# IHO Capacity Building Programme

# The State of Hydrography and Nautical Charting in The Republic of Kenya

December 2012

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# Contents

# Abbreviations

| | |
|---|---|
| ALB | Airborne Laser Bathymetry |
| AtoN | Aids to Navigation |
| BA | British Admiralty [Chart] |
| dwt | Dead Weight Tonnage |
| Ed | Edition |
| EEZ | Exclusive Economic Zone |
| ENC | Electronic Navigational Chart |
| FAD | Fish Aggregating Device |
| GLOSS | Global Sea Level Observing System |
| grt | Gross Registered Tonnage |
| ICZM | Integrated Coastal Zone Management |
| IHB | International Hydrographic Bureau |
| IHO | International Hydrographic Organization |
| IMO | International Maritime Organization |
| KMA | Kenya Maritime Authority |
| KMFRI | Kenya Marine Fisheries and Research Institute |
| KNHOC | Kenya National Hydrographic and Oceanographic Committee |
| Lidar | Light Detection and Ranging |
| LOA | Length overall |
| MBES | Multi Beam Echo Sounder |
| MoU | Memorandum of Understanding |
| MSDI | Marine Spatial Data infrastructure |
| MSI | Maritime Safety Information |
| MSP | Maritime Spatial Planning |
| NCG | National Coast Guard |
| NE | New Edition (of a navigational chart) |
| NM | Notice to Mariners |
| PCA | Primary Charting Authority |
| RHC | Regional Hydrographic Commission |
| RNC | Raster Navigational Chart |
| SAIHC | Southern Africa and the Islands Hydrographic Commission |
| SANHO | South African Navy Hydrographic Office |

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|---|---|
| SBES | Single Beam Echo Sounder |
| SoK | Survey of Kenya |
| SOLAS | [United Nations] Convention of the Safety of Life at Sea |
| ToR | Terms of Reference |
| TTW | Territorial Waters |
| UKHO | United Kingdom Hydrographic Office |
| UNCLOS | United Nations Convention on the Law of the Sea |

# Executive Summary

The IHO Technical Team considers that there are many hydrographic assets at the disposal of the government but that the national effort lacks coordination and as a result the maximum value is not being gained. Clearly there is room and need to develop on the current national hydrographic assets and international cooperation and all means should be used to ensure that Kenya's National Hydrographic and Oceanographic Committee function. The IHO team also noted the data available from the continental shelf survey project at SoK. This data should be considered to update the relevant charts.

For historical reasons, nautical charting of Kenya is still produced by the United Kingdom, through the United Kingdom Hydrographic Office (UKHO) as the Primary Charting Authority (PCA). Notwithstanding their modern appearance, the seven charts covering Kenya are based on old and generally imprecise survey information. A comprehensive chart updating programme is required if the chart coverage of Kenya is to meet national needs and international obligations.

The Survey of Kenya, Kenya Maritime Authority and the Kenya Ports Authority should coordinate efforts to ensure that a fully functioning Maritime Safety Information (MSI) infrastructure is in place in Kenya to promulgate urgent navigational and meteorological warnings including urgent charting information or to feed new and updated information to the UKHO so that it can be incorporated into the existing charts, thereby keeping them up to data and fit for purpose.

The improvement of charts covering Kenya should be a matter of particular concern to the Government of Kenya. Every effort should be made to work with the UKHO, which is the producer of the only comprehensive collection of nautical charts and publications covering Kenya, with vital new and revised information to help improve these charts and keep them up to date. The gathering and forwarding of new and relevant chart information must be actively encouraged under a national programme for chart Improvement and maintenance. An urgent local review of existing charts is required to identify discrepancies and to provide up to date information to the UKHO. This should be supplemented by the establishment of a basic level in-country capability for hydrographic surveying.

A poor state of nautical charting and lack of a coherent MSI service to promulgate navigational and meteorological warnings, search and rescue information and other urgent safety-related information, including urgent information related to charts will have an adverse impact on Kenya's economy as well as putting the safety of life at sea and protection of the marine environment at increased risk. This is because of the inherent risk of maritime incidents and the adverse effect on efficient and effective shipping operations, especially the ability of cruise ships and other larger vessels to operate safely in Kenya waters.

The proper functioning of a National Hydrographic Authority and a national Maritime Safety Information Coordinator is absolutely essential to support the UKHO and to ensure that the charts of Kenya are improved. This should also be supported by an active, empowered National Hydrographic Consultative Committee.

Kenya, as a State Party to the SOLAS Convention is required to ensure that appropriate paper charts and ENCs are available in accordance with Regulations 9 and 4 of Chapter V of that Convention.

## Recommended Actions

In order to provide an appropriate level of hydrographic surveying and nautical charting services in Kenya, it is recommended that the relevant authorities consider the following actions:

1. The Government of Kenya should:
    a. establish in law the Survey of Kenya as the National Hydrographic Authority - see 4.2 and 5.3;
    b. empower the National Hydrographic Authority to be responsible for coordination and ensuring the provision of appropriate nautical charting services for Kenya in accordance with the requirements of the International Convention on the Safety of Life at Sea (SOLAS), and in accordance with the principles established by the IHO - see 4.2;
    c. allocate regular funding and travel support for the National Hydrographic Authority to fulfil the duties of the Office and to represent Kenya in appropriate forums, and in particular, to attend relevant meetings of the SAIHC and IHO - see 4.2;
    d. ensure that, through the Survey of Kenya, that the National Hydrographic and Oceanographic Committee meets at least every six months - see 4.2 and 5.4;
    e. ensure that a Maritime Safety Information (MSI) Coordinator position is formalised as soon as possible to fulfil Kenya treaty obligations under SOLAS V/4 - navigational warnings - see 5.5;
    f. actively promote cooperation with the United Kingdom Hydrographic Office through the signed Bilateral Arrangementt - see 5.2.
2. The National Hydrographic Authority should:
    a. liaise with the Regional Team 3 at the UKHO to ensure that new navigationally significant information is forwarded and included in existing charts of Kenya - see 5.2;
    b. apply, through the SAIHC, for training for the MSI Coordinator under the IHO Capacity Building Program - see 5.5;
    c. apply, through the SAIHC, for the short term assistance of an established hydrographic office to develop a National Hydrographic Structure for Kenya - see 5.3;
    d. organise an urgent national programme of review of all the published charts of Kenya and inform the PCA (UKHO) of all detail that is incorrectly shown on these charts. Such a national programme should encourage all mariners and other interested parties to report discrepancies on existing charts together with as much information as possible on what should actually appear in the charts - see 5.2;
    e. refine the existing MoU or Cooperative Arrangement with the Primary Charting Authority (UKHO) as necessary - see 5.2;
    f. continue to provide the secretariat to the National Hydrographic and Oceanographic Committee - see 5.4;
    g. present CB requests to SAIHC - see 5.7.
3. The National Hydrographic and Oceanographic Committee should:
    a. lobby government for the promotion of national hydrography and hydrographic projects within Kenya in support of national obligations and development - see 5.4;
    b. coordinate national hydrographic requirements including input to a National Charting Plan, a National Hydrographic Survey Plan and a National Maritime Safety Information Plan - see 5.4.
4. The Government of Kenya should:
    a. actively support existing hydrographic surveyors in the enhancement of national hydrographic surveying; provide funding to re-equip the SoK Hydrographic Unit with modern, portable survey equipment, including sidescan sonar, to conduct surveys in up to 100m depth - see 5.6;
    b. provide on-going funding for the regular maintenance and routine replacement of equipment and for the training and re-qualification of operators - see 5.6;
    c. establish and fund a national marine cartographic capability such that Kenya can provide specialist chart products for national use and to be sufficiently informed to participate in decisions regarding chart coverage and availability - see 5.6.


# REPORT


## 1. Introduction

The International Hydrographic Organization (IHO) is an intergovernmental technical organization, currently comprising 81 Member States. The IHO seeks to ensure that all States with coastlines and maritime interests provide adequate and timely hydrographic data, products and services, thereby advancing maritime safety and efficiency in support of the protection and sustainable use of the marine environment. The IHO is the recognised competent authority of the United Nations for hydrography and nautical charting. The International Hydrographic Bureau (IHB), based in Monaco, is the secretariat of the IHO. The Republic of Kenya is not currently a member of IHO.

The IHO has encouraged the establishment of Regional Hydrographic Commissions (RHCs) to coordinate hydrographic activity and cooperation at the regional level. The RHCs are made up predominantly of IHO Member States; however, other regional States also participate as Associate Members. RHCs are not formal bodies of the IHO, but work in close harmony with the Organization to help further its ideals and program. RHCs meet at regular intervals to discuss such things as mutual hydrographic and chart production problems, plan joint survey operations, and resolve schemes for medium and large scale International Chart coverage in their regions Non-Member States may participate as RHC Associate members; Kenya currently has Associate Member status in the Southern Africa and Islands Hydrographic Commission (SAIHC).

As a result of a national request to the SAIHC this report has been written with the express intention of assisting the Kenya government to strengthen and develop its hydrographic effort to meet its current and future needs and in turn, to meet its international maritime obligations under the UN Convention on the Safety of Life at Sea (SOLAS). The report comprises a description of the visit, major conclusions and a number of recommended actions for consideration by the relevant organizations.

The report is supported by various Annexes and Appendices providing detailed information including the dependence on hydrography and nautical charting of various sectors in Kenya, an analysis of the current national hydrographic structure, and an analysis of the existing charting situation.

## 2. IHO Technical Visit

A proposal for a technical and advisory visit to Kenya to help assess the current status of charting and hydrography in the country and to provide advice to the government and to stakeholders on a way ahead was raised at a meeting of the SAIHC . As a result the Capacity Building Sub Committee approved and funded a visit to Kenya to assess the current status of hydrography and to raise awareness in the country of the importance of hydrography and nautical charting.

Captain Abri Kampfer from the South African Navy Hydrographic Office (SANHO) and Chair of SAIHC carried out a hydrographic awareness and technical assessment visit to Kenya on 5-8 December 2012. Mr Bowers Owino, Deputy Director of Surveys in the Survey of Kenya (SoK) co-ordinated the visit. Mr Bob Wilson from the United Kingdom Hydrographic Office drafted the IHO report and provided general assistance to Captain Kampfer.

The meetings arranged in Nairobi and Mombasa enabled Captain Kampfer to build up a picture of the salient features of the maritime sphere both on the Indian Ocean coast and on Lake Victoria. The meetings also facilitated data sharing amongst the national representatives.

This resulting report has been written with the express intention of assisting the government Kenya to arrange and strengthen its hydrographic effort to meet its current and future needs and in turn, to meet its international maritime obligations under the UN Convention on the Safety of Life at Sea (SOLAS). The report comprises a

description of the visit, an analysis of the needs and current status of charting, major conclusions and a number of recommended actions for consideration by the relevant authorities

A courtesy call was made on the Director of Surveys of SoK on the morning of 6 December and preliminary discussions were held with the survey staff of SoK with particular emphasis on training requirements and other capacity building requirements. That afternoon Captain Kampfer, accompanied by SoK staff departed for Mombasa. On 7 December a meeting of the Kenya National Hydrographic and Oceanographic Committee (KNHOC) permitted fruitful discussions and a balanced view of the national hydrographic capabilities and Capacity Building requirements.

The details of those attending the various meetings are shown at Annex A - List of Contacts.

# 3. Audit of Previous Technical Visits

The Republic of Kenya has received two previous IHO Technical Visits in 2006 and 2007, an IOC CoastMap IO Technical Visit in 2007 and a WIOMH Technical Visit in 2010; reports from these visits may be viewed on the IHO website at http://www.iho.int/mtg_docs/CB/CBA_TechnicalVisits.htm [accessed 21 November 2012]. The reports generated from these visits have been consulted in the preparation of this report.

In summary progress since previous technical visits has been positive with indications of an improved hydrographic awareness in the Government of Kenya.

An assessment of the current situation and progress on previous actions and recommendations is at Annex B.

# 4. Kenya Hydrographic Assessment

The following is a general assessment of the situation in Kenya regarding hydrography and nautical charting services. A discussion of available options, several conclusions and recommended actions, supported by a number of Annexes then follows.

Kenya has a long coastline on the Indian Ocean and extensive inland waters on Lake Victoria where the country has an obligation under international law to ensure the safety of navigation and protection of the marine environment. Matters related to the safety of navigation are the obligation of the Kenya Maritime Authority (KMA).

## 4.1 National Hydrographic Awareness

Kenya is a party to two key international conventions - the SOLAS Convention and UNCLOS - and takes a full part in regional hydrographic matters through associate membership of the Southern Africa and the Islands Hydrographic Commission (SAIHC). Kenya is not, as yet a member of IHO.

The Government of Kenya, through its various agencies, is aware of the current state of hydrography and nautical charting in Kenya and the benefits of modern hydrography on economic growth, safety of navigation and protection of the marine environment. Furthermore it is specifically aware of its treaty obligations under SOLAS and the provisions under Chapter V Regulations 4 and 9 to ensure that appropriate hydrographic and charting services are made available. Awareness has been heightened by the current programme of IMO state audits for compliance with SOLAS provisions.

## 4.2 National Hydrographic Structure

The agencies within Kenya which have responsibility for or take active participation in hydrographic matters are the Kenya Maritime Authority (KMA), the Ministry of Lands through the Kenya Hydrographic Service (KHS) a section within Survey of Kenya (SoK) and the Kenya Ports Authority (KPA).

The Kenya Maritime Authority Act (2006) and the Merchant Shipping Act (2009) provides a clear mandate to the KMA to regulate co-ordinate and oversee national maritime affairs and thereby represents Kenya at IMO and is responsible for the national compliance with SOLAS, including its amendments and protocols.

KMA, however, does not have a hydrographic capability and thus for hydrographic surveying under SOLAS Chapter V Regulation 9 the responsibility is de facto delegated to the Ministry of Lands under the Ministry of Lands and its Survey Act. Specifically the Kenya Hydrographic Service is established as a Division of the Survey of Kenya by Cabinet Memorandum of July 1991 and became operational in January 2006. It is recommended that this de facto arrangement should be changed such that the SoK is mandated by law to discharge SOLAS Chapter V Regulation 9 responsibilities on behalf of KMA.

Although Kenya lacks a formal executive hydrographic authority there is a National Hydrographic and Oceanographic Committee, representing all maritime stakeholders, that should play an important part in coordinating the national hydrographic effort and deals with any ambiguities in responsibilities. Regular meetings have not been held, which resulted in some lack of coordination, and it is recommended that regular, possibly half-yearly, meetings are established.

## 4.3 Maritime Safety Information

Maritime safety Information (MSI) may be discussed under two main headings; radio navigational warnings and chart correcting information (notices to mariners).

The actual national MSI structure relating to radio navigational warnings, the internal flow of MSI data and its dissemination via the WWNWS system was unclear to the IHO team. This Level One Capacity Building state should have been attained in Kenya but appears not to have been formalised. It is essential that there is a central MSI focal point, known and agreed to by all relevant role players, within Kenya for MSI data and for this focal point to disseminate the data to the NAVAREA coordinator and to the relevant charting authorities.

The Primary Charting Authority (PCA) for Kenya is the UKHO. Currently there is liaison between SoK, KPA, KMA and the UKHO's chart compilers and maintainers in Regional Team 3, the section responsible for producing and maintaining the existing charts of Kenya. The routine maintenance and updating of charts and publications, to include changes in buoyage and wrecks for example, is as important as new survey data if charts are to be maintained to the standard required for safe navigation. Maintenance of this crucial liaison is a priority matter in maintaining the quality of charting for Kenya. Notices to Mariners are received from the UKHO and distributed to the relevant persons and shipping.

Of the ten charts of Kenya published by the PCA (UKHO) all are metric charts referred to WGS84 with one exception (BA866 Plans on Tanganyika and Kenya). The following table shows the current publication date of charts covering Kenya, the reference of the last notice to mariners (NtoM) and the total number of NtoMs affecting the chart since publication; table correct to 27 December 2012.

| BA Chart | Title | Published (Last NtoM/Year) | NtoMs issued since Publication |
|---|---|---|---|
| 238 | Ports in Kenya Kilifi and Malindi | 23 Sep 1994<br>5418/05 | 4 |
| 616 | Approaches to Port Mombasa | 6 Mar 1992<br>4914/12 | 15 |
| 663 | Approaches to Tanga | 28 Aug 1997<br>3455/10 | 5 |
| 666 | Port Mombasa including Port Kilindini and Port Reitz | Ed 2 26 Jan 2012<br>5443/12 | 3 |
| 668 | Lamu, Manda and Pate Bays and Approaches | 23 Dec 1994<br>2727/11 | 5 |
| 866 | Plans in Tanganyika and Kenya | Ed3 24 Nov 1950<br>5353/07 | 25 |
| 2968 | Lamu to Cadale (Itala) | 10 Apr 2003<br>1486/10 | 4 |
| 3310 | Mafia Island to Pemba Island | 28 Aug 1997<br>5913/12 | 19 |
| 3361 | Pemba Island to Lamu | Ed 2 22 Aug 2002<br>3455/10 | 7 |
| 3362 | Lamu to Kismaayo | 28 Aug 1997<br>791/08 | 3 |

## 4.4 Hydrographic Surveying[1]

The agencies within Kenya which have responsibility for or take active participation in hydrographic matters are the Kenya Maritime Authority (KMA), the Ministry of Lands through the Kenya Hydrographic Service (KHS) a section within Survey of Kenya (SoK) and the Kenya Ports Authority (KPA). KMA is a regulatory authority and does not have a hydrographic capability.

Within the Ministry of Lands is the Survey of Kenya and Mapping Division which includes the Hydrographic Survey Section; the section is headed by the Senior Assistant Director of Surveys Hydrography, Ms Lucy Mburu. The Ministry is responsible for topographic and hydrographic surveys and mapping/charting of the country. The SoK has eleven IHO Cat B Hydrographic Surveyors and one IHO Cat B Marine Cartographer. The Ministry via KHS provides secretariat support for the National Hydrographic and Oceanographic Committee. The SoK has recently acquired a field survey capability.

The KPA has the responsibility to manage all of Kenya sea ports. KPA's broad functions are to promote the effective management and operations of sea ports, secure the provision of services in relation to loading and unloading of cargo, develop and manage the port infrastructure and maintain ports safety and security. One of KPA's senior pilots has recently gained an MSc in Hydrography from the University of Plymouth thereby giving the KPA its first qualified hydrographic specialist.

## 4.5 Nautical Charting

Kenya has no national capability for nautical chart or publication production or any current intention of establishing this capability. The Survey of Kenya has a Bilateral Arrangement with its PCA (UKHO) to provide charts and publications for Kenya.

## 4.6 Hydrographic Resources

The government of Kenya has a variety of hydrographic resources which are discussed below.

a. Kenya Hydrographic Service, Survey of Kenya, Ministry of Lands. The Hydrographic survey section is equipped with a Knudsen Singlebeam Echosounder, RTK GPS Base Station without rover, four portable tide gauges and a recently acquired survey launch that must still be set to work.

b. The Kenya Marine Fisheries and Research Institute (KMFRI) produces tide tables, but due to differences between the data and the predictions in the Admiralty Tide Tables, KMA only recognise the Admiralty Tide Tables as the official product for use in Kenyan waters. Permanent recording tide gauges are installed at:

   - KPA - Two in Mombasa
   - KMFRI one each at Lamu and Kilindi
   - Kenya Meteorological Department has four gauges, one each at Lamu, Mombasa, Chiman and Malindi, mainly for tsunami early warning, salinity and conductivity measurement.

c. The United Kingdom Hydrographic Office as the Primary Charting Authority publishes, maintains and distributes nautical charts of Kenya (paper, raster and ENC) and supporting publications.

[1] Kenya National Report to the 9th SAIHC meeting, 2012

# 5. The Way Ahead

## 5.1 National Hydrographic Surveying

Kenya's hydrographic surveying requirements may be viewed as large area surveying for the updating of nautical charts and the small area surveying for national uses and the maintenance of nautical charts. Kenya does not have a formal hydrographic surveying agreement with any foreign government or hydrographic office and relies primarily on its own resources with ad hoc external assistance.

An in-country deployable hydrographic surveying capability using SBES technology has been provided to the SoK which also has a large team of qualified surveyors. Although surveys may take longer using such equipment, the use of a single beam echo sounder and side scan sonar can be equally effective as much more sophisticated and expensive technology such as multibeam echo sounders (MBES). This is especially true in shallow water, such as is the case for Kenya's ports and anchorages. The SoK, once the survey launch has been made operational, should engage in a survey plan to both produce data for the necessary updating of charts and for its hydrographic staff to gain the experience necessary for the long-term development of national hydrography in Kenya.

Encourage, whenever possible, surveys in Kenyan waters by Third Party states. WB funding to improve transport infrastructure may lead to the conduct of coastal surveys. Close cooperation between SoK and KMA is critical for the success of this project that may commence in 2013.

## 5.2 Bilateral Arrangements for Surveying and Charting

Kenya is fortunate in having the support of a major hydrographic office, the UKHO, for its national chart effort through its bilateral arrangement and it is strongly recommended that this support is encouraged. It is further recommended that Kenya should review its bilateral arrangement annually and discuss proposals for amendments with UKHO. The lack of a chart agent for charts of Kenyan waters is an issue that may be addressed within existing bilateral arrangement..

Such an arrangement relieves Kenya of a particularly difficult task whilst at the same time makes it compliant with SOLAS Regulation 9 Chapter 5. However, if the PCA (UKHO) is to publish and maintain charts of Kenya successfully there is a fundamental requirement for Kenya to ensure that the UKHO is provided with all the relevant information required for inclusion in charts and publications covering Kenya. Currently, this is not happening in an organised manner.

## 5.3 National Hydrographic Authority

The IHO recommends that every coastal State should designate a National Hydrographic Authority responsible for coordinating hydrography and charting in the country. The function of the National Hydrographic Authority is to be, on behalf of the government, the national and international point of contact for all hydrographic matters and to ensure that the State meets its international obligations for the collection and dissemination of MSI, hydrographic surveying and nautical charting services. The National Hydrography Authority is the first point of contact for in-country stakeholders and for maintaining relations with relevant international organisations. In the case of Kenya, these contacts would include the PCA (UKHO), IHO, SAIHC and other countries and agencies that might support hydrographic development and assistance in Kenya.

Kenya's national hydrographic structure is steadily developing although not necessarily in a planned manner. It is recommended that Kenya apply through the SAIHC for the assistance of an established hydrographic office to develop a National Hydrographic Structure for Kenya.

## 5.4 National Hydrographic and Oceanographic Committee

It was readily apparent to the IHO technical team that the lack of effective coordination of hydrographic activity in Kenya is potentially having a significant impact on the efficient operation and management of Kenyan water space. Ensuring that a State’s nautical charts and publications contain all relevant information requires the support of all in-country stakeholders. Similarly, to ensure that the national charting coverage and associated services meet the needs of all stakeholders requires wide input.

To coordinate hydrographic effort for the effective discharge of SOLAS responsibilities and the efficient management of a State's water space the IHO recommends the establishment of a National Hydrographic Committee to provide input to and coordination of the hydrographic programme and setting national charting and

surveying priorities. In this way, the stakeholders are in a position to assist in the continuing maintenance of the charts, longer term planning and perhaps also to the programme budget. The specimen agreement produced by IHO (http://www.iho.int/mtg_docs/CB/CBA/Model_Decree_creation_Committee.pdf) was passed to MHL at the end of the IHO technical visit.

All hydrographic stakeholders need to be involved in contributing to Kenya's national hydrographic programme. This is not only to identify and prioritise national requirements, but also to contribute to the execution of the programme. This could be through help in-kind, such as the provision of boats, or personnel or through contributions to enlist contract support – for example for surveys of areas targeted for development. A key role for the stakeholders is to educate and encourage everyone to forward all relevant new or changed hydrographic information to the national coordinator for hydrography and charting. Consideration should be given to develop a catalogue of in-country survey data available for national and international use.

Kenya has an established National Hydrographic and Oceanographic Committee; however, it appears to meet irregularly and infrequently thereby greatly reducing its beneficial effects on national hydrographic policy and development. It is recommended that the KNHOC meet twice annually to coordinate the national hydrographic effort and liaise through the secretariat in between meetings. It is also recommended that the KNHOC should use its combined voice to lobby for hydrographic matters within government.

It is recommended that the SoK as the de facto National Hydrographic Authority should continue to provide the secretariat to the KNHOC.

## 5.5 National Maritime Safety Information Coordinator

The IHO recommends that every coastal State should designate a national Maritime Safety Information (MSI) coordinator. It is considered Kenya needs to formalise as a matter of utmost urgency a national MSI point of contact and educate all stakeholders on the need to pass information to the MSI Coordinator for onward transmission to the NAVAREA VIII coordinator and the charting authority, UKHO. Contact details for the MSI Coordinator should be passed to all stakeholders with MSI being a standard agenda item for the KNHOC.

It is recognized that training for the MSI Co-ordinator will be required and thus Kenya should apply, through the SAIHC, for training for the MSI Coordinator under the IHO Capacity Building Program.

## 5.6 Funding

National hydrography is a clear function of government and should be allocated funding as in any and every other government activity. Without adequate funding the progress thus made cannot be sustained and the resources and personal commitments already made will be wasted. In addition to an annual staffing and capital budget funds should be allocated specifically for:

a. The support of hydrographic surveyors in the enhancement of national hydrographic surveying; provide funding to re-equip the SoK Hydrographic Unit with modern, portable survey equipment, including sidescan sonar, to conduct surveys in up to 100m depth;

b. The regular maintenance and routine replacement of equipment and for the training and requalification of operators;

c. Establishment of a national marine cartographic capability such that Kenya can provide specialist chart products for national use and to be sufficiently informed to participate in decisions regarding chart coverage and availability.

## 5.7 Capacity Building

During the visit the Capacity Building activities listed below were identified and should be passed to the SAIHC:

- On the job training opportunities in cartography and surveying;
- Assistance of setting up of survey launch and training of operators;
- Audit of tide gauges and resolving of datum differences;
- Assistance for installation, calibration and maintenance of tide gauges.

# 6. Technical Visit Conclusions

Based on discussions and the facts obtained, the following principal conclusions have been reached:

(1) The current lack of coherent MSI services could be having an adverse impact on Kenya economy as well as putting the safety of life at sea and protection of the marine environment at increased risk.

(2) The improvement of charts covering Kenya should be a matter of particular concern to the national government. Every effort should be made to work with the Primary Charting Authority (UKHO) to enable an effective charting service to be delivered.

(3) The release of all bathymetric data to the Primary Charting Authority (UKHO) for the immediate improvement of nautical charts.

(4) An urgent local review of existing charts is required to identify discrepancies and to provide up to date information to the PCA (UKHO). Data on Marine Reserves and abandoned capped offshore wells comes to mind.

(5) The strengthening of the in-country hydrographic capability to provide local input to the Primary Charting Authority (UKHO) to assist in the maintenance of the existing charts is important to enable the provision of appropriate and up-to-date nautical charts of Kenya.

(6) Kenya, as a State Party to the SOLAS Convention must recognise and act upon its treaty obligations to ensure that appropriate paper charts and ENCs are available in accordance with Regulations 9 and 4 of Chapter V of that Convention. In this regard, Kenya will only be meeting its obligations if there is an infrastructure or capability in place to provide information to the Primary Charting Authority (UKHO) so that the relevant charts can be kept up to date and fit for purpose.

(7) The absence of up to date charts and a very limited MSI capability to satisfy the requirements of the SOLAS Convention, threaten the likelihood of Kenya passing the hydrography section of the IMO Member State audit scheme which is likely to become mandatory around 2015.

# 7. Recommended Actions

In order to provide an appropriate level of hydrographic surveying and nautical charting services in Kenya, it is recommended that the relevant authorities consider the following actions:

1. The Government of Kenya should:
    a. establish in law the Survey of Kenya as the National Hydrographic Authority - see 4.2 and 5.3;
    b. empower the National Hydrographic Authority to be responsible for coordination and ensuring the provision of appropriate nautical charting services for Kenya in accordance with the requirements of the International Convention on the Safety of Life at Sea (SOLAS), and in accordance with the principles established by the IHO - see 4.2;
    c. allocate regular funding and travel support for the National Hydrographic Authority to fulfil the duties of the Office and to represent Kenya in appropriate forums, and in particular, to attend relevant meetings of the SAIHC and IHO - see 4.2;
    d. ensure that, through the Survey of Kenya, that the National Hydrographic and Oceanographic Committee meets at least every six months - see 4.2 and 5.4;
    e. ensure that a Maritime Safety Information (MSI) Coordinator position is formalised as soon as possible to fulfil Kenya treaty obligations under SOLAS V/4 - navigational warnings - see 5.5;
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    a. liaise with the Regional Team 3 at the UKHO to ensure that new navigationally significant information is forwarded and included in existing charts of Kenya - see 5.2;
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    c. apply, through the SAIHC, for the short term assistance of an established hydrographic office to develop a National Hydrographic Structure for Kenya - see 5.3;
    d. organise an urgent national programme of review of all the published charts of Kenya and inform the PCA (UKHO) of all detail that is incorrectly shown on these charts. Such a national programme should encourage all mariners and other interested parties to report discrepancies on existing charts together with as much information as possible on what should actually appear in the charts - see 5.2;
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    a. lobby government for the promotion of national hydrography and hydrographic projects within Kenya in support of national obligations and development - see 5.4;
    b. coordinate national hydrographic requirements including input to a National Charting Plan, a National Hydrographic Survey Plan and a National Maritime Safety Information Plan - see 5.4.
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    a. actively support existing hydrographic surveyors in the enhancement of national hydrographic surveying; provide funding to re-equip the SoK Hydrographic Unit with modern, portable survey equipment, including sidescan sonar, to conduct surveys in up to 100m depth - see 5.6;
    b. provide on-going funding for the regular maintenance and routine replacement of equipment and for the training and re-qualification of operators - see 5.6;
    c. establish and fund a national marine cartographic capability such that Kenya can provide specialist chart products for national use and to be sufficiently informed to participate in decisions regarding chart coverage and availability - see 5.6.

# Annex A – List of Contacts

| Name | Organization | Contact No<br>*Direct*<br>*Mobile* | Email Address |
|---|---|---|---|
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| Ms Grace Oima<br>Marine Cartographer | | +254(0) 723 310 148 | graceoima@yahoo.com |
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| Dr. Michael Mutua Nguli<br>Principal Research Scientist (Oceanography) | Kenya Marine Fisheries and Research Institute,<br>P.O Box 81651, Mombasa | +254(0) 700 102 383 | mnguli@kmfri.co.ke |
| Simon Ndirangu Gichomo<br>Assistant Director of Kenya Meteorological Services | Kenya Meteorological Department,<br>P.O Box 98512, Mombasa | +254(0) 722 421 884 | gichomo2012@yahoo.com<br>gichomo@meteo.go.ke |
| Peter W. K. Mbiriri<br>Environment Officer | Kenya Maritime Authority,<br>P.O Box 95076 – 80104,<br>Mombasa | +254 412 318 398-9<br>+254(0) 721 364 081<br>+254(0) 724 319 344 | info@kma.go.ke<br>pmbiriri@kma.go.ke |
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| Capt Abdulaziz Ahmed Mzee<br>Senior Marine Pilot | Kenya Ports Authority,<br>P.O Box 86745, Mombasa | +254(0) 720 517 655<br>+254(0) 733 517 655 | amzee@KPA.co.ke<br>azizmzee@yahoo.com |
| Captain Abri Kampfer SAN<br>Hydrographer SAN and Chairman SAIHC | South African Navy Hydrographic Office, Private Bag X1, Tokai 7966, RSA | +27 21 7872412<br>+27 82 5545218 | hydrosan@iafrica.com |

# Annex B – Audit of Previous Technical Visits

## SAIHC Technical Visit 2006

FOLLOW UP ACTIONS

19. Encouragement of Formation of a NHC, Development of a National Hydrographic Strategy, and RHC Membership. The NHC must meet as soon as possible to ensure that Kenya takes advantage of forthcoming opportunities in the IHO capacity building Work Programme, and to provide information to enable SAIHC to shape the hydrographic components of the Lake Victoria and WB WIO MH projects. . In subsequent discussions with the Permanent Secretaries, it was indicated that Kenya will pursue membership of IHO, and guidance on the process will be provided by SAIHC.

ACTION: NHC Chairman; Permanent Secretary Lands; Chairman SAIHC.

*Progress: KNHOC was established and Kenya has participated in all available SAIHC Capacity Building events. KNHOC met on occasions, but there is a general feeling that it should meet more regularly, preferable at least twice a year.*

*The survey of Lake Victoria is under the auspices of EAC and although some harbour and approach surveys have been conducted by a contractor it will appear that the EAC is once again looking for a contract survey of harbours and approaches and shipping routes.*

*Kenya profited from training opportunities provided by the WB funded WIOMHP and also received an AIS system for Mombasa.*

*Kenya cabinet approved the application of the Ministry of Lands for Kenya to become an IHO member. Department of Foreign Affairs must still compile the letter of application and deposit in Monaco.*

20. Encouragement of Effective and Timely Collection and Promulgation of Hydrographic Information.

a. Data related to dredging, Marine Parks, and recent surveys in Kenyan waters should be forwarded to UKHO for inclusion in the official charts and publications.

ACTION: NHC Secretariat.

*Progress: SoK to follow up with Kenya Wildlife for exact coordinates of Marine Parks to enable charting. Latest dredging survey (2011) has been provided to UKHO by KPA. Data was not rendered to SoK for inclusion in national database.*

b. Data from the GLOSS tide gauges, including comprehensive information on their datums, should be forwarded for analysis by the UKHO Tidal Branch.

ACTION: NHC Secretariat.

*Progress: Situation unchanged, it is not known if any action has been carried out. Also it will appear that gauges do not share a common datum.*

c. The Visit Team will liaise with the NAVAREA VIII Co-ordinator to facilitate communication with East African states.

ACTION: Chairman SAIHC and Vice Chairman IHOCBC.

*Progress: KMA reported that they have achieved good communication with the NAVAREA VIII Co-ordinator*

21. Encouragement of Development of Hydrographic Capability. Kenya should consider seeking SAIHC support with the following:

a. Identification of opportunities for field and office experience with IHO Member States.

ACTION: NHC; Chairman SAIHC.

*Progress: Participated in survey-on-the-job experience with SHOM whilst survey of WIOMH was conducted.*

b. Preparation of bids to the IHO CBC.

ACTION: NHC; Chairman SAIHC.

*Progress: Participated in all available SAIHC Capacity Building events.*

## 3.9 Recommendations

KE-1 Advise the Kenyan Government on the importance of preparing MOUs between Government Ministries to ensure that international commitments, such as the SOLAS Convention, are completely met. In addition to update the legal mandate for a Hydrographic Service within the Ministry of Lands including a firm definition of its mandate and responsibilities.

*In Progress*

KE-2 Advise the Kenyan Government to expedite its application for full membership of the IHO in order to benefit from a direct knowledge of international standards and development programmes.

*Application in its final stages*

KE-3 Acquire a fully equipped survey launch with a capability to carry out port and coastal surveys. Such equipment to include single beam and multibeam echo sounders, side scan sonar, survey quality GPS and associated data acquisition and processing systems.

*Most achieved, but no side scan and software*

KE-4 Acquire the capability to view all UKHO produced ENCs.

*Should be able to view data if exported to shp file format.*

KE-5 Examine alternative modern technology, such as airborne bathymetric LIDAR and airborne and satellite remote sensing, as a means to expedite surveys of coastal areas to identify safety critical locations for examination by ship borne sensors.

*Not known if this has received consideration.*

KE-6 Request UKHO to proceed with production of revised ENCs, in close cooperation with SoK, utilising the latest data available and based on the most recent first order horizontal control (WGS84).

*Will be done if better data available*

KE-7 Prioritize coastal areas in need of modern surveys, based on actual shipping routes and the quality of existing surveys. From this, develop a 5 year survey plan drawing on the recommendations of the IHO Special Advisor report of 2007 (the Wyatt report) and available through the IHB. High priority should be given to resurvey the areas of the Port of Mombasa and Approaches that are not covered by the recent USN survey.

*It is understood that Captain Barritt produced a prioritised survey plan although this was not sighted during the technical visit. Captain Kampfer encouraged KNHOC to table document for adoption and revision when required.*

KE-8 Upgrade the NAVTEX receiver in the RMRCC to a transceiver so that navigational information and safety messages may be transmitted.

*KMA reported that World Bank funding may become available that will allow for the acquisition of NAVTEX transmitter.*

KE-9 Not applicable.

KE-10 Not applicable.

KE-11 Not applicable.

KE-12 With respect to hydrographic and marine cartographic training:

a. Continue to develop expertise at the Cat. B level and in particular arrange for practical training, if necessary out of country.

*One surveyor trained in Rotterdam at Skills Trade to IHO CAT B level, funded by WIOMHP*

b. Select two Cat. B surveyors to undertake training to upgrade to Cat. A. Initially this must be done out of country and suitable donor organisations be approached through the IHO and/or SAIHC.

*No progress, as IHO CB does not provide such funding.*

c. That KPA acquires or arranges training for at least one person who will supervise all contracts involving hydrography within the port.

*KPA has sponsored the training of a senior Pilot to IHO CAT A level.*

d. Investigate the feasibility of establishing a regional hydrographic training centre, possibly as an extension of the RCMRD or through the auspices of the SAIHC ensuring that practical boat work is included.

*No progress*

KE-13 Advise the UKHO that if Kenya is to have any input into the production and maintenance of ENCs of its coastal waters, a procedure needs to be developed with the concerned agency that allows it to understand and interact with these new products.

*Provision of S-57 data in a GIS compatible format will allow for this*

KE-14 Encourage the Government of Kenya to ensure that data from the USN and Japanese surveys of Mombasa are placed promptly in the hands of the UKHO to facilitate revision of existing ENCs. Not known what data is outstanding. Kenyan Navy may be in possession of data that has not been rendered to SoK, but it will need confirmation.

*UKHO have received USN survey data covering Mombasa dated 2010.*

# Annex C – Kenya Dependency on Hydrography and Charting

## 1. Introduction[2]

The coast of Kenya is about 615 kilometres in length. The country is bounded to the south by Tanzania; to the west by Uganda; to the north by Ethiopia; to the east by Somalia. The capital is at Nairobi whilst its main port, Mombasa, is the southeast corner of the country. Kenya borders Lake Victoria (the world's second-largest freshwater lake) in the west and encompasses most of Lake Turkana in the north.


The Republic of Kenya[3]

Kenya is the regional hub for trade and finance in East Africa. The country's main exports are tea, horticultural products, coffee, petroleum products, fish, cement, whilst its imports are primarily machinery and transportation equipment, petroleum products, motor vehicles, iron and steel, resins and plastics. Kenya's main exporting partners are Uganda 9.9%, Tanzania 9.6%, Netherlands 8.4%, UK 8.1%, US 6.2%, Egypt 4.9%, Democratic Republic of the Congo 4.2% (2011) whilst its main importing partners are China 15.3%, India 13.8%, UAE 10.5%, Saudi Arabia 7.3%, South Africa 5.5%, Japan 4% (2011). Thus over a quarter of Kenya's exports are carried by sea with sea transport accounting for 56.4% of its imports. Maritime trade is therefore, a significant element in the country's overall commerce.

## 2. Ports and Harbours[4]

Kenya's ports and harbours are in two groups: sea and inland lake.

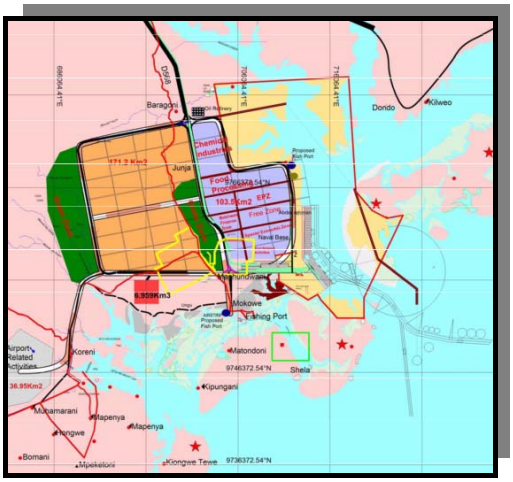
The nation's major seaports are:

> Mombasa Port Mombasa or 'the city of merchants' has a long history of maritime trade increasingly becoming a busy trading post for the region. Strategically positioned midway between South Africa and the Gulf of Aden Mombasa has experienced a tremendous growth in traffic over the years. The Port of Mombasa is the gateway to East and Central Africa, and is one of the busiest ports along the East African coastline. The port provides direct connectivity to over 80 Ports worldwide and is linked to a vast hinterland comprising Uganda, Rwanda, Burundi, Eastern Democratic Republic of Congo, Northern Tanzania, Southern Sudan, Somalia and Ethiopia by road. A railway line connects the port directly to Uganda and Tanzania.
>
> The Port of Mombasa has 16 deep-water berths totalling >3000m with alongside depth of 10m with two bulk oil jetties for tankers with a draft of 9.8m and a cased oil jetty with alongside depth of 4.3m. The Port of Mombasa also has five container berths with a total length of almost 1000m. Containerized cargo

[2] NP3
[3] https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html [Accessed 21 Nov 12)
[4] http://www.tanzaniaports.com/index.php?option=com_content&view=article&id=100&Itemid=270 [Accessed 21 Nov 12]

represents about 70% of the Port of Mombasa's total cargo volume, and that volume is growing at around 12% per year. In addition the Port of Mombasa Container Terminal has a further three berths. In 2005, the Port of Mombasa handled 436,000 TEUs, and it anticipates that volume to reach one million TEUs by 2015.[5]

Lamu (Manda Bay). Development of Lamu Port is in progress as part of the Lamu Port Southern Sudan Ethiopia Transport Corridor (LAPSSET) also known as the Second Transport Corridor which comprises the Lamu port at Manda Bay, a railway line, highway, oil refinery, oil pipeline and airports at Isiolo, Lamu and Lodwar. Lamu Port is expected to consist of 30 berths when complete covering some 1,000 acres in size. Lamu will be a deep water port with a maximum depth of 18 metres. The first phase of the port, due for completion in 2013, will include 3 deep water berths with a capability of handling ships with a dead-weight capacity of up to 100,000 tonnes.



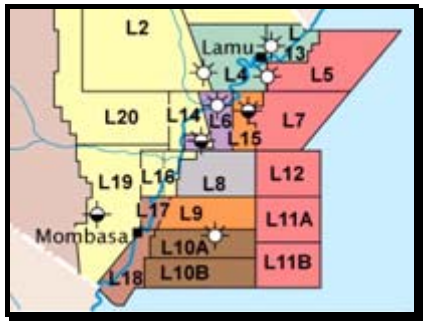

Lake traffic is an important feature of Kenya's maritime trade. Kenya Ferry Services reported that the lack of accurate surveys and charts of the waters of Lake Victoria prevents the establishment of a much needed ferry service on the lake.

## 3. Cruise Ship Operations

The IHO Technical team was not made aware of any cruise ship traffic to Kenya.

## 4. Offshore Oil and Gas

Kenya's first offshore oil or natural gas find occurred in September 2012 when Australia-based Pancontinental Oil and Gas struck deposits of natural gas in Mbawa 1 block L8, off Malindi. Pancontinental Oil has not finished operations in Mbawa 1 and state that this first ever substantive hydrocarbon discovery offshore of Kenya is very promising. The SoK has undertaken to obtain capped well data and any other seabed obstacle data to allow for charting.



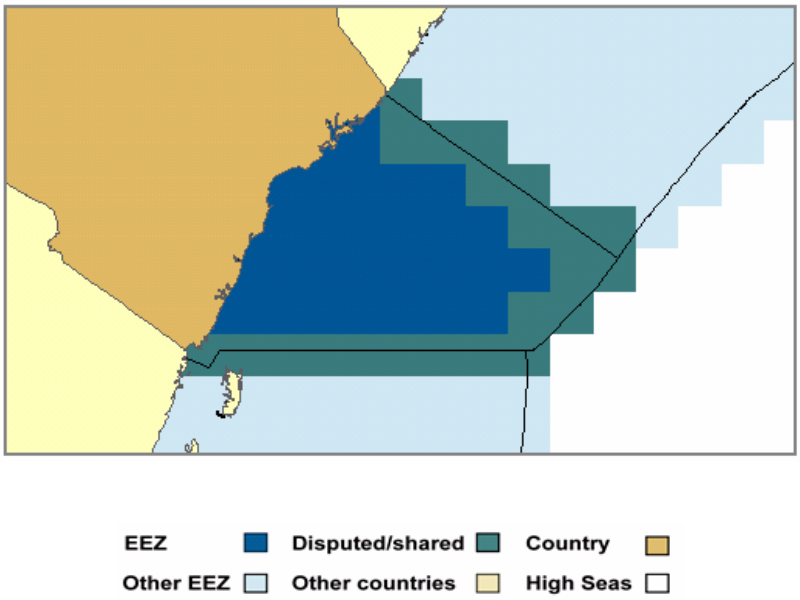

**Kenya's Oil and Gas Exploration and Exploitation[6]**

[5] http://www.worldportsource.com/ports/commerce/KEN_Port_of_Mombasa_1365.php [Accessed 28 Nov 2012]
[6] http://subseaworldnews.com/2011/11/04/kenya-plans-to-delineate-more-exploration-blocks-offshore/ [Accessed 28 Nov 21]

# 5. Maritime Claims

Kenya claims a 12 mile territorial sea and an exclusive economic zone (EEZ) of 200 miles.[7] Kenya has a Continental Shelf area of approximately 8,875 square kilometres and an EEZ of approximately 112,000 square kilometres.[8]

In April 2009, Kenya and Somalia signed a memorandum of understanding (MoU) on their common maritime boundary. Early in the following month Kenya submitted a claim to extend its exclusive economic zone (EEZ) from 200 n miles out to 350 n miles, adding 103,000 square kilometres to the nation's maritime area of responsibility, alongside the potential benefits of harnessing new and untapped resources. [9]




Kenya Maritime Boundaries[10]

# 6. Defence including Coastguard

The small Kenyan Navy (seven patrol and coastal craft in its inventory in 2012, a mix of 1970s and 1990s acquisitions, plus a range of inshore and amphibious craft) is the best equipped naval force in East African benefiting from regular training exercises and assistance from the UK, US, French and South African navies. The navy's primary mission is the protection of Kenya's coastline with specific concerns arising from the current situation in Somalia and the ability to guarantee vessels free right of passage into and out of Kenyan waters particularly as insurance rates increase for vessels using Mombasa due to the risk of piracy. Recently discovered offshore gas reserves will, when developed, provide a further task for the Navy.[11]

There is a need for surveys in inshore waters to allow effective patrolling by naval vessels.

# 7. Environment

The IHO team was not made aware of any surveys required for environmental purposes.

[7] NP39 p.9
[8] http://www.seaaroundus.org/eez/404.aspx [Accessed 28 Nov 2012]
[9] http://articles.janes.com/articles/Janes-Sentinel-Security-Assessment-Central-Africa/Navy-Kenya.html [Accessed 21 Nov 12]
[10] http://www.seaaroundus.org/eez/834.aspx [Accessed 21 Nov 12]
[11] http://articles.janes.com/articles/Janes-Sentinel-Security-Assessment-Central-Africa/Navy-Kenya.html [Accessed 21 Nov 12]

# 8. Sea Fishery[12]

Kenya marine fisheries resources within its territorial waters and EEZ have considerable quantity and range of with good potential for economic development. The Kenyan marine zone is bordered by a coastline measuring from 420 km in a straight line, expanding to around 880 km when including the actual coastal shape.

Two main river systems, the Sabaki, just north of Malindi and the Tana about 80 km further north reach the coast.

Outflow from these rivers enrich the local fishing grounds, which in turn support commercial concentrations of shrimps (prawns). Much of the coastline is fringed by mangrove forest and swamp.

Kenya's known marine inshore fishing grounds include the rich inshore grounds around Lamu Archipelago, Ungwana Bay, North Kenya Bank and Malindi Bank. The inshore fisheries zone is an important part of the Kenya fishery. The zone is exploited predominantly by artisanal fishermen operating some 4,800 mostly un-motorized boats to produce around 6-7,000mt of fish annually, valued at over KShs 500 million. The prawn fishery from which approximately 400mt are landed each year are fished by commercial trawlers from the two fishing grounds with brackish waters.

The offshore waters of the Kenyan zone are exploited by vessels from Distant Water Fishing Nations (DWFNs). The main species sought are the highly migratory tunas including skipjack, yellowfin and bigeye tuna. Some of the fish landed in Kenya and transhipped overseas. Others are landed directly in the Distant Nations. License fees from this earned the Government around KShs 30 million per year approximately US$400,000. The fees charged are US$20,000 for purse seiners.

# 9. Marine Reserves[13]

| Marine Protected Area | Designation | Designation Status | Date Designated | Total Area (km2) |
|---|---|---|---|---|
| Boni | National Reserve | Designated | 1976 | 1,339 |
| Diani | Marine National Reserve | Designated | 1995 | 75 |
| Dodori | National Reserve | Designated | 1976 | 877.4 |
| Kisite | Marine National Park | Designated | 1978 | 28 |
| Kiunga | Marine National Reserve | Designated | 1979 | 250 |
| Kiunga Marine National Reserve | Biosphere Reserve | Designated | 1979 | 600 |
| Malindi | Marine National Park | Designated | 1968 | 6.3 |
| Malindi-Watamu | Marine National Reserve | Designated | 1968 | 245 |
| Malindi-Watamu Biosphere Reserve | Biosphere Reserve | Designated | 1979 | 196 |
| Mombasa | Marine National Park | Designated | 1986 | 10 |
| Mombasa | Marine National Reserve | Designated | 1986 | 200 |
| Mpunguti | Marine National Reserve | Designated | 1978 | 11 |
| Ras Tenewi | Marine National Park | Proposed | | 350 |
| Watamu | Marine National Park | Designated | 1968 | 10 |

[12] http://www.fisheries.go.ke/index.php?option=com_content&task=view&id=98&Itemid=2 [Accessed 28 Nov 12]
[13] http://www.mpaglobal.org/index.php?country_id=404&conv_code=&site_code=&action=searchResults&submit=Go [Accessed 28 Nov 12]

## 10. Tourism and Coastal Recreational Amenities

There does not appear to be any requirement for hydrographic surveys or data in support of marine based tourism or recreational activities.

## 11. Education and Science

There do not appear to be any educational or scientific programmes sponsored by Kenya government requiring or including the gathering of hydrographic data.

# Annex D – Existing Hydrographic Data for Kenya

## 1. General

Hydrographic data for Kenya falls into three categories: modern Kenya Ports Authority data, SoK data gathered under various programmes and older British Admiralty data. The British Navy carried out a number of detailed surveys of this coast up until 1980 after which little systematic surveying has been conducted on the coast of Kenya other than US Navy surveys discussed below.

Survey data for the BA charts covering Kenyan waters comes from national, foreign government and GEBCO sources all of which are discussed below. With the exception of LiDAR data and that gathered in Mombasa by the US Navy in 2010 all bathymetric data has been gathered using a single beam echo sounder. Positioning for the earlier surveys, pre 1980, are mainly by visual means, however, given the survey scales (1:50,000 – 1:150,000) it is unlikely that any plottable positional errors exist on the final bathymetric survey sheets. Post 1980 surveys have been controlled by electronic or satellite positioning systems and are considered acceptable although some of them will not now meet IHO orders of survey.

## 2. National Data

The SoK is the national custodian of all hydrographic data. Survey data obtained in the Extended Continental Shelf Project is available at SoK. It was reported that two seamounts have been discovered and some guidance has been requested with the procedure for naming of these new features. The data arising from the ECSP has not been passed to the PCA for chart action.

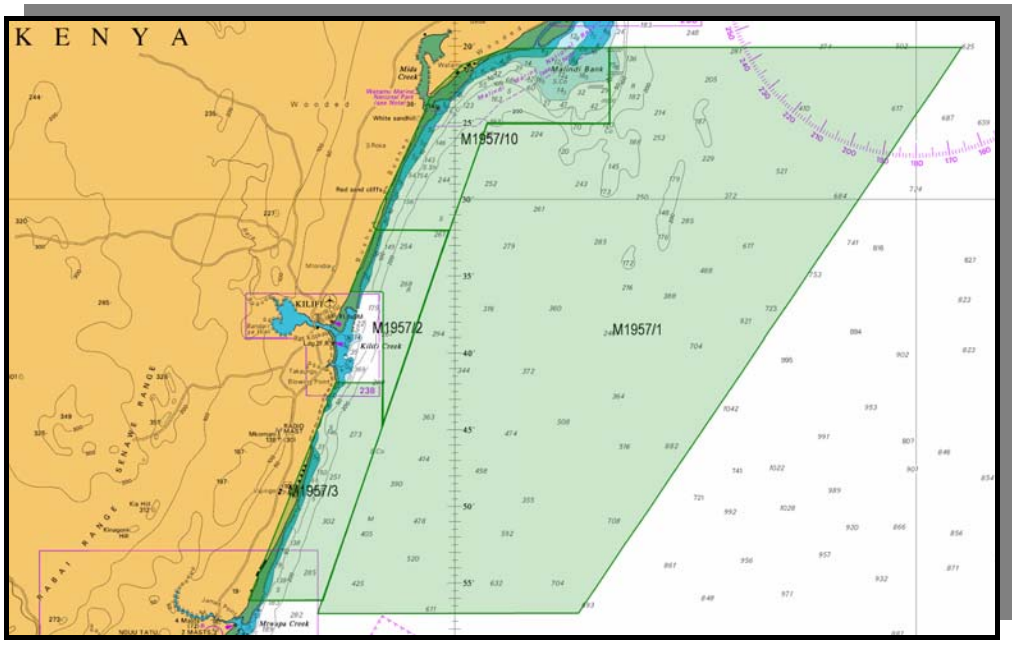
## 3. West Indian Ocean Marine Highway Data

No hydrographic surveys were conducted in Kenyan waters under the West Indian Ocean Marine Highway project.

## 4. United States of America

It is understood, but could not be confirmed that the Fleet Survey Team of the US Naval Oceanographic Office has surveyed the entire harbour of Mombasa in 2009/2010, although the results have yet to be received by Kenya. UKHO can confirm US FST surveyed Mombasa Harbour in 2010. It is further understood that the Kenyan Navy has been involved in surveys conducted by USN although it is not known what data is held by them. It is recommended that SoK approach KN to obtain all survey data for inclusion in National Data Base and rendering to the PCA.

Offshore surveys conducted by the US Navy have been used in the compilation of BA Charts. The limits of the survey areas are shown in the diagram below. Diagram – see amended version attached



# 5. United Kingdom Hydrographic Office

All survey data held by UKHO has been incorporated into the current published charts. This data is assessed further in this report. KPA confirmed that latest dredging survey (2011?) has been provided to UKHO. SoK indicated that this data has not been rendered to them as part of the National Data Base.

# 6. Summary of Current State of Surveys

The current state of surveys as summarized in IHO Publication C-55 'Status of Hydrographic Surveying and Nautical Charting Worldwide' Third Edition (2004) updated 1 September 2009 is shown in the table below. Kenya EEZ is approximately 112,000 square kilometres of which that >200m depth is approximately 13 times that of the area <200m which totals approximately 8.875 square kilometres. Given the research conducted by the IHO Team during its technical visit it was not possible to update the percentages. [14]

| Area Code | Definition | C-55 (%) |
|---|---|---|
| A1 | Area adequately surveyed (<200m) | 50 |
| A2 | Area adequately surveyed (>200m) | 85 |
| B1 | Area requiring resurvey at larger scale or to modern standards (<200m) | 35 |
| B2 | Area requiring resurvey at larger scale or to modern standards(>200m) | 10 |
| C1 | Area which has never been systematically surveyed (<200m) | 15 |
| C2 | Area which has never been systematically surveyed (>200m) | 5 |

IHO C-55 Kenya - Status of Hydrographic Surveys [Updated 17 August 2011]

[14] http://www.seaaroundus.org/eez/440.aspx [accessed 7 September 2012]

# Annex E – Charting Analysis of Kenya Waters

## 1. Kenya Chart Coverage

The Republic of Kenya does not have a chart production capability and relies historically on the UKHO to fulfil this function. The résumé of chart coverage for Kenya shown in IHO Publication C-55 - *Status of Nautical Charting* (updated 1 September 2009) is shown in the table below. The figures in brackets show revised values as supplied by the PCA (UKHO) for this report.

| Chart Type | % Covered by INT Charts | % Covered by RNCs | % Covered by ENCs |
|---|---|---|---|
| Small Scale: Offshore Passage | 100 (100) | 100 (100) | 0 (100) |
| Medium Scale: Landfall, Coastal Passage | 100 (100) | 100 (100) | 0 (100) |
| Large Scale: Approaches and Ports | 100 (100) | 100 (100) | 20 (50) |

IHO C-55 Status of Chart Coverage

While C-55 shows that Kenya is well covered by charts, it must be noted that the assessment applies only to charts produced by the PCA (UKHO) of which the quality of the data of some of those charts is often old, inadequate and of variable accuracy. The status as shown in C-55, although accurate, may be considered to be misleading.

## 2. British Admiralty Charts

For historical reasons the United Kingdom, through the United Kingdom Hydrographic Office (UKHO) remains the Primary Charting Authority (PCA) for Kenya. Nine of the ten charts produced by the PCA (UKHO) are referred to WGS 84; the remaining chart (BA866) is not and thereby making the transfer of positions from this chart to BA3310 and BA3361 difficult and possibly inaccurate. The data from which the charts are compiled is sometimes noted as being in many cases old, imperfect and on undefined reference systems such that some charts carry a warning note.

The published charts and current state of maintenance is shown in the table below.

| BA Chart INT Chart | Title | WGS84 | Scale | Published Last Updated | Annual Sales 2010 (2011) |
|---|---|---|---|---|---|
| 238 | Ports in Kenya Kilifi and Malindi | | | 23 Sep 1994 NM5418/05 | 87, 81, 72, 120, 85 |
| | Entrance to Kilifi Creek | Yes | 12 500 | | |
| | Kilifi Creek and Approaches | Yes | 25 000 | | |
| | Malindi and Approaches | Yes | 37 500 | | |
| 616 | Approaches to Port Mombasa | Yes | 50 000 | 6 Mar 1992 NM4914/12 | 482, 565, 551, 758, 738 |
| 663 | Approaches to Tanga | Yes | 37 500 | 28 Aug 1997 NM3455/10 | 86, 104, 114, 140, 113 |
| 666 | Port Mombasa including Port Kilindini and Port Reitz | | | Ed 2 26 Jan 2012 NM5022/12 | 486, 555, 547, 730, 745 |
| | Mbaraki Creek | Yes | 3 000 | | |
| | Port Mombasa including Port Kilindini and Port Reitz | Yes | 12 500 | | |

| BA Chart<br>INT Chart | Title | WGS84 | Scale | Published<br>Last Updated | Annual Sales<br>2010 (2011) |
|---|---|---|---|---|---|
| 668 | Lamu, Manda and Pate Bays and Approaches | | | 23 Dec 1994<br>NM2727/11 | 74, 73, 57, 94, 86 |
| | Lamu Harbour and Approaches | Yes | 25 000 | | |
| | Lamu, Manda and Pate Bays and Approaches | Yes | 75 000 | | |
| 866 | Plans in Tanganyika and Kenya | | | Ed3 24 Nov 1950<br>NM5353/07 | 52, 71, 82, 114, 84 |
| | Moa Bay or Gomani Bay | No | 25 000 | | |
| | Wasin Channel | No | 25 000 | | |
| | Moa or Gomani Bay to Funzi Bay | No | 50 000 | | |
| 2949 | Mtwara to Lamu | Yes | 1 000 000 | Ed1 21 Jul 2005<br>NM4596/12 | 2800, 1269, 1033, 1297, 1169 |
| 2968 | Lamu to Cadale (Itala) | Yes | 1 000 000 | 10 Apr 2003<br>NM1486/10 | 965, 957, 883, 1126, 846 |
| 3310 | Mafia Island to Pemba Island | Yes | 350 000 | 28 Aug 1997<br>NM4540/12 | 506, 537, 562, 673, 715 |
| 3361 | Pemba Island to Lamu | Yes | 350 000 | Ed 2 22 Aug 2002<br>NM3455/10 | 579, 645, 644, 816, 727 |
| 3362 | Lamu to Kismaayo | Yes | 350 000 | 28 Aug 1997<br>NM791/08 | 240, 253, 258, 336, 266 |

Summary of UKHO Charting

## Annex F – IHO Yearbook Revision

# KENYA (REPUBLIC OF)

| | |
|---|---|
| **SURVEY OF KENYA**<br>**P.O. Box 30046**<br>**NAIROBI** | |
| **Department of which the Hydrographic Office is part** – Ministère dont dépend le Service Hydrographique – Ministerio del que depende el Servicio Hidrográfico | Survey of Kenya, Department of Lands, Hydrographic Division |
| **Principal functions of the H.O. -** Attributions principales du S.H. - Principales funciones del S.H. | Collection, validation and transmission of hydrographic data to PCA (UKHO) for updating national charts. Provision of the secretariat for the National Hydrographic Committee. Central custodian of National Hydrographic data. |
| **National day –** Fête nationale – Fiesta nacional | 12 December |
| **Telephone:**<br>**Fax:**<br>**E-mail:**<br><br>**Website:** | + 254 2 718050<br>+ 254 2 717553<br>dir@ardhi.go.ke<br>bnowino@ardhi.go.ke<br>www.ardhi.go.ke |
| **Date of establishment and Relevant National Legislation - Date de fondation et législation nationale concernée** – Fecha de establecimiento y Leyes nacionales de referencia | 2006 Kenya Cabinet Direction |
| **Name and rank of the Director or Head -** Nom et grade du directeur – Apellidos y graduación del Director | Director of Surveys: Mr. E.M. Murage |
| **Tonnage** – Tonelaje | |
| **Total Budget** - Budget total – Presupuesto Total | |
| **Staff employed - Effectifs – Plantilla**<br><br>**- Hydrographers (Name and rank of managing staff)**<br>- Hydrographes (Nom et grade du personnel de direction<br>- Hidrógrafos (Apellidos y graduación del personal directivo) | 11 IHO Cat B hydrographers and one IHO Cat B cartographer<br><br>Ms L. Mburu |
| **Surveying vessels/ Aircraft** - Bâtiments hydrographiques/aéronefs - Buques Hidrográficos/Aeronaves | One Survey Launch |
| **N° of charts published** - *Nombres de cartes publiées - N° de cartas publicadas.* | British Admiralty Charts are used. |

| KENYA PORTS AUTHORITY<br>P.O. Box 95009 - 80104<br>MOMBASA | |
|---|---|
| **Department**– Ministère – Ministerio | Ministry of Transport |
| **Principal functions -** Attributions principales . - Principales funciones. | Hydrographic surveys in ports, Maintenance and improvement of navigational aids in harbours and along the coast of Kenya, Dredging to maintain depths at channels and berths, Transmission of local navigational warnings. |
| **Telephone:**<br>**Fax:**<br>**E-mail:**<br>**Website:** | + 254 41 2112999<br>+ 254 41 2311638<br>tkhamis@kpa.co.ke<br>www.kpa.co.ke |
| **Name and rank of the Director or Head -** Nom et grade du directeur – Apellidos y graduación del Director | Harbour Master and General Manager of Operations: Captain T. KHAMIS |
| **Staff employed -** Effectifs **–** Plantilla<br>**- Hydrographers (Name and rank of managing staff)**<br>- Hydrographes (Nom et grade du personnel de direction<br>- Hidrógrafos (Apellidos y graduación del personal directivo) | For details consult the WEB site :<br>Capt Abdulaziz A. Mzee<br>One CAT A Hydrographic Surveyor |
| **Surveying vessels/ Aircraft** - Bâtiments hydrographiques/aéronefs - Buques Hidrográficos/Aeronaves | None |

| KENYA MARITIME AUTHORITY<br>P.O. Box 95076 - 80104<br>MOMBASA | |
|---|---|
| **Department** – Ministère – Ministerio | Ministry of Transport |
| **Principal functions -** Attributions principales. - Principales funciones. | Enhancement of safety of navigation.<br>Coordinate and regulate Maritime Activities. |
| **Telephone:**<br>**Fax:**<br>**E-mail:**<br>**Website:** | +254 41 2318398/9<br>+254 41 2318397<br>info@maritimeauthority.co.ke<br>www.maritimeauthority.co.ke |
| **Name and rank of the Director or Head -** Nom et grade du directeur – Apellidos y graduación del Director | Director General<br>Mrs. Nancy W. Karigithu, MBS |