. from CRB/Regulator from 19/05/15*  
 13<sup>th</sup> May 2015

DIRECTOR GENERAL,  
 NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY,  
 P O BOX 67839-00200  
 NAIROBI

Dear Sir,

**RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT FOR THE PROPOSED OFFSHORE SEA SAND HARVESTING FROM OFF LIKONI TO NORTH OF TIWI IN SOUTH COAST OF THE INDIAN OCEAN FOR CONSTRUCTION OF THE PORT REITZ CARGO TERMINAL OF THE MOMBASA - NAIROBI STANDARD GAUGE RAILWAY PROJECT**

Reference is made to your letter dated 12th May 2015, reference number: NEMA/PR/5/2/13462. We commit to preparing a Relocation and Compensation Action Plan (RAP) for the Beach Management Units (BMU's) that will be affected by our operations for the duration of the project. Due to the short timelines for the project, we request that you issue us with the license as we proceed with the RAP.

Thank you for your continued efforts in managing the Environment.

Yours faithfully

Hu Zhaoguang,  
 Deputy General Manager,  
 The Head Office of Mombasa-Nairobi SGR Project  
 China Road & Bridge Corporation

*Chumya*  
*shy am abis*  
*to my info*  
*Comm. from CRB/Regulator 19/05/2015*





中国路桥工程有限责任公司  
HEAD OFFICE OF MOMBASA-NAIROBI SGR PROJECT  
CHINA ROAD & BRIDGE CORPORATION

Our Ref: CRBC-MNSGR-NA-LC/037/2015

Date: 19<sup>th</sup> August, 2015

Clerk of the National Assembly  
Clerks Chambers  
National Assembly  
Parliament Buildings  
P. O. Box 41842 – 00100  
NAIROBI

Dear Sir,

**RE: MEETING WITH THE DEPARTMENTAL COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES REGARDING THE PETITION ON ILLEGAL SAND HARVESTING AT DIANI BEACH**

Reference is made to your letter of invitation for a meeting Ref. No. NA/DC/ENR/39/2015 dated 13<sup>th</sup> August 2015 with regard to the inquiry being conducted by the Departmental Committee on Environment and Natural Resources in response to a petition by the Kenya Association of Hotel Keepers and Caterers on sand harvesting at Diani beach.

While noting that this matter is before the National Environment Tribunal under TRIBUNAL APPEAL NO.NET/152 OF 2015, the table below addresses issues raised by stakeholders as indicated in your letter and we confirm that we will attend the meeting to clarify the concerns raised.

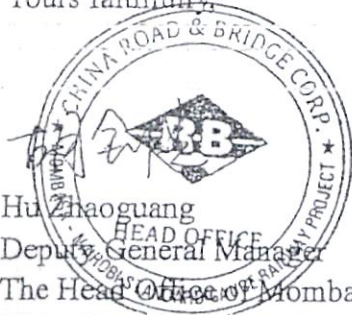
S/N	CONCERNS RAISED	RESPONSE
(i)	Environmental Impact Assessment done	<ul style="list-style-type: none"><li>• The work was undertaken for the period between November 2014 and February 2015 (copy of the EIA Report is attached). Comprehensive stakeholders' consultations were undertaken and all issues were captured and mitigated.</li><li>• Wide and exhaustive stakeholder consultations were held with state agencies namely National Environment Management Authority (NEMA),</li></ul>

		<p>Kenya Marine Authority (KMA), Kenya Wildlife Service (KWS), Kenya Navy, Kenya Marine and Fisheries Research Institute (KEMFRI). The Kwale County Government Representatives, members of Kenya Association of Hotel Keepers and Caterers and fishermen likely to be affected were consulted as evidenced in minutes annexed to the EIA report.</p> <ul style="list-style-type: none"> <li>• The consultations created a common understanding that the sand harvesting activity will be carried out with no undue negative effects to the marine environment and aquatic life. Diani was excluded out by NEMA as recommended in the EIA report.</li> <li>• All stakeholders' concerns are 100% addressed by NEMA's EIA License (see attachment of the NEMA License).</li> </ul>
(ii)	Mitigation measures on the effects of the sea sand harvesting	See the comprehensive Environmental Management Plan in the EIA report approved by NEMA and other mitigation measures outlined in the report and NEMA's EIA License.
(iii)	National Environmental Management Authority approval	A copy of the NEMA's EIA License is hereby attached.
(iv)	Environmental audits undertaken on the harvesting	<ul style="list-style-type: none"> <li>• Audits are usually done at the end of the activity/project to ascertain the compliance levels to NEMA license conditions and the Environmental Management Plan. Hence, this will be done after completion of the sand harvesting activity.</li> <li>• However, CRBC plans a day-to-day/ continuous environmental monitoring program with key national government agencies (KMA, KEMFRI and KWS) and Kwale County Government to ensure limited negative impacts occur during the sand harvesting period estimated to be 6-8 months.</li> </ul>
(v)	Why the company has continued to harvest sand despite an injunction by the National Environmental Tribunal	<ul style="list-style-type: none"> <li>• CRBC is planning to undertake sand harvesting along a strip of 400 metres to 1 kilometre offshore Indian Ocean from Likoni through Waa to Tiwi shorelines, the same area and location at which the Kenya Ports Authority with financing from the Government of Japan/ JICA is harvesting sand to construct the Terminal II for the Port of Mombasa which is almost complete.</li> </ul>

		<ul style="list-style-type: none"> <li>• CRBC has <b>NOT</b> commenced the works but the public is confusing the two (2) sand harvesting activities in the area. KPA had even signed an MOU with Kwale County Government to undertake the sand harvesting and this has been going on for the last 1-2 years.</li> </ul>
(vi)	How much sand has been harvested so far and how much is needed for the ongoing project	NO sand has been harvested so far but the reclamation works for the Port Reitz Railway Container Terminal will require an estimated 800,000 m <sup>3</sup> of sand to be used as backfilling material.
(vii)	What are the alternative materials that may be used instead of the sand and the cost implication	<ul style="list-style-type: none"> <li>• Sea sand will ensure less marine pollution to the sea as required in the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention, 72) which Kenya is a signatory.</li> <li>• Alternative materials from outside the sea like solid wastes and river-bed sand will not only be unsustainable in the long run but will degrade the environment and may lead to marine pollution. Titanium Mining Wastes from Kwale which have been mentioned by some stakeholders are likely to be radioactive due to their chemical characteristics. The stockpiled topsoil and other mining wastes will also be used in the mining area rehabilitation process.</li> <li>• Hence, sea sand remains the best material for this project due to the nature of its characteristics, in particular – the particle sizes ensure stability and this cannot be gotten from the alternative materials. The sea sand harvesting process applies the same technology and design used in KPA Container Terminal II project.</li> </ul>

Thank you for the invitation. We will attend the meeting of the Departmental Committee on Environment and Natural Resources on 20<sup>th</sup> August 2015, to shed more light on the proposed sea sand harvesting project.

Yours faithfully,



Hu Zhaoguang  
Deputy General Manager  
The Head Office of Mombasa-Nairobi SGR Project  
China Road & Bridge Corporation

**Attachment:**

1. EIA Report for the Proposed Offshore Sea Sand Harvesting
  2. NEMA's EIA License for the Proposed Offshore Sea Sand Harvesting
- 

cc: Mr. A. K. Maina  
Managing Director  
Kenya Railways Corporation

Eng. Maxwell Mengich  
SGR Project Manager  
Kenya Railways Corporation

Mr. Yuan Aiqing  
Team Leader  
TSDI-APEC-EDON Consortium