

SA supports innovation in oceans

By Gaopalelwe Moroane and Tshego Letshwiti
Images by Millicent Makoola and Diane Le Gouvello

This year South Africa joined the world in celebrating World Oceans Day on 8 June 2020 under the theme: Innovation for a Sustainable Ocean.

As the challenges to the ocean continue to grow, so does the need for novel solutions and the people driving them. South Africa hasn't been left behind in the innovation of tools to manage and protect South Africa's coastlines. One such tool is the national Ocean and Coasts Information Systems (OCIMS) developed by the Department of Environment, Forestry and Fisheries (DEFF) in partnership with the Department of Science and Innovation.

The system relies on several government agencies contributing their specialised data or information to a central platform to create products that can be used by the shipping, fishing and aquaculture industries.

At present the OCIMS system is designed to do the below:

- Track vessels around the South African coast to assist in vessel operations;
- Pollution incident management;
- Search and rescue and monitoring fishing by larger vessels in offshore marine protected areas;
- Provide alerts on algal blooms that may be potentially dangerous to coastal users and fish farms and;
- Other tools allow for coastal managers to gather and display information of different ocean uses.

Below are short overviews of the tools available on this innovative website.

Marine Spatial Planning Support Viewer

Marine Spatial Planning (MSP) Support Viewer Decision Support Tool (DeST) provides consolidated view of data sources that can inform MSP and the development of Marine Area Plans (MAPs). The MSP Support Viewer DeST contains relevant and accessible spatial data from authoritative sources and use a merged data source approach for data assimilation. Further developments will focus on the first MAP area (i.e. Knysna to Port Elizabeth) and introduce a theme base structure for the data.

Coastal Flood Hazard Decision Support Tool

The Coastal Flood hazard support tool on OCIMS provides disaster managers, spatial planners and the general public with an estimate of coastal areas that are potentially at risk of flooding. This tool intends to give a first indication on which areas are at risk of flooding. It can be used for populated areas but also for currently undeveloped areas to assess whether future development might be at risk.

Integrating climate change adaptation and disaster risk reduction measures through a risk management approach will help to reduce future losses from flood events.



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Integrated Vessel Tracking Decision Support Tool

The Integrated Vessel Tracking tool provides the capability of monitoring vessels movements based on both transponder information (such as AIS), Vessel Management System (VMS) and Long Range Identification and Tracking (LRIT) as well as coastal radar and airborne surveillance, as well as vessels detected using SAR data and provides notifications when vessels are within Marine Protected Areas.

Regular surveillance of territorial sea areas is increasingly important for coastal nations. Signatories to the United Nations Convention on the Law of the Sea (UNCLOS) can establish a territorial sea out to 12 nautical miles from the coastline and an Exclusive Economic Zone (EEZ) of up to 200 nautical miles.

Fisheries and Aquaculture Decision Support Tool

South Africa's west and south coasts have frequent occurrences of Harmful Algal Blooms (HAB). The Fisheries and Aquaculture Decision Support Tool provides a capability for monitoring and assessing risk of HAB events for the South African coastal area to approximately 50 km offshore.

Water Quality Decision Support Tool

The purpose of the Water Quality Decision Support Tool is to provide support to coastal managers' decision making processes by providing a consolidated view of various remote-sensed and in-situ sources of water quality data.

It is also expected that scientists and researchers will need access to consolidated and integrated datasets that allow for understanding of historical conditions and comparison with other, relevant datasets.

Marine Predators Decision Support Tool

The Marine Predators Decision Support Tool gives members of the public and scientists the ability to view marine predator observation data captured from iNaturalist, marine predator sightings data captured from the SEAFARI mobile application and boat-based whale observation data from the Department of Environment, Forestry and Fisheries (DEFF) on a map.

The Coastal Operations at Sea Decision Support Tool

The Coastal Operations at Sea Decision Support Tool (DeST) provides a capability for monitoring and predicting ocean and sea state variables in the coastal ocean using state-of-art forecasts of winds, currents and waves, which are provided by numerical models that simulate and predict ocean and atmospheric conditions.

Ocean and atmosphere general circulation models are complex mathematical models, that use the Navier-Stokes equations on a rotating sphere as the basis for computer programs to simulate the Earth's atmosphere or oceans on a range of spatio-temporal scales.



Above: The African Penguin (*Spheniscus demersus*) is Africa's only extant penguin. (Photo by Millicent Makoala)



Above: A Loggerhead turtle. (Photo by Diane Le Gouvello)



Above: DEFF's benthic camera (ski-monkey) used for underwater observations aboard the SA Agulhas II. (Photo by Tshego Letshwiti)



Above: Samples of dissolved oxygen, dissolved alkalinity, nutrients and chlorophyll being taken from the Conductivity Temperature Depth (CTD) device. (Photo by Tshego Letshwiti)