GMES AND AFRICA

African Union

CSIR
Touching lives through innovation

MarCOSIO Aquaculture Service: Helping authorities to safeguard marine resources from Harmful Algal Blooms

BACKGROUND:

The west coast of South Africa is a productive upwelling area with frequent occurrence of phytoplankton blooms. While not all of these blooms are harmful, some may occur at extremely high biomass concentrations that often turn the water a dark red colour – known as "red tide". Under certain conditions these blooms can cause low oxygen concentrations in the shallow waters of the bay, leading to stranding and/or death of marine life in the immediate area. An economically devastating consequence of these events is the stranding of West Coast Rock Lobster (WCRL) on the beaches of Eland's Bay. These WCRL are a scare and valuable national resource, and in the event of a stranding it is imperative that as many lobsters as possible are collected within the first 24 hours and returned to the sea in a safe and bloom-free environment.

The MarCOSIO Aquaculture Service provides satellite-derived information products that assist decision-makers in determining the risk level associated with ongoing environmental conditions.

MarCOSIO

KMFRI · NATIONAL SEA RESCUE INSTITUTE · UNIVERSIDADE EDUARDO MONDLANE · WIOMSA · reef CONSERVATION · ABALOBI · Benguela CURRENT CONVENTION · CORDIO East Africa

END-USER'S PROFILE (BENEFICIARY ORGANIZATION):

The legal mandate and core business of the Department of Forestry, Fisheries and the Environment (DFFE) are to manage, protect and conserve South Africa's environment and natural resources. Part of the mandate of the DFFE is the enforcement of the Marine Living Resources Act, including the conservation of marine living resources for present and future generations, the preservations of biodiversity, and the minimization of marine pollution. The DFFE has developed the WCRL Contingency Plan, a response plan in the case of WCRL strandings. DFFE Inshore Fisheries Management Department oversee continuous monitoring the WCRL resource and the environmental conditions in order to determine the classification status for the WCRL contingency plan.

END-USER'S NEEDS:

DFFE requires an up to date synoptic overview of the phytoplankton biomass concentration in the St Helena Bay area in order to classify the environmental status as it relates to the WCRL contingency plan:

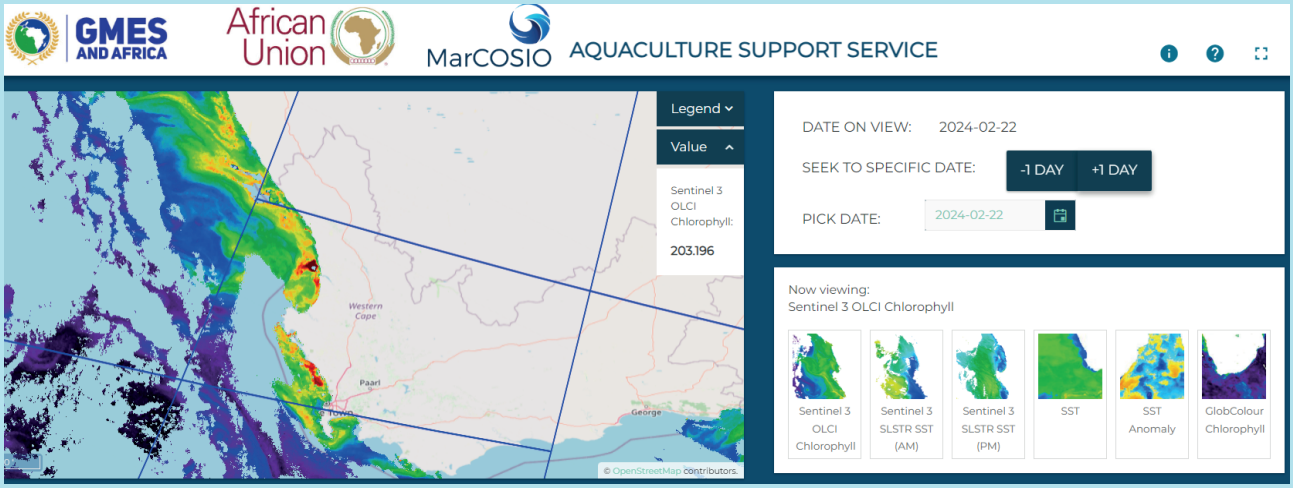
- situation green – normal ocean conditions, or no bloom
- situation yellow – satellite images show large algal blooms in the area; ocean conditions show drop in oxygen levels, change in colour, onshore wind direction, dead marine life on beach. At this point supporting government and non-government agencies are informed of the situation, personnel and resources are placed on stand-by for deployment to the beaches.
- situation red – WCRL beaching has occurred. Depending on the tonnage of WCRL on the beach, designated role players are deployed to: man a joint operation centre 24/7; mobilize workers, crates and transport; cordon off the beach; close nearby roads; erect signage; maintain law and order; collect and return live WCRL to ocean; dispose of dead WCRL.

INFORMATION PROVIDED:

The MarCOSIO Aquaculture service provides daily near-real time mapped products of regionally optimized Chl-a concentration (as a proxy for phytoplankton biomass), derived from Sentinel 3 OLCI reflectance data. These data are supplied at 1km spatial resolution and are updated on a daily basis, and provides a synoptic overview of the location, size and persistence of potentially harmful high biomass blooms. Additional products on the web-service include twice-daily Sentinel 3 SLSTR Sea Surface Temperature (SST) products at 1km resolution, as well as 5km interpolated SST and SST anomaly, and 4km interpolated Chl-a products.

USAGE:

Under normal (no bloom) environmental conditions, DFFE would use the web service to assess phytoplankton bloom risk - it may be checked daily during the spring to late summer bloom season, i.e. between November and May.



When a bloom is noted in the St Helena Bay area, full resolution (300m) Chl-a and phytoplankton type products (in png format) for the area are disseminated by MarCOSIO/ CSIR scientists via a dedicated WhatsApp channel, accessible to all role-players in the WCRL contingency plan – this enables sharing of both informative figures in addition to text summaries and externally sourced information (i.e. swell and wind forecasts), and allows users to ask questions and make decisions with scientific support.

IMPACT:

Since the implementation of the MarCOSIO Aquaculture Service, several WCRL stranding events have taken place, including an event in 2023. In all cases the DFFE were provided with early-warning synoptic information to inform the appropriate status of the WCRL Contingency Plan, towards the timely implementation of situational escalation. During 2023 this enabled several hundred kilograms of WCRL to be rescued and safely returned to the ocean. The estimated WCRL total allowable catch per year is valued at over $18M, thus safeguarding the industry is of utmost importance.

OUTREACH:

The service has been showcased at several local and international conferences and workshops over the past few years, including the AfriMAQUA International Conference (Mombasa, Kenya), GEO Blue Planet Workshop (Nairobi, Kenya) and webinar events promoted

via MarCOSIO social media. Blog posts about the service's use for Rock Lobster Walkout support has also been produced for MarCOSIO and EUMETSAT. There are potential opportunities to broaden the service to include support for marine aquaculture suitability studies in African coastal regions.