National Transboundary Diagnostic Analysis Consultation - India

Bay of Bengal Large Marine Ecosystem Project
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A Report on the TDA Consultations in India
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Abstract

Trans-boundary Diagnostic Analysis (TDA) identifies priority environmental and fisheries issues that are ‘trans-boundary’ in nature. TDA identifies, quantifies (where possible) and ranks, according to severity of environmental and/or socio-economic impacts, water-related environmental trans-boundary issues and their proximate and root causes in the Bay of Bengal Large Marine Ecosystem (BOBLME). TDA provides the scientific basis for the collaborative development of a Strategic Action Programme (SAP) that will be formulated by BOBLME Project to coordinate national and regional activities to address the issues and their causes. Based on a protracted series of national and regional level consultations and documentation, a draft TDA document was prepared by the Regional Coordination Unit, which identified three broad issues which were trans-boundary in nature viz., (i) over-exploitation of the marine living resources (ii) degradation of mangroves and coral reefs and (iii) land-based sources of pollution. The TDA document of the RC unit comes in three different forms viz., (i) Executive Summary (II) Brief Summary (iii) Summary and (IV) Full Report in two Volumes.

The draft TDA document is presently being discussed by the stakeholders at national and sub-national level in the eight member countries, thus providing opportunities for the stakeholders in these countries to assess the information and conclusions from a trans-boundary perspective and decide whether, on balance, this TDA is an appropriate basis for the development of the Strategic Action Programme. The countries are encouraged to verify, note errors, review and challenge the information and views presented in the document and to flag points that might need verification, and recommend deletions/additions. Once all the member countries complete this process, the TDA document will be modified at the regional level and presented to the Project Steering Committee (PSC) to approve for feeding into the SAP. India National Unit of BOBLME has completed the process of stakeholder consultations within the country and a national response needs to be sent to the Regional Unit.

State-level TDA Consultations in India

There were five state-level consultations held in Port Blair, Puducherry, Kakinada, Puri and Kolkata, followed by a National TDA exercise to consolidate and moderate the ideas emerged from the state level meetings. The executive summary of the TDA document was translated into Hindi, Tamil, Telugu, Oriya and Bengali and both English and regional language versions were distributed at the Consultations. All participants were free to talk in the language of their choice. Nearly 600 stakeholders took part in the state/national level
deliberations. Fisheries Department, representing the key stakeholders of the TDA process, always took a leading role in organizing the events in the States, along with state fisheries development corporations. Other key players such as Departments of Forests and Environment were also represented. Participation from the Fisheries Department was invariably at the level of Secretary/Director. Central government organizations participated in the consultations include Fishery Survey on India, Zoological Survey of India, Central Agricultural Research Institute, Central Marine Fisheries Research Institute, Central Institute of Fisheries Technology, Central Institute of Freshwater Aquaculture, Central Inland Fisheries Research Institute, Central Institute of Fisheries Education, National Fisheries Development Board and Marine Products Export Development Authority, Sundarbans Development Board. Indian Navy and Coast Guard participated in all meetings. Banking and cooperative sectors were represented by the State Bank of India, National Bank for Agriculture and Rural Development, Co-operative societies, (Fishers, Fleet operators, Food processing), SHGs. There was an impressive representation from Tribal Councils, other local self-governments, Fishing /Food processing industries, NGOs, Chamber of Commerce & Industry and Universities.

The main objective of the TDA consultations was to collect feedback on the TDA document prepared by the Regional Unit from different stakeholders. In each meeting, the salient features of the TDA findings were presented under the three major issues as drivers of change viz., Over-exploitation of marine Living Resources, Degradation of Critical habitats and Pollution (Fig 1). Trans-boundary nature of each issue was described briefly and their proximate and root causes discussed. Thereafter, all participants were encouraged to talk freely and give their critique on the contents of the TDA document presented.
National TDA Consultation

A National TDA Consultation was organized at Vishakhapatnam on 30 June 2011 to take stock of the outcomes from the State level consultations and consolidate/moderate the ideas that emerged during the five State level meetings. 25 National experts, senior level officials from the States, Indian Navy and NGOs representing different interests participated in the National TDA consultation. After sifting through the massive and variegated responses received from the stakeholders who participated in the five Consultations, a set of relevant points have been extracted, which can be taken as the national response to the TDA document of the RC unit. These include some general issues which do not fall under the three categories identified by the RC Unit. The national response to the TDA document can be summarised as follows:

General Issues

- The fish stocks exploited by different countries are not necessarily drawn from a common pool. It could well be different stocks. This needs to be ascertained and scientifically established before fixing country quotas, if any, for mackerel and hilsa.
- Fishing fleet operating under open licenses from many countries leads to IUU and irrational fishing practices.
- The eight country framework of SAP might not be able to address the issues of poaching by other countries and sea water quality standards beyond territorial waters.
• Policy harmonization among states/provinces within a country should precede any attempt to achieve policy harmonization at regional level.
• The level of awareness and capacity for following sustainability norms vary widely among the stakeholders in different countries. Thus, if a country with higher level of awareness and capacity follows the good management practices and some other ignore these norms; it will lead to an anomalous situation. Therefore, the implementation of SAP should be attempted only after ensuring a level playing field for all member countries.
• TDA is rather weak in addressing the issues from a socio-economic and governance perspectives
• Climate change and its various manifestations are fast emerging as a major trans-boundary issue and this should be included as a major component of the TDA document.
• Bilateral agreements need to be worked out between member countries to prevent harassment, ill treatment and even death of fishermen trespassing into the territorial waters of other countries. These agreements about treatment of fishermen should be respected.

Over exploitation of the marine living resources

• There is over capacity of fishing units and further increase in fishing effort needs to be restricted, but this has to be done collectively by the different countries on agreement.
• There are some known good fishing grounds also where fishing can be intensified. Fishing intensity is low in in Andaman and Nicobar islands. There should be a way to reward this contribution to sustainability on lines of carbon credits.
• Scientific assessment is needed to know the optimum fishing effort in terms of number of trawlers, gill nets and traditional nets that can be operated on a sustainable basis. This method should be uniformly followed across all the BOBLME countries.
• Bye-catch loss and stock depletion due to irrational fishing methods need to be addressed.
• Seasonal ban on fishing and other conservation measures need to be followed uniformly by all countries in order to be effective and fair.
• Collection for fish/shrimp juveniles and eggs is a major issue that needs to be addressed in countries.
• There should be emphasis on development of alternate skills, especially in offshore fishing to achieve sustainability.
• Livelihood issues of fishers should be addressed ensuring better quality of life and decent income.
• Hilsa stock protection measures have been initiated in West Bengal. This will be meaningful only if implemented uniformly by all member countries in the BOBLME project.
• Natural and man-made disasters need to be mentioned.
Degradation of critical ecosystems

- Odisha has maximum shoreline under protection including turtle breeding areas. Long ban periods up to 9 months at the cost of livelihoods. There should be a system of rewarding the fishermen for following conservation norms.
- Turtle conservation norms need to be reassessed periodically to ascertain whether the current measures are very effective.
- In mangroves, subsistence fishing should be allowed. Nutritional and economic benefits accrued to the poor through subsistence fishing cannot be ignored.
- Mangrove afforestation programme should be considered as an option to mitigate the loss.
- Freshwater flow and upstream catchment conservation are critical for mangroves.
- In spite of the acute shortage of land, A & N maintains a very high percentage of its land covered with forests, adding to the global environmental security. This contribution to the global public goods needs to be acknowledged in the TDA process and adequately compensated during the allocation process while developing strategic action plans (SAPs).
- Trespassers indulge in dynamite fishing in Indian waters destroying the ecosystem, especially by damaging coral reefs.
- Sea ranching of depleted species and sea mouth deepening/widening/dredging need to be considered as options for increasing production and conserving the threatened species.
- While seeking trade-offs between environmental norms and genuine development/livelihood issues, interests of the traditional fishers tend to be ignored, as they are not empowered and not visible as a genuine stakeholder.
- Conflict between Harbour expansion (channelization, dredging and deepening) and the fishers' livelihood needs to be recognized.
- Development of alternate skills (offshore fishing) alternate livelihood options (life guards, tourism etc) to achieve sustainability.
- Better coordination needed between security agencies and agencies dealing with environmental/fishing. The security agencies need to be informed about the conditions under which offenders can be apprehended at sea.
- Environmental flows in rivers and conservation in river stretches and their catchments.
- Mangroves in a 35 km stretch on Bangladesh and India border needs de-siltation.

Pollution

- All kinds of industries cause pollution -not only the small industries. Necessary amendments are needed in the TDA document.
- There are island-specific problems in waste disposal. New technologies needed.
- A number of new thermal and nuclear power plants are proposed, which pose serious threat of pollution in the coastal areas. Such power plants should be discouraged.
- All BOBLME countries need to agree on uniform EIA protocols. Inadequate valuation tools often leads to a situation where the real value of ecosystem services that support fishers' livelihoods are not reflected in EIA process. EIA should take into account the concern of fisheries sector.
• Common and agreed norms required for effluent treatment and management across the countries.
• Toxic ship breaking and deliberate sinking of ships are a serious concern.
• Pollution and habitat degradation should be addressed on a basin scale, covering river systems as a whole including catchments.
• Sources of pollution such as iron ore handling by ships, and sulphur washed into the sea after rain and pesticides input from tea gardens (to rivers) needs to be addressed
• Low per capita GDP is not a root cause for pollution - remove this

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Trans-boundary Diagnostic Analysis (TDA)
of the Bay of Bengal Large Marine Ecosystem (BOBLME) Project

A Report on the TDA Consultations in India

Full Report

Trans-boundary Diagnostic Analysis (TDA) is a scientific, technical, analytical document that identifies priority environmental and fisheries issues that are ‘trans-boundary’ in nature. TDA identifies, quantifies (where possible) and ranks, according to severity of environmental and/or socio-economic impacts, water-related environmental trans-boundary issues and their proximate and root causes in the Bay of Bengal Large Marine Ecosystem (BOBLME). TDA provides the scientific basis for the collaborative development of a Strategic Action Programme (SAP) that will be formulated by BOBLME Project to coordinate national and regional activities to address the issues and their causes.

A trans-boundary issue is defined as a problem in which the cause of the problem and/or its impacts is separated by a national boundary. In a broader interpretation, ecosystem degradation/loss that contributes to a global environmental problem and regional solutions aimed and global benefits are trans-boundary in nature. Similarly, “shared” issues between two or more countries are described as trans-boundary. However, "common" issues (similar issues) that occur across all the eight BOBLME countries are not necessarily trans-boundary. Such “common” issues are included in this TDA where they promote regional and/or local solutions that achieve economies of scale and cost advantages which accrue from addressing the issues in a collaborative fashion.

Background

TDA and SAP are the two key components of the BOBLME project that provide a strong basis for sharing the natural resources in the bay of Bengal region on a sustainable basis by the eight member countries. The BOBLME Project has adapted a rather protracted path of regional and national consultations, by engaging both experts and stakeholders in the TDA process, to ensure that the analysis is done on a technically sound basis and all opinions are taken on board (Fig 1). The process started in February 2003 with the First Regional Workshop on TDA in Pattaya, Thailand, which identified three broad issues which were trans-boundary in nature viz., (i) over-exploitation of the marine living resources (ii) degradation of mangroves and coral reefs and (iii) land-based sources of pollution. During 2003 and 2004, the subject was further discussed at a number of for a both at national as well as regional level that resulted in good amount of documentation (eight country papers and three theme papers), and an array of regional & national consultations (available at www.boblme.org).
The final output of all these activities has been a comprehensive draft of TDA document, which was presented and discussed in the second Regional Workshop held in Colombo in October 2004. The international consultants and national/regional level experts debated on the draft TDA report and finalized it for sending out to the member countries. Seagrass was added as a new component in the TDA process at this stage. The TDA document of the RC unit comes in three different forms viz., (i) Executive Summary (II) Brief Summary (iii) Summary and (IV) Full Report in two Volumes (Annex 1 to 4). The translations in regional languages are attached (Annex 5).

Figure 1. The TDA Consultation Process of BOBLME
The draft TDA document is presently being discussed by the stakeholders at national and sub-national level in the eight member countries, thus providing opportunities for the stakeholders in these countries to assess the information and conclusions from a trans-boundary perspective and decide whether, on balance, this TDA is an appropriate basis for the development of the Strategic Action Programme. The countries are encouraged to verify, note errors, review and challenge the information and views presented in the document and to flag points that might need verification, and recommend deletions/additions. Once all the member countries complete this process, the TDA document will be modified at the regional level and presented to the Project Steering Committee (PSC) to approve for feeding into the SAP. India National Unit of BOBLME has completed the process of stakeholder consultations within the country and a national response needs to be sent to the Regional Unit.

TDA activities in India

This document summarises the results of the TDA consultations conducted by the Indian National Unit of BOBLME in different States and Union Territories to engage the stakeholders. There were five state-level consultations held in Port Blair, Puducherry, Kakinada, Puri and Kolkata, followed by a National TDA exercise to consolidate and moderate the ideas emerged from the state level meetings. The TDA documents of the Regional Unit became available in India in the month of January 2011 and the first National Consultation for the Union Territory of Andaman & Nicobar Islands was held at Port Blair on 24 January 2011. This was followed by a Consultation in Puducherry on 7 February 2011 that covered the Tamil Nadu and the Union Territory of Puducherry (Karaikkal and Puducherry). In the Consultation organized at Kakinada on 7 March 2011, stakeholders from the State of Andhra Pradesh and those from the Yanam region of the Union Territory of Puducherry participated. Similar engagements were organized for the states of Odisha and West Bengal on 18 May and 9 June 2011 respectively (Table 1). Nearly 600 stakeholders took part in the deliberations.

The executive summary of the TDA document was translated into Hindi, Tamil, Telugu, Oriya and Bengali and both English and regional language versions were distributed at the Consultations. All participants were free to talk in the language of their choice.

Composition of participants

Fisheries Department, representing the key stakeholders of the TDA process, always took a leading role in organizing the events in the States, along with state fisheries development corporations. Other key players such as Departments of Forests and Environment were also represented. Participation from the Fisheries Department was invariably at the level of Secretary/Director. Central government organizations participated in the consultations include Fishery Survey on India, Zoological Survey of India, Central Agricultural Research Institute, Central Marine Fisheries Research Institute, Central Institute of Fisheries Technology, Central Institute of Freshwater Aquaculture, Central Inland Fisheries Research Institute, Central Institute of Fisheries Education, National Fisheries Development Board and Marine Products Export Development Authority, Sundarbans Development Board. Indian Navy and Coast Guard participated in all meetings. Banking and cooperative sectors were represented by the State Bank of India, National Bank for Agriculture and Rural
Development, Co-operative societies, (Fishers, Fleet operators, Food processing), SHGs. There was an impressive representation from Tribal Councils, other local self-governments, Fishing /Food processing industries, NGOs, Chamber of Commerce & Industry and Universities.

**Format for discussions**

The main objective of the TDA consultations was to collect feedback on the TDA document prepared by the Regional Unit from different stakeholders. In each meeting, the salient features of the TDA findings were presented under the three major issues as drivers of change viz., Over-exploitation of marine Living Resources, Degradation of Critical habitats and Pollution (Fig 2). Trans-boundary nature of each issue was described briefly and their proximate and root causes discussed (Tables 2 – 4). Thereafter, all participants were encouraged to talk freely and give their critique on the contents of the TDA document presented.

**Figure 2. Main drivers of change**
State level TDA Consultations

Andaman & Nicobar Islands

The Workshop was attended by a cross section of the stakeholders including senior officials of the A & N administration, scientists, fishermen’s representatives, NGOs, traders and environmentalists. Scientists from the central Agricultural Research Institute (ICAR) and the commandant of Indian Coast Guard also participated. The main focus of the Workshop was to view the issues identified by the Regional Unit of the Project from an Indian perspective, add value to it and make it relevant to the Indian context. About 80 participants took part in the discussions.

A major issue that strongly came up for discussions was the relatively pristine nature of the seas around A & N Islands, which needs be taken into cognizance while developing sustainability norms. A theme of discussion that came up very frequently was that the Andaman and Nicobar contributed the least to the environmental degradation, but the islands were the worst-affected on account of fall in productivity. Need for conserving corals, mangroves and pollution also dominated the discussions. Similarly, poaching by foreign vessels in the EEZ zones and security of Indian fishers who accidentally stray into the other nations’ territory or international waters came up prominently. The Workshop noted with concern that poachers from other countries indulged in dynamite fishing in Indian waters destroying the ecosystem, especially by damaging coral reefs. All the participants expressed a high level of awareness about issues related pollution, access and the sustainability in the Bay of Bengal.

The discussions were structured under the three main sections viz., overexploitation of the marine living resources; degradation of mangroves; coral reefs and seagrass; and Pollution. Some general issues have also come up. The issues raised in the meeting are summarized below:

Overexploitation of the marine living resources

- Andaman and Nicobar islands have very thin population of fishers due to a number of historic, anthropogenic and socio-political reasons and therefore the region has low fishing pressure. This way, they are contributing positively to the cause of sustainability. However, in the context of open access for fishers from other countries in the region to the shared fish stocks, A&N region stands to suffer. A way to compensate the conservation efforts by the islanders need to be explored on line of the polluter pays principle.

- Like all other islanders, sea is the main resource of the Andamaner, around which all their activities revolve. This fact needs to be factored into all conservation and developmental measures. While harmonising the fishing and environmental conservation, interests of small scale fishers who depend solely on fisheries need to be protected. Rehabilitation process, if any, needs to match the skill of the people and their aspirations. Nutritional and economic benefits accrued to the poor through subsistence fishing should not be ignored.
• Controlled breeding, culture and trade of groupers and marine ornamental species need to be encouraged in order to ease pressure on natural populations of these fishes.
• Development of aquaculture by involving entrepreneurs can be used as a means to increase production and thereby reducing over-exploitation of natural fish stocks

Degradation of mangroves, coral reefs and seagrass

• The Workshop expressed a need for better coordination, synergy and networking among various research projects on mangroves and coral reefs in the country in particular and the region in general for improved sharing of knowledge and benefits from research.
• Loss of coral reefs is a matter of great concern for the A & N region as this forms the habitat for a number of fish species. The recent unprecedented spate in coral bleaching, which resulted in bleaching up to 60-80% is accountable to global climate change. The problem is further confounded due to the slow rate of regeneration due to algal infestation. These developments need to be factored into the TDA process.
• The workshop noted that 17% of the mangroves in India are located in the A & N region and these are very vital for conserving the islands’ fishery resources. There is a need to approach mangrove conservation from a different angle. Instead of attempting to leave all mangroves untouched, possibilities need to be explored to allow utilization of fishery resources without damaging the mangrove wealth. While conserving mangroves, livelihoods of the local people who live traditionally on the natural resources in the mangrove areas should be protected. It needs to be noted that tribal populations and other traditional resource users live in harmony with nature for thousands of years without causing any degradation. Development of new technologies and adoption of existing technologies like rearing of ducks and fodder growing in saline areas can be considered.
• In spite of the acute shortage of land, the island maintains a very high percentage of its land covered with forests, adding to the global environmental security. This contribution to the global public goods needs to be acknowledged in the TDA process and adequately compensated during the allocation process while developing strategic action plans (SAPs).
• The policy on sea cucumber needs be reviewed by allowing its breeding and culture in controlled conditions in view of the high market demand.
• Poachers from other countries indulge in dynamite fishing in Indian waters destroying the ecosystem, especially by damaging coral reefs.

Pollution

• The islands face a unique problem in waste disposal. On the one hand, wastes cannot be dumped into the seas; at the same time, there is severe shortage of land to create waste disposal systems. New technologies for safe and economic waste management are needed along with resources/capacity to access them. Development of fish processing is also slow due to this problem of waste disposal.
• The Workshop noted with concern the catching of turtles by trawlers as well as the local communities. The existing regulations for using TEDs are not enforced well and the system of certification to its compliance is flawed. Local communities continue to catch turtles mainly due to ignorance of conservation norms. While creating
awareness among the local tribesmen about the need to conserve turtles, their 
dependence on turtles from livelihood, food and culture angles needs to be 
recognized and addressed.

- The TDA should address comprehensively the issue of ballast water transferring 
pollutants and exotic species across countries and regions. Existing “Best Port 
Management Practices” protocols need to be implemented more effectively.

**General**

- National security is a key issue in the Andaman and Nicobar as these islands are 
strategically located. Foreign fishing vessels who enter the territorial waters of the 
country in the Andaman region pose a great security risk apart from poaching of fish 
and damaging the ecosystem.

- Tourism development, if not done on a sustainable basis, has the potential to 
damage the ecosystem. Sea routes for tourists and coral viewing need to be planned 
more carefully to protect ecosystems.

**Tamil Nadu & Puducherry**

The one day event, reviewed the major trans-boundary issues flagged by the BOBLME 
Project. The Workshop was attended by a cross section of stakeholders including senior 
officials of the State of Tamil Nadu and the Puducherry administration, Scientists, 
fishermen’s representatives, NGOs, traders and environmentalists. The main focus of the 
workshop was to review the issues identified by the Regional Unit of the Project from an 
Indian perspective, add value to it and make it relevant to the Indian context. The exercise 
was specifically aimed at receiving feedback from the stakeholders of Tamil Nadu and the 
UT of Puducherry. More than 150 participants representing fishers, fishing related 
organizations, different organizations/Departments of the State of Tamil Nadu and the 
Puducherry administration, Central government departments such as Ministry of 
Environment and Forest, ICAR Institutes, Universities, etc took part in the deliberations. The 
majority of participants comprised actual fishers, and office bearers of their organizations 
from Tamil Nadu, Puducherry and Karaikkal. Those from Yanam were not present as they 
were to be invited to similar TDA exercise to be conducted in Kakinada (Andhra Pradesh) at 
a later date.

A summaries of the TDA document, both in English and Tamil, were circulated among the 
participants, apart from making a power point presentation on the salient points. A major 
issue that strongly came up for discussions was the harassment being faced by the fishers 
from Tamil Nadu and Puducherry from the Sri Lankan authorities. The meeting recognized 
unrestricted growth of fishing fleet and use of irrational fishing practices as major causes of 
over exploitation. It also noted that some areas have under-exploited fish stock that can be 
brought under fishing. Need for all BOBLME countries to adhere to conservation and good 
fishery management practices was a common refrain of all interventions. Pollution from 
industries and domestic sewage and deterioration of riverine environment has also come up 
in the discussions.
The discussions were structured under the three main sections viz., overexploitation of the marine living resources; degradation of mangroves; coral reefs and seagrass; and Pollution. Some general issues have also come up. The issues raised in the meeting are summarized below:

**Overexploitation of the marine living resources**

- Fisher community of Tamil Nadu and Puducherry expressed their strong concerns about Indian fishers getting killed by Sri Lankan forces, while trespassing beyond Indian territorial waters. 637 killings such killings are reported. Fishermen are forced to go beyond the territorial waters because of declining catches in the shallow areas. As these violations are often driven by livelihood and food and issues; they need to be treated more humanely.
- Trespassing into countries’ EEZ is common across the world; for instance our EEZ is being fished by Thailand, Taiwan and Myanmar, but killing is unheard of.
- Too many unregistered boats are operating in the coastal waters which contribute to over-fishing.
- Although purse seines are banned, these are being used clandestinely by unregistered fishers.
- Small fishes are caught in large numbers causing depletion of stock, necessitating effective control regimes and conservation norms.
- Indian fishers do not have any specialized gear for catching tuna. The existing incentives for taking up tuna long lining are not implemented effectively.
- The fish stocks exploited by different countries are not necessarily drawn from a common pool. It could well be different stocks. This needs to be ascertained and scientifically established before fixing country quotas, if any, for mackerel and hilsa.
- There is a need to assess the catchable fish stock beyond 50 m depth.
- Good fishing grounds are known to exist at 200 – 400 depth, between Mahabalipuam and Karaikkal, but scientific studies are needed to confirm this. Trawling is not economically feasible here due to high fuel cost, perhaps long lining can be tried.
- Seasonal ban on fishing needs to be followed uniformly by all countries in order to be effective and fair to the countries that follow the ban. The meeting expressed strong concern about trawlers from overseas that fish in Indian waters even during the ban period.
- During the ban period, traditional vessels are allowed to operate. But, in the name of country vessels, large boats operate trawl nets, thus defeating the purpose of fishing ban
- Increasing motorization leads to loss of livelihood to those operating traditional non-mechanised vessels
- In between Kakinada and Visakhapatnam, Suzuki trawlers destroy hooks and lines. Government should protect the interest of hook and line fishers.
- Off Nagapattinam, Karaikkal and Pondicherry, good potential for deep sea lobster exists up to 500 metres. These should be protected from over-fishing. Similarly, Puducherry is good for hammer-head sharks and long tail sharks. Good tuna fishery is possible from Visakhapatnam to Sri Lanka.
Degradation of mangroves, coral reefs and seagrass

- Dwindling river flows into coastal waters cause depletion of mangroves and other critical habitats. This is a serious issue.
- Fishers in Puducherry do not get any compensation during the 45 days of fishing ban.
- There is no scientific basis for the present ban period of April-May. October-November is a better option based on the traditional knowledge.
- Sea ranching of depleted species and sea mouth deepening/widening/dredging need to be considered as options for increasing production and conserving the threatened species.
- Stringent punishment including prosecution should be meted out to the boat owners who catch sea cucumbers at sea and bring them ashore.

Pollution

- Industries do not follow the norms for treating effluents and government machinery needs to enforce these norms more effectively.
- Polluting industries are allowed to establish their units near the sea and during public hearing they often mislead/influence the local people through unfair means.
- Norms for setting up industries along coastal region and the effluent treatment norms should be uniform across the eight BOBLME countries, in order to be fair to the countries that comply with norms.
- Untreated sewage is a main source of pollution in coastal sea waters. Factory effluents from Tirupur adversely impact the fish stock.

General

- Fishing fleet operating under Letter of Permission (LoP), leads to IUU and irrational fishing practices. LoP vessels operate trawls for 8 months in year catching 350 -400 t per vessel. As these vessels do not sell their catch in Indian shores, there is no room for verification of fishing practices and recording gear type, catch size, species, etc. More than 400 such vessels are in operation against the permitted number of about 80. This is a major cause of over-exploitation.
- Puducherry needs a training centre deep sea fishing, engine drivers steamers and ship navigators
- Many incentives are given to exporters for higher export performance, but these benefits never percolate down to the producers i.e., the fishers. Similarly, as the fish caught in Puducherry is exported via Chennai, the UT does not get the export incentives.

Andhra Pradesh

The Consultation was organized in association with the Fisheries Department of Andhra Pradesh, the State Institute of Fisheries Technology (SIFT) and Fishery Survey of India reviewed the major trans-boundary issues identified by the BOBLME Project. It was attended by 147 participants representing a cross section of stakeholders including senior officials of the State of Tamil Nadu, Scientists, environmentalists, fishermen’s representatives, NGOs, traders, and a representative from the Indian Navy. Fishers and fisheries related organizations form Yanam (Union Territory of Puducherry) also participated in the discussions. The exercise was specifically aimed at receiving feedback from the
stakeholders of Andhra Pradesh and Yanam. The main focus of the Workshop was to review the issues identified by the Regional Unit of the Project from an Indian perspective, add value to it and make it relevant to the Indian context. Fishers, fishing related organizations, different organizations and Departments under the State of Andhra Pradesh, Central government departments such as Ministry of Environment and Forest, ICAR Institutes, Universities, etc took part in the discussions. The majority of participants comprised actual fishers, and office bearers of their organizations from Andhra Pradesh but a number of stakeholders from Yanam (Puducherry) were also present. Summaries of the TDA document, both in English and Telugu, were circulated among the participants, apart from making a power point presentation on the salient points.

Major issue that came up for discussions prominently was over-exploitation of fish stocks due to unrestricted access to trawling and large boats. The meeting noted that heavy fishing under the Letter of Permit (LoP) scheme of government of India amounts to IUU and unsustainable fishing practices and therefore this practice needs to be scrapped. Collection for fish/shrimp juveniles and eggs from the wild for aquaculture purposes is a major cause of decline in catch. Closed season will be effective only if made applicable uniformly in all BOBLME countries. A need for working out bilateral agreements between member countries was pointed out as one of the ways to prevent harassment, ill treatment and even death of fishermen trespassing into the territorial waters of other countries. Mangrove depletion was identified as a serious issue and afforestation programme was suggested as an option to mitigate the loss. While seeking trade-offs between environmental norms and genuine development/livelihood issues, interests of the traditional fishers tend to be ignored. Pollution from industries and domestic sewage and deterioration of riverine environment have come up prominently in the discussions. BOBLME countries need to follow a uniform set of conservation and good fishery management practices.

The discussions were structured under the three main sections viz., overexploitation of the marine living resources; degradation of mangroves; coral reefs and seagrass; and Pollution. Some general issues have also come up. The issues raised in the meeting are summarized below:

**Overexploitation of the marine living resources**

- CPUE and the size at capture are declining in the coasts of Andhra Pradesh. CPUE declined from 4-5 kg earlier to less than half kg now.
- Problem of unselective fishing practices and gear; and Illegal, unregulated and unreported (IUU) fishing, need to be recognized as a national as well as trans-boundary issue. LoP is a major source of IUU and the permits issued to big companies should be scrapped.
- There is excessive fishing effort and overcapacity of fleets in the Bay of Bengal. Fishers and their organizations should take lead in setting norms voluntarily in restricting the fishing fleet, emulating the practice being followed in Gujarat and other States.
- Destructive fishing methods including multi-day fishing and ring nets need to be banned.
- Collection for fish/shrimp juveniles and eggs from the wild for aquaculture purposes is a major cause of decline in catch. Capture of tiger prawn for brood stock also
depletes the stock. Use of hatchery-bred brood stock and seed should be encouraged for shrimp aquaculture.

- All boats except the country crafts like catamarans should be banned during the 45 days of closed season.
- Closed season should be applicable uniformly in all BOBLME countries in order to be fair to the complying countries.
- Livelihood issues of fishers should be addressed ensuring better quality of life and decent income.
- Bilateral agreements need to be worked out between member countries to prevent harassment and ill treatment and death of fishermen trespassing into the territorial waters of other countries.
- There should be emphasis on development of alternate skills, especially in offshore fishing to achieve sustainability.

*Degradation of mangroves, coral reefs and seagrass*

- The shrinking Kakinada bay and the resultant habitat loss is a matter grave concern.
- Degradation and loss of mangroves are attributed to conversion for aquaculture, salt production, expanding coastal areas for industry, human settlement, tourism, unsustainable logging, destructive fishing practices, coral bleaching, oil spillage and sand mining.
- Mangrove depletion is a serious issue and afforestation programme should be considered as an option to mitigate the loss.
- Free access for fishing should be stopped.
- Shorelines are reduced due to tourism and industrial development, depriving fishers enough shore length for operating long shore seines (*pedda vala*) and enough beach space for drying fish.
- Dwindling river flows into coastal waters cause depletion of mangroves and other critical habitats. This is a serious issue.
- Awareness programmes are needed to make people aware of conservation needs.
- While seeking trade-offs between environmental norms and genuine development/livelihood issues, interests of the traditional fishers tend to be ignored, as they are not empowered and not visible as a genuine stakeholder. This is true while fixing Zone 1 (ecologically sensitive zone) by MoEF.
- While setting norms for Marine Protected Areas, genuine needs of the fishers are not taken on board. Rights of traditional fishers are often violated and they are even stopped under section 144.
- There is a conflict between Harbour expansion and the fishers’ livelihood. Channelization, dredging and deepening of Kakinada Bay are against the interests of the fishers’ livelihood.

*Pollution*

- Industries do not follow the norms for treating effluents and government machinery is not effective in enforcing these norms.
- Polluting industries are allowed to establish their units near the sea and during public hearing they often mislead/influence the local people through unfair means.
• Norms for setting up industries along coastal region and the effluent treatment norms should be uniform across the eight BOBLME countries, in order to be fair to the complying countries.
• Untreated sewage is a main source of pollution in coastal sea waters.
• Factory effluents from ONGC, other petroleum-based units and power plants are sources of pollution that adversely impact the fish stock.
• CRZ regulations up to 500 m limit is not strictly followed. Chemical factories still discharge effluents into the seas.
• All BOBLME countries need to follow common EIA protocols. Inadequate valuation tools often leads to a situation where the real value of ecosystem services that support fishers’ livelihoods are not reflected in EIA process. EIA should take into account the concern of fisheries sector.

General
• The procedure followed in registering fishing boats needs to be reviewed.
• No relief is made available to fishers during the closed season. This along with provision of insurance to cover the fishers’ occupational risks will go a long way in achieving higher compliance rates to conservation norms.
• Use of ring nets and catching of gunda chapalu are detrimental to sustainable fisheries and these need to be restricted.

Odisha
The TDA Workshop, organized in association with the Fisheries Department of Odisha and the Fishery Survey of India, reviewed the major trans-boundary issues identified by the BOBLME Project. The Workshop was attended by a cross section of stakeholders including senior officials of the State of Tamil Nadu, Scientists, fishermen’s representatives, NGOs, traders, and environmentalists. Central Marine Fisheries Research Institute, Central Institute of Fisheries Technology, Central Institute of Brackishwater aquaculture, Zoological Survey on India and the Indian Navy were also represented. The main focus of the Workshop was to review the issues identified by the Regional Unit of the Project from an Indian perspective, add value to it and make it relevant to the Indian context. 110 participants representing fishers, fishing related organizations, different Departments/organizations of State of Odisha, Ministry of Environment and Forest, Government of India, ICAR Institutes, Universities, Indian Navy, etc. took part in the discussions. The majority of participants comprised actual fishers, and office bearers of their organizations from Odisha.

A summary of the TDA document, along with its Oriya version, was circulated among the participants, apart from making a power point presentation on the salient points. The meeting stressed the fact that Odisha coasts due to their geo-physical characteristics, are very sensitive to many environmental issues including turtle and mangrove conservation. Consequently, the State is subjected to many restrictions including protracted ban periods and sometimes, they cannot fish for up to 9 months. Frequent cyclones and super cyclones also restrict their fishing activities. Fishing being their only livelihood, they should be adequately compensated during the ban period. The burgeoning number of trawlers, presence of ring nets, bottom trawlers and operation of nets without mesh regulations have been identified as the major causes of overexploitation. As the number of fishing crafts
increases, fishing becomes unviable for boat operators. Further addition of fishing craft to the existing fleet should be stopped and whenever a new boat is added, one should be scrapped in its place. The meeting also highlighted a need for consolidating efforts to meet the norms of sustainability at national and international levels by policy level interventions. The discussions were structured under the three main sections viz., overexploitation of the marine living resources; degradation of mangroves; coral reefs and seagrass; and Pollution. Some general issues have also come up. The issues raised in the meeting are summarized below:

**Overexploitation of the marine living resources**

- Excess number of trawlers, presence of ring nets, bottom trawlers and operation of nets without mesh regulations are the major causes of overexploitation. As the number of fishing crafts increases, fishing becomes unviable for boat operators.
- Further addition of fishing craft to the existing fleet should be stopped. When a new boat is added, one should be scrapped.
- Implementation of existing regulations to prevent overfishing is poor.
- Fishermen’s interest needs to be recognized while planning development projects in coastal areas.
- Policy harmonization is a tough task. States and Provinces within a country should harmonize policies before attempting this at an LME scale.
- Closed season should be applicable uniformly in all BOBLME countries in order to be fair to the complying countries.
- Fishermen in Odisha are subjected to many restrictions including protracted ban periods. Sometimes, they cannot fish for up to 9 months. Frequent cyclones and super cyclones also restrict their fishing activities. Fishing being their only livelihood, they should be adequately compensated during the ban period. Free food grains and kerosene oil should be distributed to fishers.
- There is a need to scientifically assess the optimum fishing effort in the form of number of trawlers, gill nets and traditional nets that can be operated on a sustainable basis. This method should be uniformly followed by across all the BOBLME countries.
- There should be emphasis on development of alternate skills, especially in offshore fishing to achieve sustainability.

**Degradation of mangroves, coral reefs and seagrass**

- Man-made destruction of mangroves for habitation, ports and industrialization continues unabated. Mangrove nurseries for plantation need to be developed in all countries like ornamental fish breeding.
- Conservation and sustainability norms will be meaningful only if they are followed uniformly by all member countries.
- Opportunities for alternate livelihood should be explored when pursuing sustainability goals.
- Integrated Coastal Zone Management project sanctioned by World Bank cover 80 villages and 600 SHGs. This model needs to be tried on a wider scale.
- Odisha has maximum shoreline under protection including turtle breeding areas. There should be a system of rewarding the people of Odisha for following conservation norms, which contribute to a substantial global public good.
• Turtle programme area should be properly demarcated and explained to fishers.
• Tradition fishermen should be compensated for loss due to turtle ban. Alternate livelihood to be given matching with their skills.
• Sea grass is important as breeding ground for fishes. But these are destroyed by trawling; sometimes turtle is eating/destroying sea grass.
• Odisha is fulfilling an international obligation by following turtle protection measures at the coast of fishers’ livelihood sometimes up to 9 months. This needs to be recognized and compensated.
• Fishermen of Odisha have made sacrifices for conservation. They were evicted from Bitterkanika when it was declared as protected area for crocodile in 1975. This resulted in stopping of river fishing totally. As there was no alternate livelihood, people moved towards sea fishing. In 1997, Gahirmatha was declared as sanctuary and sea fishing was banned. 3000 people were arrested and 2 people were killed. Many are reported to have committed suicide. Many have migrated to other States as daily labourers. This need to be recognized and compensated.
• Present turtle conservation norms need to be reassessed periodically to ascertain whether the current measures are very effective.
• There is a need to educate fishers about trawler ban concepts and to educate the trawler and other vessels crew on security concerns.
• In Gulf of Mannar, two islands disappeared due to exploitation of corals for lime industry.

Pollution
• Problems from land-based pollution and oil pollution from ring seines, need to be addressed.
• Untreated effluents, polythene and non-bio-degradable substances are released into the sea, mainly due to tourism sector (Puri alone receive 50 lakh tourists); Beach conservation should receive priority.
• There is no scientific data to quantify pollution from effluents carried from rivers and impact from sand mining.

General
• Fishing fleet operating under Letter of Permission (LoP), leads to IUU and irrational fishing practices. These vessels operate even during the ban period. This, being a major cause of over-exploitation, needs to be banned.
• Policy harmonization among states within the country should precede any attempt to achieve policy harmonization at regional level.
• Fishermen’s interest needs to be recognized while planning development projects.
• Better coordination needed between security agencies and agencies dealing with environmental/fishing. The security agencies need to be informed about the conditions under which offenders can be apprehended at sea.
• Regulation needed to engage fishers as life guards in tourism centres as alternate employment. Training needed in life guarding.
• Proposal to appoint 65 life guards from fishers pending at Government level.
West Bengal

The Consultation Workshop, organized in association with the Fisheries Department of West Bengal, the Central Inland Fisheries Research Institute and the Fishery Survey of India, reviewed the major trans-boundary issues identified by the BOBLME Project. The Workshop was attended by a cross section of stakeholders including senior officials of the State of West Bengal and organizations under it, Scientists, fishermen’s representatives, NGOs, traders, and environmentalists. The Indian Navy, Coast Guard, Sundarbans Development Board, WWF, the Zoological Survey of India and The West Bengal University of Animal and Fishery Sciences were also represented. The main focus of the Workshop was to review the issues identified by the Regional Unit of the Project from an Indian perspective, add value to it and make it relevant to the Indian context. This was the fourth among a series of Workshops being held in four states and two UTs in the Bay of Bengal region. The exercise was specifically aimed at receiving feedback from the stakeholders from West Bengal. 85 participants representing fishers, fishing related organizations, different departments and organizations under the State of West Bengal, Ministry of Environment and Forest, Government of India, ICAR Institutes, Universities, Indian Navy, NGOs, etc. took part in the discussions. The majority of participants consisted of actual fishers, and office bearers of their organizations from West Bengal.

A summary of the TDA document, along with its Bengali translation was circulated among the participants, apart from making a power point presentation on the salient points. The meeting stressed the importance of hilsa fisheries and noted that the State of West Bengal has imposed restrictions in hilsa fishing during breeding season i.e., from 1 March to 15 June to augment natural recruitment of hilsa population. But these, and a number of other steps initiated by the State to prevent over exploitation, will be meaningful only if implemented uniformly by all member countries in the BOBLME project. Adverse impact on biodiversity due to bye-catch loss has been recognized as a major problem calling for stricter implementation of existing regulations on mesh size. Strict check on irrational fishing methods like use of mosquito net, monofilament and other small mesh nets in all member countries was required. The Meeting highlighted a need for uniform ban on bottom trawling and IUU in all countries.

The discussions were structured under the three main sections viz., overexploitation of the marine living resources; degradation of mangroves; coral reefs and seagrass; and Pollution. Some general issues have also come up. The issues raised in the meeting are summarized below:

*Overexploitation of the marine living resources*

- There is over capacity of fishing units in the region. Therefore, further increase in fishing effort needs to be restricted, but this has to be done collectively by the different countries on agreement.
- There is overfishing within 12 nautical miles, which makes fishing operations unremunerative. This forces fishers to go out into the deeper areas. There is higher catch potential in EEZ and that is why fishers from other countries come there to fish causing over-exploitation of fish stocks.
- The State of West Bengal has imposed restrictions in hilsa fishing during breeding season i.e., from 1 March to 15 June to augment natural recruitment of hilsa population. The State has also initiated a number of other steps to prevent over exploitation. But, these steps will be meaningful only if implemented uniformly by all member countries in the BOBLME project.
- Adverse impact on biodiversity due to bye-catch loss has been recognized as a major problem. Stricter implementation of existing regulations on mesh size is needed to check irrational fishing methods like use of mosquito net, monofilament and other small mesh nets.
- LoP has been recognized as major source of IUU and the Meeting recommended scrapping of LoP forthwith.
- Bottom trawling needs to be banned in India. If allowed, it should be with the condition that small fishes should be thrown back into the sea. However, livelihood issues should be addressed, when fishers are thrown out of employment due to such bans.
- Wild seed catch of shrimp and fish seed affects the population and causes biodiversity loss through bycatch losses. Aquaculture sector should be encouraged to use only hatchery bred seed.
- Countries that follow sustainability norms contribute to global public goods and the benefits of these acts accrue to a large section of people in the region and the world at large. Therefore, those who follow the norm need to be rewarded on lines of carbon credit.

**Degradation of mangroves, coral reefs and seagrass**
- Higher attention is needed on conservation in river stretches and their catchments that impact the coastal ecosystem.
- Mangrove loss is primarily due to loss of habitat through low freshwater flow and pollution. They are destroyed for industries, habitation and brackish water aquaculture farms. Mangroves are also damaged through shipping.
- A 35 km stretch of boarder between Bangladesh and India border to be de-silted and conserved.
- Boundaries of protected areas need to be clearly defined and marked. Access to mangroves areas for fishing needs to be allowed
- Mangrove re-plantations activities need to be taken up jointly by India and Bangladesh in Sundarbans.
- Private harbours pose the danger of converting the coastal areas into concrete jungles. New harbours should be discouraged.

**Pollution**
- Pollution abatement activities in coastal areas need to be linked with the National River Action Plan.
- A number of new thermal and nuclear power plants are proposed, which pose serious threat of pollution in the coastal areas. Such power plants should be discouraged.
- Intensive aquaculture is a major source of pollution. Aquaculture should be practiced in low scale to reduce risk from nutrient loading and toxicity.
• Toxic ship breaking and deliberate sinking of ships are a source of pollution.
• All kinds of industries cause pollution - not only the small industries. Necessary amendments are needed in the TDA document.
• Pollution from dumping of unused fish and fish wastes from trawlers and factory ships is to be addressed.
• Ports are a major source of pollution and best port management norms including ballast water release need to be implemented strictly.

General
• Climate change and its various manifestations are fast emerging as a major trans-boundary issue and this should be included as a major component of the TDA document.
• Bilateral agreements need to be worked out between member countries to prevent harassment, ill treatment and even death of fishermen trespassing into the territorial waters of other countries. These agreements about treatment of fishermen should be respected.

National TDA Consultation

A National TDA Consultation was organized at Vishakhapatnam on 30 June 2011 to take stock of the outcomes from the State level consultations and consolidate/moderate the ideas emerged during the five State level meetings. This was needed as stakeholders within and among the States sometimes expressed conflicting opinions, which needed to be resolved. Moreover, we have to ensure that the positions taken by the participants conform to the national policy on environment and social equity before a national response is sent to the Regional Unit. National experts, senior level officials from the States, Indian Navy and NGOs representing different interests participated in the National TDA consultation. After sifting through the massive and variegated responses received from the stakeholders who participated in the five Consultations, a set of relevant points have been extracted, which can be taken as the national response to the TDA document of the RC unit. These include some general issues which do not fall under the three categories identified by the RC Unit.

General Issues

• The fish stocks exploited by different countries are not necessarily drawn from a common pool. It could well be different stocks. This needs to be ascertained and scientifically established before fixing country quotas, if any, for mackerel and hilsa.
• Fishing fleet operating under open licenses from many countries leads to IUU and irrational fishing practices.
• The eight country framework of SAP might not be able to address the issues of poaching by other countries and sea water quality standards beyond territorial waters
• Policy harmonization among states/provinces within a country should precede any attempt to achieve policy harmonization at regional level.
• The level of awareness and capacity for following sustainability norms vary widely among the stakeholders in different countries. Thus, if a country with higher level of awareness and capacity follows the good management practices and some other
ignore these norms; it will lead to an anomalous situation. Therefore, the implementation of SAP should be attempted only after ensuring a level playing field for all member countries.

- TDA is rather weak in addressing the issues from a socio-economic and governance perspectives
- Climate change and its various manifestations are fast emerging as a major trans-boundary issue and this should be included as a major component of the TDA document.
- Bilateral agreements need to be worked out between member countries to prevent harassment, ill treatment and even death of fishermen trespassing into the territorial waters of other countries. These agreements about treatment of fishermen should be respected.

**Over exploitation of the marine living resources**

- There is over capacity of fishing units and further increase in fishing effort needs to be restricted, but this has to be done collectively by the different countries on agreement.
- There are some known good fishing grounds also where fishing can be intensified. 
- Fishing intensity is low in Andaman and Nicobar islands. There should be a way to reward this contribution to sustainability on lines of carbon credits.
- Scientific assessment is needed to know the optimum fishing effort in terms of number of trawlers, gill nets and traditional nets that can be operated on a sustainable basis. This method should be uniformly followed across all the BOBLME countries.
- Bye-catch loss and stock depletion due to irrational fishing methods need to be addressed.
- Seasonal ban on fishing and other conservation measures need to be followed uniformly by all countries in order to be effective and fair.
- Collection for fish/shrimp juveniles and eggs is a major issue that needs to be addressed in countries.
- There should be emphasis on development of alternate skills, especially in offshore fishing to achieve sustainability.
- Livelihood issues of fishers should be addressed ensuring better quality of life and decent income.
- Hilsa stock protection measures have been initiated in West Bengal. This will be meaningful only if implemented uniformly by all member countries in the BOBLME project.
- Natural and man-made disasters need to be mentioned

**Degradation of critical ecosystems**

- Odisha has maximum shoreline under protection including turtle breeding areas. Long ban periods up to 9 months at the cost of livelihoods. There should be a system of rewarding the fishermen for following conservation norms.
- Turtle conservation norms need to be reassessed periodically to ascertain whether the current measures are very effective.
- In mangroves, subsistence fishing should be allowed. Nutritional and economic benefits accrued to the poor through subsistence fishing cannot be ignored.
• Mangrove afforestation programme should be considered as an option to mitigate the loss.
• Freshwater flow and upstream catchment conservation are critical for mangroves.
• In spite of the acute shortage of land, A & N maintains a very high percentage of its land covered with forests, adding to the global environmental security. This contribution to the global public goods needs to be acknowledged in the TDA process and adequately compensated during the allocation process while developing strategic action plans (SAPs).
• Trespassers indulge in dynamite fishing in Indian waters destroying the ecosystem, especially by damaging coral reefs.
• Sea ranching of depleted species and sea mouth deepening/widening/dredging need to be considered as options for increasing production and conserving the threatened species.
• While seeking trade-offs between environmental norms and genuine development/livelihood issues, interests of the traditional fishers tend to be ignored, as they are not empowered and not visible as a genuine stakeholder.
• Conflict between Harbour expansion (channelization, dredging and deepening) and the fishers’ livelihood needs to be recognized.
• Development of alternate skills (offshore fishing) alternate livelihood options (life guards, tourism etc) to achieve sustainability.
• Better coordination needed between security agencies and agencies dealing with environmental/fishing. The security agencies need to be informed about the conditions under which offenders can be apprehended at sea.
• Environmental flows in rivers and conservation in river stretches and their catchments.
• Mangroves in a 35 km stretch on Bangladesh and India border needs de-siltation.

Pollution

• All kinds of industries cause pollution -not only the small industries. Necessary amendments are needed in the TDA document.
• There are island- specific problems in waste disposal. New technologies needed.
• A number of new thermal and nuclear power plants are proposed, which pose serious threat of pollution in the coastal areas. Such power plants should be discouraged.
• All BOBLME countries need to agree on uniform EIA protocols. Inadequate valuation tools often leads to a situation where the real value of ecosystem services that support fishers’ livelihoods are not reflected in EIA process. EIA should take into account the concern of fisheries sector.
• Common and agreed norms required for effluent treatment and management across the countries.
• Toxic ship breaking and deliberate sinking of ships are serious concerns.
• Pollution and habitat degradation should be addressed on a basin scale, covering river systems as a whole including catchments.
• Sources of pollution such as iron ore handling by ships, and sulphur washed into the sea after rain and pesticides input from tea gardens (to rivers) needs to be addressed.
• Low per capita GDP is not a root cause for pollution- remove this
### Table 1. TDA Consultations in India

<table>
<thead>
<tr>
<th>State and Date</th>
<th>Venue</th>
<th>Organizers</th>
<th># of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andaman &amp; Nicobar Islands; 24 Jan</td>
<td>Megapode Nest, Port Blair</td>
<td>FSI, A &amp; N Administration, CARI</td>
<td>80</td>
</tr>
<tr>
<td>Tamil Nadu and Puducherry, Karaikkal; 07 Feb</td>
<td>Hotel Annamalai Puducherry</td>
<td>FSI, Tamil Nadu, Puducherry</td>
<td>150</td>
</tr>
<tr>
<td>Andhra Pradesh &amp; Yanam; 07 Mar</td>
<td>Hotel Jaya Residency Kakinada</td>
<td>FSI, Andhra Pradesh</td>
<td>147</td>
</tr>
<tr>
<td>Odisha; 18 May</td>
<td>Hotel Holiday Resort, Puri</td>
<td>FSI, Odisha</td>
<td>110</td>
</tr>
<tr>
<td>West Bengal; 09 June</td>
<td>Hotel Indismart Kolkata</td>
<td>FSI, West Bengal, CIFRI</td>
<td>85</td>
</tr>
<tr>
<td>National TDA Consultation; 30 June</td>
<td>Hotel Green Park, Vishakhapatnam</td>
<td>FSI, Andhra Pradesh States Fisheries Department</td>
<td>26</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>
Table 2. Proximate and specific root causes for over-exploitation of the marine living resources

<table>
<thead>
<tr>
<th>Issues</th>
<th>Trans-boundary nature of issues</th>
</tr>
</thead>
</table>
| 1. Decline in overall availability of fish resources;  
2. Changes in species composition of catches  
3. High proportion of juvenile fish in the catch;  
- Many fish stocks shared among BOBLME countries either through trans-boundary migration of fish or larvae;  
- Fishing overlaps national jurisdictions, both legally and illegally - overcapacity and overfishing in one location forces a migration of fishers and vessels to other locations;  
- All countries (to a lesser or greater degree) are experiencing difficulties in implementing fisheries management, especially the ecosystem approach;  
- BOBLME countries contribute significantly to the global problem of loss of vulnerable and endangered species. |

<table>
<thead>
<tr>
<th>Proximate Causes</th>
<th>Specific Root causes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- Excessive fishing effort and overcapacity  
- Destructive fishing methods  
- Unselective fishing practices and gear  
- Illegal, unregulated and unreported (IUU) fishing, both national and international |  
- “Open access” regime;  
- Increasing fishing effort, especially trawlers and purse seiners;  
- High consumer demand for fish, including for seed and fish meal for aquaculture;  
- Weak fisheries MCS and enforcement  
Strong incentives to encroach into areas with better returns. |
Table -3. Proximate and specific root causes for degradation of critical ecosystems

<table>
<thead>
<tr>
<th>Issue</th>
<th>Trans-boundary nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Loss and degradation of mangrove habitat</td>
<td>• All three critical habitats occur in all BOBLME countries</td>
</tr>
<tr>
<td>2. Degradation of coral reefs</td>
<td>• Coastal development for other uses of the land and sea are common in all BOBLME developing countries</td>
</tr>
<tr>
<td>3. Loss and damage to seagrasses</td>
<td>• Trade in products from all the habitats is trans-boundary in nature</td>
</tr>
<tr>
<td></td>
<td>• Climate change impacts are shared by all BOBLME countries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proximate Cause</th>
<th>Specific Root cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Conversion of mangroves for agriculture, aquaculture (shrimp), and salt production;</td>
<td>• Food security needs of the coastal poor;</td>
</tr>
<tr>
<td>• Expanding coastal development for industry, human settlement and tourism, including reclamation;</td>
<td>• Lack of national, provincial/state coastal development plans.</td>
</tr>
<tr>
<td>• Unsustainable logging of mangroves;</td>
<td>• Increasing trade (both domestic and export) for habitat-related products;</td>
</tr>
<tr>
<td>• Increasing pollution, eutrophication and sedimentation;</td>
<td>• Coastal development and industrialization;</td>
</tr>
<tr>
<td>• Destructive fishing practices (poisons, explosives, trawling and push-netting); and</td>
<td>• Ineffective marine protected areas and lack of enforcement;</td>
</tr>
<tr>
<td>• Coastal modification, including coral and sand mining, dredging and reclamation;</td>
<td>• Intensive upstream agriculture practices;</td>
</tr>
<tr>
<td>• Natural causes, especially coral bleaching;</td>
<td>• Increasing tourism;</td>
</tr>
<tr>
<td></td>
<td>• Climate change.</td>
</tr>
</tbody>
</table>
### Table 4  Proximate and specific root causes for pollution

<table>
<thead>
<tr>
<th>Issue</th>
<th>Trans-boundary nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sewage-borne pathogens and organic load</td>
<td>• Discharge of untreated/partially treated sewage is a common problem; sewage and organic discharges from the Ganges-Brahmaputra-Meghna system are likely to be trans-boundary;</td>
</tr>
<tr>
<td>2. Solid waste/marine litter</td>
<td>• Plastics and derelict fishing gear can be transported long distances across national boundaries;</td>
</tr>
<tr>
<td>3. Increasing nutrient inputs</td>
<td>• High nutrient discharges from rivers could intensify large-scale hypoxia; atmospheric transport of nutrients is inherently trans-boundary;</td>
</tr>
<tr>
<td>4. Oil pollution</td>
<td>• Differences among countries with regard to regulation and enforcement of shipping discharges may drive discharges across boundaries; tar balls are transported long distances;</td>
</tr>
<tr>
<td>5. Persistent organic pollutants (POPs) and Persistent toxic substances (PTTs)</td>
<td>• POPs/PTTs and mercury including organomercury undergo long-range transport;</td>
</tr>
<tr>
<td>6. Sedimentation</td>
<td>• Sedimentation and most heavy metal contamination tend to be localized and lack a strong trans-boundary dimension;</td>
</tr>
<tr>
<td>7. Heavy metals</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proximate Cause</th>
<th>Root cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Untreated or only partially treated sewage;</td>
<td>• Increasing coastal population density and urbanization;</td>
</tr>
<tr>
<td>• Untreated or only partially treated industrial discharges, especially from small industries;</td>
<td>• Increasing per capita consumption;</td>
</tr>
<tr>
<td>• Discharges of solid waste into rivers and coastal waters; Burning of solid waste;</td>
<td>• Migration of industry into BOBLME countries, and a proliferation of small industries;</td>
</tr>
<tr>
<td>• Increasing fertilizer use in agriculture;</td>
<td>• Low per-capita GDP</td>
</tr>
<tr>
<td>• Increasing aquaculture;</td>
<td>• Inadequate investment in water management and wastewater treatment;</td>
</tr>
<tr>
<td>• Increasing atmospheric emissions of nitrogen from industry and fossil fuel burning;</td>
<td>• Lack of reception facilities for used oil and oily wastes;</td>
</tr>
<tr>
<td>• Operational discharges of oil from shipping, dumping of used oil from small boats and land vehicles</td>
<td>• Lack of enforcement of environmental regulations;</td>
</tr>
<tr>
<td>• Increasing coastal population density and urbanization;</td>
<td>• Lack of awareness of policy makers, legal system, and civil society</td>
</tr>
</tbody>
</table>
Transboundary Diagnostic Analysis Document of the Bay of Bengal Large Marine Ecosystem Project

Comments of the Expert Group
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A. SUMMARY

The Transboundary Diagnostic Analysis (TDA) document prepared by the Regional Coordination Unit (RCU) of the Bay of Bengal Large Marine Ecosystem (BOBLME) Project has been reviewed in detail at various levels in India and the country’s comments on the process and contents of the TDA document have been summarized below, followed by a full report.

• During the late 1990s, in view of the importance of the BOBLME to the health, wellbeing and livelihoods of the millions of people living in the Bay of Bengal (BoB) region, the Advisory Committee (AC) of the then Bay of Bengal Programme (BOBP) requested the Food and Agriculture Organization of the United Nations (FAO) to assist in the development of a project proposal that could be submitted to the Global Environment Facility (GEF) and other donors for funding.

• At the 24th Advisory Committee Meeting of the BOBP in 1999, which was also its last formal meeting, the BOBP member-countries listed down the important problems and issues confronting fisheries development and management in the BoB region and agreed that several of the problems could be addressed better through a regional mechanism. Besides strongly endorsing the need to continue BOBP or to evolve a new regional mechanism, the 24th AC also formally agreed to support initiation of GEF-supported Block-B activity leading to the BOBLME Project.

• The present TDA document started taking shape through regional consultations in 2003 and 2004. It was further updated in 2009-10. The TDA document aims to identify, quantify and rank transboundary water-related problems and provides scientific basis for a Strategic Action Programme (SAP), which will lay the foundation of regional cooperation for addressing the identified issues.

• The present TDA document is a compilation of local-level scientific information and folk knowledge extrapolated to derive a regional picture. Thus the TDA is grossly correct at the regional level, but the same picture is not reflected at the national level.

• The document has clubbed shared and common issues for the sake of promoting regional and/or local solutions. But, in effect, the distinction between common issues and transboundary issues has got blurred, resulting in loss of focus in better understanding of the transboundary issues in the BoB region.

• The major inputs for preparation of the TDA were the eight national papers prepared by individual consultants- one for each country. The process adopted for preparation of country reports, especially for larger and diverse countries like India, suffers from inadequate information and a multi-disciplinary approach. This inadequacy is subsequently reflected in the TDA document also.

• The TDA does not provide an eco-system model of the BOBLME or any functional specifications of the causal tree. Thus, it cannot form guide for implementation of the ‘ecosystem approach’; rather at best it can create awareness on the ecosystem approach.

• As per the Project Document, the TDA is internationally peer reviewed, but to the best of our knowledge, neither the Indian National Report nor the TDA document is formally reviewed by leading scientific institute(s) in the country.

• A major weakness of the TDA preparation process is the lack of consultation with existing regional organizations including the BOBP or its successor the BOBP-IGO.

• The TDA document identifies overexploitation of fish stocks as a major transboundary issue in the BoB region. This assumption is more or less on a gross basis and not on hard data on species or stocks. The Indian position is that:
  • The threshold of overexploitation and overcapacity is considerably higher for tropical stocks and this threshold has not been reached for majority of the Indian marine fish stocks.
  • Catch trends do not show decline, although stock estimates suggest overexploitation during the last ten years. Similarly, in spite of 30-40 percent extraction of juveniles in India, there is no
decline in catches. This stresses the fact that tools and standards evolved for temperate fish stocks may not be applicable in tropical waters.

- In India, studies show that proliferation of climate-driven fisheries such as the small pelagics, leading to ‘fishing down the food chain’ is not due to fishing alone, but also under influence from the climate.

- There is no open access *per se* in India as fishing is regulated by many means, such as registration, licensing, local customs and social controls.

- Although India has been setting progressive fish production targets, these are fixed through an elaborate planning exercise involving top experts and using scientific evidences provided by research institutes. Targets are also monitored and reviewed at regular intervals. In addition, setting higher targets is also becoming possible due to scientifically justified investments in the fisheries sector through the Five-Year Plans.

- The diesel subsidy available to fishing vessels in India should be seen in the background of the relatively higher diesel price in India compared to other countries and this high price is mainly accountable for the high duty imposed on import of petroleum. The price rise is further compounded by the unprecedented inflation in world oil price, putting the small-scale fishers in difficulty. In any case, agriculture subsidy is much less in India compared to developed countries.

- Fishing operations are generally driven by private finance (*e.g.* moneylenders). There is no reason to believe that in the absence of public support, private finance would not contribute to capacity growth if the business is profitable.

- The TDA assesses mangrove loss of 9 percent in India against a regional average of 21 percent. However, on scrutiny it is seen that the above conclusions were made based on old information. Specific studies by the Central Institute of Brackishwater Aquaculture using time-series satellite data and GIS, clearly show that mangrove area has increased in Tamil Nadu and West Bengal.

- Apart from the fact that critical habitat (mangroves, coral reefs, seagrass) are contributing to global good, their role in development of transboundary fish stocks is not properly investigated.

- In the TDA document, ‘climate change’ has been used as an umbrella concept for destruction of critical habitats. However, given the global-scale of the problem and capacity of the countries concerned, the concept needs to be properly defined in the context of BOBLME to facilitate policy decisions.

- The TDA observed that through various oceanic processes and weather events (*e.g.* cyclone), pollutants within national boundaries may assume a transboundary manifestation. Simultaneously, the TDA also rightly noted that oceanic processes and weather events may also reduce the harmful impact of pollution. However, there is not enough information on the impact of oceanic processes and weather events (good or bad) on pollution and hence working of these channels is uncertain. The country reports commissioned by BOBLME in India and Bangladesh on pollution state that there is no evidence for transboundary impact. Thus, pollution is localized and more of a common issue, to be addressed by the countries.

- India (and presumably the other seven BOBLME member-countries) is party to many global initiatives and pollution-related international instruments where such issues are being addressed. Besides, in recent years, India has strengthened its policy and legal framework to effectively tackle pollution impacting the coastal waters. The 2011 Coastal Regulation Zone Notification is an important development in this regard.

- As many of these global initiatives are well-established with active involvement of the countries around the globe, it is presumed that solutions from these initiatives will emerge at an earlier time-frame, which would not only be cost-effective but also beneficial at the national and regional levels. At this stage it is not clear as to how SAP’s initiatives on climate change related matters will fit into this larger picture.
• One of the major limitations of the TDA is insufficient analysis of structural and functional diversity of the sector when considering its trends and future scenarios. Relevant typological dimensions in BOBLME include: (i) scale of technology and investment separating small-scale and large-scale fisheries; (ii) business organizations, ranging from artisanal (family business) to industrial (corporate); (iii) types of jurisdiction, e.g. national (EEZs) or international fisheries, whether in two EEZs (for shared stocks), in an EEZ and the high seas (for straddling stocks), in the production chain (capture, processing and distribution), etc. Though valid across a wide range of cases, these basic typologies may disguise more complex features. For instance, bottom fish could be of low value and some pelagic fish fetch record-high prices. Some species have bottom and pelagic characteristics. Some fisheries may be both small- and large-scale. Small-scale fisheries may be technologically sophisticated and highly productive and a growing number of them export their production.

• The present-level of poverty in the BOBLME countries is linked to its colonial past and subsequent constraints in trade and economic matters. However, the TDA does not analyze whether countries are doing their best given the limited capacity or not. The problems reflected in the TDA regarding policy are global problems present both in developed and developing countries.

• While the TDA is critical about the lack of political will to reduce fishing effort, it fails to realize the ground-level scenario or to factor in the larger economic situation prevailing in the countries. There is a significant level of unemployment in the primary sector and while the government has introduced new schemes to generate work at the rural level, the benefit is shared among all the primary activities. Therefore, fishers would like to stick to the profession where they have certain advantage. However, in the long-run it is possible to shift fishers from the sector through education, training and skill-building. This is already happening. Some recent studies (e.g. FIMSUL Project) have also indicated that there is in-migration from other sectors to fisheries, largely on account of labour shortage.

• Regarding regional arrangements, the TDA over sighted and poorly analyzed the existing regional arrangements. The collaborative structure that was developed in the region during late 1990s when organizations decided to have specific area of work and work collectively in case of an overlapping issue is not considered. Division of labour is followed as the best practice across the globe and it is also recognised within framework of FAO through the formal Regional Fishery Body Secretariats Network (RSN). It helps in pooling the resources and also not stalling all the process in case an organization faces difficulty.

• The TDA identified a set of information gaps, either actual, where information does not exist or perceived, where information exists but is not accessible. Many of these gaps exist not because of capacity but due to lack of finance. It is essential the there should be a mechanism to address these gaps to maximum possible extent before formulating the SAP. Otherwise, the discussion on SAP will be information-constrained and may not be optimal. In case, some of the information gaps cannot be filled up before preparation of the SAP, they should be addressed while preparing the SAP.

• The TDA document is largely silent on aquaculture practices in the region. Aquaculture is the fastest-growing food production sector in the world, especially in the BOBLME countries. Given this, it is likely that aquatic species with farming potential will be exchanged among these countries, both formally and through unauthorized introductions. Leaning from past experiences of outbreak of the epizootic ulcerative syndrome (EUS) in late 1980s and the white spot syndrome virus (WSSV) in mid-1990s in the region, these surreptitious introductions have the potential of bringing exotic diseases and pathogens and also impacting the native fauna once they enter the open waters. Therefore, it is essential that the TDA document also takes into account the transboundary movement of aquatic species and build programmes aimed at responsible transboundary movement of aquatic species during the SAP formulation stage.

• Lately, there is a concern within the GEF family on how science, especially latest scientific tools and findings are incorporated within the GEF projects and how the science produced by the project is mainstreamed. In this regard a review noted that in some cases, contemporary science is not used or
gaps in scientific aspect of the project are not properly addressed. Especially, in case of LME-related projects there is a weak coverage of issues regarding invasive species and diseases, which are gaining high importance due to growing popularity of aquaculture. The review also noted the need to link science and policy and capacity building in the developing countries. While these observations are not pertaining to BOBLME TDA specifically, it is felt that by adhering to some of the suggestions, the TDA can be improved further to serve the requirements of the region.

• The TDA has also not internalized regional/sub-regional political and economic arrangements, including presence of external nations in the region. These issues need to be taken into consideration, especially the existing regional/sub-regional political and economic arrangements.

• In conclusion, the TDA is a commendable first attempt to draw attention to the regional nature of fisheries and environmental issues. However, it is partially successful in doing so due to data vacuum and lack of clarity in understanding the nature of diversity and inter-dependency in the region. While developing SAP such partial knowledge can be detrimental. Since, the project is already at halfway mark, updating of the TDA may not be possible. However, before endorsing the TDA it is necessary that the shared and common issues are differentiated and country-level developments are brought out clearly. It is also necessary that the information gaps are filled-up to the maximum extent possible while the SAP process is underway.

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B. FULL REPORT

1.0 Evolution of the BOBLME Project

During the late 1990s, in view of the importance of the Bay of Bengal Large Marine Ecosystem (BOBLME) to the health, wellbeing and livelihoods of the millions of people living in the Bay of Bengal (BoB) region, the Advisory Committee (AC) of the then Bay of Bengal Programme (BOBP) requested the Food and Agriculture Organization of the United Nations (FAO) to assist in the development of a project proposal that could be submitted to the Global Environment Facility (GEF) and other donors for funding.

The BOBP was a long-term regional fisheries programme (1979 – 2003) of FAO in which Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand were participating, with Myanmar occasionally joining in capacity building programmes and other activities. In the first two phases (1979 – 1986 and 1987 – 1993), the BOBP aimed at improving the socio-economic conditions of the small-scale fisher folk in the member-countries through development and promotion of new and innovative techniques and technologies and their extension to cover a critical mass of beneficiaries in the region. The third phase (1994 – 1999) of the Programme addressed more directly the serious management problems facing the Bay’s fisheries. It assisted the national institutions responsible for fisheries management in setting directions and accelerating development of sound fisheries management policies and practices.

During the latter part of the second phase and more pronouncedly in the third phase, the BOBP member-countries increasingly recognized the need to manage the coastal and marine resources, including the environmental threats to the resources, in a coordinated, comprehensive and integrated manner. During the 20th Meeting of the AC of the BOBP held in Malaysia in 1996, the member-countries endorsed a proposal for sustainable environmental management of BOBLME. The Investment Centre of FAO was requested to assist the member-countries for development of a proposal in this regard for submission to the Global Environment Facility (GEF) for funding.

Subsequently, at the 21st AC Meeting in Thailand in 1997, the FAO mission presented its terms of reference and modalities of GEF proposal development. Also during this meeting, priority trans-boundary problems of the region were broadly discussed. Thereafter, in the 23rd AC Meeting in Sri Lanka in 1998, the GEF eligibility criteria were reviewed with special emphasis on incremental cost concept and it is in this context it was further decided that the eventual GEF regional project, while building on the results of BOBP, would not constitute an extension of BOBP’s current activities.

Finally, at the 24th AC Meeting held in Thailand in 1999, the BOBP member-countries listed down the important problems and issues confronting fisheries development and management in the BoB region and agreed that several of the problems could be addressed better through a regional mechanism. The AC further recognized the need to consider BOBLME as a whole with common and shared problems and suggested that the concerned countries should work together in a concerted manner. The 24th AC was also the last formal meeting of the BOBP and it is in this meeting the member-countries strongly endorsed the need to continue BOBP or to evolve a new regional mechanism with comparable ability to address these issues (refer Phuket Resolution). The 24th AC also formally agreed to support initiation of GEF-supported Block-B activity leading to the BOBLME Project.

2.0 Process leading to the development of Transboundary Diagnostic Analysis

The Transboundary Diagnostic Analysis or the TDA is one of the initial processes of the BOBLME Project. The document provides the scientific basis for collaborative development of the Strategic Action Programme or the SAP. The SAP, as one of the five components of the BOBLME Project, has the objective to set up an institutional mechanism, which will coordinate national and regional activities to address transboundary issues and their causes.

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1 This endorsement finally culminated in the establishment of the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) in April 2003.
2 The full text of Phuket Resolution is available at www.bobigo.org
3 The BOBLME Project was formally launched in May 2009 and the Inception Workshop of the Project was held from 3-5 November 2009.
The preliminary framework TDA (Verlaan, 2004) consolidated the results and recommendations of regional and national consultations held with stakeholders and the reports and comments received, between January 2003 and May 2004. The TDA states that the main inputs to the TDA included the eight National Reports that were prepared by national teams under the leadership of designated focal points in the member-countries (Ali, 2003), (Hossain, 2003), (Joseph, 2003), (Juntarashote, 2003), (Myint, 2003), (Omar, 2003), (Purnomohadi, 2003), and (Sampath, 2003) and five theme reports completed by International consultants on the basis of existing literature and the national reports (Angell, 2004), (Edeson, 2004), (Kaly, 2004), (Preston, 2004), and (Townsley, 2004).

At the First Regional Workshop of the BOBLME PDF-B Programme Development Phase in Pattaya, Thailand, in February 2003, the BOBLME countries agreed that the Preliminary TDA should address the following three major trans-boundary environmental concerns:

1. Overexploitation of the marine living resources;
2. Degradation of mangroves and coral reefs; and
3. Land-based sources of pollution.

At a subsequent Preparatory Meeting for the Second Regional Workshop of the BOBLME Programme, held in Penang, Malaysia in March 2004, the BOBLME countries requested the inclusion of ship-based sources of pollution (including dumping as covered by the London Convention (1972) and its Protocol (1996), as the fourth trans-boundary environmental concern to be addressed in the TDA. To accommodate this, the TDA was expanded to cover all the main types of pollution. The Preliminary TDA was presented at the Second Regional Workshop in Colombo, Sri Lanka in October 2004 and it was agreed that the habitat should also include seagrass as a critical habitat of concern in the BOBLME.

Thus, the three main areas of concern covered in this TDA are:

1. Overexploitation of the marine living resources;
2. Degradation of mangroves, coral reefs and seagrass; and
3. Pollution.

Although issues arising out of the impact of climate change on fisheries were not addressed initially, at a later stage, especially when the TDA was being reviewed, some insights were added.

3.0 Scope and extent of the BOBLME Transboundary Diagnostic Analysis

Given the above, the TDA document should be read as a strategic document that has little implications of its own, but would contribute (and to a certain extent form the basis) to the development of SAP. This is also explicitly mentioned in the communication received from the RCU, which states, “assess the information/conclusions from a transboundary perspective and decide whether, on balance this TDA is an appropriate basis for the development of SAP?” The analysis carried out on the TDA document in the following paragraphs, therefore, should be read from this perspective.

The TDA document aims to identify, quantify (where possible) and ranks priority water-related coastal and marine environmental and fisheries issues that are ‘transboundary’ in nature. It also tries to identify the proximate and root causes of the main drivers of change in the BOBLME context. While the TDA document is successful in sketching a regional picture and to an extent in identifying the drivers of change in the region, it falls short of providing a comprehensive picture of the region with national-level specifications. In essence, the TDA document is a compilation of local-level scientific information and folk knowledge extrapolated to derive a regional picture. Thus the TDA is grossly correct at the regional level, but the same picture is not reflected at the national level.

Conclusions drawn on the transboundary nature of issues are presented mostly in the form of hypothesis or educated guess and not as scientific evidences. The primary reason for this is the fact that the information available at the national level does not lead to concrete conclusions on the transboundary nature of the issues. This is further corroborated by the lack of scientific information at the regional level.

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5 National reports and theme papers are available on www.boblme.org.
The TDA document has clubbed shared and common issues as transboundary issues. Although the document acknowledges that all common issues are not necessarily transboundary in nature, yet both have been considered together for promoting regional and/or local solutions that achieve economies of scale and global environmental benefit, which accrue from addressing the issues in a collaborative fashion. However, while doing so the distinction between common issues and transboundary issues has got blurred, resulting in loss of focus in better understanding of the transboundary dimensions of the issues.

The term transboundary is well-defined in scientific and legal literature and refers to issues with spillover effect beyond national boundaries. The term (transboundary) also has a strong legal implication. Clubbing of ‘common issues’ with ‘transboundary issues’ in the document is misleading in this respect and may lead to counter-productive measures during the preparation of SAP. While transboundary issues run across country jurisdictions and need joint action, common issues are linked by themes and need country-specific action. Example: Poverty is a common issue in the region, but is being addressed by the countries through their own policies and programmes. Despite its (poverty) presence in many countries in the region, it is not a transboundary issue.

The need to include shared and common issues for resource development was first practiced by BOBP and later by its successor the BOBP-IGO. In the case of BOBP/BOBP-IGO, the programmes aimed at addressing common issues largely focused on sharing of lessons learned and in case of shared issues, programmes were designed to generate collective action. While both the issues could be included in the TDA, they should not be clubbed together to dilute the meaning of ‘transboundary issues’, which has economic and environmental implications on the participating countries.

The limitations observed in the TDA can be viewed from two aspects: (i) process-related and (ii) information-related. While the TDA circulated by the RCU is still subject to finalisation, it is observed that given the project life cycle; there is not enough time for a thorough revision of the TDA document. In addition, both types of limitations are time-consuming to address. Especially, information-related limitations need medium to long-term studies and may go well beyond the project’s life cycle.

However, in the given situation, it would be prudent to share the basic philosophy of the project: adopting a precautionary approach where information is limited and the need of an ecosystem-based approach for ensuring continuity of ecosystem services of the Bay. In this spirit, it can be concluded that the TDA should be strengthened by bringing more analytical clarity in terms of causal analysis of drivers of change, incorporating national development, especially that took place during the seven years gap between the first TDA and the final TDA, and clarifying the transboundary nature of the issues.

4.0 Review of the Transboundary Diagnostic Analysis

The TDA document is presently being examined/reviewed/validated by the member-countries through consultations. In India, five State-level and one national-level stakeholder consultations were organized since January 2011 to gather views from stakeholders. A summary of the six consultations is presented in Annexure 1. The National Coordinator of the BOBLME Project in India presented the consolidated outcome from the six consultations to the representatives of the Ministry of Agriculture (Department of Animal Husbandry, Dairying & Fisheries – DAHD&F) and the Ministry of Environment & Forests (MoEF) on 05 October 2011 at New Delhi. In the said meeting it was decided to have the stakeholder consultation outcomes reviewed by a national-level Expert Group. It was also suggested that the Expert Group, after examining the TDA document would formulate the national response and submit it to the Government for its consideration. This Expert Group, represented by MoEF; DAHD&F, Ministry of Earth Sciences (Integrated Coastal and Marine Area Management Project Directorate); BOBP-IGO, Central Marine Fisheries Research Institute; Central Institute of Brackishwater Aquaculture; Central Institute of Fisheries Education; National Biodiversity Authority; Zoological Survey of India and the Institute of Ocean Management (Anna University) met twice on 24th November and 29th December 2011. A list of participants attending these two meetings is placed as Annexures 2 & 3.

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6 As defined by the United Nations.
This document is prepared based on the output from the stakeholder consultations and the discussions that took place in the two meetings of the Expert Group. While preparing this response, two thematic country reports on Pollution (for Bangladesh and India) recently published by the BOBLME have also been referred.

4.1 Criteria for review

As per the requirements set by the RCU of the BOBLME Project, the response on the TDA should be arranged in the following manner:

a. **Review/challenge/verify information in the TDA.**

b. **Note errors, note points that might need clarification and recommend deletions/additions.**

c. **Assess the information/conclusion from a trans-boundary perspective and decide whether, on balance this TDA is an appropriate basis for the development of SAP.**

The present document provides a critique on the TDA document from the three perspectives given above. The commentary stresses mainly on major drivers and their causes as identified by the TDA such as overexploitation, overfishing/overcapacity and open access regime. Further, it reviews issues relating to habitat destruction and pollution. There is also a section that deals with issues relating to climate change, socio-economic aspects and information gaps.

4.2 The TDA: Strengths and weaknesses

The initial TDA document, prepared in 2004, was updated during July-August 2010. However, on perusal of the document it appears that the updating was limited to information and causal analysis, without any validation of the underlying assumptions. For example, the drivers of change identified in the TDA were not the outcome of any scientific investigation rather they were related to situation prevailing in the late 1990s. Since then, there have been considerable international developments, which are also reflected in the domestic policies and governance regimes of the countries, particularly India. While updating the TDA, these issues were taken as ‘given’ and not deliberated further over their current nature and scope. This seems to be a conspicuous shortcoming of the TDA.

The major inputs for preparation of the TDA were the eight national reports, which were prepared by consultants engaged by the BOBLME Project. In India, this was just one consultant. The national reports that informed the TDA were prepared by consulting the knowledge and people accessible to the consultant or sources that the consultant deemed important. That was an era before Google or any other net-searching facility had gained roots. Therefore, given the quantum of task and the time-frame, it was humanly impossible for a single consultant with training in a particular discipline, to evaluate the complex issues involved in the TDA from all angles. For example, an assessment of the reference section of the National Reports shows that they are heavily dependent on the consultants’ area of work or familiarity, which seems to be the possible course of action given the volume of work and time-frame.

Considering the size and diversity of the country, at least for India, intensive and extensive multi-disciplinary consultations would have preceded development of an informed TDA. Thus, the process adopted for preparation of country reports is weak and fails to recognize the exact requirements and ground-realities of the member-countries, especially larger and diverse countries like India where wider and extensive consultations with a multidisciplinary approach hold the key to proper understanding of the issues and the mechanisms to address them.

Common versus transboundary issues

The TDA by nature is a multi-disciplinary exercise where a suite of thematic and sectoral conditions need to be carefully considered and harmonized. Similarly, the success of a good TDA (that can effectively lead to the SAP) also depends on how clearly the boundaries between national and trans-boundary issues have been drawn.

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10 As per the TDA document, a national team under the leadership of the designated focal point prepared the country report. However, as per the India National Report, the Report was solely prepared by the consultant, who sought the assistance of the National Task Force in organization of stakeholder consultations at different places on the east coast.
In the present document, these aspects have logically remained inconclusive. Example: Over-capacity and overexploitation is a national problem. It could be considered trans-boundary if the effect of such issues can be observed on trans-boundary stocks. However, barring stocks such as hilsa, tuna and sharks, trans-boundary nature of other stocks (including mackerel) is yet to be scientifically established in the BoB region.

The TDA has also considered some ‘common issues’ as trans-boundary issues, As mentioned earlier, countries differ in institutional settings and scope of governance and hence such ‘commonality’ may be superficial and the issue cannot be addressed through a common approach. Example: In country A, excess fishing capacity could be the main driver of overexploitation, while in country B, harmful fishing practices like dynamiting is the prime cause of overexploitation. While searching for solutions, the approaches would be totally different. In country A sound policies coupled with political will could help in reducing fishing capacity, while in country B proper enforcement could be the answer. Therefore, it may not be possible to address ‘common issues’ with ‘common solutions’.

Further, in the case of land-based pollution, specific cases where pollutants discharged from a country impact another country needs to be proven scientifically. There is also not enough evidence to prove that localized pollution in some way is impacting trans-boundary fish stocks. It is also seen that within national boundaries, pollution has different root causes depending on the level of economic development and anti-pollution measures adopted.

The 2011 BOBLME Project commissioned India Report on Pollution (see reference on pre-page) has delved deeply into the pollution issues between Bangladesh and India on one hand and India and Sri Lanka on the other. The Report has concluded that the assimilative capacity of the Bay is unknown and it is believed that the anthropogenic impact of the surrounding countries is mainly local. The Report also states that there is increasing evidence that certain activities have trans-boundary effects, but at the same time it states that there is little information about trans-boundary pollution. The Report concludes that in case of Bangladesh – India, apart from localized studies, there is little information about transboundary pollution. Similarly, in case of the waters dividing India and Sri Lanka, the Report concludes that apart from oil spills arising due to shipping/fishing boats, the pollution effects appear to be localized.

Keeping in view the outcome of this latest study on pollution aspects, it is difficult to agree to the transboundary dimensions of pollution as stated in the TDA, especially in the Indian context.

**Statistical correlation**

During preparation of the TDA, no statistical analysis was attempted to confirm the assumptions made, or if attempted, not reported in the Document. The document says, “……..it is based on review of literature and perception of the countries”11. In this respect, the TDA Document has become, at best, a compilation of educated guess, which is grossly correct, but still remains a set of claims unsupported by quantified data or scientific evidences. Thus, it cannot provide enough insight into the entire issue of connectedness of the region, micro-level problems, regional differences in terms of stakes and on nature of the parameters or ranking them. Example: Assuming that there is overexploitation, no scientific tools were used to know which parameter contributes more significantly? Is it a weak monitoring, control and surveillance (MCS) regime or increasing demand of fish and fish products? Without such insight, the TDA is not adding any new knowledge to understand the region better and also the need for addressing its problems in a collective manner through SAP or any other mechanism.

**Structural weaknesses**

The TDA does not provide an eco-system model of the BOBLME or any functional specification of the causal tree (e.g. an ECOPATH Model). In its present form it could, at best provide awareness on the issues, but in no way give any guidance on how the resources could be sustainably utilized through an ecosystem approach, which otherwise is also complex and no good models exist to replicate12.

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11 Methodologically, this is akin to conducting an ‘opinion poll’ and also no structured questionnaire is used to understand the country perceptions.
12 CMFRI has developed a detailed trophic model for Gulf of Mannar from primary data sources. It is also learned that the BOBLME Project has commissioned a study to develop a set of agreed Ecosystem Indicators for the region.
The issues highlighted within the TDA are essentially reassertion of the issues used as a justification for launching the BOBLME Project. This is also agreed in-principle by the BOBLME member-countries as the basis for participating in the project and working together to achieve the project goals. Viewed from this angle, the TDA was expected to provide good scientific basis in support of these assumptions rather than repeating them. Thus, to repeat even at the cost of brevity, the issues raised in the TDA are grossly correct but not properly analyzed by facts, figures and scientific evidences.

As per the Project Document, the TDA is internationally peer reviewed, but to the best of our knowledge, neither the Indian National Report nor the TDA Document is formally reviewed by leading scientific institutes like the Central Marine Fisheries Research Institute, etc. The major weakness of above process is that the document is not benefitted by incorporation of views/critical comments of these leading scientific organizations in the region.

The TDA tends to present some general pictures of the BOBLME region without paying attention to the stark variations in situations, stakes, policies, social settings and societal requirements. To cite an example: Banning shark fishing in country A where only 100 fishers or about 500 people are dependent on the activity cannot be compared with the situation in country B where over 20,000 to 30,000 people are involved in shark fishing and where no shark tourism exists to support alternate livelihoods for the displaced fishers.

Dialogue with regional organizations and evaluation of existing regional arrangements

A major weakness of the TDA preparation process is the lack of consultation with existing regional organizations including the BOBP or its successor the BOBP-IGO. Further, on perusal of the country reports or the five thematic reports prepared by the BOBLME Project, there are not enough evidences to see that the TDA preparation process adequately benefitted from collaboration with other regional bodies such as the South Asia Cooperative Environment Programme (SACEP), South-east Asian Fisheries Development Centre (SEAFDEC) and INFOFISH.

While BOBLME identifies BOBP-IGO and SEAFDEC as partners, the reasons why these organizations were not consulted is unclear. Considering that the ultimate objective of the BOBLME Project (SAP) is to set up a regional fishery resource management organization, the TDA preparation process would have been much benefitted if these organizations were consulted. Lack of consultation with regional partners has also led to erroneous understanding of the mandate and functioning of existing regional organizations as reported in the TDA.

The TDA concluded that the existing organizations are limited in their mandate and/or geographical reach. However, the mandate and geographical reach of these organizations has resulted from the need(s) of their member-countries and other regional considerations. During the third phase of the BOBP, these issues were extensively discussed and it was decided that regional organizations should focus on particular areas to better manage their resources and to develop a cooperative mechanism in the region to pool their resources. While the former BOBP was earlier handling both marine fisheries and aquaculture, with the establishment of the Network of Aquaculture Centre in Asia-Pacific (NACA), BOBP gradually reduced its activities on aquaculture and the BOBP-IGO did not include aquaculture at all in its mandate. At the same time NACA and BOBP-IGO have developed a working relationship to collaborate in areas of mutual interest such as on the use of wild caught larvae for aquaculture purpose, etc.

5.0 Overexploitation, overfishing/over capacity, open access regime in the BOBLME

The TDA document identifies overexploitation of fish stocks as a major transboundary issue in the region. As per the TDA, factors responsible for overexploitation are excess fishing capacity resulting from policy failure such as weak monitoring, control and surveillance (MCS) measures; open access to fishing; government’s emphasis on increasing fish production; bad subsidies; and also market forces like increasing consumer demand. The factual support to the issues and their causes were derived from trends in production, changes in species composition, etc. This analysis was carried out more or less on a gross basis and not species or stock-wise to arrive at sound conclusions.

India is one of the countries in the world, which has been monitoring marine catches regularly for the last six decades by following standard methodologies. Monitoring is done at species, gear and landing centre level.
Expertise has been developed in the country to monitor fish stocks and fisheries situation as well through strong research support.

Increasing catch trends; and estimated potential yields greater than catches indicate that the stocks are not overexploited. However, overall trends may mask species-level impacts of fishing, and few stocks in some sub-regions may be at the threshold of overexploitation.

The Expert Group deliberated on this issue and felt the need for a sound scientific basis to arrive at the conclusions made in the TDA document. Noting this, the Group has made specific comments on some of the issues raised in the document and the same are detailed in the following paragraphs.

5.1 Stagnating production from marine waters in many BOBLME countries

The annual average fish landings along the east coast of India increased consistently from 0.15 million tonnes (mt) during 1950-59 to 0.95 mt during 2000-10\(^\text{13}\). On the basis of catch trends, it is clear that there is no stagnation in fish production along the east coast. The catch-per-unit effort (CPUE), which is an indicator of the status of stocks, is stagnant or is fluctuating for several stocks in spite of increasing fishing effort and efficiency, but again, a consistent decline against increasing fishing effort is not evident in the fish landings in the country. Extension of fishing grounds to deeper waters may be one of the reasons for increasing catch and stable CPUE. However, multiday fishing to deeper waters is not a new phenomenon in India as it commenced and gained momentum two decades ago. These trends show that fish stocks are in healthy state along the east coast of India.

5.2 Changes in species composition and “fishing down the food chain”

Studies\(^\text{14, 15}\) have shown that species composition has changed over the years along the east coast of India. Catches of fish low in trophic level such as oil sardine, Indian mackerel and penaeid and non-penaeid shrimps have increased over the years, resulting in a decline in the mean trophic level of the catch by 0.077 and 0.041 per decade during 1950-2006 along the northeast and southeast coasts, respectively. By considering the climate-driven fisheries such as the small pelagics, the studies have concluded that ‘fishing down the food chain’ is not due to fishing alone, but also under influence from the climate. It is now better understood that had the climate been not suitable to the low-trophic level small pelagic fisheries, the mean trophic level would not have reduced to the extent as witnessed in recent times.

5.3 Catches equal to or greater than estimated potential yields

The Ministry of Agriculture, Government of India has revalidated the potential yield estimates for different fish stocks along the Indian coast in the year 2011. The total potential yield estimated in the Indian EEZ is 4.4 million tonnes (mt) against the earlier estimated yield of 3.32 mt. The estimates show that there is scope for increasing the yield of small pelagics and catches from waters beyond 100 m depth.

5.4 Assessments of exploitation of major fish groups and selected stocks

There are differences in perception in status of fisheries that may stem from two sets of data – catch trends and stock assessment. Whereas catch trends do not show decline, stock estimates carried out indicate that several major stocks are overexploited in the last ten years (rate of exploitation: > 0.6 against the ideal 0.5\(^\text{16}\)). In the 1980s and 1990s too, analyzing the exploitation rate and catch trends for 67 stocks, studies\(^\text{17}\) showed that 71 percent of the stocks were assessed as overexploited, but the catches from these stocks had substantially increased even after sustained increase in fishing effort and efficiency. These differences in perceptions emerge from two factors: (i) the methods used for estimation of exploitation rate and other stock parameters are designed for temperate fish stocks, but used with minor modifications to suit tropical stocks. These methods are applicable to slow growing, large-sized, single-species temperate stocks, but to a large extent, are not directly applicable to fast growing, small-sized, multi-species tropical stocks; (ii) the tropical fish stocks have higher resilience capacity

\(^\text{13}\) Source: Central Marine Fisheries Research Institute.
\(^\text{16}\) Source: CMFRI Annual Reports for the last ten years.
\(^\text{17}\) Vivekanandan (2001); In Sustainable Indian Fisheries, T J Pandian (ed.), National Academy of Sciences, New Delhi, 19- 42)
to overcome fishing-induced perturbations, such as overexploitation due to advantageous biological characteristics and also due to attributes of fast growth, high fecundity, continuous spawning and recruitment into the fishery and a large number of spawning stocks.

This indicates that the threshold of overexploitation and overcapacity are considerably higher for tropical stocks and this threshold has not been reached for majority of Indian marine fish stocks. This analysis also brings out the fact that perhaps the method and criteria for measuring overexploitation and overcapacity have to be revised for tropical fish stocks.

5.5 Quantities of juvenile fish taken
The quantity of juvenile fish taken, especially by the bottom trawlers, remains high. For many exploited stocks, it is 30 to 40 percent in terms of total biomass taken; and 40 to 55 percent in terms of number of fish taken. The cod-end mesh size of trawl net is only 15 to 20 mm for the last 25 years, enabling capture of a large number of juveniles. While capture of large quantities of juveniles has reduced the mean length-at-capture of some species, it has not reduced the total quantity of fish landings.

5.6 Anecdotal information from fishermen on catches and profit trends
Fishermen always contend that fish catch and profit trends are reducing. However, statistics does not support this. Introduction of boats either as new or replacement, and the increasing number of boats show that the profit trends are not declining, otherwise it would not have been possible for fishers to add new boats to the fleet.

5.7 Open access
Although marine waters in India are held as ‘common pool resources (CPRs)’\textsuperscript{18}, to operate a fishing vessel, one need to register the vessel with the Department of Fisheries or the Mercantile Marine Department under the Directorate General of Shipping, depending on the size of the vessel. Further, the operator also needs a license from the Department of Fisheries and in most places affiliation/permission with a fish landing centre/fishing harbour to dock the boat and land the catch. In addition, fisheries in India are largely controlled by the fisherman community who are traditionally engaged in fishing. For a person, who is not from the community, it is de facto not possible to operate a boat without registration and licensing and without formal or informal agreement with the user groups or the community. Although all the boats in India are not registered or licensed, it is still difficult to operate if the community does not accept them. This is more like an informal acknowledgement of the rights of fishermen to earn a decent living from their traditional area of work. It could, therefore, be concluded that there is no open access to marine resources in India as fishing is regulated by many means such as registration, licensing, local customs, and social controls.

While the TDA is critical about the lack of political will to reduce fishing effort, it fails to realize the ground-level scenario or to factor in the larger economic situation prevailing in the countries. There is a significant level of unemployment in the primary sector and while the government has introduced new schemes to generate work at the rural level, the benefit is shared among all the primary activities. Therefore, fishers would like to continue with their profession where they have certain advantages, although in the long-run it may be possible to shift fishers from the sector through education, training and skill-building. This is already happening. However, some recent studies (e.g. FIMSUL Project) have also indicated that there is in-migration from other sectors to fisheries, largely on account of labour shortage.

5.8 Weak MCS and increasing fishing effort
The Government of India, in order to regulate fishing and sustain fisheries, has developed a Comprehensive Marine Fishing Policy and the coastal States/UT governments are implementing their Marine Fisheries Regulation Acts. Through these policies and Acts, destructive fishing practices such as dynamite fishing and cyanide poisoning have been stopped; seasonal ban on mechanized fishing is followed for 45 to 60 days every year; fishing areas are demarcated for non-mechanized and mechanized fishing; minimum mesh size is prescribed for trawls; and

\textsuperscript{18} CPRs are defined in Indian context as non-exclusive resources to which the rights of use are distributed among number of owners. These co-owners are generally identified by their membership to some other groups such as a village, a tribe or a particular community (Ref. Chopra K & P Dasgupta. 2002. Common Pool Resources in India: Evidence, Significance and New Management Initiatives. Natural Resource Systems Programme. www.nrsp.org/database/documents/706.pdf).
registration of mechanized boats is compulsory. In addition to these, minimum exportable size is prescribed for few species; Marine Protected Areas (MPAs) have been declared; and few species are being protected under the Wildlife (Protection) Act, 1972. These steps have been taken to have a regulated access and to avoid overexploitation of fish stocks and overcapacity of fishing fleet. During the ensuing Twelfth Five-Year Plan (2012-2017), the Central Government is also contemplating a full-fledged scheme for strengthening of monitoring, control and surveillance in the fisheries sector.

5.9 Government’s emphasis on increasing fish production

There is no denying the fact that the Government of India has been setting higher fish production targets from one Five-Year Plan to another. The increments in fish production are proposed to meet the requirements of the growing population. Most of the countries are increasing their production from time to time and India is no exception. In India, such targets are not fixed arbitrarily but through an elaborate planning exercise during the formulation of the Five-Year Plans. The planning exercises are done through a consultative mechanism by setting up of Working Groups, comprising fisheries scientists, planners and fisher representatives. While formulating the Plan document, the Government among other things considers reports on various aspects of fisheries from national fisheries institutes and the targets are set through a process of scientific data evaluation and consultation. The targets set are also monitored at regular intervals.

5.10 Subsidy

The diesel subsidy available to fishing vessels in India is justifiable in view of the fact that diesel price is much higher in India compared to other countries and this price is largely responsible for the high rate of duty imposed on import of petroleum. In addition, the fishers are also hard hit by global oil price inflation, and given their economic status it is necessary to support them (Figure 1). It may also be stated here that agriculture subsidy is much less in India compared to developed countries.

The subsidy on motorization is often criticized as reason for increasing capacity. This argument is justifiable if the opposite was true. That is without the subsidy in procuring engines there would have been less capacity growth. However, in terms of finance, fishing operations are largely carried out by private finance (e.g. moneylenders). There is no reason to believe that in the absence of public support, private finance could not have contributed to capacity growth. For example, in other countries where such direct public support is not available, (Bangladesh, Maldives, Sri Lanka, Indonesia) there is a continuous increase in capacity through motorization, increasing fleet size, etc. It may be acceptable that public support ushered in motorization, but it is equally possible that without public support also there would have been an increase in motorization of fishing vessels.

![Figure 1: Increase of wholesale price index of petroleum product and marine fish products 1994 – 2009](image)

6.0 Degradation of critical habitats

The TDA defines critical habitat as one whose services are necessary for the LME’s sustainability, for example, by providing centres of biodiversity and sources of food, serving as breeding, feeding, nursery and refuge areas; moderating the influence of nutrients, sediments and pollutants from land; supporting coastal and offshore productivity; and protecting the coast from the effects of storms and floods. The assessment of “criticality” would include the habitat’s exceptional ecological value and/or its being at risk in terms of imminent threats, inherent vulnerability, and/or rarity (TDA Vol. II, Page 60). The issue has been identified as of transboundary significance as critical habitats are common in all the countries and they are contributing to global good. Further, the TDA also says that the major transboundary significance is loss in biodiversity and fisheries productivity that are associated with the degradation of critical habitats. The threatened (and extinct) species of the BOBLME are closely associated with at least one of the three habitats identified as being of critical importance in their own right to the maintenance of the BOBLME region’s biodiversity.

On long-term changes in the mangrove cover, during the period 1975-2005\textsuperscript{20}, the TDA shows that, major loss of mangrove cover occurred in Sri Lanka (157%); Myanmar (35%), Indonesia (33%) and Malaysia (24%). In India, the loss is estimated at 9 percent. The regional average is 21 percent. The TDA also notes that the “losses in India and Bangladesh occurred during the earlier part of the period and the present area of mangroves in these countries have remained comparatively unchanged over the last five years.” In the Indian context, the TDA notes, “In India, although the main cause of loss is from conversion to agriculture from 1975 to 2005, a dramatic example of clear-felling of mangroves occurred in the Godavari estuary, located in the northern most end of the Cauvery delta. From 1935 to 1975 about 500 ha of mature mangrove forest of the Pichavaram wetland was clear-felled by the government management agencies for revenue generation\textsuperscript{21}.” The TDA also notes the existing reforestation work in the countries and in respect of India observed that “in the Pichavaram mangrove in India, remote sensing has shown that mangrove cover increased by 90 percent from 1986 to 2002 after re-vegetation and some channels were dug to assist water flow”. However, it concludes “despite these successes, there have been numerous failures of coastal mangrove restoration projects post-tsunami due to planting of inappropriate species, inappropriate locations, and a lack of understanding of the restoration site itself.”

The TDA document has noted that only mangroves had sufficient data on the causes of habitat loss to enable preliminary causal chain analysis. However, even these data refer to the pre-2005 period and there is no updating on the subsequent developments. Given the above, causes for loss of mangrove cover are attributed to land conversion including agriculture (82%), aquaculture (12%), residential uses (1.5%), salt production, tourism and industry. The other important cause is clear felling for wood chip production. The root causes of the issue are identified as coastal population growth, lack of green ethics in business, lack of alternative livelihoods, coastal development and lack of enforcement due to lack of capacity.

In case of the other two critical habitats, the TDA notes, “coral reefs information was, apart from data on the 1998 coral bleaching episode, very general and vague. Seagrass data was very sparse, with little scientific evidence of seagrass loss or causes of any loss”. The TDA identifies that information is needed on “areal extent and environmental status of the seagrass beds of the BOBLME as a whole, including any historical analyses of changes in seagrass extent and quality and the status of the associated biodiversity and productivity in the BOBLME and quantitative data on the causes of coral reef loss and degradation around the BOBLME”. Nevertheless, a causal analysis is attempted for coral reefs only. The TDA says that reasons for degradation of coral reefs are increased sedimentation; land reclamation; coastal pollution; nutrient increase; solid waste discharge; destructive fishing; blasting; cyaniding; coral mining; overfishing; discarded fishing gear; crown of thorns outbreaks; bleaching and storm damages. These factors are in turn caused by tourism; infrastructure development; population growth; uncontrolled tailings discharge; lack of management and enforcement and climate change (increasing sea surface temperature).

\textsuperscript{20} TDA Vol. II Page 63. The TDA used data provided in Giri et al. (2008) \\
\textsuperscript{21} TDA Vol. II, Page 64.
As per 2009 FAO evaluation, Asia harbours most extensive mangroves areas, estimated as 7.7 million ha in 1980, which reduced to 5.8 million ha in 2005. In many countries the area under mangroves is estimated with different levels of accuracy, which is similar to the situation in India before 1987. The most reliable estimation of mangrove cover in India was done in 1987 by the Forest Survey of India (FSI) using high resolution remote sensing data and better assessment tools and it was estimated to be 405 thousand ha. The FSI estimates the state-wise mangrove cover in India once in two years and the quantification of changes and its causes are more accurate. The last estimates available are for 2007 (464 thousand ha) and indicate an increase of 0.593 thousand ha over the 1987 figures. One of the recent publication that is often quoted is that of Giri et al., 2008 from the Earth Resources Observation and Science Center, USA, which has relied on open source low resolution Landsat data to arrive at a figure of 368 thousand ha for 2005 while the estimates of FSI indicate that the actual area during the period is 458 thousand ha.

The rapid expansion of aquaculture in India has also led to a growing concern about its impact on the coastal ecosystems, particularly on mangroves. There are reports that development of shrimp farming has been one of the main reasons for mangrove loss. Shrimp farming development in India started since 1987, mostly in the east coast States. In spite of utilizing only 14 percent of the potential available area for shrimp farming, aquaculture development is being cited as one of the reasons for mangrove forest degradation. The FSI estimates clearly indicate that in shrimp growing States, the extent of mangroves has increased in all coastal States except Andhra Pradesh. The Central Institute of Brackishwater Aquaculture has carried out site specific assessment of impact of aquaculture on mangroves in the east coast States such as Tamil Nadu, Andhra Pradesh and West Bengal using time-series satellite data and GIS. The land classes used for shrimp farming in nearby mangrove areas were quantified. The results given below indicate that mangrove area has increased in Tamil Nadu and West Bengal.

- In Tamil Nadu, Pichavaram and Muthupet are the major mangroves and Pichavaram mangrove area has increased from 462 ha to 641 ha between 1987 and 2004 and aquaculture development has not affected the mangroves. In Muthupet, dense mangroves have decreased from 2 374 ha to 2 016 ha and sparse mangroves have increased from 1 410 ha to 2 264 ha between 1988 and 2005. Aquaculture farms are not located nearer to dense mangrove areas. The reduction in mangrove cover was due to the trough shaped portion of the mangrove wetlands that induces hyper saline pore water to move laterally to the dense mangrove areas and that led to reduction in mangrove vegetation. The formation of trough shaped central region is attributed to earlier felling of mangrove trees. In Punnakayal mangrove, shrimp farms were not located/permitted in the region due to close proximity to the Gulf of Mannar Biosphere. In Tamil Nadu, mangroves were not converted for shrimp farming.

- In Andhra Pradesh, major mangroves forests are located in the Krishna and Godavari delta regions. In Coringa mangroves, comparing 1975 topographic maps of the Survey of India with 1988 Landsat TM data, the mangroves were degraded in patches and it was mainly due to the coupe felling system of 25 year basis since 1933 to 1970 by the Forest Department (MSSRF, 200422). Mangroves have decreased by 14 000 ha between 1987 and 2009, out of which 1 096 ha of Coringa mangroves located outside the reserve forest boundary were converted for aquaculture farms. In Krishna delta, 1 574 ha of aquaculture farms were developed within the reserve forest boundary and after 2007, most of the encroachment in reserve forests was removed and regeneration of mangroves has taken place.

- Sunderban mangroves span the border between India and Bangladesh. It occupied 215 200 ha (40 %) in West Bengal in 2007 and has increased by 7 600 ha since 1987. Shrimp farming has developed in 51 427 ha in West Bengal, but not at the cost of mangroves. The untapped shrimp farming potential of 158 153 ha area is still available in the State.

It is clear that except in Andhra Pradesh, shrimp farming has not impacted mangroves and the extent of mangroves converted to shrimp farms is negligible in comparison to the available mangrove areas and the area developed for shrimp farming. Giri et al., 2008, has given the figure of mangrove loss between 1975 and 2005 as 20 500 ha and that 12 percent of the loss is attributed to aquaculture. It does not provide supporting details of mangroves locations and shrimp farming areas.

As a precautionary action, in response to the various environmental issues raised due to aquaculture development, an Aquaculture Authority was set up by the Government of India in 1997 and the Coastal Aquaculture Authority Act, 2005 contains guidelines for developing sustainable brackishwater aquaculture. As per the guidelines, mangrove areas are not permitted to be converted for aquaculture development and a minimum of 100m buffer zone from mangrove area is mandatory for development of aquaculture farms.

India is one of the 17 identified mega diverse countries of the world. With only 2.4 percent of the total land area of the world, the known biological diversity of India contributes about 8 percent to the global biological diversity. The Indian reef area is estimated to be 2 375 km². Coral reefs occur along only a few sections of the mainland, principally the Gulf of Kutch, off the southern mainland coast, and around a number of islands opposite northern Sri Lanka. This general absence is largely due to the presence of major river systems and the sedimentary regime on the continental shelf. Besides, corals are also found in Andaman & Nicobar and Lakshadweep Island groups, although their diversity is reported to be lower than in South-East India. Other notable marine areas include seagrass beds which, although not directly exploited, are valuable habitats for commercial species such as prawns. In the Gulf of Mannar, the green tiger prawn *Penaeus semisulcatus* is extensively harvested. Seagrass beds are also important feeding areas for charismatic species such as the Dugong (*Dugong dugong*) and several species of marine turtles.

Since the report reflects a gross picture, not much can be commented on the information on coral reefs in the TDA. However, a minor correction is suggested in Vol. 1 (Page No. 1: Table under the heading “Trans-boundary nature, proximate cause, and specific root cause”). Under specific root cause, the last but one root cause given is increasing tourism. This may be changed to unregulated tourism. Since increase in sustainable tourism could help in adding value to reef areas. It also contributes to food security, employment and national economies.

Further in the same volume (Vol. 1: page 33 lines 4 - 5), the sentence ‘the main threat to the reefs in India’s Nicobar and Andaman Islands is also thought to be fishing” may be deleted. It is generally agreed that fishing in the Andaman & Nicobar is largely artisanal and not up to its potential.

It may be relevant to cite here the information drawn from the “Coral Reef Atlas of the World, Vol. I – Central Indian Ocean – Space Applications Centre, 2010, which depicts the growth/decrease (in km²) in some major reef regions of India over two decades. The Atlas shows that the major reef regions are in the Gulf of Mannar (with lowest reef extent) and the Andaman and Nicobar Islands (with highest, almost half of the total reef extent) and indicates an increase in the Andaman & Nicobar region and decrease in the Gulf of Mannar region.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Reef Region</th>
<th>1987-90 (km²)</th>
<th>2004-07 (km²)</th>
<th>Difference (km²)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Gulf of Mannar</td>
<td>94.30</td>
<td>75.93</td>
<td>-18.37</td>
</tr>
<tr>
<td>2</td>
<td>Andaman &amp; Nicobar Islands</td>
<td>959.30</td>
<td>1021.463</td>
<td>62.163</td>
</tr>
</tbody>
</table>

Coming to the live coral coverage percentage from the Biophysical Status Studies carried out by the Zoological Survey of India (ZSI) in 2010, a similar declining trend was noticed in the Gulf of Mannar region, which may be due to anthropogenic impacts and increasing trend in Andaman & Nicobar reefs may be owing to the large extent of reefs with comparatively negligible anthropogenic stress. In 2010, again a massive bleaching event occurred, triggered by delayed onset of Southwest monsoon and the resulting bleaching has been estimated as 30 -70 percent for Andaman & Nicobar Islands and 7-13 percent for Gulf of Mannar.

In the recent past, the Ministry of Environment & Forests has undertaken several steps to protect the highly productive mangrove and coral reef ecosystems and the highlights are as follows:

- Declared coral reefs and mangroves as ecologically sensitive areas.
- Banned mining of corals and coral sands.
- Banned all exploitation and developmental activities in mangrove and coral reef areas.
- Prohibited disposal of wastes from adjoining industries and carrying of wastes by pipelines through mangrove areas.
• Carried out many capacity building activities through ICRMN (Indian Coral Reef Monitoring Net Work)/ZSI.
• Amended Wild life Protection Act, 1972 to give legal protection to many reef builders and coral associates.

Except the fact that mangroves and sea grasses are contributing to global good, the document did not prove any real linkages between the different critical habitats (e.g. their role in development of trans-boundary fish stocks). It is very important to clearly establish this relationship since differences exist between countries in management of critical habitats. At present, the Government of India is taking various measures to improve the critical habitats. The result is also showing.

*In concluding the discussions on critical habitat, it can be said that a contemporary analysis of critical habitats could not be provided due to lack of data in the TDA document. Further, the causal analysis could not properly address the restoration work and include it in the causal analysis as a determining factor. In this respect, it misses the country-level lessons that could be learned from the restoration work, whether success or failure.

6.1 Lack of national, provincial/state coastal development plans

In India, some policy or legal gaps that existed earlier in respect of coastal zone management have now been filled up. In order to balance developmental needs and conservation, the Government of India passed the new Coastal Regulation Zone Notification, 2011. This was done to ensure livelihood security of the coastal communities, especially fishers, to conserve and protect marine area and to promote sustainable uses. This Notification restricts setting up and expansion of any industry or disposal of hazardous substances in the coastal zone. Other than this, the Union Government has also enacted the Coastal Aquaculture Authority Act, 2005 and set up an Authority to regulate and develop coastal aquaculture on sustainable basis.

Taking cognizance of the International Convention on Biodiversity (CBD), and to address the excessive pressure on biodiversity, the Government of India has enacted the Biological Diversity Act, 2002 (BDA, 2002). Accordingly, national, state and local-level mechanisms have been provided for implementation of the Act. At national level, the Government of India established the National Biodiversity Authority (NBA) in October, 2003 at Chennai (Tamil Nadu). Subsequently, State Biodiversity Boards (SBB) have been established by the State Governments and Biodiversity Management Committees (BMC) constituted by the local bodies.

It may also be pertinent to mention here that a World Bank assisted Integrated Coastal Zone Management (ICZM) Project is being implemented in India that includes ICZM capacity-building on mapping, delineation and demarcation of the hazard lines and environmentally-sensitive areas and delineation of the coastal sediment cells. The ICZM programme would also initiate a nation-wide training programme for coastal zone management. Based on this, a new category of “Critically Vulnerable Coastal Areas”(CVCAs) would be designated and appropriate management plans implemented for their preservation and regeneration. These would include the Andaman and Nicobar Islands, Bhitarkanika and Chilika in Orissa, Coringa, East Godavari and Krishna in Andhra Pradesh, Sunderbans in West Bengal, Pichawaram and Gulf of Mannar in Tamil Nadu.

6.2 Ineffective marine protected areas and lack of enforcement

Wildlife conservation and management in India are currently facing a myriad of complex challenges that are both ecological and social in nature. The government and the civil society are taking several measures to address these issues. Improved synergies and better coordination amongst wide array of stakeholders are needed to meet the challenges of conserving India’s diverse wilderness resources. India’s stand on protection of eco-sensitive areas is a major point of conflict between fishing communities and the government. The country is also sacrificing tourism potential to protect the environment (e.g. Andaman and Nicobar Island, Lakshadweep).

The National Wildlife Action Plan (2002-2016) of India emphasizes people’s participation and their support for wildlife conservation. India has a network of 668 Protected Areas (PAs), including 96 national parks, 510 wildlife sanctuaries, three conservation reserves, and two community reserves, covering approximately 4.75 percent of the geographical area of the country, including both terrestrial and marine ecosystems. Besides these, the Government of India has also declared 14 biosphere reserves under the Man and Biosphere (MAB) programme of the UNESCO, which are also part of the PA database. The major MPAs along the coastline of
India (excluding the Islands) that are important from a fishing-community and marine resource-conservation perspective are: the Gulf of Mannar National Marine Park, the Sunderbans National Park, the Gulf of Kutch National Park, the Gulf of Kutch Wildlife Sanctuary, the Malvan (Marine) Wildlife Sanctuary, and the Gahirmatha (Marine) Wildlife Sanctuary.

Significantly, in India, the MPAs are designated for conservation and preservation of the ecosystem and not for fisheries management. The Wildlife Protection Act (WLPA) provides for two kinds of protection to species—protection of specific endangered species listed in Schedules I, II, III and IV (especially against hunting), regardless of their location and the protection of all species in designated PAs. The species listed in Schedules I, III and IV include marine species. In national parks, the focus is on conserving the habitat of a species with a higher degree of protection, while in sanctuaries, the focus is on conservation of a species, with provisions for allowing traditional activities practiced for non-commercial purposes. The WLPA specifically mentions that if any part of the territorial waters are to be included within a sanctuary or national park, prior concurrence is needed from the Central Government and after taking adequate measures to protect the occupational interests of the local fishermen. The WLPA recognizes the right of innocent passage of any vessel or boat through the territorial water of the sanctuary.

The other important pieces of legislation relevant to wildlife and forest resource management are: the Biological Diversity Act (2002) and Rules (2004); the Indian Forest Act (1927); the Forest (Conservation) Act (1980, as amended in 1988); the Scheduled Tribes and the other Traditional Forest Dwellers (Recognition of Forest Rights) Act (2006) and Rules (2008); and the Environment (Protection) Act (1986). The MoEF is the nodal agency for implementation of all the above legislation, except the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act.

India has nearly 6.5 percent of the world’s known wildlife species and is one of the mega diverse countries of the world. The global demand for wildlife and its products puts at risk the mega diversity of the country, and calls for coordinated action in combating wildlife related crimes including building capacity for scientific and professional investigation along with other measures. The Government of India constituted a statutory body, the Wildlife Crime Control Bureau on 6th June 2007, by amending the Wildlife (Protection) Act, 1972, a special Act to protect the wildlife in the country. The Bureau would complement the efforts of the State governments, the primary enforcers of the Wildlife (Protection) Act, 1972 and other enforcement agencies of the country.

7.0 Pollution

Discussing pollution, the TDA document states that pollution is potentially transboundary, however two conditions need to be met before they can be considered strictly transboundary: (i) the impact of the contaminants/pollutant occur within the waters of a country that is not generating the contaminant or pollutant and, (ii) that the combined impacts are having a basin-scale impact. While acknowledging that most of the pollution issues are probably of local concern, the document has identified the following as potential sources of transboundary pollution:

(i) Long-term issue of expansion of bottom –water anoxia in the upper Bay of Bengal,

(ii) Plastics and fishing gear,

(iii) Sewage and other organic contaminants entering the Bay of Bengal from the Ganga-Brahmaputra-Meghna system through high river discharge and ocean circulation pattern.

Presumably, on account of the above, pollution both from land-based sources and oil spills has been identified as a driver of change of BOBLME. However, the TDA document further notes that there is insufficient quantitative information on the levels, distribution, or effects of contaminants in the BOBLME, and consequently insufficient information to prioritise and determine the relative importance of pollution threats and determine the transboundary dimensions of pollution in the BOBLME.

Working in this data vacuum, the TDA presents a set of hypothesis or possible channels, which may lead to transboundary pollution. Apart from these possible sources, the TDA also highlights pollution as a common factor in the countries and considers it as a ‘global environmental problem’ and concludes that finding regional solutions to such common problems would be considered as a global environmental benefit (Also see common versus transboundary issues in paragraph 4.2, pp 12-13 of this document).
Based on the above discussions, it is clear that the pollution-related matters are localized and are not of much transboundary significance. In this regard it is felt that that if the pollution issues in the BOBLME are of common nature and their amelioration could contribute to ‘global environmental benefits’, it may also be highlighted that India (and presumably the other seven BOBLME member-countries) is party to many global initiatives and pollution-related international instruments where such issues are being addressed. Besides, at the national level too, in recent years, India has strengthened its policy and legal framework to effectively tackle pollution impacting the coastal waters. The 2011 Coastal Regulation Zone Notification is an important development in this regard.

Further, while explaining potential transboundary nature of pollution, the TDA observed that through various oceanic processes and weather events (e.g. cyclone), pollutant within the national boundary may assume a transboundary manifestation. Simultaneously, the TDA also rightly noted that oceanic processes and weather events may also reduce the harmful impact of pollution (TDA Vol. II). However, there is not enough information on the impact of oceanic processes and weather events (good or bad) on pollution and hence working of these channels is uncertain.

8.0 Climate change

In the TDA document ‘climate change’ has been used as an umbrella concept for destruction of critical habitats. However, given the global-scale of the problem and capacity of the countries concerned, the concept need to be properly defined in the context of BOBLME to facilitate policy decisions. For example lack of mitigating and adaptive measures and research to deal with changes in the climate could be possible factors for which policies can be framed. Furthermore, in view of the recently concluded United Nations Climate Change Conference, implications of the measures accepted by India and other countries in the BOBLME region is yet to be fully appreciated. Therefore, in view of recent developments it is certain that activities regarding climate change will be conducted under the United Nation Framework on Climate Change and there may be little scope within a particular region to address the issues separately.

India is a country which is and will continue to be severely impacted by climate change precisely at a time when it is confronted with huge development imperatives. The Indian Network for Climate Change Assessment or INCCA is a network-based programme mandated to (i) assess the drivers and implications of climate change through scientific research; (ii) prepare climate change assessments once every two years (Green House Gas estimations and impacts of climate change, associated vulnerabilities and adaptation); (iii) develop decision support systems (iv) build capacity towards management of climate change related risks and opportunities. The Climate Change Division of the MoEF is India’s nodal agency for climate change cooperation and global negotiations. It is also the nodal unit for coordinating the National Action Plan on Climate Change.

Given the above developments and also the fact is India is actively participating in a number of climate-change related global initiatives and binding and non-binding international instruments, it is not clear how the SAP will direct or assist the countries in attending to their needs and obligations arising out of the climate change impacts. Matters relating to climate change are being handled at the highest level in the country. In fact countries like India have gone far ahead in articulating their climate change requirements; it is, therefore, difficult to conceive how the future SAP-driven initiatives would fit into the ongoing mechanisms. It seems the SAP may at best help the countries in their adaptation related programmes for the fisheries sector.

9.0 Socio-economic issues

While the TDA document mainly deals with international water-related issues, socio-economic characteristics and policy framework of the countries have been analyzed to identify the drivers of change. The TDA says that globally the largest share of poor coastal population is living in the BOBLME region. This wide-spread poverty has been identified in the TDA as a major cause of overexploitation, degradation of critical habitats and pollution during the causal chain analysis.

Example: The TDA says that marine living resources are extremely important for the livelihoods of millions of people and their communities, in particular as source of food. On world standards, the region consumes large amounts of seafood per capita (except India). Resultantly, population growth is leading to increasing demand for marine living resources and thus creating pressure on them.
In terms of policy and governance, the TDA says that most countries have relatively well-formulated legislation and policies in different sectors, but these are often not harmonized across sectors. Most government services are applied in a multi-layered system (national-provincial/state and local) without clear roles and responsibilities acknowledged among the different players. The TDA has further noted that all the region’s governments have set ambitious marine and freshwater fishery production targets, which in many cases do not acknowledge the biological limits to production inherent in these renewable resources and “they also need to recognise and adopt internationally accepted concepts and norms such as the ecosystem approach and the precautionary approach.”

The TDA also identifies lack of an appropriate forum for BOBLME-wide multi-national dialog, planning, monitoring and reporting on the progress of sustainable development and poor unified planning and inadequate communication, including information exchange, between and among all the relevant and legally responsible sectors and levels of central, state and local government.

Further, in the TDA this inability seems to be equated with “perceived level of corruption” reported by an international NGO; lack of clear delineation of role and responsibilities and lack of coordination. On one side the TDA has identified decentralization policies as a potential source of coordination problem: “many countries now have “decentralization” policies that present new challenges in coordination and implementation of law and order”, on the other side the document has also suggested co-management for improving fisheries management, which may lead to further devolution of power.

One of the major limitations of the TDA is insufficient analysis of structural and functional diversity of the sector when considering its trends and future scenarios. Relevant typological dimensions include: (i) scale of technology and investment separating small-scale and large-scale fisheries; (ii) business organization, ranging from artisanal (family business) to industrial (corporate) in BOBLME; (iii) type of jurisdiction, e.g. national (exclusive economic zones, EEZs) or international fisheries, whether in two EEZs (on shared stocks), in an EEZ and the high seas (on straddling stocks), or at regional level (e.g. tuna or other fisheries); location in the production chain (capture, processing and distribution). Though valid across a wide range of cases, these basic typologies may disguise more complex features. For instance, bottom fish could be of low value and some pelagic fish fetch record-high prices. Some species have bottom and pelagic characteristics. Some fisheries may be both small- and large-scale. Small-scale fisheries may be technologically sophisticated and highly productive and a growing number of them export their production.

9.1 Governance

On the issue of ‘unclear roles and responsibilities in a multilayered governance set up’ it may said that in India the jurisdiction of each Ministry in the Union Government and for that matter sharing of responsibility between the Central and the State governments is clearly laid down in the Constitution and Allocation of Business Rules of the Government of India. The problem for India is not grey areas in the domain, but lack of awareness about each-other’s action. Even to address this problem there are three national mechanisms: at the highest level is the Committee of Secretaries, which is inter-ministerial in nature and headed by the Cabinet Secretary of the Government of India. Larger policy issues affecting one sector with implication(s) of other sectors can be addressed or raised in this forum. In fisheries sector too, there are two specific committees: the Central Board of Fisheries (CBF) comprises the Minister-in-charge of Fisheries of all the States/UTs in the country and senior fisheries administrator from all the States/UTs. Besides, senior representatives of other concerned Ministries such as the Ministry of Commerce and Industry; Food Processing, etc are also members of this Committee. The other committee is the Committee of Officers which can deal with fisheries issues and address them. This Committee comprises Secretaries and Directors/Commissioners of the Department of Fisheries and reports to the CBF at its annual meetings. However, during the last decade or so, the meetings of these two bodies have not been convened. Before suggesting any alternative arrangement it is necessary to understand the existing mechanism and reasons behind the decline of their activities.

The present-level of poverty in the BOBLME countries is linked to its colonial past and subsequent constraint in trade and economic matters. However, the TDA does not analyze whether countries are doing their best given the limited capacity or not. The problem reflected in the TDA regarding policy are global problems presented both in developed and developing countries. The FAO report on “Progress in the Implementation of the Code of
Conduct for Responsible Fisheries and Related Instruments, including International Plans of Action and Strategies, and Other Matters” presented during the 29th Session of the Committee on Fisheries (COFI) held in February 2011 pointed out that “The overall trends in identified constraints and solutions to the implementation of the Code remained similar, and are ranked globally, and by region. The top constraints were related to financial (47 percent), human resource (37 percent) and institutional weaknesses (28 percent). The top ranking issues underlined a long-term global trend in both developed and developing countries in that administrations were often not endowed sufficiently with the necessary financial, human and institutional resources to effectively manage the fisheries sector (para 44 of the COFI Report)”.

Regarding regional arrangements, as mentioned earlier, the TDA over sighted and poorly analyzed the existing regional arrangements. Apart from dedicated fisheries and environment related organizations, there are three broad-based geo-political platforms in the region with mandate to deal with fisheries and environmental issues. The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) with one of its identified focus area on environment and fisheries provides a solid basis for discussing common and transboundary issues at the highest level. Five BOBLME Project countries: Bangladesh, India, Myanmar, Sri Lanka and Thailand –with the largest stake in the Bay of Bengal are its members. Many of the transboundary and common issues identified in the TDA have already assumed priority importance within BIMSTEC and this process can be strengthened further with scientific inputs to address the issues in a timely manner. In respect of South Asian Part of the Bay of Bengal, the South Asian Association for Regional Cooperation – SAARC in which Bangladesh, India, Maldives and Sri Lanka all are member has also identified environment and tourism as the focus areas. On the east Asian part of the Bay, ASEAN (Association of Southeast Asian Nations) where four BOBLME Project countries: Indonesia, Malaysia, Myanmar and Thailand are member also has strong fisheries and environment related components in its mandate. In terms of their geo-political positions, BIMSTEC provides a link with other two organisations and hence there is coverage for the whole region. More importantly, these mechanisms are well-established and their outputs have strong impact on national level policy planning. It is necessary, that their efficacy and scope in addressing transboundary and common issues are properly analyzed and reflected in the TDA.

10.0 Identifying information gaps and other issues

One of the substantial contributions of the TDA document is identifying information gaps regarding social, policy and environmental variables in the region. However, there is no proper analysis on impact of this substantial gap on validity of findings and assumptions detailed in the TDA. The TDA says, two categories of information gaps are relevant in the LME management context: (i) actual lack of essential information. This is information that does not exist and without which a sensible approach to the problem at hand is constrained; and (ii) a perceived lack of essential information. This is information that is important for problem-solving as defined above, but that does actually exist; however, in the region the existence of such information is either not known or it is not in a useable form.

It is essential the there should be a mechanism to address these gaps to maximum possible extent before formulating the SAP. Otherwise, the discussion on SAP will be information-constrained and may not be optimal. In case, some of these information gaps cannot not be filled up before the preparation of SAP, they should be addressed while preparing the SAP. Recently, the BOBLME Project commissioned few studies on ecological aspect including stock assessment of Indian mackerel and hilsa, pollution, etc. However, like the TDA, these studies are also based on existing sources of information and do not contribute in a significant way to bridge the gap. What is needed is original research studies involving regional resources to the maximum extent possible to bridge the gaps. The reason behind involving regional resources is to simultaneously build the required capacity.

The information gaps identified can be divided into short-term (1-3 years) and long term (> 3 years). The following table provides the examples on information gaps:
<table>
<thead>
<tr>
<th>Short-term (1-3 years)</th>
<th>Long-term (&gt; 3 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Informats gaps on socio-economic variables and marine living resources</strong></td>
<td></td>
</tr>
<tr>
<td>Understanding how different management instruments perform under different exogenous pressures: the 2004 tsunami gives an excellent opportunity to measure this.</td>
<td>Identifying/adapting/developing approaches that have shown success in helping people to deal with change.</td>
</tr>
<tr>
<td>Building evidence on the role of marine resources (particularly renewable marine resources) into early stages of development.</td>
<td>Evidence of the current and potential role of marine resources in different contexts of BOBLME countries.</td>
</tr>
<tr>
<td>Better information on access agreements that exist among countries so that the transboundary nature of fishing can be better qualified.</td>
<td>Better stock assessment of the BOBLME key species, based on country collaboration in data collection and an independent stock assessment expert.</td>
</tr>
<tr>
<td>Better systems of analysing statistic data to make them more useful to science (e.g. catch and effort data at the boat level).</td>
<td>More detailed reporting of fishing activities and catches, especially in Bangladesh and Myanmar.</td>
</tr>
<tr>
<td>More broad-scale information on the socio-economic context of fishing (now collected at local level by many NGOs and agencies) but not shared.</td>
<td>Developing approaches towards ecosystem based fisheries management. Better understanding of market chains and market dynamics.</td>
</tr>
<tr>
<td><strong>Information gaps on critical habitats</strong></td>
<td></td>
</tr>
<tr>
<td>An update of the extent and quality of mangroves around the BOBLME.</td>
<td>Areal extent and environmental status of the seagrass beds of the BOBLME as a whole, including any historical analyses of changes in seagrass extent and quality and the status of the associated biodiversity and productivity in the BOBLME.</td>
</tr>
<tr>
<td>The relationship between mangroves and commercial fish species, and between seagrass and commercial fish species in the BOBLME.</td>
<td>Valuation of goods and services provided by the mangrove, coral reef and seagrass ecosystems.</td>
</tr>
<tr>
<td><strong>Information gaps on pollution</strong></td>
<td></td>
</tr>
<tr>
<td>Information on emissions of most contaminants by source.</td>
<td>Trans-boundary dimensions of pollution in the BOBLME. Information on human health impacts of contamination by sewage-borne pathogens and toxic chemicals.</td>
</tr>
<tr>
<td>Information on appropriate and affordable clean production technology and best practices.</td>
<td>Insufficient information to establish acceptable limits for discharges of pollutants.</td>
</tr>
</tbody>
</table>

### 10.1 Transboundary diseases in aquaculture and aquatic health

Aquaculture is the fastest-growing food production sector in the world. Over the past three decades, aquaculture has expanded, intensified and diversified. Especially, in BOBLME countries aquaculture assumes a significant role, which is likely to be strengthened in the coming years. Even Maldives, where the fisheries sector is traditionally capture-based, is now focusing on aquaculture. This growing scenario of aquaculture is placing demands on the countries to expand the spectrum of fast growing species, with focus on their trade attributes. In India, in the last 2-3 decades a good number of exotic species have entered farming practices. While some species have been formally introduced, many others have found their way surreptitiously from the neighbouring countries.

These surreptitious introductions have the potential of bringing exotic diseases and pathogens and also impacting the native fauna once they enter the open waters. India has several experiences where such species have introduced...
diseases badly impacting the production and productivity from aquaculture. In the late eighties, the epizootic ulcerative syndrome (EUS) struck freshwater species and the carp farming went through difficult times. In the mid-nineties, the white spot syndrome virus (WSSV) affected tiger shrimp (Penaeus monodon) culture and brackishwater aquaculture was badly devastated.

The TDA document has been largely silent on aquaculture, although the India country Report has discussed coastal aquaculture sector at length. India shares land border with Bangladesh and Myanmar, the other two member-countries of the BOBLME Project. These two countries are also vigorously pursuing their aquaculture development programmes and it is likely that aquatic species with farming potential will be exchanged between these countries, both formally and through unauthorized introductions. Learning lessons from the developments in the past, it is essential that the TDA document also takes into account the transboundary movement of aquatic species and build programmes aimed at responsible transboundary movement of aquatic species during the SAP formulation stage.

10.2 Science behind International Waters Project of GEF

A review was carried out by the United Nations University (UNU) on ‘Science behind 20 years of International Waters (IW) Projects’. A presentation based on this review23 noted that there is a need to ensure that the IW Projects are based on contemporary and cutting-edge science (not 15-20 year old science) and GEF needs to identify the gaps in existing water science pertinent to IW projects, and help address them.

The review observed that in the projects related to rivers and lakes, science plays an important role as the foundation/basis of project designs and implementation activities. However, there is an under-representation of social scientists and lack of involvement of local communities/universities, especially at early stages. While the outcomes of the projects are disseminated through various media, there are few known publications in peer-reviewed journals and lack of formality and visibility of findings and recommendations to allow an efficient contribution to policies. In the case of LMEs, the review identified that in case of critical issues, problems of invasive species and diseases; ballast waters; illegal transport and aquaculture; causes of harmful algal blooms and nutrient ratio changes and impact of improper land-use and unregulated development were raised but not dealt with properly. From the perspective of users of IW Projects (largely the national governments), it is identified that the IW Projects need to be better informed about contemporary science, as well as identify project-relevant research needs and while doing so capacity should be built, especially in the context of developing countries to sustain research and to develop a bridge between science and policy, particularly based on a broader scientific synthesis.

While these are general observations made to improve outcomes of the IW project, it seems that these are applicable in case of the present TDA also. Taking cue from this limitation, the TDA can be improved further to serve the requirements of the region.

11.0 Conclusion

In conclusion, the TDA is a commendable first attempt to draw attention to the regional nature of fisheries and environmental issues. However, it is partially successful in doing so due to data vacuum and lack of clarity in understanding the nature of diversity and inter-dependency in the region. Developing SAP based on such partial knowledge can be detrimental. Since the project is already at halfway mark, updating of TDA may not be possible at this stage. However, before endorsing the TDA it is necessary that shared and common issues are differentiated and country-level developments are brought out clearly. It is also necessary that the information gaps are filled-up to the maximum extent possible while the SAP process is underway. The follow-up activities on the TDA need to recognize these inherent shortcomings.

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23 A Synopsis and Analysis of Science behind 20 years of IW Projects and Priorities/Challenges of the Future: Presentation by Dansie Andrew, Project Manager, United Nations University, International Network on Water, Environment and Health (UNU-INWEH), Freshwater Ecosystem Programme, during the IW Science participant workshop during the 6th GEF Biennial International Waters Conference in October 2011 in Dubrovnik, Croatia.
Report of the Stakeholder Consultations on Validation of the BOBLME
Transboundary Diagnostic Analysis in India

1.0 In accordance with the roadmap developed by India during BOBLME TDA Consultation Planning Workshop (Bangkok, Thailand 24-25 August, 2010), extensive stakeholder consultations were organized to review and validate the TDA document. The stakeholder consultations were organized during 24th January 2011 to 30th June 2011 in 4 coastal States (West Bengal, Odisha, Andhra Pradesh and Tamil Nadu), and the Union Territories (UT) of Puducherry and Andaman and Nicobar Island. After the State/UT-level stakeholder consultations, a national-level stakeholder consultation was organized to synthesize the inputs from State/UT-level consultations and charting a roadmap for validation of the TDA. The schedule of stakeholder consultations organized in India is placed as Appendix 1.

2.0 The stakeholder consultations were well-represented by the Department of Fisheries of the concerned States and UTs, fisheries research institutes, fisheries development agencies, environmental agencies, Indian Navy and Coast Guard, financial institutions, academia, fisheries cooperatives, industry, self-help groups (SHGs), NGOs and representatives of fisher associations. The detailed list of participants is given in Appendix 2.

3.0 An executive summary of the TDA document as provided by the Regional Coordination Unit (RCU) of BOBLME Project was translated into vernacular and used for the stakeholder consultations. Other materials used were the TDA Reports (Vol. I and Vol. II); a brief summary of the TDA reports and the Executive Summary of the TDA report.

4.0 The format of the stakeholder consultations included brief presentation on the TDA, importance of the TDA and the issues affecting the BOBLME region, viz., overexploitation of marine living resources; degradation of critical habitats and pollution; transboundary issues and their proximate and root causes. Extensive discussions followed the presentations at each consultation.

5.0 Findings from stakeholder consultations show that the issues raised in the TDA are in general valid for India; however, there are important spatial differences between the States/UTs and the sector (e.g. between small-scale and large-scale fisheries). The stakeholder consultations also raised the issue of regional coherence in policy and implementation and identified socio-economic differences among the countries that could hinder policy coherence.

6.0 On the issue of overexploitation, the consultations observed that overexploitation is not uniform across the country and there are areas where fishing can be expanded while in some areas fishing needs to be regulated. It was also observed that scientific assessment is needed to know the optimum fishing effort in terms of different craft/gear combinations that can be operated on a sustainable basis. The consultations also agreed that overexploitation should not be treated in isolation and there is a need to emphasize on development of alternate skills, especially in offshore fishing to achieve sustainability. It was further recommended that livelihood issues of fishers should be addressed for ensuring better quality of life and decent income.

During the stakeholder consultations, some issues were identified for priority regional cooperation. These issues include by-catch reduction; uniformity in conservation measures such as seasonal ban (as followed in India); prohibition on collection of larvae from the wild; and curbing Illegal fishing by foreign fishing vessels in Indian waters. It was informed that illegal fishing in and around waters of the Andaman Sea is rampant. Such fishing, apart from increasing pressure on the resources, is destroying the marine environment by using destructive fishing methods such as dynamiting.

7.0 On the issue of degradation of critical habitat, conflict between livelihoods and conservation measures occupied the center stage. The main focus of the debate was perceived lack of adequate compensation to fishers who are adversely impacted due to establishment of Marine Protected Areas (MPAs)/sanctuaries. The stakeholders were of the view that by agreeing to such conservation programmes, the fishers are participating in the protection of the environment, and in turn contributing to global environmental benefits. This aspect should be duly
acknowledged in the TDA and at the Strategic Action Programme (SAP) stage mechanisms for compensating such fishers should be worked out. The stakeholders also agreed that there is a need to review the efficacy of existing conservation measures and to investigate if eco-friendly fishing (e.g. subsistence fishing) can be conducted in the MPAs/sanctuaries. The stakeholders emphasized on the need to consider the views of the fishers, especially artisanal fishers while drawing conservation and development plans. It also emerged that there is a need to promote environmental-friendly practices in upstream and catchment areas of the drainage system as it can positively impact the mangroves and other ecosystems. Further, the stakeholders emphasized on the need of promoting sea ranching of depleted species and sea mouth deepening/widening/dredging as options for increasing production and conservation of threatened species.

8.0 On the issue of pollution, it emerged that the TDA was partial in equating pollution with the scale of operation and poverty. The stakeholders opined that pollution is not scale-dependent, it is rather process dependent and suggested correction in the document. They were also of the view that research is needed to design suitable waste disposal strategy for the region and particularly for the islands. It was also suggested that a common Environmental Impact Assessment (EIA) procedure/protocol may be developed for the region and pollution and habitat degradation should be addressed on a basin scale, covering river systems as a whole including the catchment. Concerns were raised on pollution arising from ship breaking and deliberate sinking of ships and their impact, in any, in the Indian waters.

9.0 A summary table on issues raised in the various consultations is given in Appendix 3.

State-wise reports

10.0 The consultation in Andaman & Nicobar Islands (A&N) was held in 24 January 2011 and attended by 80 participants that included senior officials of the A&N administration, scientists, Indian Coast Guard (ICG) fishermen’s representatives, NGOs, traders and environmentalists. The main focus of the consultation was on issues identified in the TDA from an Indian perspective, add value to it and make it relevant to the Indian context. The relatively pristine nature of the seas around A&N Islands and the need to develop sustainability norms while planning for exploitation of the resources came up very strongly in the discussions. The stakeholders felt that the A&N Islands contributed the least to the environmental degradation, but they were the worst-affected on account of fall in productivity. Similarly, poaching by foreign vessels in the waters surrounding the Islands was increasing and these poachers indulged in dynamite fishing destroying the ecosystem, especially by damaging the coral reefs.

11.0 The stakeholder consultation in Tamil Nadu & Puducherry was held on 07 February 2011. The consultation was attended by 150 participants representing fishers, fishing related organizations, concerned Departments/organizations of the State of Tamil Nadu and the Puducherry Administration, representatives from the Ministry of Environment and Forests (MoEF), scientists and academia and representatives of fisher organizations from Tamil Nadu and Puducherry. The major issues that came up for discussion in the consultation included the problems faced by fishers straying into foreign waters; exploitation of the under-exploited resources; and control on over-capacity to stem overexploitation of the resources. It was also stressed that there is a need for all BOBLME countries to adhere to conservation and good fishery management practices and stricter implementation of anti-pollution measures, especially along the coast.

12.0 In Andhra Pradesh the stakeholder consultation was held on 07 March 2011, where 147 participants representing the concerned Departments/organizations of the State Government, scientists and academia, Indian Navy, environmentalists, fisher organizations, NGOs and traders attended the consultation. Fishers and fisheries related organizations from Yanam (UT of Puducherry) also participated in the discussions. Overexploitation of fish stocks by trawlers and other larger boats was flagged as a major issue of concern. The consultation also noted that collection for fish/shrimp juveniles and eggs from the wild for aquaculture purposes is a major cause of decline in catch. It was suggested that closed season should be followed uniformly in all BOBLME countries. The consultation also stressed on bilateral dialogue to solve the problem of fishers who stray into foreign waters. Further, mangrove depletion was also identified as a serious issue and afforestation programme was suggested to mitigate the loss. The consultation concluded with the suggestion that that the interest of the fishers should be protected while designing development plans.
13.0 The stakeholder consultation in Orissa was held on 18 May 2011. It was attended by 110 participants representing fishers; fishing related organizations; concerned Departments/organizations of the State Government; MoEF, Government of India; scientists and academia and Indian Navy. The consultation stressed on the fact that the Odisha coast due to its geo-physical characteristics is an environment hotspot for turtle and mangrove conservation. This has resulted in many restrictions, including protracted fishing ban periods. Frequent cyclones also restrict fishing activities. As fishing is the only livelihood, fishers should be adequately compensated during the ban period. The increasing number of trawlers, presence of ring nets and operation of nets without mesh regulations were identified as the major cause of overexploitation. It was suggested that new additions to the fishing fleet should be stopped and a new boat should only be permitted as a replacement. The meeting also highlighted a need for consolidating efforts to meet the norms of sustainability at national and international levels by policy interventions.

14.0 In West Bengal the consultation was organized on 09 June 2011. The consultation was attended by 85 participants representing fishers, fishing related organizations, concerned Departments/organizations of the State Government; MoEF, Government of India, scientists and academia, Indian Navy and NGOs. The meeting stressed on the importance of hilsa fisheries and noted that the West Bengal Government has imposed restrictions in hilsa fishing during the breeding season i.e., from 1 March to 15 June to augment natural recruitment of hilsa population. But these, and a number of other steps initiated by the State to prevent overexploitation, will be meaningful only if implemented uniformly by other concerned countries in the region. Adverse impact on biodiversity due to by-catch was also recognized as a major problem calling for stricter implementation of existing regulations on mesh size. Strict check on harmful fishing methods like mosquito nets, monofilament nets, etc in all the member-countries was suggested. The consultation also highlighted a need for uniform ban on bottom trawling and illegal fishing in the region.

15.0 The national-level stakeholder consultation was held in Visakhapatnam, Andhra Pradesh on 30 June 2011. The objective of the national consultation was to take stock of the outcomes from the five State/UT- level consultations and consolidate the suggestions that emerged from the State/UT- level meetings and also to examine the TDA document from the perspective of existing national policies on the issues flagged in the document. 26 participants including national experts, senior officials from the States, Indian Navy and NGOs took part. The consultation noted that the shared status of fish stocks needs to be scientifically established. The consultation pointed out that the issue of poaching by countries outside the BOBLME region and sea water quality standards beyond territorial waters was not properly addressed in the TDA and efficacy of SAP may be limited in addressing these issues. It was also noted that the level of awareness and capacity for following sustainability norms varies widely among the stakeholders in different countries and implementation of SAP should be attempted only after ensuring a level playing field for all member-countries. The consultation also observed that the TDA is rather weak in addressing the issues from socio-economic and governance perspectives. The national consultation stressed on giving a larger weight to the climate change and its various manifestations in the TDA document.
### Date, Venue and Participation in Stakeholder Consultations on Validation of the BOBLME Transboundary Diagnostic Analysis in India

<table>
<thead>
<tr>
<th>State</th>
<th>Date &amp; Venue</th>
<th>Organizers</th>
<th>Participants</th>
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<td>Andaman &amp; Nicobar Islands</td>
<td>24 January, 2011</td>
<td>Fishery Survey of India (FSI), A &amp; N Administration, CARI</td>
<td>80</td>
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<tr>
<td></td>
<td>Megapode Nest, Port Blair</td>
<td>FSI, Department of Fisheries, Tamil Nadu</td>
<td>150</td>
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<td>Tamil Nadu, Puducherry &amp; Karaikkal</td>
<td>07 February 2011</td>
<td>Department of Fisheries, Puducherry</td>
<td>147</td>
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<td></td>
<td>Hotel Annamalai, Puducherry</td>
<td>Andhra Pradesh</td>
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<tr>
<td>Andhra Pradesh &amp; Yanam</td>
<td>07 March 2011</td>
<td>FSI, Department of Fisheries, Puducherry</td>
<td>85</td>
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<tr>
<td>Odisha</td>
<td>18 May 2011</td>
<td>Hotel Holiday Resort, Puri</td>
<td>26</td>
</tr>
<tr>
<td>West Bengal</td>
<td>09 June 2011</td>
<td>FSI, Department of Fisheries, Odisha</td>
<td>598</td>
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<tr>
<td>National</td>
<td>30 June 2011</td>
<td>FSI, Department of Fisheries, Andhra Pradesh</td>
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### Appendix 2

**List of Organisations Participating in Stakeholder Consultations on Validation of the BOBLME Transboundary Diagnostic Analysis in India**

<table>
<thead>
<tr>
<th>Environment and forests administration agencies</th>
<th>Central Institute of Brackishwater Aquaculture (CIBA)</th>
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<tbody>
<tr>
<td>Ministry of Environment and Forests, Government of India</td>
<td>Central Institute of Fisheries Education (CIFE)</td>
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<tr>
<td>Department of Environment and Forests, Government of Tamil Nadu</td>
<td>West Bengal University of Animal and Fishery Sciences</td>
</tr>
<tr>
<td>Department of Environment, Forests, Science and Technology, Government of Andhra Pradesh</td>
<td>Fisheries and other development agencies</td>
</tr>
<tr>
<td>Forest and Environment Department, Government of Odisha</td>
<td>National Fisheries Development Board (NFDB)</td>
</tr>
<tr>
<td>Department of Environment, Government of West Bengal</td>
<td>Marine Products Export Development Authority (MPEDA)</td>
</tr>
<tr>
<td>Forests and Wildlife Department, Government of Puducherry</td>
<td>Sundarbans Development Board</td>
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<tr>
<td>Department of Environment and Forests, Andaman and Nicobar Administration</td>
<td>Monitoring and surveillance agencies</td>
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</table>

<table>
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<tr>
<th>Fisheries administration agencies</th>
<th>Indian Navy</th>
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<td>Department of Animal Husbandry, Dairying &amp; Fisheries</td>
<td>Indian Coast Guard</td>
</tr>
<tr>
<td>Department of Animal Husbandry, Dairying and Fisheries, Government of Tamil Nadu</td>
<td>Banking and financial agencies</td>
</tr>
<tr>
<td>Department of Animal Husbandry and Fisheries, Government of Andhra Pradesh</td>
<td>State Bank of India (SBI)</td>
</tr>
<tr>
<td>Directorate of Fisheries, Department of Fisheries &amp; Animal Resources Development, Government of Odisha</td>
<td>National Bank for Agriculture and Rural Development (NABARD)</td>
</tr>
<tr>
<td>Fisheries Department, Government of West Bengal</td>
<td>Co-operative societies (Fishers, Fleet operators, Food processing)</td>
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</table>

| Department of Fisheries and Fishermen Welfare, Government of Puducherry | Industry/NGOs/Other Stakeholders |
| Department of Fisheries, Andaman and Nicobar Administration | Fishing /Food processing industries |

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<tr>
<td>Zoological Survey of India (ZSI)</td>
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</tr>
<tr>
<td>Fishery Survey on India (FSI)</td>
<td>Tribal Councils</td>
</tr>
<tr>
<td>Central Agricultural Research Institute (CARI)</td>
<td>Self Help Groups</td>
</tr>
<tr>
<td>Central Marine Fisheries Research Institute (CMFRI)</td>
<td>Fisher Organisations</td>
</tr>
<tr>
<td>Central Institute of Fisheries Technology (CIFT)</td>
<td>Other concerned stakeholders and NGOs</td>
</tr>
<tr>
<td>Central Institute of Freshwater Aquaculture (CIFA)</td>
<td>International Collective in Support of Fishworkers</td>
</tr>
<tr>
<td>Central Inland Fisheries Research Institute (CIFRI)</td>
<td>World Wildlife Fund for Nature</td>
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Summary Table on Issues Raised during Stakeholder Consultations

Codes used: WB = West Bengal; Od = Odisha; AP = Andhra Pradesh; T&P = Tamil Nadu and Puducherry; A&N = Andaman and Nicobar island; IN = National Consultation; W = Weight (%)

<table>
<thead>
<tr>
<th>Issue</th>
<th>WB</th>
<th>OD</th>
<th>AP</th>
<th>T&amp;P</th>
<th>A&amp;N</th>
<th>IN</th>
<th>W (%)</th>
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<td>Overexploitation of the marine living resources</td>
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<td>Compensation and recognition to fishers for participating in conservation</td>
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<td>Protection of interests of fishers</td>
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<tr>
<td>Rehabilitation process should meet skill and aspirations of fishers</td>
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<tr>
<td>Development of aquaculture/sea ranching</td>
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<tr>
<td>Controlling fishing effort and unsustainable fishing methods</td>
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<td>Controlling juvenile fishing</td>
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<td>Incentives for deep sea fishing</td>
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<td>Region-wide seasonal ban</td>
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<td>Controlling illegal fishing by foreign fishing vessels</td>
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<td>Encouraging fishers to set fishing norms voluntarily</td>
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<td>Encouraging use of hatchery-bred brood stock and seed</td>
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<td>Development of alternative skills, especially in offshore fishing</td>
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<td>Degradation of critical habitats (mangroves, coral reefs and sea grass)</td>
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<td>Better coordination, synergy and networking among various research projects</td>
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<td>To control algal infestation</td>
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<td>Developing eco-friendly fishing norms</td>
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<td>Review of national policy on sea cucumbers</td>
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<tr>
<td>Destructive fishing by IUU vessels</td>
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<td>Addressing dwindling river flows</td>
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<tr>
<td>Stringent punishment for catching sea cucumbers</td>
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<td>Sea ranching</td>
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<tr>
<td>Controlled access to fishing</td>
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<tr>
<td>Conservation and sustainability norms will be meaningful only if they are followed uniformly by all member-countries</td>
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<td>Attention needed on conservation in river stretches and their catchment that impact the coastal ecosystem</td>
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<td>Issue</td>
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<td>OD</td>
<td>AP</td>
<td>T&amp;P</td>
<td>A&amp;N</td>
<td>IN</td>
<td>W</td>
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<td><strong>Pollution</strong></td>
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<td>Technologies for safe and economic waste management</td>
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<td>Awareness about the need to conserve turtles</td>
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<td>Best Port Management Practices - protocols need to be implemented effectively</td>
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<td>Norms for setting up industries along coastal region. Effluent treatment norms and EIA should be uniform across the BOBLME countries</td>
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<td>Effective enforcement of anti-pollution norms</td>
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<tr>
<td>All kinds of industries cause pollution - not only the small industries</td>
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<td>33.33</td>
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<tr>
<td><strong>General/Others</strong></td>
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<td></td>
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<tr>
<td>Eco-tourism</td>
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<td>Implementation of SAP should be attempted only after ensuring a level playing field for all member-countries.</td>
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<tr>
<td>TDA is rather weak in addressing the issues from a socio-economic and governance perspectives</td>
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<tr>
<td>Better treatment of crew straying into the waters of other countries</td>
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# List of Participants

## Ministry of Environment & Forests

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Title</th>
<th>Organization</th>
<th>Address</th>
<th>Contact Information</th>
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<tbody>
<tr>
<td>1.0</td>
<td>J R Bhatt</td>
<td>Director</td>
<td>Ministry of Environment &amp; Forests</td>
<td>Paryavaran Bhawan, CGO Complex, Lodhi Road, New Delhi – 110 510</td>
<td>Tel: + 91 11 24362543; Fax: + 91 11 24362543; Email: <a href="mailto:jrbhatt@nic.in">jrbhatt@nic.in</a></td>
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## Ministry of Agriculture

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Title</th>
<th>Organization</th>
<th>Address</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>Vishnu Bhat</td>
<td>Fisheries Development commissioner</td>
<td>Ministry of Agriculture</td>
<td>Department of Animal Husbandry, Dairying &amp; Fisheries</td>
<td>Tel: + 91 11 2338891 Extn (4481); Fax: + 91 11 23384030; Email: <a href="mailto:frio4@nic.in">frio4@nic.in</a></td>
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## Research Institutions

<table>
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<th>Name</th>
<th>Title</th>
<th>Organization</th>
<th>Address</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>E Vivekandan</td>
<td>Principal Scientist &amp; Scientist in Charge</td>
<td>Central Marine Fisheries Research Institute</td>
<td>Madras Research Centre, Central Marine Fisheries Research Institute, 75, Santhome High Road, Chennai – 600 028, Tamil Nadu</td>
<td>Tel: + 91 44 24617264; Fax: + 91 44 24617290; Email: <a href="mailto:evivekandan@gmail.com">evivekandan@gmail.com</a></td>
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<th>Title</th>
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<th>Address</th>
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</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>AG Ponniah</td>
<td>Director</td>
<td>Central Institute of Brackishwater Aquaculture</td>
<td>Indian Council of Agricultural Research, 75, Santhome High Road, RA Puram, Chennai – 600 028, Tamil Nadu</td>
<td>Tel: + 91 44 24617523; Fax: + 91 44 24610311; Email: <a href="mailto:director@ciba.res.in">director@ciba.res.in</a></td>
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</tbody>
</table>

## Bay of Bengal Large Marine Ecosystem Project

<table>
<thead>
<tr>
<th>No.</th>
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<th>Title</th>
<th>Organization</th>
<th>Address</th>
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<tr>
<td>5.0</td>
<td>K Vijayakumaran</td>
<td>Director General &amp; National Coordinator (BOBLME Project)</td>
<td>Fishery Survey of India</td>
<td>Botawala Chambers, Sir P M Road, Fort</td>
<td>Tel: + 91 22 22617144; Fax: + 91 22 22702270; Email: <a href="mailto:vijayettan@yahoo.com">vijayettan@yahoo.com</a></td>
</tr>
</tbody>
</table>
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Policy Analyst
Bay of Bengal Programme Inter-Governmental Organisation
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Email: rmukherjee@bobpigo.org

***
Second Expert Consultation on the Transboundary Diagnostic Analysis
Document of the Bay of Bengal Large Marine Ecosystem Project
29th December 2011, Chennai, India

List of Participants

**Ministry of Environment & Forests**

<table>
<thead>
<tr>
<th>No.</th>
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<th>Position</th>
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<tbody>
<tr>
<td>1.0</td>
<td>J R Bhatt</td>
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<td>Lodhi Road, New Delhi – 110 510</td>
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**Ministry of Agriculture**

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<tr>
<th>No.</th>
<th>Name</th>
<th>Position</th>
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<td>2.0</td>
<td>IA Siddiqui</td>
<td>Fisheries Research &amp; Investigation Officer</td>
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<tr>
<td></td>
<td></td>
<td>Department of Animal Husbandry, Dairying &amp; Fisheries</td>
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<td>Government of India</td>
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<td>Krishi Bhawan, New Delhi-110001</td>
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<td>E Vivekandan</td>
<td>Principal Scientist &amp; Scientist in Charge</td>
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<tr>
<td></td>
<td></td>
<td>Madras Research Centre</td>
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<td>Central Marine Fisheries Research Institute</td>
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<tr>
<td></td>
<td></td>
<td>75, Santhome High Road</td>
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<td></td>
<td></td>
<td>Chennai – 600 028, Tamil Nadu</td>
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<td>Indian Council of Agricultural Research</td>
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Bay of Bengal Large Marine Ecosystem Project
Transboundary Diagnostic Analysis

Comments of the Expert Group

Submitted to the
Department of Animal Husbandry, Dairying & Fisheries
Government of India
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.

For more information, please visit www.boblme.org