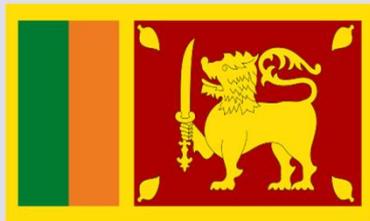
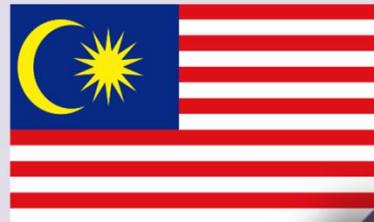




Bay of Bengal Large Marine Ecosystem Project



Report of the
National consultation on Mainstreaming Ocean Research for
Ocean and Resource Management, India
12-14 September 2012 • Kochi, India

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Acronyms used

ARGO

BOB Bay of Bengal

BOBLME Bay of Bengal Large Marine Ecosystem

BOBP - IGO Bay of Bengal Programme – Inter-Governmental Organisation

CARI Central Avian Research Institute, India

CIFNET Central Institute of Fisheries Nautical and Engineering Training

CIFRI Central Inland Fisheries Research Institute

CIFT Central Institute of Fisheries Technology, India

CMFRI Central Marine Fisheries Research Institute

CMLRE Centre for Marine Living Resources and Ecology, India

CSIR Council of Scientific and Industrial Research

CUSAT Cochin University of Science and Technology

EAF Ecosystem Approach to Fisheries

EEZ Exclusive Economic Zone

EPP Environment Protection Plan

FAO Food and Agriculture Organisation of United Nations

FSI Fishery Survey of India

GEF	Global Environmental Facility
GOM	Gulf of Mannar
HRD	Human resource Development
ICAR	Indian Council of Agricultural Research
IIT	Indian Institute of Technology
INCOIS	Indian National Centre for Ocean Information Services
IOTC	Indian Ocean Tuna Commission
ISRO	Indian Space Research Organization
KUFOS	Kerala University of Fisheries and Ocean Studies
LME	Large Marine Ecosystem
MORFORM	Mainstreaming Ocean Research for Ocean and Resource Management
MOU	Memorandum of Understanding
NAIP	National Agriculture Innovation Projects, India
NARA	National Aquatic Resources Research and Development Agency, Sri Lanka
NBFGR	National Bureau of Fish Genetic Resources
NCAOR	National Centre for Antarctic and Ocean Research
NCU	National Coordination Unit
NIO	National Institute of Oceanography, India
NIOT	National Institute of Ocean Technology, India
NISCAIR	National Institute of Science Communication and Information Resources, India
NOAA	National Oceanic and Atmospheric Administration
PFZ	Potential Fishing Zone
RGCA	Rajiv Gandhi Centre for Aquaculture, India
SAC	Space Applications Centre, India
SAP	Strategic Action Programme
SEAFDEC	Southeast Asian Fisheries Development Centre
SST	Sea Surface Temperature
TDA	Transboundary Diagnostic Analysis
UBC	University of British Columbia
VMS	Vessel Monitoring System

Bay of Bengal Large Marine Ecosystem (BOBLME) Project

National consultation on Mainstreaming Ocean Research for Ocean and Resource Management (MORFORM) 12-14 September, Kochi

Proceedings

1. Introduction

The Bay of Bengal Large Marine Ecosystem (BOBLME) Project is a regional initiative driven by the Global Environmental Facility (GEF), the Food and Agricultural Organization of the United Nations (FAO) and a number of other international organizations. The Project attempts to evolve a common strategy for exploitation of the shared marine resources of the Bay of Bengal on a sustainable basis. Eight countries namely Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand are participating in the project. The Project aims at building a Strategic Action Plan for sustainable use of the marine resources of the Bay of Bengal by the member countries on the basis of a sound understanding of the ecosystem as well as the socio-economic environment.

Under Component 3 of the project, programmes are being implemented for improved understanding and predictability of the BOBLME environment. Though India is bestowed with extremely capable research institutions bringing out significant outputs related to ocean science, the BOBLME Project has encountered hitches in evoking desired response from these institutions and getting appropriate experts for participation in various programmes.

The National Coordination Unit (NCU) had considered this issue seriously. Realising the inevitable lead role India has to play in promoting the science and management of ocean related matters in the Indian Ocean in general and BOBLME in particular, an effort was made by the NCU to assemble the major players in marine sciences in the country to discuss the issues and evolve strategies for achieving full-fledged cooperation and synergy.

To accomplish this objective a national consultation on Mainstreaming Ocean Research for Ocean and Resource Management (MORFORM) was organized under the national banner of BOBLME Project for 2012. The event was held at the conference hall of the Hotel Avenue Regent, M.G. Road, Kochi during 12-14 September 2012. The major objectives of the consultation were:

- to take stock of the mandated and current research activities of the organizations and to explore areas of collaboration and identify partners;
- to clear up the factors causing impediments in full-fledged cooperation among institutions and in addressing regional and global issues;
- to brainstorm on selected themes and elucidate expert views in evolving strategies for addressing the emerging requirements, specific short-term and long-term needs of ocean and resource management;
- to examine the proposals for collaborations from various international agencies, prioritise the proposals, identify partners, define their roles and decide on the time lines for the activities and
- to emerge with an action plan for fostering partnership and collaboration and synergise the outputs to facilitate India taking the lead role in ocean and resource management in the Indian Ocean region.

The meeting was represented by scientists, teachers and administrators (List of participants is annexed) from the following national and international organizations:

- The Central Marine Fisheries Research Institute (CMFRI), ICAR, Kochi
- The Central Institute of Fisheries Technology (CIFT), ICAR, Kochi
- The National Bureau of Fish Genetic Resources (NBFGR), ICAR, Lucknow
- The National Institute of Ocean Technology (NIOT), MoES, Chennai
- The Centre for Marine Living Resources and Ecology (CMLRE), MoES, Kochi
- The Indian National Centre for Ocean Information Services (INCOIS), MoES, Hyderabad
- The National Centre for Antarctic and Ocean Research (NCAOR), MoES, Goa
- The Space Applications Centre (SAC), ISRO, Ahmedabad
- The National Institute of Oceanography (NIO), CSIR, Goa
- The National Institute of Science Communication and Information Resources (NISCAIR), CSIR, New Delhi
- The Fishery Survey of India (FSI), MoA, Mumbai
- The Central Institute of Fisheries Nautical and Engineering Training (CIFNET), MoA, Kochi
- The Cochin University of Science and Technology (CUSAT), Kochi
- The Kerala University of Fisheries and Ocean Studies (KUFOS), Kochi
- The Bay of Bengal Programme – Inter Governmental Organisation (BOBP-IGO), Chennai
- The Bay of Bengal Large Marine Ecosystem (BOBLME) Project, GEF/FAO, Bangkok

2. Pre-consultation meeting

An informal pre-consultation meeting on 12th September evening initiated the deliberations on the agenda. Among other things, it resulted in suggestion of the following additional themes for discussion at the consultation:

- Conservation and management,
- National and international regulations,
- Management of Andaman Sea and
- Fishing regulations beyond the territorial waters.

It was assured to address these aspects separately or within the agreed themes without sacrificing the items already on the agenda. Another suggestion was to set targets and thrive for fulfilling them within agreed timelines.

3. Inaugural session

The MORFORM 2012 was formally inaugurated by Dr V.N Sanjeevan, Director, CMLRE on 13 September 2012 morning after a formal welcome address by Dr K. Vijayakumaran, the National Coordinator (NC), BOBLME Project in India. Dr Sanjeevan initiated the proceedings and said that BOBLME is a complex ecosystem very difficult to manage. The understanding of the processes in the bay is poor and there are many issues to be tackled. He appreciated the title of this much needed and timely interactive meeting. While appreciating the efforts taken by the NC of BOBLME in India to organize MORFORM, he hoped that the two day's deliberations would bring the institutions closer and pave ways for collaborative efforts.

Dr Chris O'Brien, Regional Coordinator, BOBLME Project made a presentation highlighting the activities of BOBLME Project in the eight member-countries. He said that MORFORM is an extraordinary and excellent interactive event and such innovative programmes need to be repeated in other countries too. Dr O'Brien mentioned that the important outcome of the BOBLME Project is improved understanding of the LME leading to better governance and adoption of Ecosystem

Approach to Fisheries (EAF) management. The two major outputs of the project were the Transboundary Diagnostic Analysis (TDA) and a Strategic Action Plan (SAP). He exhorted the Indian researchers to grab the opportunities as the co-owner of the project to showcase their findings and capabilities and interact with scientists from other countries too. He also explained the up-coming events under BOBLME Project and requested full-fledged cooperation from Indian research institutions.

4. Technical session 1

The participants made presentations on the mandates, activities, capabilities and current collaborative research of their respective organizations. They also touched upon areas where they would need support of various other research organizations. Each presentation was followed by discussion and suggestions on the role the institution could play in the context of managing BOBLME as well as the Indian Ocean. The following important points emerged from the discussions:

- Activities under BOBLME Project are mainly country based and national level initiatives like MORFORM can be emulated in other member countries resulting in regional working groups on important issues.
- CIFT is primarily a technology institution and it can play some role in BOBLME region in areas such as fish processing, Environment Protection Plan (EPP) for processing industry, discards and waste management, by-catch reduction, craft and gear development etc.
- NIO has good expertise in all aspects of ocean sciences. The expertise in deep sea mooring of sub-surface buoys to study current, chlorophyll, etc. could be of significance in the BOBLME context. NIO can collaborate in ocean modelling, climate change response in Indian Ocean, physico-chemical and biological studies in BOBLME, etc.
- INCOIS is already engaged in cross country collaboration in various aspects such as fishery predictions - Potential Fishing Zone (PFZ), tsunami warning, capacity building, etc. While there is scope for improving on the existing services, any advanced visualisation of data can also be incorporated. Though data and models are used for development of forecast products, data products can also be made available. It was suggested that accessing of the data should be flexible and INCOIS should try to evolve an interaction system in a question and answer mode.
- NIOT is playing a major role in ocean observation as it has the technological capability for deep sea mooring, data buoy deployment, deep sea sensors, etc. The SAC is planning to deploy a buoy each in the BOBLME and in the Arabian Sea with NIOT collaboration. It was remarked that the question should not be on how many buoys were deployed but the rationale in deployment and its optimization.
- CMFRI mentioned that scientists from the institute have been involved in various BOBLME activities. CMFRI has catch and effort data for public utilization on payment, and completely free access to data may not be permitted. The fishing effort data is yet to be standardised to make available for public access. The institute has collaborations with various other organizations, especially in National Agriculture Innovation Projects (NAIP) and would look forward to tie up with other institutions in areas where synergy can be achieved.
- SAC is the source of valuable, remotely sensed satellite data. The Centre is collaborating with several organizations related to natural resources, environment, disaster management, etc. SAC develops the technology and forecast products, which are transferred to INCOIS for dissemination. In the context of BOBLME, SAC can collaborate in productivity potential, climate change studies and ocean modelling.
- Being mandated for polar studies and cryobiology, the NCAOR could contribute to studies related to glaciers in Himalayas and its effect on BOBLME. As SAC is also working on Himalayan glaciers, collaboration between these institutions would bring synergy.

- Information dissemination being the primary mandate of NISCAIR, it can play a major role in publicising issues of priority. Recently NISCAIR had invested significant resources on climate change and spatial analysis with vulnerability and adaptation approach towards sustainable island development. There is a collaborative project on the anvil with a large number of partners in the country.
- LME studies naturally fall under the mandate of CMLRE and some initiatives were made before the BOBLME Project. The MoES through CMLRE has been supporting various agencies to take up projects for better understanding of the biological oceanography of the Indian EEZ. CMLRE had made significant progress in understanding the environmental productivity pattern in the Indian EEZ. Programmes related to BOBLME are also a major activity contemplated for CMLRE in the 12th Plan. Collaboration is desirable for achieving enhanced results and CMLRE could play a nodal role in future LME studies.
- CUSAT is a well-established educational institution with strong intellectual and infrastructure capabilities for undertaking education and HRD in marine biology, oceanography, atmospheric sciences, microbiology, biotechnology, industrial fisheries, etc.
- KUFOS is a new and emerging university with educational programmes in fisheries and ocean studies. Partnership is inevitable in the early stages of development of such institutions.
- FSI undertakes exploratory surveys, charting of fishing grounds, assessment of fish stocks in the Indian EEZ including adjoining high seas. Attempts are being made to generate valuable hydrographic data by equipping the vessels. Recognizing the value of vessel time available with FSI, collaborative efforts are being mooted in recent years. NIO can utilize FSI vessels for productivity and climate change studies and FSI in return would like to get capacity building in oceanography for its staff from NIO. Other organizations like INCOIS and SAC are long standing partners in several projects.

5. Technical session 2

The brainstorming session on ten identified themes was initiated by Dr Vijayakumaran. Discussing on the themes Dr Chris commented that most of the activities are on a national-scale undertaken by organizations with 10-20 year perspective plans. The themes must be carefully dealt with a view of a broad scale-matrix where the activities of the organizations should figure appropriately. In the long-run, national activities should be scaled up to international collaboration to achieve sustained results in LME management.

5.1. Theme 1. Understanding BOBLME

LME is only a concept, which could be refined in terms of boundaries, manageability and priority issues based on enhanced knowledge about the components and processes. Though the present edition of BOBLME Project covers almost all important aspects, concerted meso-scale studies and the extension of the present activities may be necessary for refining the next edition. Simplifying each issue is far more important to make things manageable.

5.2. Theme 2. Productivity potential

This theme was dropped from discussions on the argument that exercises of potential estimation often lead to overestimation of resource availability. This tendency would not be desirable when the sustainability is being currently highlighted as the acceptable paradigm.

5.3. Theme 3. Climate change and ecosystem

The central point is how to define a change in the Indian Ocean and examine what tools are available to analyse it. Micro level changes in physical, chemical and biological parameters such as temperature, salinity, dissolved oxygen, aerosol, phytoplankton, nutrients, etc. can be understood only by systematic continuous measurement. In situ analysis of phytoplankton and measurement of fine changes in aerosol may also be required.

The critical factor in BOB could be salinity rather than temperature. Macro level changes in fish production and ecosystem interactions have to be identified. The use of indicator species and changes in communities are areas of interest where attention needs to be paid.

We do not have climate models applicable to India and we need to develop appropriate models. For this, time-series data are required. Available tools - moored buoys, satellite ARGO - with chlorophyll and oxygen sensors are to be optimally used and further expanded in extent and frequency.

The research vessels (e.g. of FSI) can be fitted with sensors for continuous monitoring of various parameters. We have to standardise real time data collection and might require at least quarterly collection (preferably, monthly) of data in the three regions of BOBLME - the Northern region (low saline), Mid region and the Southern region (high saline).

FSI and NIO can work together on data collection in reference points, which can be analysed by NIO. CMFRI is looking at how fishes adapt to climate change, especially with regard to maturation and recruitment. The role of climate factors on systematic reduction in predator population or geographic expansion of pelagics need to be examined in the context changes in the fishery. Changes in fishery could be attributed to more intense fishing pressure. Long-term time series data (50-60 years) are required to understand any such change.

To begin with it was suggested that all available data are to be gathered and collectively analysed. The institutions that can involve in these studies are CMFRI, CMLRE, NIO, NIOT (especially for Andaman Sea), FSI, SAC, CIFT, CIFNET, CUSAT, and KUFOS and they must join together in this effort.

5.4. Theme 4. Transboundary species

Stock assessment is most important aspect in the management of fishery resource. Without comparative analysis of the stock in the countries involved it is difficult to define transboundary species. Further, in the absence of scientific evidence on the boundaries of different stocks, assessment is meaningless and management impossible. Adoption of standard methodology is most important for transboundary stock management involving different countries and institutions. The capacity gaps have to be filled in all relevant areas. Institutions such as CMFRI, CIFT, FSI, CIFRI should be involved in dealing with different transboundary species such as hilsa.

5.5. Theme 5. Sustainability of Islands

Sustainability of islands is an important issue yet to get serious consideration. Issues to be tackled are food, energy and water security of the island communities. Besides, the problems of solid waste disposal, saline intrusion, disaster management, etc. are to be considered with reference to Indian Island territories in BOB and Arabian Sea. The issues may be similar in other island nations.

Since simple application of technology may not be sufficient, there should be social interaction with the island communities and their involvement is important for the success of the programme. NISCAIR has taken up an island sustainability project in Kavaratti Island of Lakshadweep and would like to get support from institutions such as CMFRI, FSI, CIFT and NIO in their endeavour. Similarly, NIOT has proposed sustainable island programme on selected islands in the Andamans in the 12th Plan to provide basic amenities such as energy, water and food.

NIOT would like to get associated with organisations such as CMFRI, NIO, RGCA (The Rajiv Gandhi Centre for Aquaculture) and FSI. ICAR made master plan for islands involving CARI, CMFRI and CIFT

and the Planning Commission also have prepared State development report for Andamans and Lakshadweep involving all agencies concerned. These documents are to be referred while formulating collaborative projects on island sustainability.

5.6. Theme 6. Data, methods and models

Conventional models on fish population are not often satisfactory in explaining the multispecies fishery of India. More researchers and institutions should address this problem together. The present climate model was arrived at by testing many models by various groups of scientists. Such attempts were never heard of in the case of stock assessment models. There was some attempt initiated by SEAFDEC on the same lines, but somehow these models are not exactly fitting to our fishery.

India adopted a unique multi-stage random sampling statistical model and it appears to be good for multispecies fishery. The need of the hour is to strive for reducing errors in this method. Though FAO has voluminous work on bio-economic models, we are yet to get a flawless model. This should be taken up in the national context by the FSI and CMFRI.

Models which incorporate ¹⁴C also in the conventional ones developed by IIT Delhi can also be tried. It was remarked that the PFZ models are not often supported by true feedback from fishermen and therefore there is room for improvement. PFZ model was generated earlier using only SST data, but later chlorophyll and wind factor was also included. Effort is also on to incorporate sea surface height in the existing model as there is always room for improvement.

Tuna forecasting models are at present premature. The core issue is to bring various data sets available to a common platform and analyse. Data analysis and modelling should be integrated. There should also be proper inter-calibration, harmonisation and standardisation of data collection and analysis. Dedicated collaborative projects are needed for fast-tracking development in this area.

5.7. Theme 7. Marketing products

The research output of our country is not properly marketed. It is reasonable that the people involved and the country should be benefited, though not necessarily in cash. There is a need for proper accounting and valuation of the products. Tricky question is should we ignore the market interests in this endeavour to make the contributions of scientists in Indian research labs available to all for free.

The digital repository of publications initiated by NIO and CMFRI are steps to ensure free public access. The issue of paying for our own publications which appear in a foreign journal is serious. It was suggested that the copyright problem can be overcome by uploading the original MS word format of the paper. We should thrive for a common platform where all Indian publications are available. The digital libraries should be interconnected.

Open access journals are not the solution as most of them are discontinued after a few issues and are not of great standard and are not often peer reviewed. The CSIR journals are now open access ones. Though Impact factor is important for scientists, it should not be the only criterion accessibility is equally important. We have to work to elevate Indian journals to world standard.

We should think of putting the data and results in public domain after a moratorium of a year or two. There is no harm in pricing the data reasonably as the satellite data is not made available in its original resolution anywhere. We should work for a web based data sharing system which would be accessible to all and there should be inter-institutional mechanism for sharing data.

5.8. Theme 8. Regulative environment

There is a need for harmonisation of internal and regional fisheries regulations. BOBLME did a policy review of regulations and it will be disseminated in the next meeting. In India, the maritime states are yet to harmonise marine fisheries policies. The marine fisheries regulations and policies have to be harmonised in India and we should have regulatory mechanisms for areas beyond the territorial waters in the EEZ. Further, there is a capacity gap at various levels on the implications of various international maritime instruments. This is an area requiring immediate attention.

The Vessel Monitoring System, which transcends boundaries, should be implemented properly though it is not done so now. The objection to VMS is that, apart from the administrative cost, it will be difficult to monitor about 70 000 mechanised fishing trawlers. Further, the use of VMS data will lead to much litigation which is often difficult to prove. However the use of automated VMS which can monitor many thousands of fishing vessels could solve some issues.

Though we have enough regulations on registration of vessels, it is not implemented properly. There should be proper regulation and implementation of the size of the vessel and the engine capacity.

5.9. Theme 9. Sectoral sustainability

This theme was dropped from discussion as the subject is broad, vague and there were no representation from social scientists who could articulate on this subject.

5.10. Theme 10. International cooperation

BOBLME Project is a five year project involving eight countries. Each country has nominated an implementing agency. The active role is being played by Fisheries and Environment Ministries in each country. But there are likely roles for many other organizations and BOBLME is getting expertise from various organizations in the member-countries.

BOBLME Project needs response from institutions on quality service, delivery within timeline, and professionalism to a contract. Experts from a country are often not available for BOBLME. The institutions should accommodate the project in their programmes and finish it on time. BOBLME is seeking collaboration in the following two programmes:

- Stock assessment workshop -CMFRI/FSI/IOTC/NOAA - at Kochi
- Ecosim workshop with UBC Experts – CMFRI/FSI/others – location to be decided

The stock assessment workshop envisages data and benefit sharing with BOBLME funding. Apart from CMFRI and FSI, other institutions such as NIO and CMLRE (conditional) also showed interest.

BOBP-IGO's core theme is on fisheries management and it has initiated discussions on two transboundary issues - hilsa (India, Bangladesh and Myanmar) and sharks (India, Sri Lanka, Maldives and Bangladesh). It has included research institutions such as CMFRI and NARA (Sri Lanka) for scientific information. Unfortunately, institutions offer data at a cost and the IGO is requesting intervention of National Governments. The member-counties are discussing whether the IGO should become a management body. At the same time the IGO is figuring prominently in the discussions on exit plan of BOBLME Project.

Resource management options require scientific data and capacity building on this subject has to be taken up by premier Indian research organizations. Unfortunately, support is lagging and the institutions hesitate to showcase their capabilities. The representative from SAC informed about ISRO conducting regular training programme for Asia Pacific region on satellite tracking, meteorology and communication.

It was informed that almost all Institutions in India have regular training programmes and IGO can make use of them or if any specific programme is required, it can approach the concerned institution. BOBP-IGO desired collaboration on the following programmes:

- Training on data collection and processing for BOBLME countries
- Collaborative arrangements on GOM
- Fish stock assessment – hilsa and shark

NIO and INCOIS expressed their willingness to cooperate. CIFT informed that they are giving 60 days training to Sri Lankan beneficiaries on long lining and drift gill netting under the Colombo Plan programme.

During discussions on the themes, general consensus prevailed on enhanced interactions among the institutions and fostering partnerships and collaborations, especially on vessel based meso-scale studies. It was also agreed that every attempt should be made by the institution to showcase their expertise to the benefit of neighbouring countries in capacity building.

6. Summing up

Summing up the meeting, the NC, BOBLME-India said that the consultative meeting on MORFORM should be an annual event. While attempts to support the MORFORM 2013 shall be made by BOBLME Project, other institutions (like CMLRE/MoES) should take it up in the subsequent years. He also informed that Dr Chris had promised to support MORFORM-2013 meeting under the aegis of BOBLME Project. The following points were suggested for consideration at MORFORM 2013:

Institutes may consider probable partnerships and chalk-out collaborative programmes, which could be showcased as success stories next year.

Participants are encouraged to prepare and publish concept papers on relevant topics indicating the need for collective action and urging coordinated efforts.

Institutes may publicise the facilities available for capacity building and research and provide clear guidelines for formalising arrangements and signing MOUs.

The available media space in journals could be judiciously used to spread the ideas about collective efforts in ocean research.

Concluding the meeting, the NC said that the institutions should further foster collaboration and thanked the participants for the wonderful engagement during the meeting. The MORFORM 2012 concluded at 17:00 h on 14 September 2012.

Appendix I Programme agenda

Bay of Bengal Large Marine Ecosystem (BOBLME) Project
National consultation on
Mainstreaming Ocean Research for Ocean and Resource Management
 12-14 September 2012, Kochi

Programme

12 September 2012	
17:30-20:30	Registration, pre-consultation briefing, setting the stage and introduction
20:30-21:30	Dinner
13 September 2012	
09:00-10:00	Opening session
10:30-13:00	Presentation by institutes
13:00-14:00	Lunch
14:00-17:00	Brainstorming on themes
18:00-20:00	Presentations by theme leaders
20:00-21:00	Dinner
14 September 2012	
09:00-10:00	Presentations by theme leaders
10:30-13:00	Preparing the roadmap for national actions
13:00-14:00	Lunch
14:00-16:00	Discussions on regional and international collaboration
16:00-17:00	Winding up

Appendix II List of participants

Bay of Bengal Large Marine Ecosystem (BOBLME) Project

National consultation on

Mainstreaming Ocean Research for Ocean and Resource Management (MORFORM)

12-14 September 2012, Kochi

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Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand are working together through the Bay of Bengal Large Marine Ecosystem (BOBLME) Project to lay the foundations for a coordinated programme of action designed to better the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries.

The Food and Agriculture Organization (FAO) is the implementing agency for the BOBLME Project.

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