

Kenya ANNEX VI. A summarized, prioritized, list of requirements for data collection OR analysis (processing/modeling/integration) OR repatriation to inform the national MEDA

1. Verification of Model and Satellite outputs in the Western Indian Ocean

Objective of the Study

The main objective is to improve the understanding of the East African coastal ocean circulation patterns using observed data over the region.

Specifically to establish;

- How well the ROMS model replicates the surface flow of the East African coastal ocean circulation as observed by the real time data.
- How well the AVISO satellite altimetry products compare with the real time data.
- How well the volumetric and speed values as observed by Beal et al 2003 compare with the observed real time data.

Data required

- Depth section of the current speeds
- Temperature profiles with depth.
- Salinity profile with depth.

Data acquisition

This will require the deployment of ADCP, CTD and XBT equipments by a research vessel

Data Analysis

Matlab scripting will be extensively employed to manipulate the observed data. The products to be computed will include volumetric flow of the currents, spatial plots of SSTs and salinity at different depths using Matlab krigging method, heat fluxes and depth sections of Temperature, salinity and current speeds.

Methods such as Continuous Wavelet Transforms (CWT) and Hovmöller plots which exploit the computational power of Matlab will be used in the analysis of the observed data. Data interpolation using Matlab will be employed to address the data sparsity in the observations.

Workplan & budget

No.	Activity	Method	Delivarables	Budget (USD)
1	Data acquisition	Participation in the cruise	Raw data	20 days ship time
2	Acquisition of Equipment and Software	Purchase	2 Laptop, 1 PC Workstation with Linux & Window Vista, ODV and Matlab software	6,000
2	Data Visualization	Ocean Data View	ODV products	Free

3	Data Analysis (training workshop)	Model Run, Matlab scripting, Data krigging	Products <ul style="list-style-type: none"> • SST spatial plots • Salinity plots • Temperature profiles • Velocity profiles 	15,000
4	Report writing (workshops)	Results interpretation, discussion and conclusion	Research Paper	10,000
4	Evaluation Report (workshop)	Project Assessment	Improvement of subsequent cruises, and projects developments, improved understanding of ASCLME objectives, Gain skills in handling of Oceanographic data, improved understanding of ocean processes	5,000

2. Investigation on Shifting Hydrography of East African Boundary Current off Kenya Coast During the End of the Southeast Monsoon

Objectives

1. Determine hydrographic structure for the Kenya shelf at the end of SEM in relation to the currents and velocity observations (ADCP).
2. Investigate flow structure variation and to estimate transport, especially in water immediately to the north of Pemba Island and near NKBs where Island wake and frontal-ridge dynamics at 5°S, and topographic and Ungwana Bay steering of EACC may impact strongly on its structure.
3. Investigate sea level and wind forcing using meteorological data and later additional data from coastal sea level and meteorological stations, satellite data and other related oceanographic data in world data bases in order to attempt an explanation on reversal mechanisms in ASCLME system towards the end of SEM.
4. Investigate topographic feature at sea bottom that are expected to have some influence on EACC flow dynamic or structure, especially the sea mounts to the north of Pemba Island and north Kenya coast.

Workplan:

- (1) The Shimoni (or south coast) transect along ~ 4.5°S,
- (2) The Mombasa transect along ~ 4.0°S,
- (3) The Ungwana Bay-North Kenya Banks transect along ~ 2.5°S

Activities & Budget

ACTIVITY	BUDGET (USD)
1. Measurements of salinity, temperature, density and oxygen using CTD-Rosette sampler	20 days ship time
2. Continuous measurement of current and direction along specifies transects using ADCP	20 days ship time
3. Obtain observations data on sea state, meteorological parameters especially wind speed and direction	20 days ship time
4. Bathymetric measurements using multi-beam echo sounder	20 days ship time
5. Collection of other physic-chemical parameters	20 days ship time + boat
6. Capacity building and training of scientists and infrastructure development	To be determined later

Data analysis

- Various data analysis softwares-Matlab and Statistica will be used
- Caris software will be used for Multi-beam data analysis.

Data acquisition

- CTD-Rosette sampler, XBT
- Salinometer and ADCP,
- Multi-beam echo sounder
- Small boat to be launched from a Vessel to collect oceanographic data in shallow areas e.g. Ungwana Bay area in north Kenya and near slope water in Shimoni (south coast)-transect($\sim 4.5^{\circ}\text{S}$)
- Meteorological data-wind speed and direction, and sea state, from the Vessel / Nutrient data

3. In-situ assessment of the planktonic structure, occurrence, and primary productivity and the related application of remote sensing in Kenya EEZ.

Objectives

- Determine the abundance (biomass), distribution and composition of plankton in the Kenyan waters
- Assess the applicability of remote sensing as a monitoring tool of the ecosystem health
- Relate plankton occurrence with fish stocks

Work Plan: Activities & Budget

No	Activity	Method	Deliverables	Budget (USD)
1	Acquisition of equipment and software	Purchase	Research Equipment	20,000
2	Data acquisition	Collection of plankton, use of satellite images (MERIS, MSG)	Raw data	20 days Ship time
3	Data Analysis (Workshop)	Non-parametric test for plankton, retrieval of SSTs and Chlorophyll a	Spatial and temporal variations	10,000
4	Report writing (Workshop)	Results interpretation, discussion and conclusion	Research papers	5,000
5	Evaluation report (M&E)	Project assessment	Improvement of subsequent cruises	5,000

4. Survey of nutrients variations as a result of ocean dynamics in the Kenyan waters

Objectives

- Determine the vertical distribution of nutrients at different cruise stations.
- Determine the distribution of nutrients concentration from near shore to deep sea sites at various cruise stations.
- Determine effect of upwelling on the concentration of nutrients.
- Compare the levels of nutrients at different cruise stations.

Data requirement

- Depth profile and water samples will be collected using a CTD/rosette sampler
- Nitrates, phosphate, ammonium and silicate concentrations
- Current velocity profile

Work plan & Budget

No.	Activity	Method	Deliverables	Budget (USD)
1	Data acquisition	Participation in the cruise	Raw data	20 days ship time
2	Acquisition of equipment and software	Purchase	Equipments delivered	20,000
3	Data analysis (training workshop)	Numerous	Reference values	15,000
4	Report writing (workshop)	Numerous	Research Paper	5,000
5	Evaluation (M&E)	Project assessment	Improvement of subsequent cruises	10,000

5. The biodiversity of demersal invertebrates in the Kenyan coast: focusing on Molluscs, Crustaceans and Echinoderms

Objectives

- Gather information and data on the biodiversity of demersal macro-invertebrates
- Relate the distribution, abundance and diversity of the macro-invertebrates with the physical parameters (depth, temperature, salinity, etc.)
- Assess the relationships between populations/communities of demersal invertebrates
- Establish national reference and voucher collection

Workplan : Activities & Budget

Activities	Deliverables	Budget (USD)
Survey of biodiversity data	Collected samples of Species list	20 days ship time
Map abundance and distribution of invertebrates (workshop)	Maps	10,000
Acquisition of equipment	Lab and ship	20,000
Voucher specimen – curation and related (in partnership with NMK)	e-Catalogue of preserved specimen	10,000
Data analysis (workshop)	Technical report Manuscript	5,000