FOR SAFETY OF NAVIGATION ON THE THIRD LARGEST LAKE IN AFRICA

Hydrographic Survey Lake Malawi: A bilateral co-operation (Malawi - Iceland)

Lake Malawi, being close to 25,000 sq km, occupies over a fifth of Malawi and is a veritable inland sea. At its deepest it is over 700 metres, which is actually 230 metres below sea level. It is probably the most significant natural endowment of the country and together with its single outlet, the Shire River, plays a significant role both historically, economically and as a means of communication. It has played a major role to the communities of Malawi as it runs parallel or adjacent to the country which lies mostly to west of the lake. There are over 500 fish species most of them endemic to the lake.

Some of them are prized by aquarists the world over. Also as a source of protein, the fish provide seventy per cent of all protein requirement in Malawi - a readily available cheap source of protein. Most of the power supply in Malawi is generated by hydropower using the waters from Lake Malawi, which empties into the Shire River. The renowned explorer David Livingstone came to Malawi, then Nyasaland, on a boat from the Indian Ocean through the Zambezi River and the Shire River which provided better navigation than the Zambezi, up to the southern end of Malawi.
Even though Malawi is known as a landlocked country the author believes that the fact that the early explorers came into Malawi by boat has been mostly ignored and with it, its great potential as a waterway has gone unnoticed. It should also be noted that the lowest place on the southern tip of Malawi is actually 37 metres above sea level whereas the distance to the ocean is just about 300 kms, giving a very low gradient which allow for the possibility of shipping.

Early Surveys
The first proper surveys of Lake Malawi were those of Edmund Rhoades at the turn of the last century. Then in the 1950s a Hydrographer to the Royal Navy was engaged to commence surveys on the lake after the ship Viphya, capsized with a considerable loss of life in 1946. Even though the charts produced were of a good standard, considering the current great advancement in technology and frequent changes in lake level, they are no longer adequate and ship accidents have continued happening due essentially to outdated chart information.

A Hydrographic Project
The hydrographic project of Lake Malawi started in earnest with the building of the 70-ton ship Timba with assistance from the French government and the inauguration was in 1989. Essentially this was a capacity building period. Positioning equipment was the Syledis radio positioning and a Furuno analogue echo sounder, which was basically for navigation and fishing, but was in 1992 replaced with an Atlas Deso 22 echo sounder which has been operating well up to now. Due to insufficient operational funding meaningful work could not be embarked on, apart from contract work for harbour construction / improvement and surveys carried out to monitor siltation on the Shire river. The same chart datum as used in previous charts was maintained since there was no problem arising from this and this would also allow for the fullest use of the old work for comparison purposes. The main reference benchmark is at Monkey Bay Lake Service shipping dockyard. For calibration of the echo sounder the traditional bar check method was used.
The project was therefore truly resuscitated by through the Iceland (the Icelandic International Development Agency) and Malawi bilateral co-operation, which started at the beginning of 2001. This time great strides were made in technological advancement and in less than four months we had put into use Racal DGPS, Hypack Max hydrographic software for data acquisition and processing, Vale Port automatic tide gauge and a sound velocity profiler. Currently a new acquisition is the Grab corer, which will let us have a sample of the surface bottom sediments and in conjunction with the echo sounder, acts as a ground-truthing for the description shown on the echo sounder and as denoted on charts which, among other uses, is useful for anchoring properties.
Above all, the personnel have shown great adaptability and versatility at handling and using this equipment which was installed by the Icelandic Technical advisor who, in a relatively short time, managed to create a modernised hydrographic office with a working local computer network and made sure that the data capture onboard ship and data processing at the office was functioning as required. The digitising table and survey software / programs were installed and in a working order. Thus technological transfer was successful and from equipment which at first hand appeared out of this world in a developing country such as ours, were so well adopted by the hydrographic team and in the formative months we were able to discard the old equipment and with the new equipment produce a survey of the approaches to Shire River for the Shire River Augmentation Project.
Currently, two charts, one of 1:10,000 scale and another of 1:50,000 have been compiled and are awaiting printing and it is hoped that

these will be printed this April. By the end of this year we hope to have done six charts at of scales 1:10,000 and 1:50,000. (See Tables 1 and 2.)
Apart from the framework, the charts will be produced by manual cartographic methods such as scribing and stripping text values, of which our cartographers are well conversant,
even though it tends to slow down scheduled plans for printing. Discussions are under way to acquire modern methods of chart production. A move into automated methods of chart production would be commensurate with the automated hydrographic data acquisition and processing methods already in place.

Training
With proper training the change to automated cartographic software such as CARIS, should present no insurmountable difficulties. The ability to handle new equipment and software has already been demonstrated in the survey and processing stages whereby our personnel who have had no previous training in hydrography have assimilated new ideas and made good use after little orientation on the job by the Hydrographic consultant and the author. However, formal training in nautical cartography and hydrography in international institutions cannot be compromised if we are to achieve the standards which we are striving for, as set out by the international hydrographic community. It is hoped that avenues for training will be opened up and candidates from Malawi will be admitted where chances have not materialised in past years. In recent years Malawi has participated in the Southern African and Islands Hydrographic Commission (SAIHC) conferences where the plight of the Malawi Hydrographic Office has been heard and there appear to be solutions at the end of the tunnel. Apart from this, the project lacks a smaller vessel to carry out surveys in shoal waters and it is hoped that as more progress is attained those remaining gaps will be plugged to make a showcase of this hydrographic adventure.

Conclusion
The work to be carried out on Lake Malawi will take many years in view of its vastness. The lake has a well-respected place in navigation circles. Those who sailed and surveyed it have always noted that great care of seamanship, equivalent to ocean shipping, has to be taken. Boats with engine failure have been known to have drifted the length of the lake with no help in sight and have been found on the Tanzanian harbour of Mbamba Bay with the crew in very poor condition and lucky to be alive.
With adequate assistance from those entrusted to provide it we hope to achieve the aims of the project which are compliant to safety of navigation for the seafaring communities neighbouring the lake and others who benefit from it.