

African Great Lakes and Rivers Working Group – Collaboration through practical demonstration

Authors

Tim Lewis¹ and Nick Swadling¹

Abstract

This note highlights the successful collaboration between industry, Member States of the Southern African and Islands Hydrographic Commission (SAIHC) African Great Lakes and Rivers Sub Working Group (AGL&RsWG) and other organisations. Malawi hosted, through the Ministry of Lands and most AGL&RsWG members were represented. An initial meeting in Lilongwe was followed by a demonstration day at Monkey Bay, sponsored by Kongsberg Maritime AS, Sensors & Robotics division*, delivered by GeoSystems. The United Kingdom Hydrographic Office (UKHO) funded attendance for AGL&RsWG members. Outcomes included, a greater awareness of shared challenges faced by regional stakeholders and collaborative solutions to maximise resources.

*Sensors & Robotics Division is now a new Business Area "Kongsberg Discovery" under the KONGSBERG GROUP



Fig. 1 The African Great Lakes & Rivers Sub Working Group, opened by Deputy Minister of Lands Malawi – Honourable Deus Gumba MP.

1 Background to working group

Established at SAIHC 17 in February 2021, the AGL&RsWG is a sub working group of SAIHC Integrated Chart Coordination Working Group (ICCWG). Its aim is to give focus to the regions significant inland water ways and recognise the specific challenges which deserve recognition and discussion. The group is open to land-linked nations, those with coastal waters who are SAIHC members, associate members, observers, or industry with an interest in the hydrography of these areas. The group was initially made up of regional government bodies including Kenya, Malawi, Mozambique, South Africa, Uganda, and the United Kingdom, with additional representation from Port Management Association of Eastern and Southern Africa (PMAESA). The working group has now grown and benefits from the additional representation from further key stakeholders; Kenya Ports Authority (KPA), Lake Victoria Basin Commission (LVBC), Regional Centre for Mapping and Resources for Development (RCMRD) and Zambia.

✉ Tim Lewis · tim.lewis@ukho.gov.uk

¹ United Kingdom Hydrographic Office

The following Terms of Reference (ToRs) were agreed at the second meeting:

- Promote hydrography in the African great lakes and rivers for the sustainable development and use of navigable inland waters
- Identify and review the status of hydrography, navigational products, and Maritime safety Information (MSI) provision
- Consider users requirements for navigational products and services
- Engage with external stakeholders to identify new data sources, requirements, and potential funding opportunities
- Create and maintain a digital catalogue of navigational products
- Create and maintain a spatial database that contains an inventory of survey extents and meta data for the use of the working group, International Hydrographic Organisation (IHO) and external agencies
- Create and maintain a digital list of Aids to Navigation
- Identify any capacity building requirements specific to African great lakes and rivers

Most of the significant lakes in the region are lacking in official navigation products. Whilst some national and local products are made, few have the capacity to maintain these products. Although there have been previous World Bank funded data collection programmes, they may not have specifically incorporated the production of analogue or digital navigation products resulting from data collected. The UKHO produce a series of six analogue navigation charts covering Lake Victoria, although due to a lack of information these charts are no longer updated. Availability of hydrographic surveys and safety information has been limited. The group seeks to open-up, share and develop awareness of activities in the region, ultimately leading to the delivery of a sustainable and modern navigational product to meet the needs of the Mariner and Marine User.

2 The plenary: Topics of discussion and presentations

A rich programme was developed between Malawi as Hosts and the United Kingdom as Interim Chair. Prior to plenary there was a ceremonial opening by Deputy Minister of Lands, Malawi – Honourable Deus Gumba MP; this stressed the importance of the event. Each nation had prepared a presentation pertinent to their inland waters. These highlighted the challenges faced in data collection, sharing and promulgation, notwithstanding their commitment to developing in the field of hydrography. They also demonstrated the breadth of work in the field of hydrography being implemented in the region.

The following topics were tabled for discussion:

- MSI – The group considered the opportunity to develop an App to enhance MSI in the region. A



Fig. 2 RV Timba.

low-cost solution providing information access to anybody with a mobile phone.

- Marine Spatial Data Infrastructure (MSDI) – The SAIHC MSDI Working Group Chair (UK) provided an overview of MSDI and recent developments across the United Nations (UN) and how this is aligned within the IHO. The United Nations Integrated Geospatial Information Framework (UN-IGIF) provides a basis and guide for developing, integrating, strengthening, and maximizing geospatial information management and related resources in all countries. It will assist countries in bridging the geospatial digital divide, secure socio-economic prosperity, and to leave no one behind. IGIF is developing a quantitative and prescriptive “Quick Start” guide for nations beginning their IGIF-aligned MSDI implementation plans. The session generated a discussion on how the regional MSDI working group can better incorporate the needs of the inland waterways.
- Hydrographic surveys and understanding water levels – The Interim Chair gave a presentation detailing hydrographic surveys recently acquired by the UKHO for Lake Victoria. The UKHO has experienced challenges in understanding the variety of vertical datums present throughout the region. Additionally, significant changes in water levels and their impact on surveys need to be fully understood.
- User requirements, charting now and in the future - The interim chair shared with the group the UKHO's aim to produce new digital coverage of Lake Victoria. The group discussed sub-ECDIS opportunities and whether there was appetite or requirement to develop this service throughout the region.
- Data sharing – The interim chair led the discussion on how to improve the flow of data in the region, to allow continued maintenance of navigational

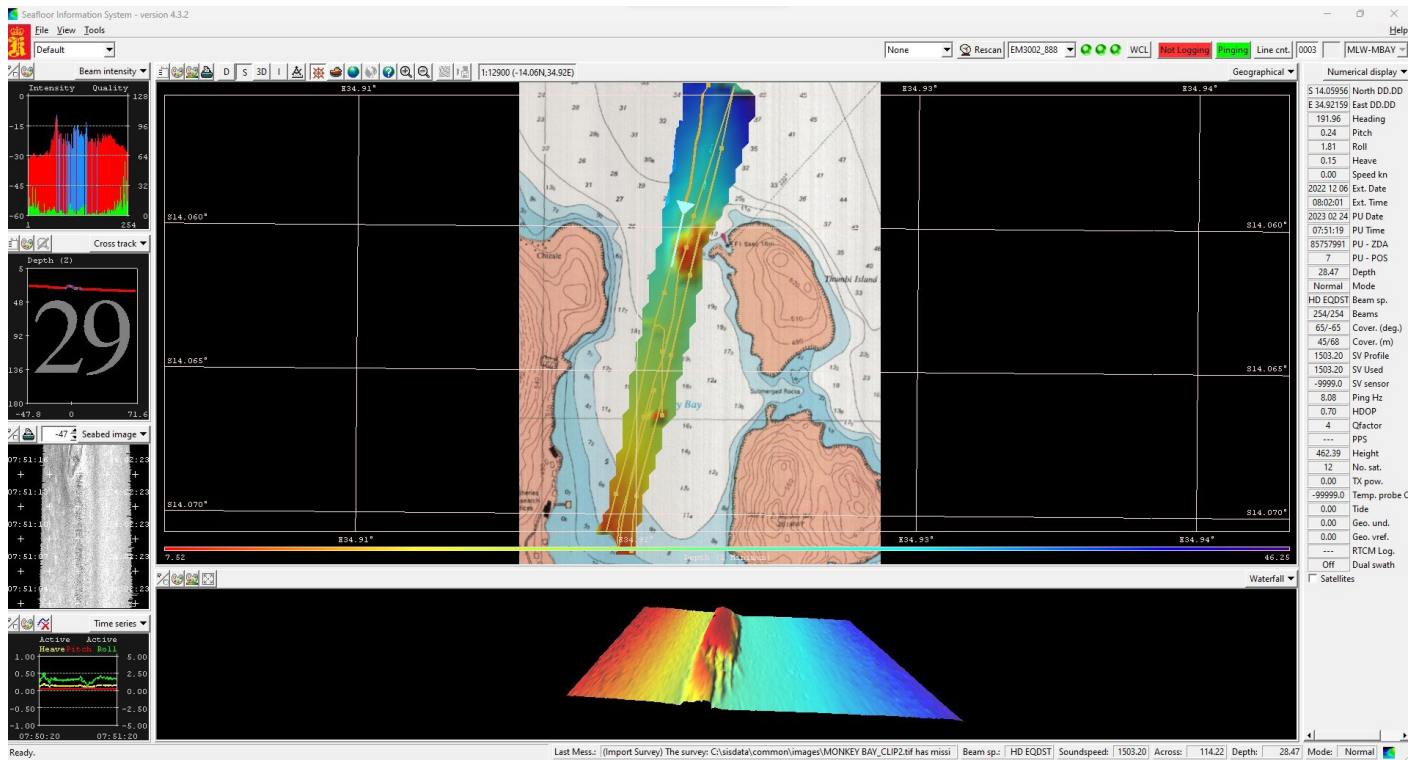


Fig. 3 Display system onboard.

products and raise awareness of data as well as promoting the sharing of data between regional stakeholders.

3 Rationale for providing a data collection demonstration

Following a vibrant discussion during SAIHC18 in Maputo, it became clear that the most effective way to bring to life the challenges, opportunities and requirements of the great lakes and rivers community, would be through practical demonstration for key stakeholders. For efficiency, this was combined with a plenary meeting to advance core items of the working group. Malawi, through the Surveyor General, Mr. Julius Chisi, offered to host the 5th AGL&Rswg, and most importantly facilitated the opportunity to work together with industry in providing a practical data collection demonstration. Whilst very intuitive and valuable contributions have been provided during previous virtual meetings, it was recognised that a practical session in-region would really bring to life the challenges and opportunities and would achieve greater collaboration.

4 Data collection vessel

Research Vessel (RV) Timba is a Survey Vessel of the Hydrographic Unit, at Monkey Bay, Malawi. She was constructed by Societe Francaise De Constructions Navales (SFCN), a French Company in 1988 and commissioned in 1989. The vessel has a displacement of 70 tonnes, length of 21 m, waterline length 19.11 m, beam of 5.55 m, draft of 1.5 m, and can accommodate 11 crew members, including hydrographers.

RV Timba is mounted with dual Single beam echosounder Atlass Deso 22 (not functioning) and Syledis beacons (outdated) for soundings and position respectively. Since its commissioning she has been engaged in harbour, Lake Malombe and Shire River hydrographic Surveys.

In 2001, the positioning system was upgraded to a modern positioning system and a Racal Differential GPS was installed. RV Timba went for refit between 2009 and 2021 when the new C7 Caterpillar Engines were installed. At present she is back in the water waiting for the installation of new hydrographic equipment.

5 The practical demonstration

The practical demonstration of data collection using MBES equipment installed on the RV Timba took place the day after the AGL&RWG plenary meeting concluded. There was a significant amount of coordination, planning and investment to set this demonstration up effectively and efficiently prior to the practical day. This proved invaluable in maximising the short time available in Monkey Bay.

Kongsberg Maritime, Single and Multibeam Echo Sounder manufacturer based in Norway, sponsored the demo and contracted their business partner in Mozambique, GeoSystems Ida, to conduct the live demo using their own system onboard RV Timba.

The demonstrated system comprised:

- 1 ea. KONGSBERG EM 3002 Multibeam Echo Sounder with Kongsberg SIS real time acquisition software

- 1 ea. KONGSBERG Seapath 130-H (with MRU-H) GNSS/Attitude Sensor
- 1 ea. Valeport SWIFT sound velocity profiler
- 1 ea. GNSS Base Station LEICA GS10 with UHF Radio Modem for Differential Corrections

Once in place, and with the assistance from representatives of RV Timba, the installation was seamless.

Based on discussions some weeks in advance, Geosystems had engineered an adaptor bracket for the EM 3002, which made the installation of the EM 3002 onto RV Timba's over-the-side pole very simple.

This was achieved by an adequate measurement of the lever arms between the MBES, GNSS and attitude sensor, so the system could operate correctly. From commencing the installation, the whole task took six hours to complete.



Fig. 4 The African Great Lakes & Rivers Sub Working Group preparing to board RV Timba in Monkey Bay.

Table 1 Statistical summary of the practical demonstration.

Vessel		RV Timba – Malawi Hydrographic Unit	
Survey equipment		KONGSBERG EM 3002 MBES	
		KONGSBERG Seapath 130-H (with MRU-H) GNSS/Attitude Sensor	
		Valeport SWIFT sound velocity profiler	
		GNSS Base Station LEICA GS10 with UHF Radio Modem for Differential Corrections	
Sponsor		Kongsberg Maritime AS, Sensors & Robotics division	www.kongsberg.com
		United Kingdom Hydrographic Office	UK Hydrographic Office - GOV.UK (www.gov.uk)
Practical session delivered by		GeoSystems Ida	www.geosystems-mz.com
Nations attending		Kenya, Malawi, Mozambique, Uganda, Zambia, United Kingdom	
Other attendees		Lake Victoria Basin Commission (LVBC)	www.lvbc.com.org
		Port Management Association of Eastern and Southern Africa (PMAESA)	www.pmaesa.org
		Regional Centre for Mapping of Resources for Development (RCMRD)	www.rcmrd.org
Survey location		Monkey Bay, Malawi	
Survey days		3 (including set up and calibration)	
Area surveyed		Approx. 304,000 m ²	

In the morning of the demonstration event, RV Timba was taken out for a quick calibration/patch test, and once in place, the survey vessel was ready to undertake the data collection.

Once the AGL&RsWG boarded, the group was introduced to the day's proceedings by Surveyor General, Mr. Chisi and Geosystems, led by Mr. Nuno Gomes. Mr. Gomes gave the group a step-by-step summary of their KONGSBERG hydrographic survey system, including the prior set up and calibration, before RV Timba set sail. An explanation of the data acquisition process and methodology was provided, through efficient use of MBES survey capability.

The KONGSBERG EM 3002 system operates at 300 kHz, and has long since been replaced by its successor, EM 2040C. But nevertheless, the EM 3002 still performs perfectly, and was able to provide a good data set to support the Hydrographic Unit of the Ministry of Lands in Malawi.

6 Conclusions

This unique opportunity, brought nations, other organisations and industry together, and empowered a greater awareness of the importance of hydrography to those communities that live on, around and connected to significant lakes and rivers. The activity provided a focus to the specific challenges faced by regional stakeholders and identified collaborative solutions to maximise limited resources. The inland waterways and rivers provide a network of corridors, enabling trade and development, they are critical to the region's "Blue Economy". Valuable collaborative partnerships were forged during this event; this will further progress as we look into the needs of the region and look at wider funding opportunities to accelerate the initiatives.

Kongsberg Maritime and GeoSystems Ida were delighted to contribute to this event and RV Timba proved to be a good platform for this activity. Going forward, Kongsberg Maritime would be honoured to contribute further with IHO Capacity Building Programme activities on the African continent.