

Voyage to enhance scientific training in Africa

By Tshego Letshwiti



Above: The IIOE Expedition team aboard the SA Agulhas II after arriving in Dar es Salaam.



Above: Trainees from Tanzania and the University of Fort Hare pose for a picture with their trainer, while examining some of the samples found after the Dredge was sent out.

The Department of Environmental Affairs' (DEA) research and polar vessel, the SA Agulhas II entered into its second year of participating in the International Indian Ocean Expedition (IIOE2), as part of South Africa's training and capacity building voyage. On-board were DEA research staff and trainee-participants from Tanzania, Comoros, Kenya, Madagascar, Congo, Zimbabwe and Mozambique.

The second voyage aboard the SA Agulhas II started on the 10th of June and ended on July 13th, where a total of 46 stations (stops made to assess the ocean and its inhabitants) were completed at the end of the research cruise, having covered Tanzanian and Comorian waters.

The IIOE2 is a multi-national programme of the Intergovernmental Oceanographic Commission (IOC) which emphasises the need to research the Indian Ocean and its influence on the climate and its marine ecosystem.

The IOC recognised that there was a persistent lack of basic long-term environmental information in the Indian Ocean, particularly for developing countries surrounding the Indian Ocean. As a result, the IOC decided to declare the beginning of the IIOE2, 50 years after the first IIOE. This renewed interest in the area has brought numerous research voyages with state-of-the-art technology. The data collection covered physics, chemistry, plankton, biodiversity, large animals such as whales and seabirds as well as geology.

Gathering of basic long-term environmental data and information will place the developing countries of the Indian Ocean, in a better position to conserve the integrity of its ocean, find ways to unlock their respective potential Ocean Economies to improve the lives of their citizens; and to better detect and adapt to ocean related threats to coastal communities and infrastructure. All this data provides important information in understanding the ocean environment and its links to developing a successful sustainable Ocean Economy.

In 2017 South Africa accepted the Chair of IORA and cabinet approved the utilisation of the DEA's research vessels, SA Agulhas II and RV Algoa, as research platforms in the region during the IIOE2 period to not only further our own information in South African waters but to assist our African neighbours in understanding theirs.

Chief Scientist of the cruise Ms Keshnee Pillay said the voyage was a great success. "The second South African led IIOE2 training cruise was a success leaving all involved with more skills, confidence and friends, than when we began. It's the first and vital step to an African Network where we work together for common causes and goals," added Ms. Pillay.

Some of the research conducted includes using an instrument which measures the conductivity, temperature and water depth (referred to as CTD) which is deployed on every survey point. It can be used to show the differences in temperature of the water from the surface to the bottom of the ocean. During an era of potential warming ocean,



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this is an important factor to monitor as it could have severe impacts on livelihoods.

The CTD which has an oxygen sensor and fluorescence sensor that measures how much chlorophyll is in the water, can also be used as a measurement of phytoplankton (organisms that produce half of the world's oxygen). Bottles are triggered at different depths and fill up with water. The water is used to calibrate the sensors on the CTD as well as for analysis of the kinds of phytoplankton and micro-plankton plastics microbes are in the water.

The Bongo and MultiNet, are nets with a probe for temperature depth and amount of water flowing through the nets. The nets collect zooplankton which is being used for plastic analysis, zooplankton biomass (amount of food available in the environment to bigger organisms), amount of fish eggs and larvae in the water, microorganisms, DNA and genetics testing of Plankton.

Additionally, top predator surveys conducted during this expedition made for an exciting part of the cruise. Observers search for whales, sharks, turtles and marine birds as environmental sampling continues. This is an equally important exercise as generated data, whether it be diversity or abundance can be used in the ecosystem level management approach; and will help in getting a holistic view of ecosystems. For example, understanding the distribution of marine mammals in the region can contribute towards the determination of marine mammal important areas.

Consequently, efforts can be pursued to temporarily or seasonally suspend certain activities during key animals' activities including breeding and feeding. The IIOE2 is amongst the initial steps taken towards a region wide co-ordinated research effort which is aimed at better conservation management of common species between the Indian Ocean nations in Africa. One such species is the migratory humpback

The scientific expeditions will also contribute towards the establishment of Regional Centres of Competence to build capacity, as contained in the IOC Sub-Commission for Africa (IOCAFRICA) strategy document within South Africa, Mauritius, Mozambique, Madagascar, Comoros, Tanzania and Kenya. In order to facilitate cooperation and strengthening of capacity the centres were defined, based on existing initiatives within the selected country:

- Cape Town, South Africa: Operational Oceanography
- Port Louis, Mauritius: Satellite Remote Sensing
- Zanzibar, Tanzania: Biodiversity
- Mombasa, Kenya: Data and Information Management

These centres will also act as regional training facilities, collaborative areas and to allow for regional and international experts to run hands-on training workshops, etc.

South Africa, too, has committed to this very important initiative with research voyages in our own waters of the Indian Ocean. Within the ocean context and its links to climate change, national efforts must be coordinated with regional programmes, as many of the processes occur and impact several countries at once. The impacts of extreme ocean-based events will affect both economic and social aspects of the country. This is very relevant in South Africa when considering the Ocean Economy strategy within the broader NDP-Vision 2030, in addressing economic growth, poverty alleviation and job creation.



Above: CTD being lowered into Tanzanian waters. The CTD has an oxygen sensor and fluorescence sensor that measures how much chlorophyll is in the water, it can also be used as a measurement of phytoplankton (organisms that produce half of the world's oxygen).



Above: DEA's researcher deploys the Argo float which measures ocean temperature, salinity and oxygen while drifting with Oceanic Currents.



Above: DEA researchers with a North-West University trainee sampling the presence of magnetic metallic elements and micro-plastics in the seawater.



Above: DEA Researcher explains to trainees from Tanzania, Kenya, and Mozambique, about seawater filtration for chlorophyll analysis after taking samples from the CTD.