COASTAL ECOSYSTEM MONITORING IN BANGLADESH: A SCIENCE AND CITIZEN BASED APPROACH

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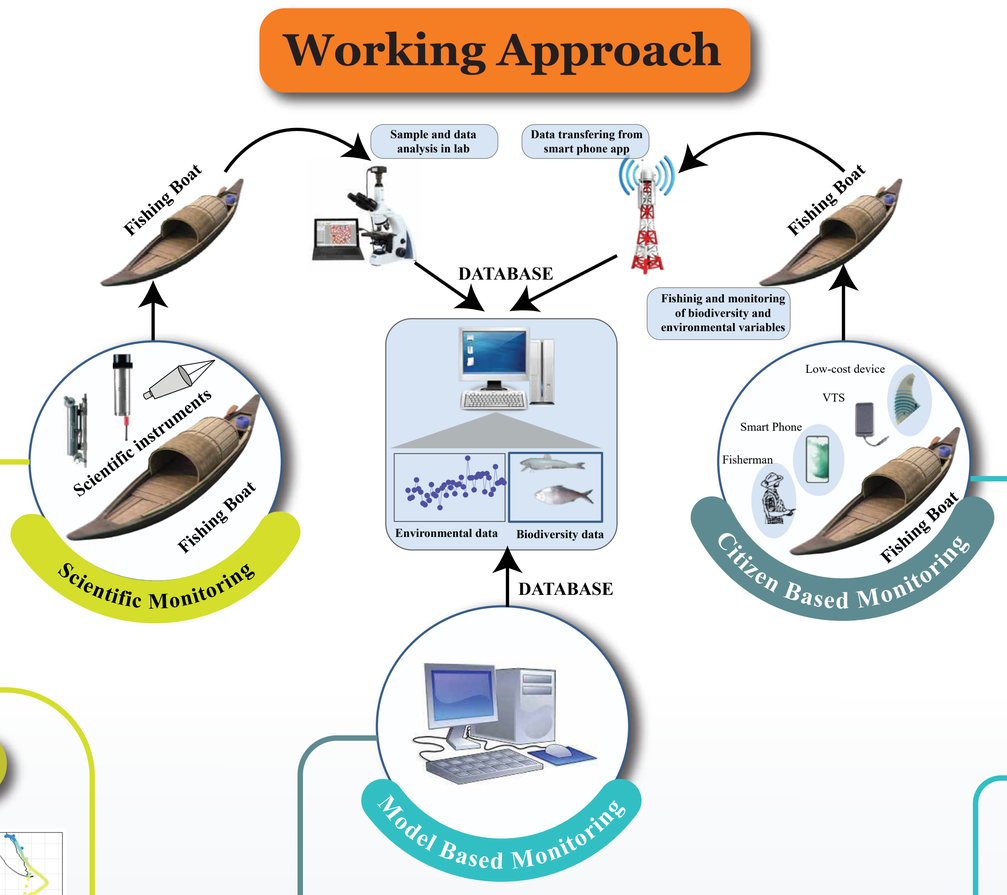
INTRODUCTION

- Bangladesh is a maritime country with about 118000 sq. km maritime area
- Vast maritime area of Bangladesh has huge potentiality for blue economy development
- Limited data of marine ecosystem of Bangladesh is the main limiting factor for the coastal and marine ecosystem management of Bangladesh

- Therefore, an initiative has been taken by the department of oceanography of SUST in collaboration with the department of zoology, University of Dhaka and OLIK limited to develop a monitoring system for the coastal ecosystem of Bangladesh
- The monitoring system is integrated scientific citizen and model based approaches

Working Approach



MONITORING SITE

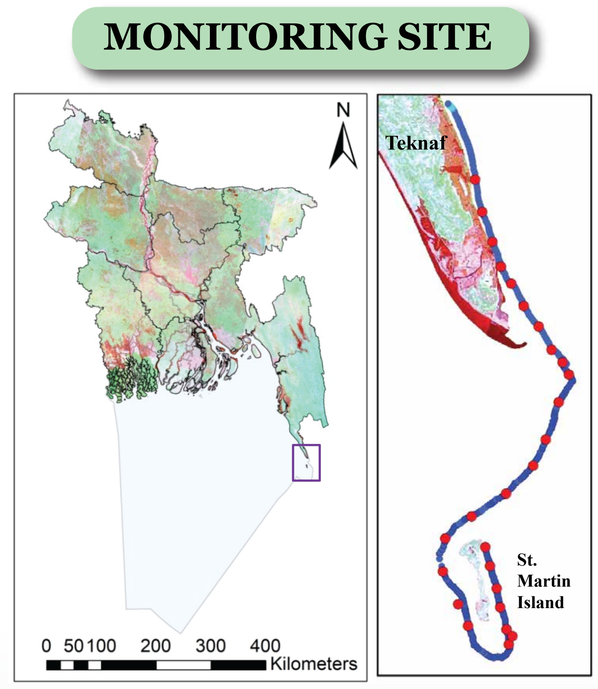


Figure 1: Geographical location of monitoring sites

- Currenlty monitoring activities is conducted in the Naf - Saint Martin Peninsula.
- Naf - Satint Martin is an active fishing area.
- This area is an ideal spot for piloting the concept of scientific, citizen and model based monitoring.
- More than 5000 fishermen are involved with fishing in this area

SCIENTIFIC MONITORING

- Monthly Monitoring is conducted from the Naf - Saint Martin Peninsula
- CTD is used to collected the vertical profile data of temperature, salinity, DO and Chl
- Nano CTD is attached to the fishing boat to collect continuous surface temperature and salinity data
- Algal torch is used to collect turbidity and algal class data
- Plankton net is used to collect plankton samples
- Niskin bottle is used to collect water samples to measure nutrients

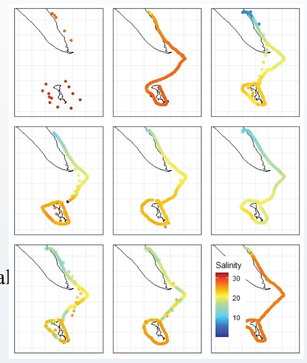


Figure 2: Spatial and temporal variability of surface salinity in the Naf - Saint Martin Peninsula

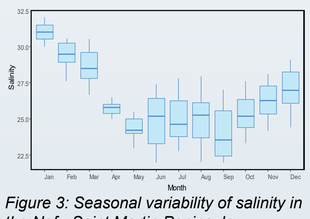


Figure 3: Seasonal variability of salinity in the Naf - Saint Martin Peninsula

Key Findings

- Strong spatial and temporal variabilities in environmental conditions are observed in the study area
- Spatial and temporal variability is controlled by monsoon rainfall and river discharge
- The ecosytem is well mixed
- High nutrients and plankton abundance is observed during winter
- Low salinity is observed during monsoon
- Diatom is the dominant phytoplankton group
- Coscciondiscuss is the dominant phytoplankton genus
- Zooplankton community is dominated by copepod
- Phytoplankton community structure is controlled by salinity and nutrient concentration of the ecosystem

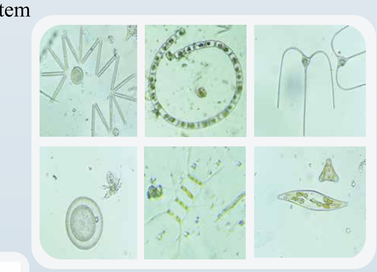


Figure 4: Few dominant phytoplankton species in the Naf-Saint Martin Peninsula

Figure 5: Few zooplankton species in the Naf-Saint Martin Peninsula

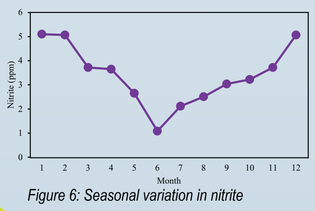


Figure 6: Seasonal variation in nitrite

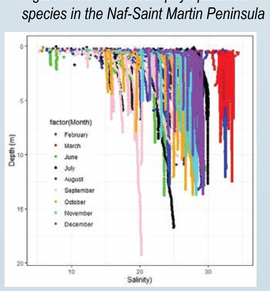


Figure 7: Monthly vertical variability of salinity in the Naf - Saint Martin Peninsula

MODEL BASED MONITORING

- Model based monitoring is conducted to understand the regular changes in environmental conditions at the Naf-Saint Martin Peninsula
- Delf3D model is used to simulate the estuarine environmental conditions
- Monitored environmental conditions: temperature, salinity, DO

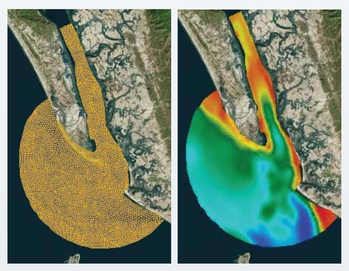


Figure 8: Model domain with mixed grids and water level condition

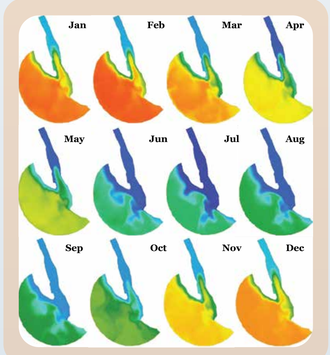


Figure 9: Model outputs of seasonal variability in surface salinity of Naf River Estuary

- The model can simulate the similar pattern of spatial and temporal vari -ability of environmental variables in the Naf - Saint Martin Peninsula
- Currently the model is set to simulate different scenarios for the Naf - Teknaf Peninsula
- In near future, the ocean modelling lab at SUST will develop forecasting system for the major estuarine ecosystem of Bangladesh
- Bathymetry data from Bangladesh inland water transport authority was used in the model
- Simulations are performed at 1 hour time interval
- In-situ data are used to force and validate the model
- Continious model simulations are performed at he ocean modelling lab of department of Oceanography, SUST

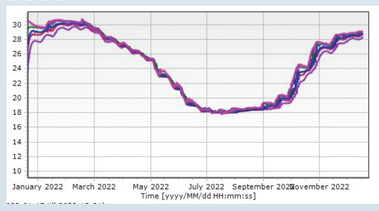


Figure 10: Seasonal variability in surface salinity.

CITIZEN BASED MONITORING

Citizen based monitoring system aims to develop a citizen led monitoring system for coastal and marine ecosystem of Bangladesh

Name	ID	Date	Latitude	Longitude	Temperature	Salinity
Md. Abdulla	AS123	15-Mar-22	20.63202	92.32962	26.3	28.47
Md. Abdulla	AS123	15-Mar-22	20.63109	92.32949	25.57	28.76
Md. Abdulla	AS123	15-Mar-22	20.63005	92.32956	25.46	28.75
Md. Abdulla	AS123	15-Mar-22	20.62903	92.32989	25.34	28.83
Md. Abdulla	AS123	15-Mar-22	20.62819	92.33009	25.28	28.78
Md. Abdulla	AS123	15-Mar-22	20.62734	92.33031	25.22	28.82
Md. Abdulla	AS123	15-Mar-22	20.62651	92.33054	25.19	28.76
Md. Abdulla	AS123	15-Mar-22	20.62566	92.33076	25.16	28.7
Md. Abdulla	AS123	15-Mar-22	20.62482	92.33101	25.11	28.57
Md. Abdulla	AS123	15-Mar-22	20.62395	92.33123	25.02	28.71
Md. Abdulla	AS123	15-Mar-22	20.62304	92.33146	24.96	28.66
Md. Abdulla	AS123	15-Mar-22	20.62174	92.33176	24.99	28.81
Md. Abdulla	AS123	15-Mar-22	20.62057	92.33204	24.93	28.68
Md. Abdulla	AS123	15-Mar-22	20.61964	92.33234	24.9	28.62
Md. Abdulla	AS123	15-Mar-22	20.61867	92.33254	24.9	28.7
Md. Abdulla	AS123	15-Mar-22	20.61761	92.33282	24.93	28.76
Md. Abdulla	AS123	15-Mar-22	20.61665	92.33305	24.93	28.68
Md. Abdulla	AS123	15-Mar-22	20.61644	92.33308	24.93	28.76
Md. Abdulla	AS123	15-Mar-22	20.61574	92.33325	24.9	28.78
Md. Abdulla	AS123	15-Mar-22	20.61498	92.33369	24.9	28.78
Md. Abdulla	AS123	15-Mar-22	20.61449	92.33382	24.87	28.8
Md. Abdulla	AS123	15-Mar-22	20.614	92.33386	24.85	28.82
Md. Abdulla	AS123	15-Mar-22	20.61319	92.33405	24.82	28.76

Figure 11: Sample data from citizen based monitoring system

- Few low cost intruments are provided to the local fishermen of Naf - Saint Martin Peninsula
- Fishermen are trained about the operation of these instruments
- A mobile app is developed in local language for the fishermen
- Fishermen collect the data of temperature and salinity, and upload the data in the android app
- Currently temperature and salinity data are monitored
- App is developed to monitor the plastic, plankton and fisheries data, and mappling of coastal resources
- Service for fishermen (i.e. information about cyclone and potential fishing zone will be included soon)

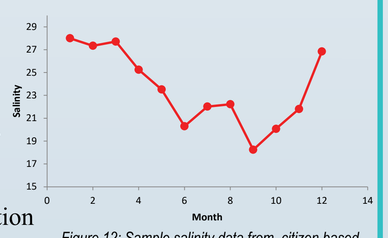
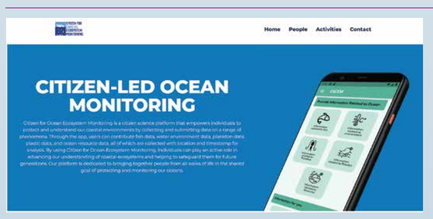


Figure 12: Sample salinity data from citizen based monitoring system

COMPILED DATABASE



- Compiled data from scientific, model and citizen based approach to a data base
- Details of this initiative is avaialble at: https://c4cem.org/
- Data will be available at: https://dashboard.c4cem.org/#/

Partnership for Observation of the Global Ocean

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