



Bay of Bengal Large Marine Ecosystem Project



Report of the
Regional workshop on "establishing a cooperative mechanism for protection
of met-ocean data and tsunami buoys in the Northern Indian Ocean region"
6-7 May 2011 • Chennai India

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For bibliographic purposes, please reference this publication as:

BOBLME (2011) Report of the regional workshop on “establishing a cooperative mechanism for protection of met-ocean data and tsunami buoys in the Northern Indian Ocean region”, 6-7 May 2011, Chennai, India
BOBLME-2011-Ecology-23



Report of the regional workshop on “establishing a cooperative mechanism for protection of met-ocean data and tsunami buoys in the Northern Indian Ocean region”

6-7 May 2011, National Institute of Ocean Technology, Chennai, India

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1. Background

Many marine observing platforms have been deployed to record and report a wide range of information which relate to sub-surface, surface, and atmospheric conditions in the world’s oceans, coastal seas and internal waterways. The data and information have been aiding ocean-based transport and commerce, help warn against ocean borne hazard, and support sea rescue missions.

The Ocean Observing System (OOS) began to deploy and increase the number of buoys in the Indian Ocean since the last decade especially after the tsunami in the Indian Ocean in 2004. Numerous tsunami buoys were deployed by many countries in the region including through aid from outside the region. One of the major problems of ocean data and tsunami buoys is vandalism, which refers to interference and damage of the observing platforms by human action, whether that action is unknowing, incidental or reckless activities, or malicious. Most of the evidence indicates that it is damage from fishing activities.

To deploy and maintain the ocean data and tsunami buoys is costly and requires a lot of budget. It therefore is a big effort to deploy and maintain the buoys. The damage of the buoy is not only loss of investment but also loss of important information and critical ocean data which is used to provide information for disaster warning and climate system. The United Nations, through UNESCO’s Intergovernmental Oceanographic Commission (IOC), and the World Meteorological Organization (WMO), cooperates with member states to help establish and maintain these systems, and recently, the United Nations General Assembly has called for policies and guidance to help prevent and minimize actions that often result in extensive damage to these critical ocean observing networks.

The objective of the Regional Workshop was to bring together representatives of key ministries of the countries around the Bay of Bengal (BOB) dealing with OOS and Fisheries: regional organizations dealing with OOS, environmental and fisheries matter; international experts working on OOS; and representatives of fisher associations to discuss ways and means for creating necessary awareness amongst concerned stakeholders on the importance of Met-Ocean Data and Tsunami Buoys and evolve common strategies for establishing mechanisms for their protection. The Regional Workshop aimed also to enable raising the profile of the issue as it has potential concerns for the society as a whole in the BOB region. The workshop was organized under cooperation of the National Institute of Ocean Technology (NIOT) and the Bay of Bengal Programme Inter-Governmental Organization (BOBP-IGO).

The list of participants is found in **Appendix I** and the full meeting report compiled by BOBP-IGO may be downloaded from to BOBLME website at:

<http://www.boblme.org/meetingDisplay.php?eventDisplay=2131>

2. First day

The first day of workshop was an introduction of general oceanographic features, fisheries, early warning systems to prevent disaster including ocean data and tsunami buoy experience of countries both inside and outside the region as well as ocean data and tsunami buoy technology by leader buoy building companies.

- The Bay of Bengal is defined as semi-enclosed bay which is closed by the land mass on the northern part. The climate of the region is influenced by monsoon. A large volume of fresh water including the sediment is discharged into the north and northeast of the Bay. This prevalence of low salinity plays a major role in various exchange processes between the atmosphere, surface and deep waters that affect the biological and biochemical processes.

The Bay of Bengal is full of biological diversity, diverging amongst coral reefs, estuaries, fish spawning and nursery areas, and mangroves. The Bay of Bengal is one of the world's 64 Large Marine Ecosystems (LME). The major natural disaster risks are cyclones, storm surges, tsunamis, and climate change and sea level rise etc. One of the recent cyclones which killed a lot of people especially in Myanmar is Cyclone Nargis. The area range of cyclone impacts are from northeast to northwest of the Bay of Bengal. The sources of tsunami generation are predominant on the east close to Indonesia (Sumatra Island) and along the Nicobar and Andaman Islands of India. The Tsunami in 2004 killed many hundred thousand of people, especially in Indonesia. As example of using integration of science and technology to benefit to the socio-economy of the Indian sub-continent and in the Indian Ocean region is by the Ministry of Earth Sciences, India. They utilize most OOS data and information to be analyzed for ocean and climate forecast including fisheries.

- Quite a number of ocean data buoys were deployed by countries around the Bay of Bengal beside the RAMA Array (Research moored array for African-Asian-Australian Monsoon Analysis and prediction). The RAMA array programme deployed the ocean data buoys from north to south and east to west along the equator in the Bay. India indicates that they deployed a total of twelve ocean data buoys, two reference stations and four tsunami buoys. The challenges of buoy operation experienced by India were technology, procedure, and vandalism. Vandalism becomes the big problem of buoy deployment as there is an increasing number of damage to buoys. Since most external sensors including solar cells, for power charging, were also destroyed, this causes loss of communication, power supply and sensors. New technologies were developed to protect and minimize damage of the buoy by vandalism.
- About 480 moored buoys, 1,560 drifting buoys, and 3,200 sub-surface profiling floats are globally deployed at present. The data generated from the buoys were organized by a networking system. There are world network components which compose of many levels such as international networks (designed at regional or ocean basin scale), national networks (domestic), and sectoral or local observing stations. Vandalism is the major cause of buoy damage. The causes of damage could be categorized as:
 - Ship impact damage: accidental or reckless operation in vicinity of surface buoys.
 - Incidental, unknowing damage: fishing line or nets foul mooring lines which damage under water cables and sensors, and vessel tie-up to surface buoy as temporary anchor or safe haven causing structural damage, drag stations off anchor point, over-stress to mooring lines.
 - Direct exploitation as Fish Aggregation Devices: vessel ties up to buoys during fishing and “sling-shot” purse seiner fishing etc.
 - Incidental and malicious damage: intentional damage to superstructure, sensors, communications, gunshot damage, and mooring lines cut to release entangled fishing gear.
 - Theft of removable superstructure, parts, cables, solar cells, electronics payloads or entire surface buoys.

The strategies used to reduce vandalism or its impacts could be done by improving technology to protect the buoy (having hardened platforms), abandon bad sites (fishing or dense navigation area) or reduce exposure of surface, install extra station for resilience even when some stations are out (high cost), and education and outreach to fishing fraternity and coastal communities. There were also buoy building companies who gave their presentation on their present and future technology to prevent the vandalism

- Country reports indicate that all countries in the region are well aware on the natural disasters and understand the role of ocean data and tsunami buoys. However, many countries, such as Maldives, Sri Lanka, Bangladesh, and Myanmar, do not have their own buoys. But the cooperation through international organizations could help them to access

the data and utilize it. However the countries in the region are facing similar problems on the natural disasters such as climate change (sea level rise, increasing sea surface temperature etc.), cyclones and storm surges, and tsunamis. The existing international cooperative project or programme in the region such as tsunami buoy and RAMA Array could provide data and information for warning systems to the region. After the tsunami of 2004, India, Thailand, Malaysia, and Indonesia have been deploying tsunami buoys as a part of regional and national warning systems. Indonesia has developed OOS at national level and joint oceanographic research with other countries such as China and NOAA (USA). The existence of OOS in most countries in the region is through tide gauges which are provided by their countries and assistance from international organizations such as IOC etc.

3. Second day

The second day of the meeting was group discussion. There were three groups and the results from the each group are

3.1. Enhancing safety and security of data buoys – proven strategies and new options; control measures by the national governments

Strategies: *Re-think the objective (service result), and the means of delivery (system design, operational practices). Take a step back and find ways for a fresh focus on the objective rather than the current business issues. Invent a better competitor.*

- Network optimisation – sensitivity analysis – identify core stations and adapt defence / reaction strategies to match priority / service impact
- Adopt whole-of life network decisions, including tendering, taking vandalism service risk into account
- Take an operational risk-management approach – insurance
- Use multi-purpose platforms where possible, but:
 - Use sub-surface (non-real-time) platforms where appropriate
 - Protect core function – primary observation chain, alternate communications
- Use cabled systems or alternate platforms not so exposed to vandalism
- Establish a custodial service-oriented performance contract with network operators (service continuity focus) – will include service interruption costs in decision making (no apparent cost for protracted data gaps, or reward for rapid restitution)
- Small, fast response vessels – avoid whole-buoy handling
- Avoid fishing grounds / shipping routes
- Locate deployed buoys near existing platforms or support sites
- Fishers influencing other fishers, incentives or recognition
- Dummy buoys – trial a site, fishers exposure
- Decoys
- Trackers on all vessels
- Rotate surveillance focus and adapt response / defence strategy during intense fishing cycles, high risk times

Awareness and education: *Extend awareness of the purpose and value of ocean buoys to fishers, administrators, communities or others. Motivate will to protect, or to support protection efforts*

- Leaflet to be in multi language (more than current)
- Buoy purpose signage
- Community awareness program, local language, in video

- Teacher / school delivery
- Identify / enlist NGOs that could be effective information vectors or reinforcers
- Sign on buoy to scare fishermen of hazard
- Compensation paid for entanglement of nets
- Recognition / appreciation for custody of buoy, location reporting
- Awareness for local fishermen, NGOs and local community
- Alternate strategy for safety of buoys
- Multi-tier education strategy, with sharing international practice
- Visible chain of value to fishers for ocean observations– e.g. fish forecast
- Don’t issue fish forecast for buoy locations
- Fishers influencing other fishers (neighbourhood watch)

Technology:

- Buoy Improvements
 - Short Term
 - Multi-purpose buoy platform but protect core functions, e.g. alternate communications
 - Mooring cut prevention – cut-proof top section, high tension on top section
 - Buoy adrift sensor
 - Hidden surface sensors- air pressure, communications, temperature
 - Long Term
 - Technical innovation – focus on vandal-proof buoy
 - Fence around buoys
 - Alternate surface met sensors
 - Pop-up secondary sensors after vandalism (meteorological)
 - Alarm during disturbance
 - Tamper detection
 - Cameras
 - Hydro-acoustic sensors
 - Mooring tension sensor
 - Grow buoys to large size – too difficult to handle
 - Defence on surface equipment – e.g. floating buoy defence
 - Infrastructure Improvements
 - Tracking system on all fishing vessels [+ Process]
 - Satellite monitoring of buoy and vessel
 - Improve operational response – small restore vessels
 - Alternative Technology
 - Cabled systems
 - Wave-gliders or temporary gap-fill surface buoys
 - Pop-up buoys

Administration: *To provide a regulatory or legal framework which recognizes a vandalism “offence” and provides some coverage of actions outside the EEZ. Engage other agencies in the chain of education, interception or enforcement, including in other countries with delegated custody of buoys deployed far from the host country.*

- Regulation / legislation to recognize / protect national security assets (warning centres to lead)
- Recognize (law) national property out of EEZ
- International Cooperation – safe zone around buoy
 - On behalf of owner country
 - Delegate authority to protect

- Interception – no legal basis beyond EEZ
- Notification of outages of Coast Guard / officials
- Link with enforcement / investigative agencies

3.2. Reaching the fisher

Review the reasons for vandalism of data buoys by fishers:

- The fishers are largely unaware of the utility of data buoys and also their significance in providing valuable information on multiple aspects, which are valuable for the safety and well-being of people including coastal communities such as the fishers. On many occasions the reasons for vandalism also arise from this ignorance
- Lack of catch often leads to vandalism of data buoys with the intention of selling the buoy parts and making up for the lost income
- Interference of data buoys in the operation of gear leads to damage to the buoy and its underwater components
- Many fishers consider the sea to be their territory and, therefore, everything in the sea is also their property (including data buoys)
- Data buoy are frequently used as an anchor for resting, for conducting minor repairs on the boats or to the gear and at time also as Fish Aggregating Devices (FADs), since fish tend to congregate to feed on the flora and fauna that accumulates on the submerged components of the buoys
- Data buoys are vandalized to make use of the buoy components on the fishing vessels (e.g. the buoy antenna)

Identify and suggest awareness strategies:

- The Ministry/Department of Fisheries (MoF/DoF) should be made aware of the data buoy locations, which in turn should be communicated by the MoF/DoF to all concerned fisher associations/cooperatives and other organized fisher groups. These Data Buoy location charts should be made available to all concerned organizations so that fishing is not conducted in the vicinity of the data buoys
- Awareness creation would involve multiple strategies and all forms of print media (poster, brochures, comic books, etc.); electronic media (radio including FM and community Radio Networks, TV); other communication strategies (village theatre, folk songs, articles in newspapers, magazines, etc.) should be effectively used in communicating the message to the target groups. Effective use of internet and creation of message groups (e.g. Yahoo Message Groups) can be cost-effective and reach a much wider audience in minimum possible time
- Models of data buoys could be placed in the Fishing Harbours; Fish Landing Centers; with suppliers of fishing equipment, etc.; at offices of Fisher Cooperatives, Associations, etc. for awareness creation
- As charity begins at home, so could awareness on the utility of data buoys. In this regard the fisher family can play an important role in educating the bread-winner on the need of safeguarding the data buoys
- Religious institutions are also an important point of community interaction and such institutions can play an important role in publicizing the importance of data buoys and their role in protection of the communities
- Awareness on the data buoys could also be carried out during the Annual Fishermen Days celebrated in most countries around the Bay of Bengal. Besides, special events such as
- International Data Buoy Day/year, release of special commemorative stamps on data buoys, etc. could be other activities in creating awareness amongst fishers and other stakeholders
- FRP Buoy model should be placed at Fishing harbour and fisherman landing

- Data buoys have multiple functions (weather forecasting, early warning on extreme weather events, etc) and many such information are also being used for predicting climate change and impacts on the environment. This issue needs to be highlighted and concerned agencies (e.g. Meteorological/ Seismological Departments, Disaster Warning Centers, etc) can play an important role in this task
- Awareness creating activities should be taken to the field i.e. at the community level. In this regard the MoF/DoF and other concerned organizations (e.g. Coast Guards) should aim at conducting regular workshop at the local level to ensure participation of larger numbers of fishers and other stakeholders
- Sound awareness programmes would require effective coordination between concerned agencies/ institutions and stakeholder groups. This would be crucial to the overall success of the awareness programmes and would need due consideration while devising the strategies
- The concerned nation-level agencies should ensure maintaining ‘biometric identity’ of all the fishers

National mechanism for information dissemination:

- All Disaster Management Agencies should include in their agenda awareness on data buoys and the need for their protection. The concerned agencies should have a focused approach and all activities on awareness creation should be undertaken on continuous basis. Sporadic attempts will lead to partial or no success
- ‘Catch them young’- The school curriculum (Disaster Management Course) should also include a chapter on Data Buoys so that the younger generation can be made aware of their importance
- Annual meetings should be organized with the national/regional level fisher groups and one of the agenda could discuss protection of data buoys. The overall motto of such attempts should be to involve people and work with them towards protection of the data buoys in the most cost-effective manner. This would also make the fishers a ‘part of the solution’ rather than keeping them only as ‘part of the problem’
- Once the fishers are made a part of the solution this would also give them a ‘de facto’ ownership of the data buoys and make them responsible for their protection
- The non-governmental and civil society organizations (NGOs/CSOs) are important society organizers (and also catalysts of change) and their involvement at all levels and at all time needs to be ensured
- Regional meetings where experts from other countries can also be invited should be organized at regular intervals to review the situation and mobilize regional support and coordination
- National Data Buoy Networks could be set up for effective coordination and information sharing within the country and between countries

Community monitoring and international support from the fisher groups (including community intelligence to identify bad elements):

- The community can play an important role in amelioration of the problem. Like national-level agencies, the community groupings should also include the data buoy issues as a standing agenda in their meetings
- The community should identify ‘Friends of Fishermen’ to ensure that right messages reach the fishers
- The community should identify ‘deterrent’ that can be used for the ‘violators’ and also impose sanctions on fishers who violate the guidelines
- The community in close cooperation with the DoF/Coast Guard should conduct sporadic inspections to ensure that no fisher indulges in data buoy vandalism

3.3. Regional and international cooperation in protection of the data buoys

Terms of reference:

- Review the existing regional and international cooperation in data buoy protection
- Needs for strengthening regional and international cooperation (including an Action Plan)
- Establishing focal points, etc (part of Action Plan) and
- Networking and setting up of a mechanism for information dissemination

Actions:

- Define the geographic extent of the region so that there is a collective willingness to carry out actions suggested at this Workshop

Communication:

- Development of location plans of the buoys
- Clear information on buoy deployments to the governments, private sector and relevant local stake holders
- Communicate to stake holders

Communication – what?

- Location of the Buoys
- Don't touch the buoys
- Value of the Buoys
- What to do in case of damage and contact information

Communication – how?

- Brochures, leaflets, posters, stickers, media (local TV and newspapers), bill boards, ocean information boards, internet, street plays, short films in local cinema in local languages about the buoys, T-shirts with the message on value of the buoys etc.
- Teaching material disseminated through national and international training centres and local schools, international and national programmes operating in the region already (IOGOOS, SIBER, **BOBLME**, SAARC, SACEP, IOTC, ASEAN, IUCN, etc.)

Communication - who?

Local

- Inform local stake holders (stake holders include fishing community, crew on board, tourism, shipping, offshore industry local schools, local NGOs, etc.) about the value of buoys to their lives and livelihoods

Government

- Inform the governments in the region about the importance of the buoys (in terms of financial and social cause) and request them to inform relevant agencies in their country (including maritime authority, meteorological, fisheries, education, shipping, port authorities, enforcement agencies including coast guard, navy, marine and land police, offshore industries, foreign affairs, and co-operative societies)
- Create MoU among the countries in the Bay of Bengal region for cooperation to protect the data buoys from vandalism in the international waters and also local EEZs
- Encourage Countries in the region to launch national campaigns on awareness
- Develop code of conduct for protection of data buoys to be provided to all stakeholders especially the fishing industry (supplementary to the 'Code of Conduct for Responsible Fisheries' by FAO)

Private sector

- Inform the private sector (including fishery and oil industries) about importance of buoys

Regulation

- In case of intentional damages of the buoys, formulate regulations that discourage vandalism (e.g. penalization)
- Create legal framework for protecting the buoys at country and international levels. Consider an Amendment to the UN Convention of Law of the Sea (UNCLOS)
- Consider the potential to gazette areas where buoys are deployed so that stakeholders avoid buoys

Review:

- Reviewing the actions over a time period (e.g. every 2-5 years?) to ensure that the message of protection of buoys is maintained and that damage to buoys is reduced in the region and internationally

4. Conclusion

BOBLME's Point of View: The presentation of BOBLME showed that the Bay of Bengal is one of the regions of highly dense population living along the coast line of the world. The basic livelihood of most people in this region is based on marine resources. The productivity of the marine resources including fisheries is governed by oceanographic processes. The management and planning of utilizing marine resources therefore needs to understand the oceanographic processes from global down to regional and local scale. The examples of the oceanographic processes that are of influence to marine resources are monsoon (ocean and atmospheric interaction), Indian Ocean Dipole (IOD), internal wave, and water circulation. BOBLME is preparing and carrying out activities which concern directly the marine habitat, fisheries (migratory species), pollution, and oceanography etc. To understand the oceanographic processes in each member country's waters in the BOBLME Project, it is needed to understand the processes at regional level. The ocean observing system programme and project has been introducing into the Indian Ocean since the last decade initiatives such as Ocean Global Observing System for Indian Ocean (IOGOOS), RAMA Array (Research moored array for African-Asian-Australian Monsoon Analysis and prediction), Indian Ocean Penal (IOP), and Sustained Indian Ocean Biogeochemistry and Ecosystem Research (SIBER) etc. The existing programmes and projects in the region could be of benefit to BOBLME. BOBLME therefore became a member of IOGOOS in 2010, and also joined as a partner of SIBER and IOP through IOGOOS. BOBLME is planning to contribute some biogeochemical sensor to the SIBER. As vandalism is a big problem to the ocean observing system, BOBLME realized this issue and decided to support the achievement of this workshop.

5. Recommendation

Since BOBLME is working with all countries in the Bay of Bengal Region which participated in this workshop, BOBLME could provide support to address vandalism of ocean data and tsunami buoys by giving an introduction of ocean data and tsunami buoy and vandalism problem to all relevant training/workshop/meeting events of the project including distribution of any teaching material, poster for campaign, and information about buoy deployment etc. to fishermen community of member countries.

Appendix I List of participants



Regional Workshop on Establishing a Cooperative Mechanism for Protection of Met-Ocean Data and Tsunami Buoys in the Northern Indian Ocean Region
6 - 7 May 2011, Chennai, India



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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 and to lay the foundations for a coordinated programme of action designed to improve 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.

The Project is funded principally by the Global Environment Facility (GEF), Norway, the Swedish International Development Cooperation Agency, the FAO, and the National Oceanic and Atmospheric Administration of the USA.

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