BOBP/REP/116

Report of the National Workshop on Monitoring, Control and Surveillance in Marine Fisheries

India

1- 2 December, 2008
Chennai, India

BOBP

BAY OF BENGAL PROGRAMME **BOBP/REP/116**

Report of the National Workshop on Monitoring, Control and Surveillance in Marine Fisheries – *India*

1-2 December 2008
Chennai, India

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Prospectus

1.0 Background and Rationale

Marine fisheries occupy an important place in the socio-economic development of India. The sector plays a significant role in providing food and livelihood security, generates employment and stimulates the growth of a number of subsidiary industries. In terms of resources, the country has a long coastline of 8 118 km, a continental shelf of 0.53 million sq km and an Exclusive Economic Zone (EEZ) of 2.02 million sq km. The exploitable marine fishery resources have been estimated at 3.92 million tonnes. As per the 2005 Census of marine fisheries sector, a total of 3.57 million fishers inhabit the 3 322 fishing villages along the coastline of mainland India and the Island territories of Lakshadweep and Andaman & Nicobar Islands.

The marine fishing fleet is estimated to comprises about 1 07 448 traditional craft, 76 748 motorized traditional craft and about 60 000 small mechanized fishing boats. A majority of these boats operate in the coastal waters. However, due to excess capacity and unsustainable fishing practices, marine fish production has been stagnating around 2.6 - 3.0 million metric tonnes for the last one decade. Many commercially important fish stocks are fully exploited or over-exploited and are in need of recovery. Almost the entire small-scale/artisanal fishery in the country operates in an open access regime.

Fishing communities constitute a large population, which is mostly illiterate, poor and has limited access to electronic and print media. In view of their remote location, illiteracy and lack of access to mass media, making them aware about the significance of responsible fishing, implementation of management measures and conservation related issues is an enormous task. Provisions of the existing fisheries Acts and Regulations are also not known to most of the fishing communities and as such compliance levels are very poor. Further, the available manpower and resources with the coastal States/Union Territories (UTs) are inadequate to ensure compliance of the rules and regulations and other stipulations enforced by the Government from time to time.

An effective and implementable Monitoring, Control and Surveillance (MCS) is pre-requisite to management and conservation of fisheries resources in the Indian EEZ. In January 2008, the four member-countries (Bangladesh, India, Maldives, Sri Lanka) of the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) organized a Regional Workshop on MCS (RW-MCS) in Chittagong, Bangladesh. One of the major outputs of the RW-MCS was the adoption of the '*Chittagong Resolution*', which *inter alia* recommended that member-countries may undertake measures to formulate time bound action plans for ensuring successful implementation and also strengthening of the national agencies responsible for MCS.

2.0 The Proposed Workshop and its Justification

The main constraints, which impede practical application of MCS in India, have been identified as follows:

- Lack of accurate statistics in small-scale/artisanal sector, which contributes about 95 per cent of the total marine fish production.

- Lack of scientific information system to support management of fish stocks.
- Lack of awareness at the community-level of the need for MCS.
- Large number of inaccessible landing places along the coast.
- Lack of supporting legislation to implement MCS.
- Inadequate manpower and funding for MCS.

MCS in small-scale fisheries or in coastal areas presents a range of unique problems, which relate to large numbers of widely dispersed fishers operating within a fishery, mixed gear/ species and landing points. In the given situation, some of the main controls and instruments that could be used in implementing MCS are:

(i) determining the level of sustainable exploitation and other relevant information by data gathering, assessment and analysis;
(ii) controlling (optimizing) fishing effort (*e.g.* through licensing);
(iii) selecting appropriate management instruments- closed season/closed area for fishing (*e.g.* zonation for different categories of fishers);
(iv) developing fisheries management plans based on the principles of conservation of fish stocks in a sustainable manner;
(v) enforcing controls in ports and at sea;
(vi) using Vessel Monitoring System, wherever applicable;
(vii) educating the community through information dissemination;
(viii) promoting co-management strategies and devolving rights to communities;
(ix) providing legislative support for fishery management plans and regulations to ensure equitable allocation of resources; and
(x) implementing regulations through licensing, reporting and enforcement of laws.

Another critical requirement for effective MCS is the establishment of a coordinating mechanism, with well-defined objectives and a clear work plan. The Government cannot practice MCS in isolation and, therefore, coordination among stakeholders is essential. In this regard, an important approach to MCS in such fisheries is, where possible, to foster strong local awareness on the need for conservation and management. The setting up of MCS can also assist in establishment of multiple channels of communication, which can provide information to the fisher community on weather, commodity and market prices, safety aspects, hygiene, etc.

3.0 Objectives of the National Workshop

The main objective of implementing MCS is to secure responsible and sustainable management of fisheries resources in India while allowing an ecologically safe and economically profitable exploitation of living marine resources in the interest of not only today's population but also for posterity. It is also expected to bring in a paradigm shift in the sector from open access to limited and controlled access regime or by promoting rights-based fisheries management. In essence, the proposed MCS will be the Government's response to challenges posed by the anarchism that prevails in the fishery.

The objectives of the National Workshop on MCS are as follows:

(i) Review of existing marine fisheries management programmes and analysis of fisheries in the coastal waters and the EEZ (this will *inter alia* include the registration of fishing vessels, number and category of fishing craft and gear, fishing harbours/fish landing sites, boat building yards, etc).

(ii) Review of the existing fishing vessel licensing and registration procedures and practices, fisheries legislations and of other concerned Ministries/Departments (*e.g.* Mercantile Marine Department - MMD) having bearing on marine fisheries.

(iii) Assessment of the MCS capacity and identification of institutional development requirements within the Ministry/Department of Fisheries and, if necessary, other concerned sister Departments (*e.g.* MMD).

(iv) Preparation of an outline of procedures and practical application of fisheries MCS programmes (Action Plan).

4.0 National Workshop

The National Workshop will be organized by the BOBP-IGO in coordination with the Ministry of Agriculture (Department of Animal Husbandry, Dairying and Fisheries), Government of India.

Date and Venue

The National Workshop will be organized from **1-2 December 2008** at the Convention Centre, Hotel GRT Grand, 120, Sir Thyagaraya Road, T Nagar, Chennai – 600 017, Tamil Nadu, India (Tel:+91 44 -2815 0500/ 5500/ 1617;Fax: +91 44 -2815 0788; Email: reservations@grtgrand.com; Website: www.grtgrand.com).

Conduct of the Workshop

The National Workshop will be conducted in English.

Participation

Participants of the National Workshop shall include representatives from the (i) Ministry of Agriculture, Government of India, (ii) Planning Commission, (iii) Coast Guard, (iv) Mercantile Marine Department, (v) Department of Fisheries of the Coastal States/Union Territories, (vi) Representative of Fisher Groups/Associations, (vii) Experts and (vii) BOBP-IGO.

Format of the Workshop

The National Workshop shall include four (4) lead presentations followed by Group Discussions and finalization of an action plan for consideration of the Government of India. Copies of the presentations and other documents shall be distributed to the participants prior to the Workshop.

Coordination of Workshop

The Director, BOBP-IGO will coordinate the National Workshop arrangements in consultation with the Department of Animal Husbandry, Dairying and Fisheries, Government of India.

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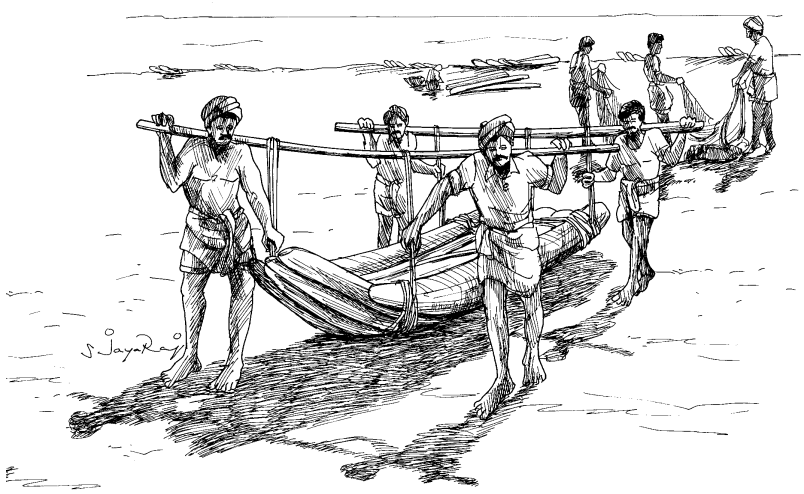
Agenda and Timetable

01 December 2008 (Monday)	
0830 – 0900	Registration
0900 – 1000	Session I - Opening Session
1000 – 1030	*Tea/Coffee Break & Group Photograph*
1030 – 1300	Session II- Presentation of Technical Papers
1300 – 1400	*Lunch Break*
1400 – 1530	Session III - Group Discussion
1530 – 1545	*Tea/Coffee Break*
1545 – 1700	Session III contd…
02 December 2008 (Tuesday)	
0900 – 1300	Session IV - Group Presentation & Preparation of Draft Action Plan
1100 – 1115	*Tea/Coffee Break*
1115 – 1300	Session IV contd…
1300 – 1400	*Lunch Break*
1400 – 1530	Session V - Concluding Session
1530 – 1600	*Tea/Coffee/Departure of Participants*



Programme

30 November 2008 (Sunday)	***Arrival of Participants***
01 December 2008 (Monday)	**Day 1**
0830 - 0900	**Registration**
0900 - 1000	***Session I - Opening of the National Workshop***
0900 - 0905	Lighting of the Traditional Lamp.
0905 - 0910	Welcome and Introductory Remarks: Director, BOBP-IGO.
0910 - 0915	Introductory Remarks by Chairperson: Joint Secretary, Department of Animal Husbandry, Dairying and Fisheries, Government of India.
0915- 1000	Monitoring, Control and Surveillance in Small-scale Fisheries – Guiding Principles and Practices – Director, BOBP-IGO.
1000 - 1030	Group Photograph; Tea/Coffee
1030- 1300	***Session II - Presentation of Technical Papers***
1030 - 1120	Overview of Marine Fishing Fleet in India and its Preparedness for a Monitoring, Control and Surveillance Regime - Department of Animal Husbandry, Dairying and Fisheries, Government of India.
1120 - 1210	Rights-based Fisheries Management and the Role of Fisher Community in the Implementation of Monitoring, Control and Surveillance in India – Mr Sebastian Mathew, Expert.
1210 - 1300	Legal Support to Implement Monitoring, Control and Surveillance in Marine Fisheries Sector in India: Present Status and Gaps to be Addressed – Director, BOBP-IGO.
1300 - 1400	Lunch
1400 - 1530	***Session III - Group Discussion***
1400 - 1415	Formation of Groups/Orientation
1415 - 1530	Groups Discussions
1530 - 1545	Tea/Coffee
1545 - 1700	Group Discussions contd…

02 December 2008 (Tuesday)	***Day 2***
0900 - 1300	***Session IV – Group Presentations & Preparation of Draft Action Plan***
0900 - 1100	Group Presentations
1100 - 1115	*Tea/Coffee*
1115 - 1300	Preparation of Draft Action Plan.
1300 - 1400	*Lunch*
1400 - 1530	***Session V - Concluding Session***
1400 - 1515	Presentation of Draft Action Plan and its Adoption.
1515- 1525	Concluding Remarks: Chairperson
1525 - 1530	Vote of Thanks: BOBP-IGO
1530 - 1600	*Tea/Coffee*
1600 hrs onwards	***Departure of Participants***







List of Participants

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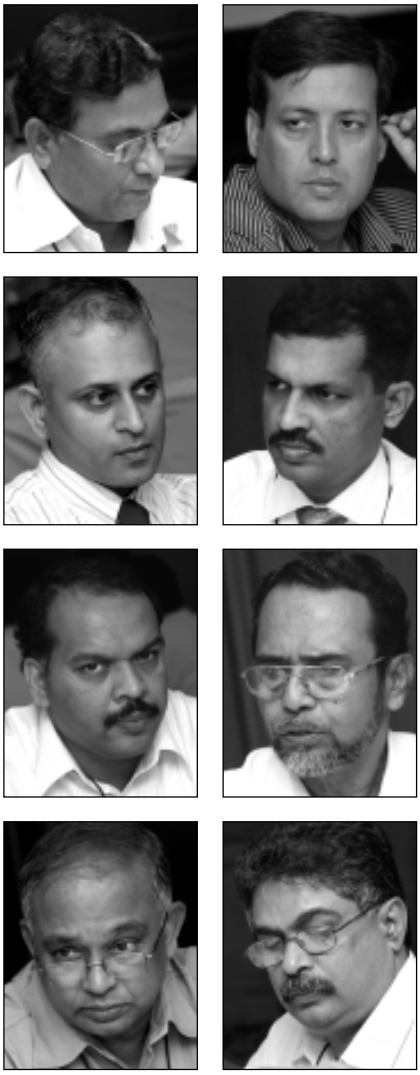

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BANGLADESH
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Kakinada
Andhra Pradesh
Machilipatnam
Panaji (Goa)
Bay of Bengal
Nellore
Chennai
Pondicerry
Tamil Nadu
Port Blair
Cochin
Andaman and Nicobar Islands (INDIA)
Lakshadweep (INDIA)
Tuticorin
Thiruvananthapuram
Kanniyakumari
SRI LANKA

Not to scale

Report

Opening session

1.0 A National Workshop on Monitoring, Control and Surveillance in Marine Fisheries (NW-MCS) was jointly organized by the Government of India (GoI) and the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), in Hotel GRT Grand, Chennai from 1-2 December 2008. Representatives from the Ministry of Agriculture, Government of India (GoI); Planning Commission; Indian Coast Guard (ICG); Mercantile Marine Department (MMD); Department of Fisheries (DoF) of the coastal States of Andhra Pradesh, Goa, Karnataka, Tamil Nadu, West Bengal and the Union Territories (UTs) of Lakshadweep and Puducherry; Fisher Associations and the Food and Agriculture Organization of the United Nations attended the NW-MCS.

2.0 The Opening Session of the Workshop began with the lighting of the traditional lamp. Mr Tarun Shridhar, Joint Secretary (Fisheries), Department of Animal Husbandry, Dairying & Fisheries (DAHDF), Ministry of Agriculture, GoI chaired the Opening Session and the First Technical Session of the Workshop.

3.0 Dr Y S Yadava, Director, BOBP-IGO welcomed the participants on behalf of the organizers of the National Workshop. In his introductory remarks, Dr Yadava said that the suggestion for the National Workshop came from the Regional Workshop on Monitoring, Control and Surveillance (RW-MCS) held in Chittagong, Bangladesh during January 2008. The RW-MCS was attended by representatives of the four BOBP-IGO member-countries (Bangladesh, India, Maldives and Sri Lanka). A significant output of the Regional Workshop was the '*Chittagong Resolution'* which *inter alia* called for a time-bound formulation of National Plan of Action on MCS by all the four BOBP-IGO member-countries.

Dr Yadava said that the NW-MCS was initially planned for the coastal States and UTs on the east coast of India. Later, in accordance with the suggestion of the GoI, it was decided to broaden the participation by also inviting the coastal States/UTs from the west coast. However, the purpose could not be fully achieved since some of the important maritime States like Gujarat, Kerala, Maharashtra and Orissa did not participate in the National Workshop. "The poor response from these States also indicates that MCS is yet to be a priority in fisheries management in most of the coastal States in the country", said Dr Yadava.

Elaborating on the development of MCS in different parts of the world, Dr Yadava said that MCS was now an integral part of responsible fisheries in many Asian countries. In South-east Asia, some countries were also moving towards regional strategies for implementation of MCS. "In many developed countries, MCS is deeply rooted in their fisheries policy and these countries are now moving from conventional command and control type of MCS to more participatory forms of monitoring and control, making MCS cost-effective", said Dr Yadava. Expressing his grief over the act of terrorism in Mumbai and loss of innocent lives, Dr Yadava said that in the past also fishing vessels were used for unlawful activities and a strong MCS regime in the maritime States/UTs could perhaps help reducing such illegal use of fishing vessels and contribute to the national security.

Participants at the National Workshop on MCS.

Concluding his introductory remarks, Dr Yadava hoped that the two-day Workshop would be fruitful in analyzing issues concerning implementation of MCS in India and emerge with an implementable action plan. Dr Yadava also thanked the Government of India for the cooperation and support in organization of the National Workshop and wished the participants a pleasant stay in Chennai.

4.0 Mr Shridhar in his inaugural address expressed happiness on being part of the Regional Workshop. He said that he would look forward to the plan of action that would emerge from the Workshop and hoped that the action plan would not be academic in nature but relate to the need-based requirements of the marine fisheries sector in the country.

"MCS is a generic tool of governance. In fisheries sector in India, the focus of MCS is more on control and surveillance and less on monitoring. Monitoring is very important and this needs an authentic data base. Monitoring also leads to control and surveillance. In India, we work in a data poor situation and, therefore, the MCS regime is also weak", said Mr Shridhar.

Describing the status of global fisheries, Mr Shridhar said that of the 15 Ocean zones in the World, fish production from 13 zones had gone down. The remaining two zones, which lie in the Indian Ocean, were still productive. He said that to allow these zones to remain productive, a proactive approach was required. Since fisheries were not an infinite resource and about fifty percent of the fish stocks were over-exploited, there was an urgent need for conservation of the resources and for doing so, a reliable database was very important. He further said that the reasons behind depletion of fish stocks should be ascertained. "Although the Fishery Survey of India is mandated for collection and analysis of data and making it available to the Government for policy planning, such information is not available", said Mr Shridhar.

"In India, MCS is lower in the fisheries agenda. The challenge before us is how to sell MCS as a desirable activity rather than as a nuisance and burden. The challenge is also to make MCS high on the political and governance agenda. To reduce the conflict between fishers operating in the coastal waters and the Exclusive Economic Zone (EEZ) requires a good MCS regime for the entire sector", Mr Shridhar said.

On the issue of Illegal, Unregulated and Unreported (IUU) fishing, Mr Shridhar said that IUU fishing was becoming rampant and about 25 percent of the global fish catch was originating from IUU vessels. He said that it was difficult to bring down IUU fishing overnight. Besides regulatory aspects, a better understanding was also required on the scientific, economic and social aspects. While the ICG had the larger responsibility of surveillance of the EEZ, the force could not commit itself to the surveillance of fisheries alone. The Port State responsibilities were also not being addressed adequately and the gravity of the problem required sound understandings by all.

Mr Shridhar said that the issues in fisheries sector varied from open access to regulated access to rights-based fisheries. There were various sub-sectors and pressure points within these sectors. He further said that reduction in post-harvest losses was critical as this could lead to reduced pressure on the resources. Similarly, aquaculture could also divert the pressure from capture fisheries.

"A good database and strong institutional support are pre-requisites of a good legislation. The support of stakeholders and a consensus among them to adopt MCS is also essential. MCS should not be seen as an encroachment into the livelihoods of the fishers. Any MCS measure should be protective of the livelihoods and not a mere policing activity. Further,

involvement of stake holders is extremely critical. The Ministry of Agriculture has also provided budgetary support for fisheries management in the Eleventh Five-Year Plan", said Mr Sridhar.

In conclusion, Mr Shridhar said that MCS should be considered beyond the existing technological requirements such as VMS, etc. Fisheries form an important economic resource in India and MCS should be used to sustain this resource.

Technical presentations

5.0 The first presentation was made by Dr Yadava on "Monitoring, Control and Surveillance in Small-scale Fisheries- Guiding Principles and Practices". Dr Yadava said that the impact of the small-scale or artisanal fisheries was often overlooked due to its low scale of operation. However, given the magnitude, small-scale fisheries posed major issues in fisheries governance. He further said that MCS in the Indian scenario was a challenging task due to a pre-dominant small-scale fisheries and its highly dispersed nature. In this regard, he discussed the main controls and instruments that could be used in implementing MCS in India. He also emphasized on the need for formulation of a time-bound plan of action for successful implementation of MCS and for strengthening of national agencies responsible for MCS as per the '*Chittagong Resolution'*.

6.0 Dr C P Juyal, Fisheries Research and Investigation Officer, DAHDF made a presentation on "Overall Status of Marine Fisheries in India and its Preparedness for a MCS Regime". He described the status of fisheries resources in the Indian EEZ and the potential for deep sea fishing, particularly of tuna and tuna like species. Dr Juyal also elaborated on the existing legal mechanisms and salient features of the 2004 Comprehensive Marine Fishing Policy of the Central Government. He said that many new initiatives were planned in the Eleventh Five-Year Plan to strengthen management of the resources and for introducing satellite-based surveillance measures (Vessel Monitoring System or the VMS) for the fishing vessels.

7.0 Mr Sebastian Mathew, Expert, made a presentation on "Rights-based Marine Fisheries Management and the Role of Fisher Community in Implementation of Monitoring, Control and Surveillance in India". Mr Mathew said that the basic elements for implementation of MCS programme were provided for in the existing legislation on marine fisheries in India. However, the need was to strengthen them and while doing so it was essential to ensure that they were complimentary with the international instruments to which India was signatory. Referring to the registration of fishing vessels, Mr Mathew said that if millions of automobiles could be registered annually, registration of fishing vessels should not be an insurmountable task.

Mr Mathew said that there were no provisions for powers to be delegated to the community for management of the resources in the Constitution of India. He suggested that it was necessary to have management architecture for sustainable development of fisheries and also for adoption of a nested approach. In the questions that followed Mr Mathew's presentation, references were made to the appalling conditions on the fishing vessels with respect to hygiene and sanitation, lack of effort to promote co-management and lack of political support for devolution of power to the Panchayats. Responding to the questions, Mr Mathew said that there were certain preconditions for adoption of rights-based fisheries in India. In this regard, legal reforms were needed to recognize traditional arrangements and their adaptation to facilitate an equitable rights-based approach.

8.0 The final technical presentation was made by Dr Yadava on "Legal Support to Implement Monitoring, Control and Surveillance in Marine Fisheries Sector in India: Present Status and Gaps to be addressed". He presented a comprehensive review of the Marine Fisheries Regulation Acts (MFRAs), Rules, Regulations and Notifications of the coastal States and UTs and highlighted the provisions and gaps relating to implementation of MCS in the coastal States/UTs. Dr Yadava further elaborated on the provisions contained in the international binding and non-binding instruments like the 1982 United Nations Law of the Sea, the 1993 FAO Compliance Agreement, the 1995 UN Fish Stocks Agreement and the 1995 FAO Code of Conducts for Responsible Fisheries.

9.0 During the discussions that followed the four presentations, the participants raised several issues pertaining to the implementation of MCS in the country. These issues included weak patrolling and the failure of the Centrally Sponsored Scheme, which had provided patrol boats to the coastal States in the late nineties; lack of efforts to optimize fishing fleet size; and poor enforcement of the MFRAs to prevent fishing in restricted areas. Participants observed that the transformation from *de facto* open access fishery to regulated access fishery was achieved in some countries by effective implementation of registration and licensing procedures in consultation with the stakeholders. Participants suggested that over time the village Panchayats should be involved in fisheries governance. It was also observed that the focus of fisheries development in most coastal States/UTs was on fisher welfare programmes, while other developmental aspects were overlooked. While acknowledging the need for welfare programmes, it was emphasized that MCS was equally essential and should be implemented by dedicated units in the DoF. On the issue of VMS, the Workshop felt that it was an effective mean to track the movements of fishing vessels but caution must be exercised while applying the same technology to smaller category of fishing vessels in the country.

Workshop participants engaged in Group Discussion.

Group discussion

10.0 In the next Technical Session, four Working Groups were formed to discuss the following issues:

Group I: ***Registration and Licensing of Fishing Boats, Demarcation of Zones, Colour Coding, Communication and Surveillance Infrastructure.***

Group II: ***Estimation of Fishing Capacity, Maximum Sustainable Yield and Optimization of Fishing Fleet.***

Group III: ***Governance, Policy and Legislative Support to MCS.***

Group IV: ***Institutions, Human Resource Development and Role of Non-Governmental and Community-Based Organizations.***

The Group Discussions and preparation of reports by the four Working Groups continued until the close of the day's proceedings. The details of the topics discussed in each group are given in ***Annexure I.*** The group-wise list of participants is given in ***Annexure II.***

11.0 Mr M K R Nair, Fisheries Development Commissioner, Government of India chaired the second day's proceeding. In the forenoon session, the four Working Groups presented the outcome of their group's discussion.

12.0 Mr Ravi Kumar made the presentation for Group I. The Group suggested the urgent need for registration and licensing of all seaworthy fishing vessels, increased level of surveillance and recommended the use of an Automatic Identification System (AIS) for all vessels below 15 meter LOA (Length Over All). On the issue of impoundment of fishing vessels that violate rules and regulations, the Group felt that the fishing harbours and fish landing centres lacked adequate berthing space to keep such impounded boats. On the issue of training, the Group was of the view that the two 24-months training courses conducted by the Central Institute of Fisheries Nautical Engineering and Training (CIFNET), Kochi did not benefit fisheries sector, as the courses were oriented towards the merchant shipping sector and suggested revamping of the courses to make them relevant for the fisheries sector.

In the discussions that followed the Group's presentation, it was suggested that while estimating fishing capacity, both length of the fishing vessel and gross tonnage (fish hold capacity) should be taken into account and the conditions for issuing license should also include working and living conditions as provided for in the Convention of the International Labour Organization (ILO) on 'Work in Fisheries Sector'. The other issues raised by the participants included (i) re-selling of the fishing vessel to be done with the knowledge of the DoF; (ii) antecedent of the boat owners to be verified by the police prior to registration; (iii) life saving appliances should be mandatory; and (iv) area of operation should be mentioned in the registration/license issued to the boat owner. The ICG informed that the boat owners and crew were being issued with SMART cards. The Director (Fisheries), Karnataka said that in his State it was compulsory for fishing vessels to register under the Merchant Shipping Act, 1958 (MSA, 1958) and suggested that this condition should be relaxed and the DoF should be delegated the powers to register fishing vessels. The representative from the MMD, Chennai said that there was a need to streamline the various Marine Fishing Regulation Acts/Rules and in the process also harmonize them with the MSA to the extent possible. In this context it was also suggested that the Ministry of Agriculture, Government of India might consider constituting a group/committee to look into the matter.

13.0 The presentation for Group II was made by Dr H Mohamed Kasim. The Group made recommendations on the need for regular stock assessment and estimation of maximum sustainable yield, enumeration of infrastructure, estimation of landings, etc. The points raised in the discussions that followed the Group's presentation included (i) the use of log sheets for estimation of fish landings; (ii) use of 'allowable catch' for selected fish stocks and also adoption of the 'precautionary approach'; (iii) to consider commercially important stocks in place of species; and (iv) opening and closing of fishery to allow sustainable fishing of stocks/ species. Concluding the discussions on the presentation of Group II, the chairperson said that the assessment of the fleet capacity should be done immediately by the coastal States/ UTs and an inventory of boat building yards should also be prepared. He strongly emphasized on the need for adopting the principle of 'precautionary approach' in areas where either data was lacking or not available.

14.0 Commandant Donny Michael made the presentation on behalf of Group III. He said that MCS was a misnomer in the Indian context. Citing the example of the ICG, he said that the Coast Guard officers do not undergo any course on MCS after the initial capsule programme conducted in the CIFNET. Since the ICG being the main agency for surveillance in the EEZ, a sound understanding of MCS and its requirements was essential for the officers and staff of the ICG. In the discussions that followed the presentation, it was suggested that the fishing vessels be marked with Radio identification frequency and the DoF should exercise greater control on the small-scale fishing sector in the territorial waters. It was also informed that the Ministry of Agriculture was contemplating the use of VMS on all categories of fishing vessels and also proposing introduction of a new Bill for regulating fishing by Indian vessels in the EEZ.

15.0 The presentation for Group IV was made by Commandant Paramesh of the ICG. He said that the existing fisheries and other relevant institutions contributed in one or the other way towards implementation of MCS in the country. In the discussions that followed his presentation, it was informed that the Zonal Bases of the Fishery Survey of India regularly conducted workshops in different coastal States, where MCS was also discussed. Participants were of the view that empowerment of the DoF was essential for successful implementation of MCS in the country. The recommendations made by each group on their respective topics are given in ***Annexure III (A-D)***.

Concluding session

16.0 Based on the recommendations of the four Working Groups and the suggestions given by the participants during discussions on the presentations, a draft National Plan of Action for Implementation of MCS was prepared by the BOBP-IGO in consultation with the chairperson and presented in the Concluding Session of the Workshop. The National Plan of Action was finalized based on the suggestions made by the participants and the same is placed as ***Annexure IV***.

17.0 In his concluding remarks, the chairperson said that a National Workshop on MCS was being held for the first time in the country. He requested the coastal States/UTs to consider the National Plan of Action seriously and include it in their work plans. He also suggested that the Panchayati Raj Institutions should be involved in the planning process and also at the subsequent stages of implementation.

18.0 The NW-MCS concluded at 1600 hrs on 02 December 2008.

Annexure I

Details of topics discussed in each group

Sl. No	***Group I*** **Registration and Licensing of Fishing Boats, Demarcation of Zones, Colour Coding, Communication and Surveillance Infrastructure.**	***Group II*** **Estimation of Fishing Capacity, Maximum Sustainable Yield and Optimization of Fishing Fleet.**	***Group III*** **Governance, Policy and Legislative Support to MCS.**	***Group IV*** **Institutions, Human Resource Development and Role of Non-Governmental and Community-Based Organisations.**
1.0	Fishing vessel registration procedure.	Estimation of fishing fleet size (capacity) and its distribution in the coastal areas.	Fisheries policy framework.	Institutions and their capacities in meeting the need of MCS system.
2.0	Fishing vessel licensing procedure.	Estimation of maximum sustainable yield (MSY) of commercial fin and shell fish species.	Fisheries management framework.	Empowerment of the Department of Fisheries to enforce MCS system.
3.0	Fishing area/zones for different categories of fishing boats/fishing practices.	Enumeration of fishing harbours/fish landing sites.	Fisheries legislation and its applicability to meet the needs of MCS system.	Training needs for establishment of MCS system.
4.0	Procedures for boat identification marks/ colour coding.	Analysis of fisheries and fishing effort in coastal waters/ Exclusive Economic Zone.	Existing legislation of other concerned Ministries and their applicability to meet the needs for MCS system.	Community mobilization and networking.
5.0	Communication system and surveillance procedures, including setting up of shore stations and inspection of boats at port and at sea.	Adjustment of fishing fleet to MSY or best scientific estimates available.	Operational and logistical requirements for MCS.	Co-management of resources.

Annexure II

Details of participants in each group

Group I **Registration and Licensing of Fishing Boats, Demarcation of Zones, Colour Coding, Communication and Surveillance Infrastructure**	*Group II* **Estimation of Fishing Capacity, Maximum Sustainable Yield and Optimization of Fishing Fleet**	*Group III* **Governance, policy and Legislative Support to MCS**	*Group IV* **Institutions, Human Resource Development and Role of Non-Governmental and Community-Based Organisations**
M K R Nair	V S Somvanshi	Donny Michael	P Paul Pandian
P S Jha	K Omprakash	C P Juyal	S Paramesh
Aji Vasudeven	H Mohamad Kasim	P Sivaraj	S Danassegarane
N V Vernekar	V Suresh	G D Rajeev	S N Jana
G Prithviraj	H S Veerappa Gowda	P P Koya	Sebastian Mathew
R Ravikumar	S Chakraborty	J Natarajan	Andreas Westerberg
M Paramasivam	P Sivagurunathan	Y S Yadava	Rajdeep Mukherjee

Annexure III-A

Summary of Group Discussion: Group I

Sl.No	Issue	Recommendations
1.0	Fishing vessel registration procedure.	• While registration is in place in many coastal States, the requirements are not uniform. • Under the Merchant Shipping Act, 1958 (MSA, 1958), the MMD is the authority for registration of all fishing vessels. • To overcome the shortage of manpower the MMD/MOT may delegate the powers of registering fishing vessels less than 20 meters to the DoF of the coastal States. • The parameters required for registration need to be made consistent for all States. However, the following 9 parameters are the minimum requirements: 1. Name of owner; 2. Vessel size/HP; 3. Name of fishing vessel; 4. Boat builder/supplier; 5. Material of construction; 6. Type of fishing; 7. Year of construction; 8. Place of registry; 9. If applicable, structural requirement.
2.0	Fishing vessel licensing procedure.	• For any fishing vessel the two main documents required are (a) Registration certificate (b) Licence/inspection certificate. • The purpose of registration is purely for identification and is permanent. Whereas the licence or inspection certificate needs to be renewed annually. • The requirements for issuing a licence should aim at meeting guidelines for design, construction and equipment of fishing vessels; area of operation and type of fishing; insurance; and minimum safety equipment for different classes of fishing vessels. • Insurance should be mandatory for registration and for grant of licence. • To overcome the inability of the artisanal fishers to meet the burden of insurance, government may consider subsidized premium for insurance of such vessels.
3.0	Fishing area/zones for different categories of fishing boats/ fishing practices.	• The present system of defining fishing areas and zones vary from State to State depending on parameters such as continental shelf and traditional methods of fishing. • The present system should be further corroborated by correlating fishing areas/zones of operation with the proposed FAO/IMO/BOBP-IGO Safety Guidelines, which take into account the state of the sea rather than the length of the boat.

Sl.No	Issue	Recommendations
4.0	Procedures for boat identification marks/colour coding.	• While the registration number indicates the port of origin, colour coding of boats will indicate the port of registry and also the zone of operation.
5.0	Communication system and surveillance procedures, including setting up of shore stations and inspection of boats at port and at sea.	• Communication equipment and distress signaling should be as per recommended international guidelines and be appropriate to the size and type of fishing vessel. • The Indian registered fishing vessels operating in territorial waters should use a separate VHF channel (other than channel 16) for distress communication to avoid interference from shipping traffic. • Presently, surveillance at sea is carried out only by the Indian Coast Guard (ICG), which checks crew ID, vessel documents and safety equipment on board. The ICG should be given the mandate to take punitive action (fine/ suspension of licence) when vessels are in default. • Random inspection should be carried out at port to ensure that the parameters for granting licence are maintained and that no illegal species have been targeted.

Annexure III-B

Summary of Group Discussion: Group II

Sl.No	Issue	Recommendations
1.0	Estimation of fishing fleet size (capacity) and its distribution in the coastal areas.	• In order to facilitate estimation of fishing capacity, details on horse power, tonnage, etc. should also be included in the forthcoming marine fisheries census of 2010. • To facilitate better estimation of fishing capacity, fishing vessels should be registered specifically for the type of fishing and the usage of nets, period of fishing, types of catches and time limit. The vessels used for more than one type of fishing should register as multipurpose fishing vessels with details on the types of fishing and the seasons of fishing at the time of registration. Estimation of fishing capacity should be made based on appropriate scientific method(s). • Fishing capacity for each maritime state should be estimated independently by proven scientific method (s) and the maritime States/ UTs should form East and West Coast Forum to reconcile the State/UT-wise fishing capacity.
2.0	Estimation of maximum sustainable yield (MSY) of commercial fin and shell fish species.	• MSY varies from time to time. The current estimates on MSY of different fishery resources and the secondary data available elsewhere, should be taken into consideration before arriving at the new estimate for different resources. The potential yield revalidation committee should validate the potential yield of different shell and fin fishes for each maritime State/UT once every five years.
3.0	Enumeration of fishing harbours/ fish landing sites.	• The available details on infrastructures such as fishing harbours, fish landing centres, ice plants, cold storages, fish markets, etc. with the maritime States/UTs should be compiled and if needed a fresh enumeration of these infrastructures may be undertaken whereever necessary in order to generate new data base on infrastructure facilities available in the country. • As per DAHDF, the existing infrastructure facilities are sufficient to cater to 25 percent of the existing fishing fleet of the country. Therefore, the estimate made on the fishing capacity and MSY should be evaluated to assess the future infrastructure requirements of each maritime State/UT and also for the entire country. • Considering the post-harvest losses and unhygienic handing of fish at the landing centres and fishing harbours, it is highly essential that the hygienic standards be improved.
4.0	Analysis of fisheries and fishing effort in coastal waters/Exclusive Economic Zone.	• Fish production and fishing effort should be recorded systematically with reference to territorial waters and EEZ separately by each maritime State/ UT. The development of fleet and fishing effort should be linked with such information. • Each fishing vessel should submit log sheets for the fishing trips undertaken to the concerned DoF for enumerating fishing effort and catch data.
5.0	Adjustment of fishing fleet to MSY or best scientific estimates available.	• The optimum fleet size should be estimated based on the historical data on yield and also on the available information on MSY.

Annexure III-C

Summary of Group Discussion: Group III

Sl.No	Issue	Recommendations
1.0	Fisheries policy framework.	• Based on the comprehensive Marine Fishing Policy, 2004, the coastal States/UTs may formulate their own fisheries policy with MCS as one of the objectives. • The Marine Fisheries Regulation Acts (MFRAs) framed by the coastal States/UTs have provisions for implementation of MCS system but they are not being fully enforced. Concerned States/UTs should implement the MFRAs by providing adequate manpower support. • There is also need for MCS to cover the Indian vessels fishing in the country's EEZ and those operating under the Letter of Permit. To do so, legal provisions would also be necessary.
2.0	Fisheries management framework.	• Management plans for major fish stocks should be formulated by taking into account the present status of stocks. Such plans should focus both on harvesting and conservation of the resources.
3.0	Fisheries legislation and its applicability to meet the need of MCS System. Existing legislation of other concerned Ministries and their applicability to meet the need for MCS System.	• States/UTs should ensure strict implementation of legislation. The Central Government should also ensure formulation of appropriate legislation for implementation of MCS. Further to ensure compliance, provisions for adequate manpower should be made. • If required, enforcement powers should be delegated to the Marine Enforcement Wing (or the Marine Police) of the State Governments. • Existing legislation such as Merchant Shipping Act, 1958; MFRAs; Territorial Sea, Continental Shelf, Exclusive Economic Zone and other Maritime Zone Act, 1976; MZI Act, 1981; Wildlife Protection Act, 1972; Coastal Regulation Zone Notification, 1991; etc are dealt by different Ministries in the Central Government. The concerned Ministries/ Departments should coordinate and formulate guidelines for smooth implementation of the MCS system in the country.
5.0	Operational and logistical responsibilities for MCS.	• Reporting of fish catch, gear type, location, etc are some of the minimum requirements for MCS. The other requirements, which need to be met are: ▪ Vessel identity system, VMS, AIS; ▪ Manpower; ▪ Vessels for monitoring at sea; ▪ Satellite based pictures of fishing grounds, etc.

Annexure III-D

Summary of Group Discussion: Group IV

Sl.No	Issue	Recommendations
1.0	Institutions and their capacities in meeting the needs of MCS System.	• Review of the existing capacity and the need for creating new capacities and qualified manpower for management at the State level. The other requirements are hardware, funds, capacity building at all levels, linkages and convergence between the line departments since they need to work together. There is also need for periodic monitoring.
2.0	Empowerment of the Department of Fisheries to enforce MCS System.	• The fisheries sector should receive better recognition proportionate to its potential to contribute to employment and income generation in the country. • Need for updated information on resources and other matters concerning sustainable development of fisheries. • Improved coordination and collaboration between different agencies concerned with fisheries development. • Measures for *ex situ* and *in situ* conservation of endangered fish species. • Use of extension mechanism for awareness creation on the need for sound MCS system. • Development of VMS system and Distress Alert Transmitters for improving safety at sea. • Promotion of genuine fisher cooperatives and their participation in various programmes. In this regard, the active involvement of fisher associations, trade unions, women's organizations, etc in the MCS programme is also essential. • Organisation of community interaction and training programmes for safety and survival at sea, health, hygiene, literacy as an incentive. • Need for a single nodal agency to coordinate MCS activities. • Political will to change orientation from fisheries development to fisheries management. • Involvement of Panchayat Raj institutions in various fisheries development activities, including MCS. • Greater community participation in the MCS programmes.
3.0	Training needs for establishment of MCS System.	• Availability of funds for training and capacity building of fishers in improved understanding of the provisions of the Code of Conduct for Responsible Fisheries in general and fisheries management in particular. Training programmes should also aim at reduction in post-harvest losses and value addition. The National Fisheries Development Board should take lead in this respect. • Community interaction programmes should be organized for conservation of endangered species, including turtles. • Fishing boat owners should be made accountable for the working and living conditions of fishers on board fishing vessels. • Success stories on MCS should be documented. • The socio-economic conditions of fishers should be improved. Such programmes should also aim at education of fisher's children, including vocational education to impart knowledge on identification of fish species, responsible fishing methods, etc.

Sl.No	Issue	Recommendations
		• Special programmes should aim at greater gender participation in MCS activities. • Programmes on conservation and management of fisheries resources should be promoted through radio, TV and other audio-visual means.
4.0	Community mobilization and networking.	• Monitoring of anthropogenic activities that contribute to pollution of resources (sewage discharge, dredging, reclamation, tourism, etc) should be undertaken. • Stock enhancement programmes should be undertaken through the use of fish aggregating devices, cage fish farming, etc. Fisheries sector should negotiate for better livelihood options for fishers.
5.0	Co-management of resources.	• Fishing communities should be empowered to undertake MCS, with emphasis on shore-based MCS programmes. While implementing MCS, communities should set up marshalling points for departure and arrival of all fishing boats. • In community-based MCS system, more focus should be on *monitoring* and *control* aspects. More specific management measures can be considered after elaborate stakeholder discussions. • Communities should also be involved in protection and restoration of mangrove forests, turtle conservation and implementation of Marine Protected Areas, sanctuaries, etc. • Traditional arrangements that can enhance fisheries conservation and management measures should be documented.

Annexure IV

National Plan of Action Plan on Implementation of Monitoring, Control and Surveillance in Marine Fisheries

A. Resource estimation

- Marine fish landings should be estimated regularly on the basis of a scientifically designed programme, which should be uniform for all coastal States and Union Territories (UTs). The monitoring of fish landings should include data on various biological aspects of commercially important fin and shellfish species. Consolidation of fish landings at designated fishing harbours and fish landing centres (FLCs) will improve the quality of data and provide better estimates on fish landings.
- The scientifically designed programme should allow segregation of data on fish landings from the Territorial Waters and those from the Exclusive Economic Zone (EEZ).
- Stock assessment should be carried out at regular intervals. The revalidation of potential yield estimates should be conducted for commercially important fin and shellfish stocks every five years. While revalidating potential yield estimates and arriving at Maximum Sustainable Yields (MSY), the data available with different agencies should also be taken into account.

B. Estimation of fishing effort and adjustment of fishing capacity

- The fishing capacity should be estimated for each coastal State and UT using scientific methods. Besides estimating the fleet size in absolute numbers, parameters such as gross tonnage and engine horse power should also be included in the next marine fisheries census, which is likely to be conducted during the Eleventh Five-Year Plan Period.
- The deployment of fishing fleet/effort by the coastal States/UTs in their territorial waters should be commensurate with the potential yield estimated for such area. Deployment of fishing fleet/effort in the EEZ should be coordinated by the Central Government. The coastal States/UTs should also devise a consultative mechanism to coordinate and regulate fishing fleet within their territorial waters and also in the EEZ; for the latter in consultation with the Central Government.
- Adjustment of fishing fleet/effort should be undertaken on a regular basis by the coastal States/UTs for their territorial waters and for the EEZ by the Central Government using controls which target both inputs (*e.g.* fishing area, fishery effort) and outputs (*e.g.* analysis of fisheries potential).
- Besides ongoing programmes for collection of statistics on fish landings, it should also be made mandatory for the fishing vessels to file log sheets containing information on species-wise fish catch, area of operation, effort deployed, etc after each fishing trip to the designated authority. In the beginning this requirement may be restricted

to harbor-based mechanized fishing vessels. In the longer-term, this data collection mechanism could also be extended to other categories of fishing vessels.

C. Registration and licensing of fishing vessels

- All sea-worthy unregistered and unlicensed fishing vessels should be registered/ licensed in a time-bound manner.
- To overcome the shortage of manpower, the Mercantile Marine Department (MMD) may consider delegating powers for registering fishing vessels less than 20 meters Length Overall (LOA) to the Department of Fisheries (DoF) of the coastal States/UTs.
- The registration of fishing vessels by the coastal States/UTs should be uniform and consistent using a minimum set of parameters, which should include (i) name and address of owner; (ii) name of fishing vessel; (iii) vessel size (length and tonnage)/ horse power; (iv) boat builder/supplier; (v) material of construction and if applicable, structural requirement; (vi) type of fishing; (vii) year of construction; (viii) place of registry; (ix) requirements of certified crew (fishing operations and engine/machinery operation).
- The fishing vessels should be registered specifically for the type of fishing, the type of gear to be used and the period and frequency of operation. The vessels used for more than one type of fishing should be registerd as multipurpose fishing vessels with details on the types of fishing and the fishing seasons. Such details in the registration data would be useful for arriving at fishing effort deployed in the marine waters and would also enable adjustments in the fishing fleet as and when required.
- The licence or inspection certificate is a document that needs to be renewed annually. The requirements for issuing a licence should aim at meeting guidelines for design, construction and equipment of fishing vessels; area of operation; type of fishing; insurance; minimum safety equipment; reporting as provided for in the law and minimum requirements for working and living conditions as appropriate for different classes of vessels.
- Insurance of fishing vessel and crew should be a mandatory requirement for registration and also for grant of licence. In the case of artisanal sector (traditional fleet, both motorized and non-motorized), the Government may consider subsidizing the insurance premium.
- The colour coding of fishing vessels should be mandatory to indicate the port of registry and the licensed zone of operation. To avoid overlaps in colour coding, the coastal States/UTs may together decide on the colour patterns to be used by the fishing vessels of each State/UT.

D. Infrastructure development

- The existing fisheries infrastructure facilities in the coastal States/UTs in terms of landing and berthing facilities (such as fishing harbours and FLCs), ice plants, cold storages, fish markets, boat building yards, etc should be inventoried.
- The existing landing and berthing facilities cater to the requirements of about 25 percent of the fishing fleet in the country. This situation is leading to acute congestion in the fishing harbours and FLCs. In many cases the navigational channels/ approaches to the fishing harbours and FLCs are silted and cause delays in landing of fish besides posing safety hazards. Therefore, a thorough assessment of the existing

infrastructure facilities and the actual requirements in terms of new units and or modernization of the existing facilities for each coastal State/UT should be made.

- Considering the need to minimize post-harvest losses and to improve hygienic handling of fish at the fishing harbours and the FLCs, the concerned agencies owning the facilities should adopt and implement hygienic standards so as to conform to international standards for food safety.

E. Zonation of fishing grounds

- The zonation of fishing grounds for different categories of fishing vessels is provided in the Marine Fishing Regulation Act (MFRA) of the coastal States/UTs. The zones vary from State to State and are largely based on the extent of the continental shelf and the size of the different categories of fishing vessels. Keeping in view the safety of fishing vessels, the license for fishing in a particular area should be dependent on the size of the vessel and its capability to fish in a particular area.

F. Surveillance

- Surveillance at sea is presently done by the Indian Coast Guard (ICG), who check crew identification, vessel documents and safety equipment on board. Surveillance should also be carried out at port through random inspections by the designated agency.
- The coastal States/UTs should make provisions to provide Identity Cards to the marine fishers and such cards should be issued after making proper verification of their antecedents.
- A comprehensive surveillance mechanism should be evolved and such a mechanism should involve the ICG, State/UT Governments and also the stakeholders. In this regard, the responsibilities for surveillance should be split between the ICG for the EEZ and the State/UT Government (DoF or Marine Enforcement Police) for the territorial waters. The involvement of stakeholders (*e.g.* fishers) is crucial for effective surveillance both at port and at sea. Emphasis should be laid on shore-based MCS programmes with greater community participation, as it is cost-effective.

- The recommendations for communication equipment and distress signaling should be as per recommended international guidelines and should be appropriate to the size and type of fishing vessels.
- Fishing vessels operating in territorial waters should use Channel 16 exclusively for distress communication. Separate channels should be used for other communication. For distress signaling, the Distress Alert Transmitter (DAT) devised by the Indian Space Research Organization and the ICG has proved to be successful and should be promoted for use by the fishers. For vessels over 15 meter LOA, fitment of AIS for tracking and collision prevention is recommended.
- The Central Government may consider creation of a central database of fishing vessels. The coastal States/UTs may also consider setting up of Fisheries Intelligence Wings for effective surveillance.

G. Review of fisheries legislation

- To regulate fishing in the EEZ by wholly Indian owned and Indian flagged fishing vessels, the Central Government should enact a central legislation, which should *inter alia* include provisions for MCS, fisheries management (inclusive of safety requirements) and resource conservation and enforcement. Such legislation should also be compatible with the International voluntary and non-voluntary instruments (*e.g.* the 1982 United Nations Convention on the Law of the Sea, the United Nations Fish Stocks Agreement, the 1995 FAO Code of Conduct for Responsible Fisheries, IMO/ FAO/ ILO Voluntary codes for fishing vessels Part A and B).
- A thorough review of the existing fisheries and supporting legislation enacted by the Central Government should be undertaken. Wherever necessary, such legislation should be amended to include requirements of MCS, fisheries management, resource conservation and also the requirements of International voluntary and non-voluntary instruments. All relevant provisions concerning marine fisheries sector contained in the Central legislation should be implemented in a coordinated manner.
- The MFRAs of the coastal States/UTs contain adequate provisions to implement MCS within their respective jurisdictions. However, many such provisions are not implemented by the coastal States/UTs, due to inadequate manpower, funding constraints, etc. In view of the importance of MCS in the marine fisheries sector, the coastal States/UTs should deploy adequate manpower and also make appropriate funding provisions. Wherever required and feasible, some provisions may also be considered for delegation to other relevant agencies in the State/UT (*e.g.* Marine Enforcement Wing, Marine Police, etc).

H. Fisheries policy and management frameworks

- Based on the 2004 Comprehensive Marine Fishing Policy of the Central Government, the coastal States/UTs should formulate their policies with adequate involvement of all concerned stakeholders. The State/UT policy should clearly define the objectives and goals of fisheries development. It should be comprehensive and not only include the topical requirements of the fisheries sector but also ensure that the fruits of development reach the end users. The policy should ensure decentralization and adopt the '*Principle of Subsidiarity'*. The policy may also consider promoting rights-based fisheries management to the extent possible. Further, such policy documents should

be dynamic in nature and allow for periodic revisions and adoption of new developments to assist in sustainable growth of the fisheries sector.

- Management plans for major fish stocks should be formulated by the Central Government in coordination with the concerned States/UTs for sustainable use of the fisheries resources. In a data-deficient situation, such plans may rely on the 'precautionary approach'. The plans, wherever feasible, may also consider fixed time schedule for allowing the stocks to be harvested, *ex situ* and *in situ* conservation and management measures and stock enhancement using proven technologies such as artificial reefs, fish aggregating devices and sea ranching.
- The MCS, which is an integral part of fisheries management, should be implemented in stages. The first stage should include mandatory registration and licensing. The second stage should take up enforcement of the provisions contained in the rules and regulations. Involvement of stakeholders from the very beginning would help promoting voluntary compliance by the fishers and other concerned user groups. This situation can help in making MCS successful and also cost-effective.
- Adequate provision of funds for implementation of MCS and other fisheries management measures is a pre-requisite. The Central Government and the States/ UTs must ensure that adequate budgetary provisions are made to cover the requirements of logistics, manpower, surveillance, human resource development, etc.
- Safety, like MCS, is also an integral part of fisheries management. Development of management plans for fish stocks should take into account the safety of fishers and ensure that such plans do not put the fishers, especially the artisanal sector, at risk.
- Effective fisheries management programmes should aim at minimizing post-harvest losses and ensuring that the harvested resources are available as food fish to the people and also put to other productive uses.

- To coordinate various activities related to fisheries management (*e.g.* management plans, MCS, safety at sea, exercise of coastal State jurisdiction, port State and flag State control), the Central Government and the coastal State/UT Governments may consider setting up of dedicated Fisheries Resource Management and Enforcement Units (FRMEU) within their organizational frameworks.

I. Capacity building and empowerment

- The DoF is the nodal agency for fisheries development in the coastal States/UTs. Therefore, it should be ensured that the DoF is adequately staffed in terms of trained technical manpower to address the issues of sustainable fisheries development within their jurisdiction. In this regard, the coastal States/UTs may consider reorganizing the existing capacity and or creating new capacity to meet the growing requirements of fisheries management. Empowerment of the DoF and its staff is also necessary to meet the increasing challenges of maintaining balance between fishery resource exploitation and conservation.
- The capacity building of the staff of the Fisheries Division in the Central Government, MMD, ICG, DoF of the coastal States/UTs and other concerned organizations should be initiated in a planned manner. A Gap Analysis may be undertaken to arrive at the actual needs of capacity building.
- Similarly, strengthening of the fisheries institutions and other agencies concerned with the implementation of fisheries management (*e.g.* community-based organizations) should be taken up in a time-bound manner.
- The fishing community, as the grassroots practitioners of fisheries, should be empowered to participate in the fisheries management programmes. Their skills and capacities should be enhanced through short-term and highly focused vocational trainings and hands-on workshops. The boat owners, who at times may not be the actual practitioners, should also be involved in the training programmes on resource management.
- The socio-economic well being of fisher community should be improved. Besides strengthening their safety nets, the working and living conditions of fishers on board fishing vessels should also be improved.
- The fisheries sector has the potential to contribute to national economy and, therefore, should receive better recognition. In this regard, the need for political will to support fisheries management that would allow sustainable use of the resources and stem depletion of fish stocks is well recognized and emphasized.

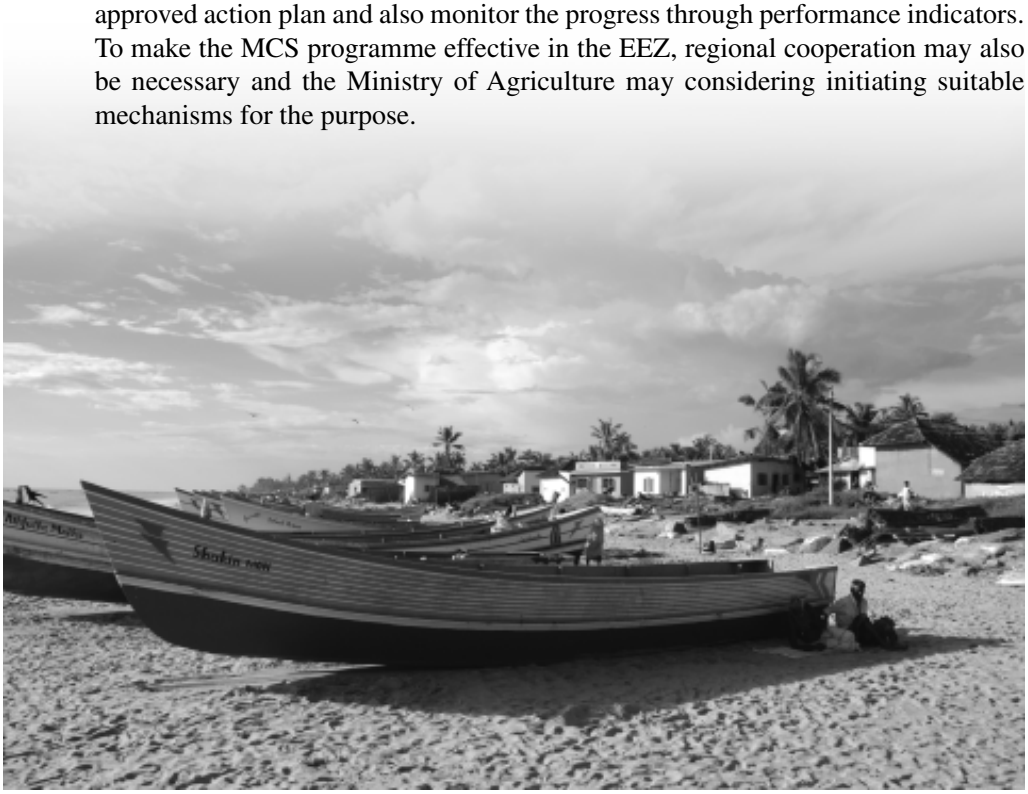
J. Community mobilization, communication and awareness

- Fisher communities in the coastal States/UTs should be mobilized to participate and assist in the implementation of fisheries management programmes. Fisher cooperative should be strengthened. Co-management should be promoted, wherever feasible. Involvement of the Panchayati Raj institutions would facilitate the process at the grassroots level.
- Community interaction programmes should be undertaken on issues such as resource management and formulation of management plans, MCS, safety and survival, health, hygiene and literacy. Women must be included in such programmes and activities may also be conceived for them to participate in MCS programmes.

- The print and electronic media should be made use of to the fullest extent in educating fishers and other stakeholders on the need for fisheries management. The mass media should also be used for building the capacity of the stakeholders.
- There is a greater need for information collection, collation and dissemination. Stories of success (and also failures) in fisheries management, indigenous knowledge in fisheries management, etc can enhance fisheries conservation and management measures and should be documented and shared with fishers and other stakeholders. Information on fisheries census should be disseminated to the stakeholders with minimum time lag and they should be educated on the consequences of changes noted in the census from the previous year's data. Students from the universities/ colleges/schools and public personalities should also be involved in the exercise. Fullest use of information technology and Geographical Information System should be made.
- Vocational education for fishers and non-formal education of fisher's children should also be considered as a necessity for preparing the community to take ownership of the resources.

K. Coordination and networking

- Formal and effective linkages should be established between the key players – Ministry of Agriculture/DoF of the coastal States/UTs/ICG/MMD for implementation of the fisheries management programmes in general and MCS activities in particular.
- The Central Government may consider constituting an interdisciplinary Ministerial/ Departmental committee to coordinate and collaborate on the implementation of the approved action plan and also monitor the progress through performance indicators. To make the MCS programme effective in the EEZ, regional cooperation may also be necessary and the Ministry of Agriculture may considering initiating suitable mechanisms for the purpose.



Monitoring, Control and Surveillance in Small-scale Fisheries – Guiding Principles and Practices[1]

1.0 Introduction

Since the first major debate on the sustainability of global fish stocks that took place in Mexico in 1992[2], coastal states all over world are engaging themselves in sustainable management of their fisheries resources. Over the years, the tryst with sustainability has assumed many dimensions and efforts made by some countries have yielded results, albeit slowly. In most others, the small-scale (including artisanal) and open access nature coupled with the large size of the fisheries has hampered their efforts to achieve the objectives of sustainable growth.

It is widely recognized that sound management is the key to achieve sustainable growth in the fisheries sector and this cannot be accomplished without good governance. Good fisheries governance rests on the pillars of appropriate legal, social, economic and political arrangements that influence the communities and management of the resources. It has several other dimensions and ramifications, which broadly take into account, inter and intra-relationships with other user groups, traditional laws and practices and also the impact of regional and international voluntary and non-voluntary instruments and arrangements.

Monitoring, control and surveillance or simply MCS has been a time-tested approach in fisheries management and many nations use MCS to its fullest extent to manage their resources in a sustainable manner. The MCS is implemented with many permutations and combinations, depending on the requirements of each country. In recent years, this 'command and control' type of approach has also given way to more participatory and community-based approach, resulting in cost-reduction and greater levels of compliance.

2.0 Background

2.1 Defining small-scale fisheries

Following the terminology given by the Food and Agriculture Organization (FAO) of the United Nations, small-scale fisheries can be defined as: "traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital and energy, relatively small fishing vessels (if any), making short fishing trips, close to shore, mainly for local consumption. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export. They are sometimes referred to as small-scale fisheries".

The small-scale or the artisanal fishery is often invisible. Owing to its name of small-scale/ artisanal, which is associated with subsistence fisheries, its impact on resources is often

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[1] ***Yugraj Singh Yadava, Director, Bay of Bengal Programme Inter-Governmental Organisation, 91, St Mary's Road, Abhiramapuram, Chennai – 600 018, India.***

[2] ***International Conference on Responsible Fishing held in Cancun, Mexico in May 1992 followed by the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Mexico in June 1992.***

overlooked or downplayed. This is unless we bring their magnitude in the frame. In spite of their low individual capacity to harvest small volumes, the total impact on fishery resources can be enormous because of their large size. In recent decades, motorization and mechanization has added to their means of propulsion and also to the harvesting of fish (in case of small trawlers or long liners) thereby allowing them to increase the effort manifold.

2.2 Fisheries sector in India

In India, since time immemorial, fish has constituted an affordable and rich source of protein in different parts of the country, but more so in the coastal areas. It is still cheaper compared to other sources of animal protein in the country. Fishery and fishery related activities are also the sole source of livelihood of more than 14 million fishers. Besides, the sector has been an important contributor to the national economy and employment generation, contributing 1.07 percent to the total GDP.

The country has a long coastline of 8 118 km and the continental shelf area amounts to 5 30 000 sq. km of which 71 percent area is available in the Arabian Sea (west coast) and the remaining 29 percent in the Bay of Bengal (east coast). After declaration of the Exclusive Economic Zone (EEZ) in 1977, the area available to India is estimated at 2.02 million sq. km, comprising 0.86 million sq. km on the west coast, 0.56 million sq. km on the east coast and 0.60 million sq. km. around the Andaman and Nicobar Islands.

In 2006-07, the country produced a total of 6.869 million metric tonnes (mmt) of fish, which included 3.024 mmt from the marine sector and 3.845 mmt from the inland sector. The Ministry of Agriculture (2001) estimated the potential yield from the marine waters to be 3.92 mmt. The major share of the resource lies within 0-50 meter depth zone, which is over-crowded. Marine waters of India harbour around 1 707 species of fish, of which over hundred species are commercially harvested.

Time-series catch composition of marine fishery shows considerable variation through the period 1950-2005. These changes are: (1) increase in number of species harvested/caught; (2) changes in catch composition; and (3) decline in population of some commercially-important species. Broadly speaking, during the 1950s and 1960s, Indian oil sardines, natantian decapods, mackerels and Bombay duck constituted the majority (more than 1/3rd) of the landings, but since 1970s, the share of Bombay duck in the catch composition has declined steadily. The share of other dominant species such as clupeids and hair tails has also declined considerably during the period 1950-2005. On the other hand a phenomenal rise in the landing of prawns, shrimps and other marine crustaceans has taken place during the same period.

The marine fishing fleet comprises about 2 43 939 fishing craft of which 1 84 896 are of traditional types (including 76 748 motorized traditional craft). The mechanized fishing fleet comprises 29 246 trawlers, 983 purse seines, 14 413 gill-netters, 8 862 dol-netters, 1 768 liners and 4 466 other type of boats. As seen from the number of traditional craft and small-mechanized vessels, the major fishing activities are still concentrated in the areas within 0 to 50 meter depth zone. As compared to the west coast, concentration of traditional craft (including motorized) is more on the east coast (about 57 % of the total). In the case of mechanized vessels, the trend is reverse. The scale of mechanization is also reflected in the total fish landings of the two coasts. At the national level, the mechanized sector contributes about 67 percent of the landing. In 1969 it was a mere 20 percent. Motorized sector contributes about 25 percent and the balance 8 percent is contributed by the traditional crafts.

2.3 Issues in management

Since Independence, fish production in the country has been showing an increasing trend and has reached a record level of 6.869 mmt in 2006-07. The progress in the inland fisheries sector during the 1990s has been commendable (about 7.0 % per annum); whereas the growth in marine fish production during the same period has been slow (about 2.2 % per annum). Besides slow growth, there are also increasingly clear signs of concern in the marine sector. The coastal waters are now over crowded as the fishing fleet has increased both in number and capacity. The sector portrays a picture of unregulated access, overcapacity and low catches per unit effort and fishing rights conflicts. Many commercially valuable fish stocks are either fully or over-exploited.

Marine fisheries sector in India is rather complex due to multi-species, multi-gear, multi-craft and multi-interest of the stakeholders. In most cases, the entire community relies on fishing as its chief source of sustenance, lacking alternative means of livelihood. The open access system also leads to uncontrolled exploitation. Illegal, Unreported and Unregulated (IUU) fishing further aggravates the situation.

As defined by the Indian constitution, both the Union and the State Government agencies manage fisheries activities. Fisheries within territorial waters are the exclusive province of the State, whereas beyond territorial waters, it is the exclusive domain of the Union. The Fisheries Division in the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture (MoA) acts as the focal point for fisheries development and management in the country. It formulates strategies for the national development plans for the sector and issues policy guidelines for fisheries development and management. It also provides technical and financial assistance for fisheries development and management to various States/UTs. The financial assistance is over and above the budgetary support provided to the States by the Planning Commission.

The Departments of Fisheries (DoF) in the State/UT Governments are responsible for fisheries development and management in their respective jurisdictions. The principal objectives of the DoF are planning and development of infrastructure facilities for landing and berthing of fishing craft, creating suitable marketing facilities, implementation of various fisheries development programmes *viz*., channeling financial assistance for purchase of fishing implements, implementation of socio-economic programmes and interactions with the Government of India and other agencies for technical and financial assistance.

3.0 Understanding MCS

Monitoring, control and surveillance is recognized as an important key component of fisheries management. In essence MCS is vital for collecting data on basic attributes of fisheries *i.e.* biological, technical, economic and social aspects of fisheries. It plays a vital role in implementation of fisheries management involving government, fisher community and the industry. According to the 1981 FAO Expert Consultation[3], the following definitions for MCS were adopted. These three inter-related activities are defined as:

- ***Monitoring*** – the continuous requirement for measurement of fishing effort characteristics and resource yields.
- ***Control*** – the regulatory conditions under which the exploitation of the resource may be conducted.
- ***Surveillance*** – the degree and types of observations required to maintain compliance with the regulatory controls imposed on fishing activities.

The operation of any MCS regime will be based on the domestic legal arrangements in place in each country. Legislation is crucial because there need to be a legal basis to allow for the effective implementation of fisheries management measures as well as for successful implementation of MCS operations.

4.0 Implementation of MCS in India

For development of marine resources, the Indian Parliament enacted the Territorial Sea, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Acts in 1976, pursuant to which a 200 nautical mile EEZ was established with effect from January 15, 1997. Since then, India has also enacted a number of other laws and regulations, including the Marine Products Export Development Authority Act, 1972; the Indian Coast Guard Act, 1978; the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981 and the related Rules of August, 1982; the Environment Protection Act, 1986; Coastal Aquaculture Authority Act, 2005; etc. The other Central legislation, which has important bearing on the fisheries sector include the Merchant Shipping Act, 1958 and the Wildlife Protection Act, 1972. However, there is still no law to regulate Indian-owned fishing vessels operating in the EEZ.

The Marine Fishing Regulation Act (MFRA) of the maritime State/UT Governments and the deep sea fishing schemes as provided under the Maritime Zone of India (Regulation of Foreign Fishing Vessels) Act, 1981 of the Government of India provide for prohibition of fishing by mechanized fishing vessels in the areas earmarked for the traditional and small-motorized crafts. For monitoring fishing activities to be carried out in different assigned fishing zones by respective fleets, patrol boats have been provided under a Central Sector Scheme to the

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[3] ***FAO, 1981. Report of an Expert Consultation on Monitoring, Control and Surveillance Systems for Fisheries Management. FAO Report FAO/GCP/INT/344/NOR.***

DoF of the maritime States. The resources monitoring surveys conducted by the Fisheries Survey of India (FSI), Mumbai are being linked with the management measures to be evolved and applied for sustainable development of fisheries in the country.

However, the main constraints, which impede practical application of MCS in India, have been broadly identified as follows:

- *Lack of accurate statistics of the dynamics of small-scale fisheries sector;*
- *Lack of a scientific information system;*
- *Lack of management plans for commercially-important species;*
- *Inadequate trained manpower at both management and operational levels;*
- *Lack of awareness at the community-level on the need for MCS;*
- *Large number of inaccessible landing places along the coast;*
- *Lack of supporting legislation to implement MCS;*
- *Multiplicity of agencies and lack of well-defined roles and jurisdictions; and*
- *Inadequate funding for MCS.*

MCS in small-scale fisheries or in coastal states, as mentioned above, presents a range of unique problems, which relate to large number of widely dispersed fishers operating within a fishery, mixed gear/species and landing points. In the given situation, some of the main controls and instruments that could be used in implementing MCS in India are:

(i) *revalidating the level of sustainable exploitation and other relevant information by data gathering, assessment and analysis;*

(ii) *registration of fishing vessels, defining areas of operation, colour coding, etc;*

(iii) *fishing effort control (through licensing);*

(iv) *selecting appropriate management instruments – fishing areas/duration of fishing (zonation);*

(v) *development of fisheries management plans based on the principles of conservation of fish stocks in a sustainable manner;*

(vi) *controls in ports and at sea;*

(vii) *educating the community by dissemination of information;*

(viii) *promoting co-management strategies;*

(ix) *legal support for fishery management plans and regulations to ensure equitable allocation of resource; and*

(x) *implementation of regulations through licensing, reporting and enforcement of fishery laws.*

Legislative measures may be appropriate for sophisticated commercial fisheries, but generally in the case of artisanal/small-scale fisheries in India it may be important to reduce the need for conventional surveillance. Alternative methods need to be used to encourage compliance and thus reduce the need for confrontational enforcement, particularly in the light of the costs of management and limited resources generally available. An important approach to MCS in such fisheries is, where possible, to foster strong local awareness on the need for conservation and management.

Another critical requirement for effective MCS is the establishment of a coordinating mechanism, with well-defined objectives and a clear work plan. MCS cannot be practiced in isolation by the Government and, therefore, coordination among stakeholders is essential. In India, this also includes developing more synergies between the Coast Guard, MoA and the DoF. The setting up of MCS can also assist in establishment of multiple channels of communication, which can provide information to the fisher community on weather, commodity and market prices, safety at sea aspects, hygiene, etc.

Therefore, any MCS programme will have a focus on the interaction between control and management of fisheries since control is not an end in itself but an essential corollary of resource conservation and management measures. In essence, the proposed MCS will be the Government's response to challenges posed by the anarchism that prevails in the fishery.

5.0 The Action Plan

In January 2008, the four member-countries (Bangladesh, India, Maldives, Sri Lanka) of the Bay of Bengal Programme Inter-Governmental Organisation along with experts met in Chittagong, Bangladesh to discuss implementation of the MCS within their national jurisdictions as also on a regional basis. At the end of the three-day Workshop, the member-countries agreed on a common agenda, which is termed as '*Chittagong Resolution*' and is attached as Annexure. The Resolution *inter alia* recommended that 'member-countries undertake measures to formulate time-bound action plans for successful implementation of MCS and for strengthening the national agencies responsible for MCS. In view of the '*Chittagong Resolution*', one of the objectives of this National Workshop is also to formulate an 'action plan', which can guide the development of MCS in the country.

The main objective of implementing MCS in India should be to secure responsible and sustainable management of fisheries resources while allowing an ecologically safe and economically profitable exploitation of the living marine resources in the interest not only of today's population but also for posterity. The objective should also aim at bringing in a paradigm shift in the marine fisheries sector from open access to limited and controlled access regime and wherever possible allocating rights to the user groups.

While it is recognized that there are no unique solutions to the design and implementations of MCS system, the action plan, based on common principles and goals, will endeavour to meet the specific requirements of the objectives of the 2004 Comprehensive Marine Fishing Policy of the Government of India. The proposed framework of the action plan is suggested as follows:

(i) Review of existing marine fisheries management programmes and analysis of the fisheries in the coastal waters and the EEZ (this will inter alia include the registration of fishing vessels, number and category of fishing craft and gear, fishing harbours/ fishing landing sites, boat building yards, etc);

(ii) Review of the existing fishing vessel licensing and registration procedures and practices, fisheries legislations and of other concerned Ministries/Departments (e.g. MMD);

(iii) Assessment of the MCS capacity and identification of institutional development requirements within the DoF and, if necessary, other concerned sister Departments;

(iv) Creation of a MCS Unit in the MoA and the DoF;

(v) Preparation of an outline of procedures and practical application of fisheries MCS programme and its implementation on pilot basis (in one or two manageable sites);

(vi) Organisation of community groups at the selected sites and their orientation for participation in the MCS;

(vii) Training of core MoA/DoF/Coast Guard staff in MCS;

(viii) Organisation of hands-on workshops for the stakeholders; and

(ix) Development of manual/guidelines essential for implementation of MCS.

6.0 Conclusion

Fishers are a set of entrepreneurs engaged in one of the riskiest occupation of the world and creating livelihoods for millions of people, both upstream and downstream. Therefore, the ultimate objective of MCS tools for small-scale and artisanal fisheries is not just to protect the resource but to stabilize the sector, minimize occupational hazards and optimize policy benefits. The small-scale fisheries sector can get immediate benefits from successful MCS measures through (i) effective demarcation of fishing areas, (ii) better insurance deals from data strengthening, (iii) target fishing through resource mapping, (iv) sea-safety, (v) reflecting their stakes in fishing policy, (vi) stabilization of catch per boat hence income, and (vii) possible jobs in land and sea-based monitoring systems. Implementation of MCS will also be a step forward in the fulfilment of the requirements of the Code of Conduct for Responsible Fisheries by India.

Community motivation is the most important step for successful implementation of a MCS policy for small-scale fisheries. Sustainability or availability of fish for generations to come offers little or no incentive to artisanal fishers as they earn and live by the day. Promoting MCS as a business-strengthening package could be more appealing and effective in community mobilization for successful implementation of MCS in India.

Annexure

The Chittagong Resolution

Conscious that the marine fisheries sector is highly important for the economies of member-countries of the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO);

Recognizing that the marine fisheries sector is a major contributor to the livelihoods, food and nutritional security and foreign exchange earnings of member-countries;

Realizing that a high percentage of the world's artisanal fisheries and small-scale fisheries are concentrated in South Asia, where many of the coastal stocks are almost fully exploited;

Recognizing that the marine fisheries sector largely operates in an open-access regime, and that the present condition of fisheries is largely attributable to weaknesses in the institutional and regulatory environment, a declining resource base and poor socio-economic conditions;

Realizing that monitoring, control and surveillance (MCS) regimes are weak in the marine fisheries sector of member-countries;

Concerned about the social and political constraints in regulating access to marine fisheries and in optimizing the fishing fleet;

Concerned that the current fisheries management regime for coastal fisheries in the region may lead to further unsustainable levels of exploitation of fisheries resources, and thereby impact the livelihoods of small-scale fishermen;

Concerned that the supporting regulations and policy framework relevant to the needs of MCS for small-scale fisheries, remain inadequately addressed by fisheries and maritime administrations in the sector;

Recognizing the limitations in institutional capacity of fisheries and maritime administrations in the region to undertake all responsibilities associated with the mandate;

Recognizing that the 1995 Code of Conduct for Responsible Fisheries (CCRF) of the FAO does not adequately address the need and requirements of MCS in marine fisheries;

Emphasizing the urgent need to address the multi-dimensional issue of MCS for small-scale fishermen in a holistic manner; and

Recognizing that the problem is not insurmountable;

We, the representatives of Fisheries and Maritime Administrations, Coast Guard and Fishermen's Associations, nominated by the Governments of Bangladesh, India, the Maldives and Sri Lanka, having participated in the BOBP -IGO Regional Workshop on Monitoring, Control and Surveillance for Small-scale Fisheries held in Chittagong, People's Republic of Bangladesh, from 16 -18 January 2008, now therefore:

Resolve to address, as a matter of urgency, the issue of MCS for small-scale fisheries;

Recommend that MCS requirements be comprehensively integrated into every member-country's fisheries policy and regulatory and managerial frameworks. This would include associated commitments under the CCRF and other regional, inter-regional or global instruments and initiatives;

Emphasize the need to rationalize institutional mandates and inter-sectoral cooperation at the national level, in order to enhance implementation of MCS in small-scale fisheries;

Recommend that fisheries and maritime administrations enhance their knowledge and database on the health of the fish stocks and on commensurate efforts required to harvest resources in a sustainable manner;

Recommend the development and implementation of education, training and awareness programmes which satisfy and promote MCS requirements;

Recommend that mandatory requirements for improving implementation of MCS be supplemented by other strategies which involve the participation of fisher communities, families, the media and other stakeholders in order to promote the adoption of a wide range of MCS measures;

Recommend that member-countries, while implementing MCS, also undertake measures to enhance the economic viability of small-scale fishing enterprises, as an essential element of the marine fisheries sector;

Recommend that member-countries make full use of the available technologies, including Vessel Monitoring System wherever feasible, in support of MCS;

Recommend that member-countries employ innovative measures such as co-management. This will be an effective cost-sharing measure for MCS and enhance the participation of fishers and other stakeholders in the management of marine fisheries resources;

Recommend that member-countries undertake measures to formulate time-bound action plans for successful implementation of MCS and for strengthening the national agencies responsible for MCS;

Recommend that member-countries undertake measures directed towards regional cooperation in ensuring successful implementation of MCS; and

Strongly recommend the formation and implementation of a regional MCS programme, employing a consultative and participatory approach, building upon institutionally derived data and the operational experience of small-scale fishermen.

Adopted on Friday, 18th January 2008 in Chittagong, Bangladesh.

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Overview of Marine Fishing Fleet in India and its Preparedness for a Monitoring, Control and Surveillance Regime[1]

1.0 Introduction

Indian marine fisheries have a long history of development from subsistence level activities in the 1950's to a modernized fishery in recent years. Since the fifties, many developments have taken place in the sector and fishing methodologies have also undergone sea-change with the introduction of modern crafts, gear, fish finders, fish aggregating devices, etc. The potential of fish production from marine and inland resources in India has been estimated at 3.9 million metric tonnes (mmt) and 6.5 mmt respectively. However, production from inland fisheries has significantly increased due to increase in productivity and production from aquaculture sources. In 2007-08, the total production stood at 7.13 mmt, comprising 4.21 mmt from inland and 2.92 mmt from marine fisheries. Having almost reached a plateau in production from the coastal waters, the scope for increasing fish production from marine sources now lies in the deep sea.

There has been a steady growth in the export of fish and fish products over the period. Efforts are being made to boost the export potential through diversification of products for export. The country has now also started export of frozen squid, cuttle fish and variety of other fin-fishes. The export of fish and fish products increased from 4.24 lakh tonnes valued at INR 6 310 crores in 2000-01 to 6.13 lakh tonnes valued at INR 8 363 crores in 2007-08. The Gross Domestic Product (GDP) has shown an increase of 68.8 percent in 2005-06 over the year 2000-01 as compared to 32.3 percent in agriculture and allied activities. In case of fisheries, the increase has been 62.9 percent over the same period indicating potential of the sector.

2.0 Marine fishery resources

The country has a long coastline of 8118 km and an equally large area under estuaries, backwaters, lagoons, etc, which are highly amenable for developing capture as well as culture fisheries. After declaration of the Exclusive Economic Zone (EEZ) in 1977, the marine area available to India is 2.02 million sq. km, comprising 0.86 million sq. km on the west coast, 0.56 million sq. km on the east coast and 0.60 sq. km around the Andaman and Nicobar Island in addition to the free access to international waters.

As per the National Marine Fisheries Census 2005, there are 3 322 marine fishing villages in all the maritime States/UTs and the 10 inhabited islands of Lakshadweep. As per the Census, the total population of marine fishers has been estimated at 35.75 lakh. Nearly 56.5 percent of the fisher population is educated with varying levels of education. About 46.8 percent of the fishers are actively engaged in fishing and fisheries related activities in the coastal States /UTs.

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[1] *C P Juyal and S N Jana, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India, New Delhi.*

The country's fishing fleet is estimated at a total of 29 246 trawlers, 983 purse-seiners, 14 413 gill netters, 8 862 dolnetters, 1 768 liners, 76 748 motorized, 107 448 non-motorized and 4 466 other mechanized crafts. Using different craft and gear combinations, a large number of fin and shell fish stocks are harvested, which principally consist of sardines, Bombay-duck, ribbon fish, Indian mackerel, coastal tunas, seer fishes, penaeid and non-penaeid shrimps, cephalopods, croakers, thread breams, silver bellies and carangids, trevallies, scads and horse mackerel. The marine resources are distributed in coastal waters (58%), offshore (34.9%) and deep sea (7.0%). The major share of the resource is demersal (2.02 mmt), followed by pelagic (1.67 mmt) and oceanic (0.24 mmt). However, due to over capacity and over-exploitation, marine fish production has remained stagnant during the last few years and depletion of resources in the coastal waters has been noticed. Further, due to low levels of literacy, it is becoming increasingly difficult to make fishers aware about the significance of sustainable fisheries and the need for conservation measures.

In case of marine fisheries, about 76 748 traditional craft have been motorized, and so far 6 major fishing harbours, 61 minor fishing harbours and 190 fish landing centres (FLCs) have been taken up for establishment in the coastal States/UTs. Presently, 6 major fishing harbours, 40 minor fishing harbours and 160 FLCs have been completed and made operational. For strengthening post-harvest operations,13 ice plants/cold storages, 45 fish retail outlets/kiosks and 31 insulated/refrigerated vehicles have been provided during 2006-07 and 2007-08 to different Fisheries Corporations/Cooperatives/SHGs, etc. For strengthening of the extension and training programmes, the Government of India is also providing funds to establish awareness centres/training centres in the States/UTs.

Due to open access nature of marine fisheries in India, implementation of MCS in small-scale fisheries presents a range of unique problems, such as the large numbers of widely dispersed fishers and mixed gear/species. The main objective of implementation of MCS is to secure responsible and sustainable management of fisheries resources, but the main obstacle in successful implementation of MCS is the large number of stakeholders and the lack of coordination among them and their organizations.

3.0 Legal mechanism

An enabling legal framework is an essential pre-requisite for proper management and control of fisheries sector. In India, the subject of fisheries falls within the jurisdiction of the State and regulated mainly by the Department of Fisheries (DoF) of the State Governments. Accordingly, fisheries within the territorial waters are the subject of maritime States, whereas

fisheries in the EEZ fall within the jurisdiction of the Central Government. The Indian Fisheries Act of 1897 is the first of its kind in the country and is still in force with certain modifications by some State Governments. Besides, the MPEDA Act, 1972; the Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976; Indian Coast Guard Act, 1978; The Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981 and Rules, 1982 are the other important legislations enacted by the Government of India. The coastal States/UTs have also introduced the Marine Fishing Regulation Act (MFRA) for regulation of fishery in their respective territorial waters. Most of these laws are intended to prevent and minimize disputes and conflicts among different sectors of the fishing industry.

The Comprehensive Marine Fishing Policy, 2004 of the Central Government was launched in November 2004 for sustainable increase in marine fish production; boost export of sea food and to increase per capita fish protein intake by the masses; to ensure socio-economic security of artisanal fishermen whose livelihood solely depends on fishing; and to ensure sustainable development of marine fisheries with due concern for ecological integrity and bio-diversity of the country.

4.0 Preparedness for MCS

Endorsing international laws and conventions in the marine fisheries sector and harmonizing national laws with the international laws wherever necessary, active participation in the regional fisheries management bodies (FAO, BOBP-IGO, IOTC, BIMSTEC, etc.) and greater cooperation amongst countries in the region are some of the areas where due attention is being paid by the Government of India.

The MFRAs of the concerned coastal States/UTs have adequate provisions for fisheries resource management, but implementation is yet to be effective. However, the State/UT Governments have been implementing some measures like uniform fishing ban, prohibition on fishing by mechanized fishing vessels within the territorial water up to 5-8 km to avoid conflict with traditional fishing boats and regulation of mesh size for trawlers. The MFRAs also contain provisions for zonation for different categories of fishing boats. The Government has also initiated several steps such as introduction of resource specific deep sea fishing vessels and intermediate craft of improved design to popularize deep sea fishing that will lead to reduction in fishing pressure in the coastal areas.

4.1 Strengthening of database and geographical information system for fisheries

A Central Sector Scheme on "Strengthening of Database and Geographical Information System (GIS) for Fisheries Sector" is being implemented with the following objectives during the Eleventh Five-Year Plan period (2007-2012):

- *Catch assessment survey of inland waters;*
- *Information technology networking;*
- *Development of GIS using satellite data;*
- *Census on marine fisheries; and*
- *Catch assessment survey of marine fisheries.*

The development of GIS and catch assessment of inland fisheries has been entrusted to the Central Inland Fisheries Research Institute, Barrackpore and the marine catch assessment survey is being conducted by the Fishery Survey of India (FSI) in collaboration with the Central Marine Fisheries Research Institute, Kochi and the maritime States/UTs.

4.2 Vessel Monitoring System (VMS)

The VMS is considered to be useful for better fisheries management as it provides information on real time position, course of fishing, codified information on catch and effort and distress signals at times of emergency. The system is also useful to ascertain illegal fishing undertaken by fishing vessels. In India, the INSAT Mobile Satellite Services (MSS) reporting system provides one way transmission of short messages or positions from reporting terminals.

After the success of a pilot project of installing VMS on 11 vessels of FSI, the Ministry of Agriculture in collaboration with Antrix Corporation (Department of Space) is now working on installation and commissioning of VMS for deep sea fishing vessels (above 20 m OAL) fishing in the Indian EEZ and beyond. The Antrix Corporation has developed the software and installed a 6.3 meter antenna including pedestal, reflector and drive motors, etc at the Indian Coast Guard office in Porbandar (Gujarat). The civil works for the centre are under completion and the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture is in the process of obtaining licenses and necessary clearances from the Department of Telecommunications to make the system operational for testing by the end of February 2009.

Apart from this, the Ministry of Shipping is also planning to implement Automatic Identification System (AIS) for tracking ships (50-300 tonnes) including mechanized and motorized fishing boats operating in the territorial waters for establishment of an integrated and centralized coastal surveillance system for maritime security. The Antrix Corporation has also been assigned the work for the development of software and hardware.

4.3 Vessel marking and safety at sea

The Indian coast is characterized by fishing crafts of different sizes and shapes. Presently there are no uniform standards for marking and identification of these vessels. The adoption of uniform marking system and state-wise registration of all fishing vessels will be highly useful for the management of fisheries as well as MCS and will be helpful in developing better safety measures for the fishers and their boats at sea. To improve safety at sea and better shore to boat communication system, especially at times of distress, the Ministry of Agriculture also proposes to subsidize installation of Global Positioning System, communication equipments, echo-sounder and search and rescue beacon on the small mechanized fishing vessels below 20m LOA. The Scheme is proposed to be implemented through State Fisheries Federations/Corporations and Panchayati Raj Institutions.

4.4 Management of marine fisheries

Over capacity and over fishing have been identified as the two major factors contributing to resource depletion in marine capture fisheries in India. Unsustainable fishing practices, damage to marine habitat and illegal, unregulated and unreported (IUU) fishing are other major problems, which are negatively impacting the stock levels. Maximization of fish production and exports through various developmental programmes were occupying the centre-stage of our fisheries planning since independence. Since exploitation of fish resources in the territorial waters have either reached the optimum level or exceeded in certain instances, focus has to be shifted to scientific management of marine fisheries with development of appropriate tools and techniques in harmony with international guidelines. The Government proposes to implement scheme for management of marine fisheries with the objectives of (i) training and capacity building in implementation of the Code of Conduct for Responsible Fisheries;

(ii) study of fishing capacity in each coastal State; (iii) introduction of participatory management with active involvement of stakeholders and Panchayati Raj Institutions; (iv) implementation of resource enhancement measures/programmes; (v) re-assessment of potential of marine living resources in the EEZ and (vi) production of material for propagating various management tools and techniques.

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Rights-based Marine Fisheries Management and the Role of Fisher Community in the Implementation of Monitoring, Control and Surveillance in India[1]

1.0 Introduction

According to the 1982 United Nations Law of the Sea (LOSC), the territorial sea – the marine space up to 12 nautical miles measured from baseline – is the adjacent belt of sea beyond the land territory to which the sovereignty of the coastal State extends. The Exclusive Economic Zone (EEZ) is an area beyond and adjacent to the territorial sea where the coastal state has sovereign rights. While the coastal state may adopt laws and regulations, among other things, for the conservation of the living resources of the sea and the preservation of the environment and the prevention, reduction and control of pollution in the territorial waters, it also has certain rights and duties in relation to the EEZ.

The rights of coastal states in the EEZ include the sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources in the EEZ, including fishery resources. The coastal states also have a duty to make available scientific information, catch and fishing effort statistics and other data relevant to the conservation of fish stocks within the EEZ to competent international organizations. The coastal states further have to recognize certain rights and duties of other states in the EEZ.

2.0 The Indian marine fisheries and legislation

India has about a quarter million fishing vessels (CMFRI, 2006). This includes about 60 000 vessels with inboard engines and over 75 000 vessels with outboard engines that fish in the territorial as well as in the adjacent waters. Nearly half of the fishing vessels with inboard engines comprise trawlers. Confined only to the territorial waters, there are another 1 00 000 vessels that have no means of mechanical propulsion. Since there are no estimates of gross tonnage or horse power of the Indian fishing fleet, it is difficult to have a clear idea about the total fishing capacity of the Indian fleet. Although the aggregate number of fishing vessels is large, the gross tonnage of the fleet may not be that significant considering that most of them are open-decked (nearly 90 %).

The marine fish production in the year 2007-08 stood at 2.92 million tonnes. This included roughly 5 00 000 tonnes of sardine, 3 40 000 tonnes of shrimp, 1 80 000 tonnes of mackerel, 1 70 000 tonnes of croaker and 1 30 000 tonnes of ribbonfish. Trawlers, employing bottom, mid-water and pelagic trawling, accounted for nearly 45 percent of the total marine fish production. Kerala accounted for the largest share with 5 90 000 tonnes of fish, followed by Gujarat (5 70 000 tonnes) and Tamil Nadu (3 60 000 tonnes). Going by fish production trends so far, there is no discernible pattern in relation to biological overfishing of marine fishery resources.

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The marine fish production is undertaken by about 9 00 000 active marine fishers (this includes over 7 10 000 full-time, as well as part-time and occasional fishers). The marine fish landing is spread over 40 fishing harbours and over 160 formal fish-landing centres, in addition to numerous informal shore-based landing centres.

The Indian Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976, and the Maritime Zones of India (Prevention of Fishing by Foreign Vessels) Act, 1981 (MZI Act, 1981), and the Indian Wildlife Protection Act, 1972, as periodically amended, are consistent with some of the provisions of the 1982 LOSC for the territorial sea and the EEZ. The 1982 LOSC is also behind extending the limit of Indian territorial waters from 'one marine league of the sea coast', or three nautical miles, as per the Indian Fisheries Act, 1897, to 12 nautical miles.

At the national level, while 'fisheries' fall within the purview of the States, 'fishing and fisheries beyond territorial waters' fall within the purview of the Union Government. The littoral states thus are responsible for continental fisheries in their jurisdiction as well as fisheries in the territorial waters. There are provisions, although yet to be invoked, for a State legislature to devolve, among other things, powers in relation to fisheries to the Panchayats.

Currently, area, vessel, gear and species-specific measures to regulate, restrict or prohibit fishing are adopted by all maritime States and Union Territories (UTs) within their territorial waters under the rubric of the Marine Fishing Regulation Act (MFRA). It has been enacted by respective States and UTs since the year 1980. These measures are with the object of protecting fishers on board traditional fishing craft, conserving fish and regulating fishing on a scientific basis and maintaining law and order at sea. Only registered and licensed fishing vessels can undertake fishing operations in territorial waters as per the provisions of this Act under the auspices of respective coastal States or UTs. Thus, open access fishery is not legally permitted in the Indian territorial sea, in particular, although, in practice, there are many fishing units that might operate without being registered or licensed.

The fisheries conservation and management measures in the EEZ, under the MZI Act, 1981, are confined to foreign fishing vessels acquired by Indian citizens, permitted to fish under charter arrangements in the EEZ, or foreign-owned and operated fishing vessels that are licensed to fish in the EEZ. There are, however, no foreign-flagged fishing vessels that are licensed to fish in the Indian EEZ, although, in fact, there might be many illegal, unreported

and unregulated (IUU) East Asian and South East Asian fishing vessels, in particular, operating in the Indian EEZ due to poor enforcement regimes. The Indian-flagged chartered vessels are prohibited from catching species protected under the Wildlife (Protection) Act, 1972, in the EEZ. Nor are they permitted to fish in the territorial waters.

There are, however, yet no full-fledged provisions to conserve and manage fishery resources in the EEZ, especially in relation to the Indian-owned and flagged vessels, consistent with the 1982 LOSC or the 1995 UN Fish Stocks Agreement (UNFSA). The allowable catch of fisheries resources in the EEZ is yet to be determined. Conservation and management measures to ascertain that fisheries in the EEZ are not endangered by over-exploitation are yet to be put in place. Measures to maintain or restore populations of fisheries resources at levels that can produce the maximum sustainable yield are yet to be adopted. Although catch statistics are compiled, fishing effort statistics are yet to be systematically collected. Fisheries conservation and management measures such as long-term sustainability of fish stocks and their optimum utilization; prevention or elimination of overfishing and excess fishing capacity; ensuring fishing effort commensurate with the sustainable use of fishery resources; implementation and enforcement of conservation and management measures through effective monitoring, control and surveillance (MCS) are yet to be undertaken.

3.0 Rights-based approach to marine fisheries management

From an economic point of view, rights-based fisheries could be seen as a formalized system of managing fisheries by allocating fishing rights to individual fishers, fishing vessels, fishing enterprises, cooperatives or fishing communities. These rights might be specific to a fishery resource, or fishing space and can be transferable or non-transferable in nature. Several authors, including major proponents of rights-based fisheries, have pointed out the limitations of applying individual transferable quota system to tropical fisheries where often a large number of fishers catch hundreds of commercially important species in smaller quantities using a large number of smaller vessels and bring them to numerous landing centres peppering the seaboard.

It should be recognized that the degree of success of rights-based approach to fisheries management would largely depend on recognizing the human rights - economic, social, cultural and civil rights - of fishing and coastal communities as in the Universal Declaration of Human Rights (UDHR) and in the Constitution of India. Rather than economic efficiency, rights-based fisheries on equity considerations can be considered based on cultural or social criteria, in particular. Thus, small-scale fishers employing non-mechanized fishing vessels or fishers on board traditional or small-scale fishing vessels, for example, have been granted preferential rights to littoral fishing space, as has been demonstrated by MFRAs in the coastal States of India.

A rights-based approach to marine fisheries management essentially is a delivery mechanism for fisheries management and it could be effective only if credible fisheries management architecture is in place. Needless to say, such an approach also has to be coherent with management goals. Further, it can only work in tandem with a fisheries management plan. Such a plan, for example, should lay down, in a time-frame, guidelines regarding species that can be caught; seasons and areas of fishing; the types, sizes and amount of gear; and the types, sizes and number of fishing vessels that can be used; the minimum age and size of fish and other species that can be caught; minimum information that is required of fishing vessels, including catch and effort statistics; rules regarding landing of catch; and rules regarding

minimum age, working and living conditions of fishers and fishworkers, including safety of fishing vessels and fishing operations.

Rather than starting from scratch, existing legal instruments and formal and traditional institutions should be used as the foundation to build up an effective rights-based management regime. The provisions of MFRAs for registered and licensed fishing vessels in Indian territorial waters, for example, should be beefed up and properly implemented if adoption of a rights-based approach is seen important.

A rights-based approach to fisheries management can take the form of concurrent management or co-management, whereby fishers share power with relevant government agencies in relation to implementing management measures. In this sense, fishers would not be an instrument of government decision-makers; they would be active, more or less equal partners in undertaking and implementing management decisions.

It could also take the form of community-based management where the community alone is responsible for management. It could be a cooperative or collective management regime whereby different communities undertake joint fisheries management.

However, the degree of participation of fishers or fishing communities in such rights-based regimes would largely depend on the quality of the process that would precede the introduction of a rights-based regime. Fishers may have to be convinced that such an approach would lead to greater benefits to them in terms of improving their livelihood options, *i.e.*, ensuring sustainable fish production, getting a better price for their catch, accessing credit for fishing operations at affordable interest rates, minimizing conflicts at sea, etc.

Further, to facilitate a rights-based approach, there should be legal mechanisms in place to recognize fishers and fishworkers on board licensed fishing vessels as well as licensed shore-based fishing operations. If fishing communities have to be directly involved either exclusively or in a co-management regime, there should be provisions to devolve power to fishing communities to perform their tasks.

4.0 Participatory MCS regimes

If the adoption of a fisheries management plan is an indicator of moving towards proper fisheries management, the adoption of an MCS regime is a measure of implementing fisheries management in practice. Thus, fisheries management plans and MCS regimes are two sides of the same coin.

According to the 1981 MCS Conference of Experts in Rome, under MCS, monitoring would be the continuous requirement for the measurement of fishing effort characteristics and resource yields; control would be the regulatory conditions under which the exploitation of the resource may be conducted; and surveillance would be the degree and types of observations required to maintain compliance with the regulatory controls imposed on fishing activities (Flewwelling, 1995).

MCS basically refers to implementation of fisheries management measures. It could logically be part of any co-management regime where the state and community - whether a community of interests or a community inhabiting a geographic space - share power, or have their respective spheres of legitimate power, or any community-based management regimes where the communities have been devolved power, to implement fisheries management measures.

Of the three, surveillance phase is the most expensive aspect of MCS (Flewwelling, 1995). Enforcement, or surveillance, costs appear to be the single largest component of fisheries management and conservation costs in the OECD countries, for example. Enforcement costs as share of total government financial transfer in the OECD countries were as high as 32 percent in 1997 (OECD, 2000). This would be in sharp contrast to developing countries including India where enforcement costs would currently be an insignificant component of fisheries management and conservation.

Due to the paucity of financial resources to undertake enforcement functions in developing countries, most of the community-based MCS initiatives are mainly focusing on the surveillance component as illustrated by the recent experience of West Africa under the auspices of the Sustainable Fisheries Livelihoods Programme (SFLP) implemented by the Department for International Development (DFID) of the Government of United Kingdom in collaboration with the FAO (SFLP Ud.), which perhaps may not be the best option for developing countries.

With a seaboard of 8 118 km and adjacent territorial waters, and an EEZ extending over 2 million sq. km, implementing an effective MCS regime, particularly the surveillance component, would be an onerous and challenging task in the entire marine space under India's jurisdiction. An effective approach to MCS would, therefore, be to ascertain aspects of MCS that could be undertaken at different levels within a coherent framework. Thus, while certain MCS aspects can be undertaken at the local level, certain other aspects can be undertaken at the state and at the national level by the fishing community on its own, or by the fishing community in co-operation with the State or Union Government, as the case may be; or only by the appropriate level of Government.

Arguably, community-based or co-management regimes would stand a better chance of success if MCS programmes are land-based. This would also be the least-cost option. Thus, implementation of mesh size; type, sizes and amount of fishing gear; gear material; types, sizes and number of fishing vessels; horsepower of engine; species and minimum size of fish that can be landed; closed seasons; living and working conditions; hygiene and quality standards; etc can be, to a greater extent, implemented from land either before a fishing vessel steams off or on its return to the fishing base.

However, implementation of measures in relation to by-catch, discards, observance of closed areas, habitat protection measures, use of by-catch reduction devices, etc might require on-site enforcement measures. Similarly, some of the inter-gear conflicts between fishers of the same maritime state or between fishers of different maritime states might require on-site enforcement, perhaps best delivered by formal enforcement structures under the aegis of the state. If land-based enforcement measures can be effectively coordinated, then some of the intractable problems in relation to MCS that might appear to require on-site measures could perhaps be better addressed.

The success of community-based, or co-management based, initiatives in conjunction with the state initiatives would depend on several factors. First of all, there should be sufficient clarity regarding jurisdiction, willingness, competence and viability of such a nested approach to MCS. The participation of fishing communities in enforcement activities might be a tricky issue in composite fisheries where conflicting gear groups share the same fishing space or operate from the same fishing base. In shore-based fishing operations such as beach seine, in fishing for sessile or sedentary species such as oysters or shellfish, in fishing operations engaging stationary gear such as stake-nets, or in mariculture operations, it might be possible to consider community-based enforcement of fisheries management measures, provided these measures enjoy legitimacy at the community-level. In a similar vein, it is also possible to consider community-based enforcement in marine protected areas, especially for the protection of mangroves, seagrass beds, coral reefs, turtle nesting grounds and charismatic animals such as species of turtles and whale sharks.

Secondly, there has to be sufficient capacity-building of fishing communities to undertake tasks hitherto unfamiliar to them. Since they would be locked into self-policing to a certain extent, there might be a need to streamline fisheries legislation in consultation with fishing communities to enhance ownership for necessary management measures in certain designated fisheries or areas. Such streamlining efforts should also draw upon traditional knowledge and customary practices and should lead to seeking recognition for traditional arrangements that enjoy legitimacy within fishing communities (*e.g.* padu system of Pulicat Lake, Tamil Nadu).

Thirdly, there should be political will to embark on such a reform, also keeping in mind international obligations arising from the 1982 LOSC and the 1995 UNFSA as well as from the obligations that might arise from new international instruments such as the ILO Work in Fishing Convention, 2007. Currently, provisions in the Indian Constitution do not seem to permit devolution of power to any entity or group below that of the Panchayats. There might be need to develop legal mechanisms that would help devolve power to fishing communities to implement fisheries management measures.

Finally, community-based or community participation in MCS regimes should not be to palm out onerous or difficult tasks to fishing communities in an irresponsible way. What is expected of the community should be in line with its capacity to undertake and deliver. There should be sufficient sensitivity to ensure that such regimes are not overburdened to make them ineffectual. Simultaneously, it is also pertinent that the fisheries administration takes necessary steps to ensure that the fishing communities are not denied of their homestead rights and are not threatened by the activities of other sectors such as polluting and displacing industries or activities. Likewise, since capacity-building of fishing communities is an important requirement for the success of community participation in MCS regimes, the

fisheries administration should also be in the forefront in midwiving with other ministries and departments with regard to better education, healthcare, childcare, safe drinking water, sanitation, housing and disaster mitigation facilities for fishing communities. Care should be taken to ensure that women in fishing communities also have an important role in community-based MCS regimes, especially with regard to the monitoring and control part of MCS.

5.0 Conclusion

In conclusion, recognition of existing traditional arrangements and their adaptation, introducing legal reforms that might facilitate an equitable rights-based approach, bringing about institutional reforms that can translate legal reforms into practice, and establishing effective mediation mechanisms on behalf of the fisheries sector and fishing communities to ensure that the well-being of fishing communities is looked after, can facilitate the introduction of community-based or co-management-based MCS regimes in India. The success of such participatory regimes is likely to be higher if they are focusing on land-based measures. Such an introduction does not preclude an oversight role for the institutions of the state in the near shore waters, as well as space for active state participation in MCS regimes in the EEZ. Participatory MCS regimes in near-shore waters and state-controlled MCS regimes in the EEZ should be able to deliver on fisheries management commitments of the state and pave way for sustainable fisheries and livelihoods.

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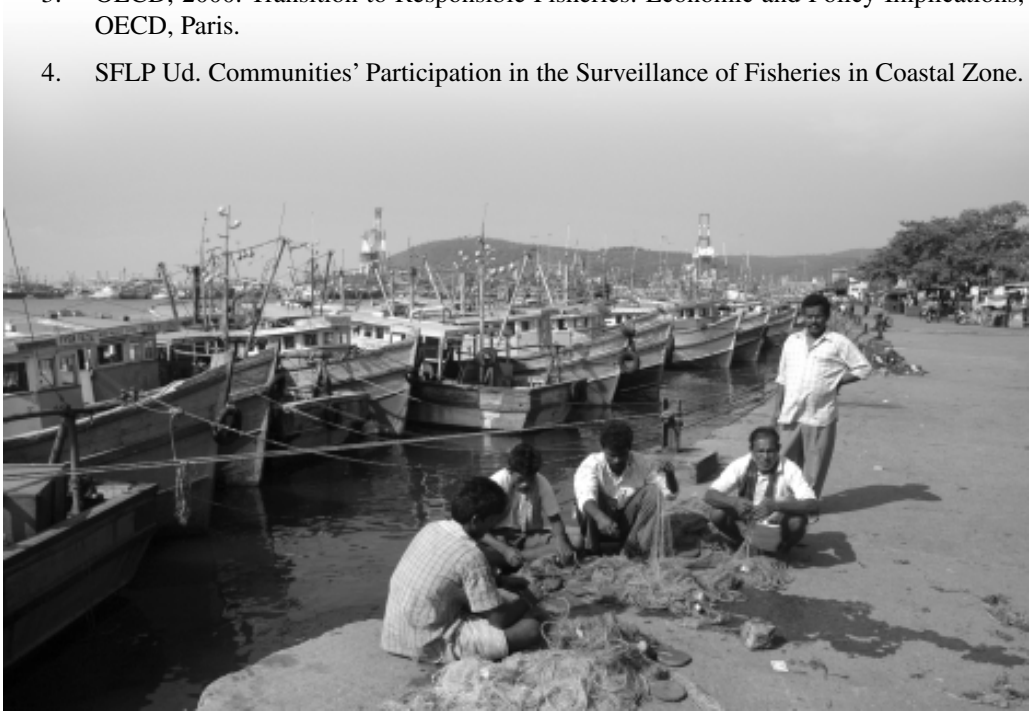


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Legal Support to Implement Monitoring, Control and Surveillance in Marine Fisheries Sector in India: Present Status and Gaps to be Addressed[1]

1.0 Introduction

The fisheries sector occupies an important place in the socio-economic development of India. Soon after independence in 1947, the Government started focusing on the fisheries sector for two reasons: (i) to promote fish production in order to ensure food security (subsequently foreign exchange earnings were also added); and (ii) socio-economic development of fishers/fish farmers through subsidization of various assets. As a result, starting from a purely traditional activity in the fifties, both aquaculture and fisheries have now transformed to commercial enterprises. The sector has been recognized as a powerful income and employment generator as it stimulates the growth of a number of subsidiary industries and is a source of cheap and nutritious food.

In marine fisheries, the transformation from low level subsistence fishing to capital intensive motorization and mechanization has contributed to increase in catches, commercialization of activities and contribution to foreign exchange earnings. Simultaneously, development of ancillary sectors and supportive institutional mechanisms has encouraged the growth of marine fisheries. However, the Indian marine fisheries sector is set in a highly diverse environment. It is characterised by a multi-gear, multi-craft and multi-species fisheries, which overall has the attributes of a small-scale enterprise. The territorial waters of the country, where majority of the fishing fleet operates, are over-exploited. If this situation continues unchecked there are chances of some commercially important fish stocks collapsing. On the contrary, the off-shore resources are less exploited, and on the whole about 1.0 million metric tonnes of additional fish production can be harvested from the under or un-exploited resources in the Indian Exclusive Economic Zone (EEZ).

The global attitude towards use of marine resources has undergone a sea change in the last six decades. Starting from the United Nations Convention on the Law of the Sea (UNCLOS) a large number of international agreements/arrangements have been concluded, to which India is also signatory. The focus of these agreements/arrangements is on responsible fishing, which implies that 'the right to fish also brings with it the obligations to do so in a sustainable manner'. In India, as per the Constitutional provisions, the responsibilities of management of fisheries sector are split between the Union and the States. In marine fisheries, while the territorial waters are within the jurisdiction of the coastal States/Union Territories (UTs), the EEZ is within the purview of the Union Government. While fishing activities in the territorial waters and those by foreign fishing vessels in the EEZ are operating under a sound legislative framework, the regulatory mechanism for Indian vessels to fish in the EEZ is yet to be in place.

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2.0 Fisheries policy framework in India

Entry 57 of List 1 of Seventh Schedule of the Constitution of India specifies Fishing and Fisheries beyond Territorial Waters as Union Subject, whereas Entry 21 of List II speaks of Fisheries as a State Subject. Reading both the Entries together, it follows that control and regulation of fishing and fisheries within territorial waters is the exclusive province of the State, whereas beyond the territorial waters, it is the exclusive domain of the Union. The Central Government acts as a facilitator and coordinator responsible for policy formulation, carrying out fishery research and channeling funding support to the States in line with the national priorities and the commitments made to the State/UT Governments. The Department of Animal Husbandry, Dairying and Fisheries(DAHDF), Ministry of Agriculture, within the purview of its allocated business, helps the coastal States and UTs in development of fisheries within the territorial waters, besides attending to the requirements of the sector in the EEZ. Therefore, management of fishery exploitation in the EEZ requires close coordination between the Union and the States.

In the Indian perspective, the scope of fisheries management can be traced through the Five-Year Plans. On perusal of the Plans, it is seen that until the Seventh Five-Year Plan (1985–1990), the Government was mainly concerned with increasing fish production and promoting capitalization of the fishing fleet. Fisheries management *per se* was not elucidated in the earlier Plans. It was only during the Eighth Five-Year Plan (1992–1997) that fisheries management figured in the scope of Plan budget, which was then carried on to the subsequent Plans also. The other major policy initiatives taken by the Government of India in relation to marine fisheries development in the country are the setting up of the Review Committee on Deep- Sea Fishing Policy (Murari Committee) in 1995 and formulation of the Comprehensive Marine Fishing Policy (CMFP) in 2004.

The CMFP was formulated to ensure that marine fisheries in India were sustainable and globally competitive and Indian producers stood to gain in the international market. The CMFP, 2004 also considered bringing traditional and coastal fishermen into focus along with stakeholders in the deep-sea sector so as to create a level-playing field and achieve harmonized development of marine fishery, both in the territorial and extra territorial waters of the country. Thus the Policy was framed with the objectives of (i) augmenting marine fish production of the country up to the sustainable level in a responsible manner so as to boost export of sea food from the country and also to increase per capita fish protein intake of the masses; (ii) ensuring socio-economic security of the artisanal fishermen whose livelihood solely depends on this vocation; and (iii) ensuring sustainable development of marine fisheries with due concern for ecological integrity and bio-diversity.

The Policy also underscored the need for a departure from the open access concept in the territorial waters, putting in place stringent management regimes and promoting exploitation in the deep sea and oceanic waters for reducing fishing pressure in the traditional fishing areas. Regarding resource management, the CMFP prescribed the following:

- *Review of the existing situation and prescribing a fresh model bill on coastal fisheries development and management.*
- *Registration of all existing boat-building yards; new fishing units to be constructed only after obtaining a license.*
- *Closed season will be observed on both the coasts, the duration of which would be*

decided by a designated authority. There would be strict ban on all types of destructive methods of fishing.

- *Regulation on mesh sizes in fishing gear. Catching of juveniles and non- targeted species and discarding less preferred species once they are caught would be strictly prohibited through legislation.*
- *Posting of observers on commercial fishing vessels and enforcing of monitoring, control and surveillance system.*

3.0 The legal framework for fisheries management in India

Central Acts

The Indian Parliament enacted the Territorial Sea, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Acts in 1976, which paved the way for establishment of a 200 nautical mile (nm) EEZ with effect from January 15, 1997. Since then, India has enacted a number of other laws and regulations which have bearing on the sustainable exploitation of marine fisheries resources in the Indian EEZ. These include the Indian Coast Guard Act, 1978; the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981 and the related Rules of August, 1982; the Environment Protection Act, 1986, etc. The other Central legislations, which have important bearing on the fisheries sector include the Merchant Shipping Act, 1958; the Marine Products Export Development Authority Act, 1972; the Wildlife (Protection) Act, 1972 and the Biological Diversity Act, 2002. However, there is still no law to regulate the Indian-owned fishing vessels operating in the EEZ. A summary of important provisions contained in the Central Acts regarding Indian maritime zone is given in ***Table 1 (see page 68)***.

The Marine Fishing Regulation Acts

The Marine Fishing Regulation Act of the coastal States/UTs in India was a response to the growing conflicts in the coastal waters during the mid- seventies. To reduce the conflicts and also allow for regulation of fisheries in the territorial waters, the Ministry of Agriculture formulated a Model Bill, which was circulated to the coastal States/UTs in 1979. Based on the Model Bill, all the coastal States/UTs have enacted the Marine Fishing Regulation Act and the rules and regulations there under. Goa (then a UT), Karnataka and Kerala were the first States to enact their MFRA in 1980. The UT of Puducherry is the last to enact the MFRA in 2008.

The MFRAs have provisions for regulating fishing and conservation measures in the territorial waters. These include regulation of mesh size to avoid catching of juvenile fish, maximum-minimum fish sizes, regulation of gear to avoid over-exploitation of certain species, reservation of zones for various fishing sectors to provide exclusive rights to traditional fishermen to fish unhindered in near-shore areas and also for declaration of closed seasons during fish breeding period to avoid catching of juvenile fish. The other important aspects include vessel movement control, vessel inspection, registration and license and colour coding. The state-wise details of MFRAs and the important MCS measures contained in them are given in ***Tables 2 & 3 (see pages 69&70)***.

The MFRAs of the maritime States/UT Governments and the deep sea fishing schemes as provided under the Maritime Zone of India (Regulation of Foreign Fishing Vessels) Act, 1981 of the Government of India provide for prohibition of fishing by mechanized fishing vessels in the areas earmarked for traditional and small-motorized crafts.

Table 1: Summary of major acts enacted by the Central Government

Name of the Act	Main objective	Follow ups	Main implementing agency	Fisheries management
The Merchant Shipping Act, 1958.	To foster development and ensure efficient maintenance of an Indian mercantile marine.	Registration. Setting up of National Shipping Board.	Ministry of Shipping, Road Transport and Highways.	Defining a fishing vessel, which acted as the base for later acts. Registration procedure. Provision for data collection.
The MPEDA Act, 1972.	To promote export of fisheries products.	Collection of information on fish production, etc.	Ministry of Commerce and Industry.	Licensing. Basic focus on controlling of fish export and quality control in respect of exported fish and export promotion.
The Wildlife (Protection) Act, 1972.	To protect wildlife.	Sanctuaries.	Ministry of Environment & Forests.	Restriction on hunting of several mammals, fish, coral, sponge, turtle, etc.
The Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976.	To establish sovereignty over Indian maritime zone.	To ensure national security. To facilitate exploitation and other economic uses of Indian maritime zone.	Ministry of External Affairs.	Licensing. Establishment and division of maritime zones into 4 areas.
The Coast Guard Act, 1978.	To establish the Coast Guard.	National security. Protection of national interest. Safety at sea.	Ministry of Defence.	Establishment of control and surveillance measures. Establishment of sea rescue measures.
Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981.	To control activities of foreign fishing vessels within Indian maritime zone.	Basis for joint ventures and chartered vessels. Base for fishing access agreements.	Ministry of Agriculture.	Permits fishing by foreign vessels through licensing.
The Biological Diversity Act, 2002.	To protect biological diversity of India.	National and State Biodiversity Boards.	Ministry of Environment & Forests.	Permits fishing for commonly traded fish. Encourages conservation. Provision to declare a fish stock threatened if it is over-exploited.

Table 2: Area reservation for traditional and mechanized fishing vessels in the territorial waters of maritime States/Union Territories under the Marine Fishing Regulation Acts/Rules

Sl. No	State/Act	Area exclusively for traditional craft*	Area for mechanized vessel
1	Gujarat – GFA, 2003	5 nautical miles (9 km).	Beyond 5 nautical miles from the shore.
2	Maharashtra – MFRA,** 1981	5-10 fathom depth (9-18 m depth).	
3	Goa – MFRA, 1980	5 km.	Beyond 5 km.
4	Karnataka – MFRA, 1980	6 km.	Beyond 6 km.
5	Kerala - MFRA, 1980	10 km.	Beyond 10 km.
6	Tamil Nadu – MFRA, 1983	3 nautical miles (5.4 km).	Beyond 3 nautical miles.
7	Andhra Pradesh- MFRA, 1993	10 km.	Beyond 10 km.
8	Orissa – MFRA, 1982	5 km.	(i) up to 15 meter OAL beyond 5 km. (ii) above 15 meter OAL beyond 10 km.
9	West Bengal – MFRA, 1993	Up to 8 km for boats up to 9 metres. Up to 20 km but not below 8 km for boats over 9 metres.	For boats up to 15 metres up to 50 km but not below 20 km. For boats above 15 metres beyond 50 km.
10	UT of Lakshadweep-MFRA, 2000	Fishing by a ship or boat fitted with mechanical means of propulsion may be regulated, restricted or prohibited in any specified area.	
11	UT of Pondicherry, 2008		Beyond 3 nautical miles.
12	Andaman & Nicobar Island – MFRA, 2003	Fishing by a ship or boat fitted with mechanical means of propulsion may be regulated, restricted or prohibited in any specified area.	

- ** Traditional craft can fish anywhere in the sea. The reservation mentioned implies only that other category of vessels may not fish in the area reserved for traditional craft*
- *** Marine Fishing Regulation Act*

4.0 Institutional setting

As mentioned above, both the Union and the State Government agencies manage fisheries activities. While at the Central-level, the DAHDF in the Ministry of Agriculture is the focal point, in the State/UTs, it is the Department of Fisheries (DoF). Other Central Ministries/ Departments like the Ministry of Commerce and Industry (MoCI), Ministry of Earth Sciences (MoES), Ministry of Food Processing Industries (MoFPI), Ministry of Environment and Forests (MoEF) play important role in various aspect of fisheries resources management. At the national level, the Ministry of Defence (MoD) through the Indian Coast Guard (ICG) is also associated with the management of fisheries in the EEZ.

Role of Central Government

The Fisheries Division in the DAHDF acts as the focal point for fisheries development and management in the country. It formulates strategies for national development plans for the sector and issues policy guidelines for fisheries development and management. It also provides technical and financial assistance for fisheries development and management to various States/UTs. The financial assistance is over and above the budgetary support provided to the States by the Planning Commission.

Table 3: Major MCS measures and their provisions in the Marine Fishing Regulation Act & Rules of coastal States/ UTs

Sl. No	MCS measures	GU	MH	GOA	KA	KE	TN	PU	AP	OR	WB	ANI	LAK
1	Mesh size	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2	Area closures	Y	Y	-	-	-	Y	-	Y	Y	Y	-	-
3	Zonation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4	Minimum and maximum fish sizes	Y	-	-	-	-	-	-	Y	-	Y	-	-
5	Vessel movement controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6	Vessel inspections	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7	Registration & license	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8	Display	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9	Colour coding	Y	-	-	-	-	Y	-	-	-	-	-	-
10	Classification of boats	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11	Fishing regulations	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12	Catch & quota control	-	-	-	-	-	-	-	-	-	-	-	-
13	Effort control *a) Trip limits*	-	-	-	-	-	-	-	-	-	-	-	-
	b) Timing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	c) Restrictions on number of boats	-	-	-	-	-	-	-	-	Y	-	-	-
	d) Seasonal closure	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
14	Observer	-	-	-	-	-	-	-	-	-	-	-	-
15	Vessel monitoring	-	-	-	-	-	-	-	-	-	-	-	-
16	Participatory management	-	-	-	-	-	-	-	-	-	-	-	-

Y = Provision Available; - not available
GU - Gujarat; MH - Maharashtra; KA - Karnataka; KE - Kerala; TN - Tamil Nadu; PU - Puducherry; AP - Andhra Pradesh; OR - Orissa; WB - West Bengal; AN - Andaman & Nicobar Islands; LAK - Lakshadweep.

To promote export of fish and fish products, the Government of India established the Marine Products Export Development Authority (MPEDA) under the MoCI in 1972. While the processing aspects fall under the MoFPI, the control of marine biodiversity and marine pollution falls under the jurisdiction of MoEF and the MoES. A detailed description of the duties of the relevant Ministries/Departments in the Central Government is provided in ***Table 4 (see pages 72-74)***.

Role of the State Governments

The State/UT Governments are the principle custodians of fisheries in their respective jurisdictions (land as well as the territorial waters). In the marine sector, they are responsible for fisheries development and management with the main objectives of planning and development of infrastructure facilities for landing and berthing of fishing craft, creating suitable marketing facilities, implementation of various fisheries development programmes *viz.*, channeling financial assistance for purchase of fishing implements, implementation of socio-economic programmes and interactions with the Government of India and other agencies for technical and financial assistance. Each State/UT has a DoF, which functions as its main implementation agency for fisheries and aquaculture development programmes.

5.0 International treaties and conventions regarding MCS

The rules of international law are reflected primarily in treaties, which generally create obligations only for those States party to the treaty. Other rules of international law arise from general international practices accepted as law (so-called "customary international law"), although it is sometimes difficult to determine whether a particular practice has become accepted as a law by States. The most important rules of international law relating to MCS are those contained in treaties, such as UNCLOS and related agreements. Customary international law plays a relatively minor role in governing MCS activities.

Treaties

UN Convention on the Law of the Sea (UNCLOS).

FAO Compliance Agreement (FAOCA).

UN Fish Stocks Agreement (UNFSA).

Table 4: Areas of coordination and networking of concerned Ministries/ Departments in the Central Government and coastal State/UT Governments for implementation of MCS

Ministry/ Department	Main tasks (as per the Government of India (Allocation of Business) Rules, 1961)	Areas for coordination/ networking
Ministry of Agriculture (Department of Animal Husbandry, Dairying and Fisheries).	Nodal Department for fisheries in the country. Responsible for estimation of demand and fixing of targets for products under its review; collection and collation of information on livestock and censuses for this purpose; liaison and cooperation with international organizations in matters relating to livestock, poultry and fisheries development.	• Nodal agency; • Liable for coordination and networking with other concerned Ministries/Departments.
Ministry of Defense (Department of Defence and Indian Coast Guard).	The Ministry is responsible for defence of India and every part thereof including preparation for defence and all such acts as may be conducive in times of war to its prosecution and after its termination to effective demobilization. The Indian Coast Guard's (ICG) main function is to protect India's EEZ and operates under the effective control of the Ministry of Defense. The ICG is also used in SAR operations, anti-pollution and other duties in maritime zones. While protection of the high seas is vested with the Indian Navy, the area between 10 and 30 nautical miles from the shore is under the charge of the ICG and from shore to five nautical miles with the coastal police as well as the ICG. It's responsibilities include: • Enforcing the provisions of enactment in force in the maritime zones. • Assisting the Customs and other authorities in anti-smuggling operations. • To preserve & protect the marine environment and control marine pollution. • Measures for safety of life and property at sea including aid to mariners in distress. • Ensuring the safety & protection of artificial islands, offshore terminals and other installations in maritime zones. * The ICG is also the nodal agency for oil spill response in India's EEZ.	• Monitoring of fishing vessels; • Prevention of marine pollution by ships; • Protection of endangered species; • Protection against poaching.

Ministry/ Department	Main tasks (as per the Government of India (Allocation of Business) Rules, 1961)	Areas for coordination/ networking
Ministry of Commerce and Industry (Marine Products Export Development Authority).	The Ministry is responsible for international trade and commercial policy including tariff and non-tariff barriers of the country and is the nodal agency for International Agencies connected with Trade Policy (*e.g.* UNCTAD, ESCAP, ECA, ECLA, EEC, EFTA, GATT/WTO, ITC and CFC). Its responsibility also includes export facilitation, export credit and export insurance and undertaking projects and programmes for stimulating and assisting the export efforts. Under these, the Ministry promotes export of marine products through the Marine Product Export Development Authority.	• Data on export of marine products; • Promotion of marine fisheries aimed at increased exports; • Quality control of marine exports.
Ministry of Environment and Forests.	The Ministry is responsible for overall policy in relation to environment and forests. This includes, environment and ecology, including environment in coastal waters, in mangroves and coral reefs but excluding marine environment on the high seas. The Ministry is also responsible for environment research and development, education, training, information and awareness and Environmental Impact Assessment. It is the nodal agency for international cooperation on issues concerning environment, forestry and wildlife and undertakes Biosphere Reserve Programme.	• Protection of marine biodiversity; • Protection of coastal habitats; • Restoration of degraded habitats; • Conservation of endangered/ threatened species.
Ministry of Agriculture (Department of Agriculture Research and Education).	The Department is responsible for fundamental, applied and operational research and higher education, including coordination of such research and higher education in agriculture, agro-forestry, animal husbandry, dairying, fisheries, agricultural engineering and horticulture, including agricultural statistics, economics and marketing and development of human resources in agricultural research/extension and education.	• Quantitative and qualitative aspect of marine fish stocks; • Estimates on fish stocks and catch per unit effort; • Data on oceanic productivity, climate change, etc; • Data on craft and gear.
Ministry of Earth Sciences.	It is the nodal agency for Earth Commission and all matters relating thereto. It deal with matters of policy, coordination, and schemes relating to the Ocean, meteorology, seismology, marine environment, atmosphere and earth sciences, not specifically allocated to any other Department or Ministry. The Ministry is also responsible for undertaking surveys to map, locate and assess living and non-living marine resources; preservation, conservation and protection of marine resources; development of appropriate skills and manpower; international collaboration and cooperation; and laws and regulatory measures relating to the above. The Ministry also oversees marine environment on the high seas.	• Protection of marine biodiversity in high seas; • Protection of coastal habitats in high seas; • Restoration of degraded habitats in high seas; • Weather/climate information; • Potential fishing zone advisories; • Productivity and other related parameters.
Department of Space.	The Department is responsible for Space Commission and all matters relating thereto and all matters relating to Space Science, Space Technology and Space Applications.	• Tracking and monitoring of fishing vessels; • Satellite-based communication.

Ministry/ Department	Main tasks (as per the Government of India (Allocation of Business) Rules, 1961)	Areas for coordination/ networking
Ministry of External Affairs.	It is the nodal agency for relations with foreign States and Commonwealth countries and looks after all matters affecting foreign diplomatic and consular offices, UN offices and its specialized agencies in India. It is also the nodal agency for matters relating to Law of the Sea, including the Indian Territorial Waters, Contiguous Zone, Continental Shelf and Exclusive Economic Zone; questions of international law arising on the high seas including fishery rights, piracies and crimes committed on the high seas or in the air, offences against the Law of Sovereign States committed on land or the high seas or in the air, legal matters concerning the International Seabed Area and Authority.	• Implementation of the provisions of UNCLOS; • International relations.
Planning Commission.	The Commission is responsible for making an assessment of the material, capital and human resources of the country, including technical personnel and investigate the possibilities of augmenting such of these resources as are found to be deficient in relation to the nation's requirement and formulation of Plans for the most effective and balanced utilization of country's resources and determination of priorities. The Commission also undertakes periodic evaluation of the developmental goals. The emphasis of the Commission is on maximizing the output by using country's limited resources optimally. Instead of looking for mere increase in the plan outlays, the effort is to look for increases in the efficiency of utilization of the allocations being made.	• Budgetary allocations; • Fisheries policy; • Developmental planning.
Ministry of Shipping, Road Transport and Highways (Department of Shipping).	The Ministry/Department is responsible for maritime shipping and navigation; provision of education and training for the mercantile marine; lighthouses and lightships; administration of the Indian Ports Act, 1908 (15 of 1908) and the Major Port Trusts Act, 1963 (38 of 1963); and ports declared as major ports. Other jobs of the Department are monitoring, shipbuilding and ship repair industry; fishing vessels industry and floating craft industry. The Department is also responsible for prevention and control of pollution arising from ships, shipwrecks and abandoned ships in the sea, including the port areas; enactment and administration of legislation related to prevention, control and combating of pollution arising from ships; and monitoring and combating of oil pollution in the port areas.	• Registration of fishing vessels under the Merchant Shipping Act, 1958; • Ensuring sea worthiness of fishing vessels; • Related tasks.
Coastal States/UTs.	The territorial waters are under the jurisdiction of the coastal States/UTs. The Department of Fisheries (DoF) of the coastal States/UTs administers the Marine Fishing Regulation Act within the territorial waters. The DoF also undertakes registration of fishing vessels under the Act in most of the coastal States/UTs.	• Licensing of fishing vessels; • Onshore monitoring; • Socio-economic development.

Non-Binding Instruments

1995 FAO Code of Conduct for Responsible Fisheries (CCRF).

International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU).

The UNCLOS holds that the coastal State should take proper conservation and management measures and that the maintenance of the living resources in the EEZ is not endangered by over-exploitation based on best scientific evidences. Further, the coastal State may, in the exercise of its sovereign rights to explore, exploit, conserve and manage living resources in the EEZ, take such measures, including boarding, inspection, arrest and judicial proceedings, as may be necessary to ensure compliance with the laws and regulations adopted by it in conformity with this Convention.

The UNFSA holds that the Coastal States and States fishing on the high seas shall adopt measures to ensure long-term sustainability of straddling fish stocks and highly migratory fish stocks and promote the objective of their optimum utilization. In addition, the Coastal States and States fishing on the high seas shall take measures to prevent or eliminate overfishing and excess fishing capacity and to ensure that levels of fishing effort do not exceed those commensurate with the sustainable use of fishery resources and shall establish appropriate cooperative mechanisms for effective monitoring, control, surveillance and enforcement.

6.0 State of MCS activities in Indian waters

Shore-based monitoring

The DoF of the State Governments is responsible for shore-based monitoring. For this purpose, the DoF have District Fisheries Officer and Fisheries Inspector who are in-charge of monitoring fish landings at the fishing harbours and fish landing centers. However, given the dispersed nature of capture fisheries (see statistical tables on pages 77-91) such shore-based monitoring is largely ineffective.

At-sea monitoring

The Indian Coast Guard is primarily responsible for monitoring of Indian waters, especially the EEZ. As such there is no mechanism for monitoring the territorial waters which comes under the jurisdiction of the coastal States/UTs. Since its inception in 1978, the Coast Guard has apprehended over 1 200 fishing vessels belonging to nine Asian countries for violation of the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981. However, since the MFRAs enacted by the State Governments/UTs do not authorize the Coast Guard to undertake MCS function in the territorial waters, there is little monitoring or even surveillance activity by the Coast Guard in the territorial waters.

7.0 Conclusion

India has a detailed legal and policy framework to implement MCS in marine capture fisheries. However, multiple constitutional authorities, dispersed fisheries and a large resource base are acting both as a potential and problem for Indian fisheries. Due to the federal structure of fisheries governance, it is not possible to pinpoint a particular authority for MCS in the marine fisheries sector. While, in an ideal situation, the responsible agencies should have cooperated with each other at the State and at the Centre, such regime is yet to evolve.

Salient Statistical Features of Fisheries Sector in India

Table 1: Marine fisheries resources - Coastal States and Union Territories of India

Sl.No	State/Union Territory	Length of coast line (Kms.)	Continental shelf ('000 sq.kms)	Number of landing centres	Number of fishing villages
1	Andhra Pradesh	974	33	271	498
2	Goa	104	10	34	39
3	Gujarat	1 600	184	123	263
4	Karnataka	300	27	88	156
5	Kerala	590	40	178	222
6	Maharashtra	720	112	152	406
7	Orissa	480	26	57	641
8	Tamil Nadu	1 076	41	352	581
9	West Bengal	158	17	44	346
10	A & N	1 912	35	25	100
11	Daman & Diu	27	-	7	22
12	Lakshadweep	132	4	19	20
13	Puducherry	45	1	26	28
	Total	**8 118**	**530**	**1 376**	**3 322**

Source: State Government/Union Territory Administrations

Table 2: Potential of fishery resource in the EEZ

(million metric tonnes)

Depth range (m)	0-50	50-200	200-500	Oceanic	Total
Demersal	1.28	0.63	0.03	—	1.93
Neretic Pelagic	1	0.74	—	—	1.74
Oceanic Pelagic				0.25	0.25
Total	2.28	1.37	0.03	0.25	3.92
Percent to total	**58.15**	**34.86**	**0.71**	**6.27**	**100**

(million metric tonnes)

Depth range	West Coast	East Coast	Lakshadweep	Andaman & Nicobar	Total
Demersal	1.25	0.66		0.02	1.93
Pelagic	1.11	0.43	0.06*		
Oceanic				0.25	0.25
Total	2.36	1.09	0.06	0.41	3.92
Percent to total	**60.17**	**27.83**	**1.61**	**10.39**	**100**

** Demersal resources from 300-500m depth zone (except from Lat. 8-10 N).*
Source: Fishery Survey of India, Mumbai.

Table 3: Contribution of fish to GDP

Year	Total GDP	GDP from Agriculture, Forestry & Fishing	GDP from Fisheries	GDP from Fisheries as % of	
				Total GDP	GDP from Agriculture, Forestry & Fishing
1993-94	7 81 345	2 41 967	8 679	1.11	3.59
1994-95	9 17 058	2 78 773	10 602	1.16	3.8
1995-96	10 73 271	3 03 102	11 866	1.11	3.91
1996-97	12 43 547	3 62 606	14 083	1.13	3.88
1997-98	13 90 148	3 87 008	17 269	1.24	4.46
1998-99	15 98 127	4 42 494	18 156	1.14	4.1
1999-00	17 86 525	4 46 515	18 939	1.06	4.24
2000-01	19 25 415	4 49 746	21 336	1.11	4.74
2001-02	21 00 187	4 87 063	23 240	1.11	4.77
2002-03	22 65 304	4 72 679	25 491	1.13	5.39
2003-04	25 49 418	5 33 642	26 938	1.06	5.05
2004-05	28 55 933	5 36 629	28 775	1.01	5.36
2005-06	35 86 743	6 25 635	31 257	0.87	5
2006-07	41 29 174	6 86 045	32 980	0.8	4.81
2007-08	47 23 400	7 82 597	35 650	0.75	4.56

Source: Central Statistical Organisation (CSO), Government of India.

Table 4: Fish Production in India 1950-51 to 2007-08

Year	Fish Production ('000 tonnes)			Average Annual Growth rate (%)		
	Marine	Inland	Total	Marine	Inland	Total
1950-51	534	218	752	-	-	-
1955-56	596	243	839	2.32	2.29	2.31
1960-61	880	280	1 160	9.53	3.05	7.65
1965-66	824	507	1 331	-1.27	16.21	2.95
1970-71	1 086	670	1 756	6.36	6.43	6.39
1973-74	1 210	748	1 958	3.81	3.88	3.83
1978-79	1 490	816	2 306	4.63	1.82	3.55
1979-80	1 492	848	2 340	0.13	3.92	1.47
1980-81	1 555	887	2 442	4.22	4.6	4.36
1981-82	1 445	999	2 444	-7.07	12.63	0.08
1982-83	1 427	940	2 367	-1.25	-5.91	-3.15
1983-84	1 519	987	2 506	6.45	5.00	5.87
1984-85	1 698	1 103	2 801	11.78	11.75	11.77
1985-86	1 716	1 160	2 876	1.06	5.17	2.68
1986-87	1 713	1 229	2 942	-0.17	5.95	2.29
1987-88	1 658	1 301	2 959	-3.21	5.86	0.58
1988-89	1 817	1 335	3 152	9.59	2.61	6.52
1989-90	2 275	1 402	3 677	25.21	5.02	16.66
1990-91	2 300	1 536	3 836	1.10	9.56	4.32
1991-92	2 447	1 710	4 157	6.39	11.33	8.37
1992-93	2 576	1 789	4 365	5.27	4.62	5.00
1993-94	2 649	1 995	4 644	2.83	11.51	6.39
1994-95	2 692	2 097	4 789	1.62	5.11	3.12
1995-96	2 707	2 242	4 949	0.56	6.91	3.34
1996-97	2 967	2 381	5 348	9.60	6.2	8.06
1997-98	2 950	2 438	5 388	-0.57	2.39	0.78
1998-99	2 696	2 602	5 298	-8.61	6.73	-1.67
1999-00	2 852	2 823	5 675	5.79	8.49	7.12
2000-01	2 811	2 845	5 656	-1.44	0.78	-0.33
2001-02	2 830	3 126	5 956	0.68	9.88	5.30
2002-03	2 990	3 210	6 200	5.65	2.69	4.10
2003-04	2 941	3 458	6 399	-1.64	7.73	3.21
2004-05	2 779	3 526	6 305	-5.51	1.97	1.47
2005-06	2 816	3 756	6 572	1.33	6.52	4.23
2006-07	3 024	3 845	6 869	7.39	2.37	4.52
2007-08	2 920	4 207	7 127	-3.44	9.41	3.76

Source:
i. Central Marine Fisheries Research Institute (CMFRI, Kochi for the period up to 1970-71.
ii. State Governments/Union Territory Administration for the rest of the period.

Table 5: Marine fish production by states

Sl. No	State/Union Territory	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
1	Andhra Pradesh	113.07	154.32	150.26	151.99	152.05	146.55	150.00	166.48	182.50	204.94	248.50	263.93	210.73	218.84	240.20	254.89
2	Goa	101.49	102.11	98.46	84.21	93.76	88.81	65.84	62.11	67.33	66.55	72.29	83.76	94.81	100.91	98.97	32.26
3	Gujarat	589.00	619.84	645.26	600.00	660.07	745.71	550.00	670.95	620.47	650.83	743.64	609.14	584.78	663.88	670.51	644.53
4	Karnataka	234.19	204.52	203.75	247.51	252.78	219.86	190.61	195.63	205.9.0	128.42	180.16	187.00	171.23	176.97	168.54	175.57
5	Kerala	496.24	559.20	548.37	532.55	578.92	526.34	583.36	593.72	566.57	593.78	603.29	608.52	601.86	558.91	598.06	586.29
6	Maharasthra	387.55	350.40	357.00	387.00	481.00	453.00	394.88	397.90	402.84	414.27	386.86	420.01	417.77	445.34	464.09	419.82
7	Orissa	119.38	103.93	122.89	123.20	133.46	156.08	124.33	125.94	121.09	113.89	115.01	116.88	121.93	122.21	128.14	130.77
8	Tamil Nadu	308.00	317.72	330.50	340.00	350.79	355.10	359.55	363.00	367.86	371.00	371.50	373.00	307.69	307.99	387.25	393.27
9	West Bengal	145.00	153.00	151.20	153.00	172.00	164.00	171.50	180.00	181.00	184.30	181.50	181.60	179.50	160.00	178.10	182.74
10	A & N Islands	24.17	25.08	26.12	25.68	26.40	27.23	27.40	28.15	27.62	27.02	28.23	31.06	32.60	12.05	28.60	28.60
11	Daman & Diu	13.43	11.53	11.50	15.28	15.28	18.81	26.85	15.95	16.38	21.52	11.26	13.77	12.51	17.72	16.35	26.28
12	Lakshadweep	9.73	9.41	9.75	9.82	11.75	10.55	13.54	13.60	12.00	13.65	7.50	10.03	11.96	11.96	11.75	11.04
13	Puducherry	35.0	37.78	36.75	36.82	38.55	38.42	38.60	38.62	38.95	39.60	40.11	42.80	31.50	19.27	33.61	33.44
	India	**2 576.25**	**2 648.84**	**2 691.81**	**2 707.06**	**2 966.81**	**2 950.46**	**2 696.46**	**2 852.05**	**2810.51**	**2 829.77**	**2 989.85**	**2 941.5**	**2 778.87**	**2 816.05**	**3 024.17**	**2 919.5**

Source: Director/Commissioner of Fisheries, State Govt./UTs Administration.

Table 6: Marine fish landings by species- coastal States and Union Territories, 2007 (P)

Sl. No	Species	Region No 57 - Indian Ocean East						
		AP	Orissa	Tamil Nadu	West Bengal	A & N Islands	Pudu-cherry	Total
1	Flat fish	2 165	1 840	2 308		10		6 323
2	Unicorn cod	2 541		40			488	3 069
3	Bombay duck	15	1 168	38	32 107		140	33 468
4	Catfishes	2 144	10 874	2 666	30 171	285	337	46 477
5	Lizard fishes	7 184		1 127		7	751	9 069
6	Eels	1 391	2 212	555	98		59	4 315
7	Big jawed jumper	4 198		941		56	423	5 618
8	Silverbellies	2 328	1 868	39 200	3 650	2 450	1 486	50 982
9	Croakers	2 961	12 792	10 666	7 239	834	380	34 872
10	Goat fishes	7 437			429	6		7 872
11	Perches	4 588	2 343	19 980	4 480	4 808	2 272	38 471
12	Half Beaks	6 588		4 401	305	202	318	11 814
13	Flying fish	419		1 942		19	320	2 700
14	Barracudas	2 248		2 677		634	483	6 042
15	Mullets	791	6 616	971	5 914	865	1 358	16 515
16	Treadfins	9 621	1 600	2 259	2 205	21	580	16 286
17	Indian Mackerel	3 643	5 476		7 470		2 246	18 835
18	Trevallies	5 115		14 564	3 768	1 095	1 026	25 568
19	Other Carangids	2 773	3 379	3 075		2 052	956	12 235
20	Butter fish	5 521	8 364		8 694		849	23 428
21	Indian Shad		3 793	1 595	16 072	196	654	22 310
22	Sardines	4 391	5 561		8 505		3 348	21 805
23	Anchovies	6 442	3 925	3 288	539	2 981	690	17 865
24	Wolf herrings	2 892	2 773	7 268		14	137	13 084
25	Other Clupeids	5 824	4 344	3 736	5 055	834	494	20 287
26	Ribbon fishes	777	9 071	989	8 195		651	19 683
27	Elasmobranches *(sharks, Rays & Skates)*	8 338	6 972	21 155	123	2 956	1 158	40 702
28	Seer fishes	12 732	2 257	24 597	659	1 204	1 911	43 360
29	Firgate & Bullet tunas	9 832					100	9 932
30	Little tuna	1 835	705	4 806		94	500	7 940
31	Long tail tuna	759				64		823
32	Skipjack tuna	315				124	300	739
33	Yellowfin tuna	2 065	27		225	72	1 352	3 741

Table continued...

Region No 51 - Indian Ocean West									
Sl. No	**Gujarat**	**Karnataka**	**Kerala**	**Mahara-shtra**	**Goa**	**Laksha-dweep**	**Daman & Diu**	**Total**	**Total for India**
1	8 121	4 565		7 110	1 950		116	21 862	28 185
2	0			424				424	3 493
3	1 14 370			70 362			540	1 85 272	2 18 740
4	37 821	597		13 848	1 821		1 296	55 383	1 01 860
5		4 964		2 698				7 662	16 731
6	7 591	21	169	3 358			195	11 334	15 649
7		2 963	3 576	2 770				9 309	14 927
8	0	4 781	5 426	3 584	1 664		149	15 604	66 586
9	1 35 947	2 377	9 636	21 720	1 938		5 745	1 77 363	2 12 235
10	0			13 760		56		13 816	21 688
11	23 666		32 272	699	950	217	1 373	59 177	97 648
12	0		701	938	4 822		49	6 510	18 324
13	0					140		140	2 840
14	0		1 598			20	45	1 663	7 705
15	6 120	215	44	598	102		259	7 338	23 853
16	1 268	26	70	1 331	25		598	3 318	19 604
17	0	4 541		29 530	19 930		414	54 415	73 250
18	0		27 583	6 589	401	236	775	35 584	61 152
19	20 168	1 176	22 257				242	43 843	56 078
20	0	1 572	9 558	10 938	665		178	22 911	46 339
21	3 240			1 148			913	5 301	27 611
22	0	45 637	1 55 993	27 215	28 173		98	2 57 116	2 78 921
23	10 426	2 366	33 118	23 742	3		951	70 606	88 471
24	9 297		263	2 865	251		313	12 989	26 073
25	14 684	2 425	16 140	2 109	2 023		1 255	38 636	58 923
26	35 869	7 616		34 186	1 368		1 882	80 921	1 00 604
27	26 194	2 811	3 203	10 217	1 228	75	874	44 602	85 304
28	14 460	3 511	48 089	9 841	4 966	95	1 031	81 993	1 25 353
29		1 157		5 336		1 331	127	7 951	17 883
30					226	532	474	1 232	9 172
31			12 258			2 140	79	14 477	15 300
32					1 916	4 871	156	6 943	7 682
33	14 830						158	14 988	18 729

Table continued...

Sl. No	Species	Region No 57 - Indian Ocean East						
		AP	Orissa	Tamil Nadu	West Bengal	A & N Islands	Pudu-cherry	Total
34	Bigeye tuna	1 724				64		1 788
35	Marlin and sailfishes	687						687
36	Swordfish	0				17		17
37	Other fin fishes	15 192	23 706		14 773	4 854	4 227	62 752
38	Decapods *(a) Tiger prawn*	1 940						1 940
39	*(b) Other penaeid prawn*	19 795	12 672	22 027	11 001	586	1 674	67 755
40	*(c) Non-penaeid prawn*	24 987	1 801	4 881	5 527	18	398	37 612
41	*(d) Crabs*	12 072		1 578	894	571	671	15 786
42	*(e) Natanian decopods*	5 439						5439
43	Cepholopods *(Squid & Cuttle fish)*	38	1 535	9 581		12	480	11 646
44	Other Molluscs	3 623	568					4191
45	Unspecified	191		189 759			55	190 005
46	Deep sea fishes*	3 350						3350
	Total	**2 18 911**	**1 38 242**	**4 02 670**	**1 78 098**	**28 005**	**33 272**	**9 99 198**

Source: Handbook of Fisheries Statistics. 2008.

Sl. No	Region No 51 - Indian Ocean West								
	Gujarat	Karnataka	Kerala	Mahara-shtra	Goa	Laksha-dweep	Daman & Diu	Total	Total for India
34							135	135	1 923
35							21	21	708
36								0	17
37	73 096	25 290	129 699	56 040	1674	1 687	2 829	290 315	353 067
38							79	79	2 019
39	12 686	12 742	49 165	47 836	8 642		50	131 121	198 876
40	42 567		1 689	57 017			141	101 414	139 026
41	2 615	12 416	4 970	2 699	819		79	23 598	39 384
42							28	28	5 467
43	20 526	14 775	14 912	17 512	330		381	68 436	80 082
44	2 209	620						2 829	7 020
45	66 263	9 380		1 018	5 298		448	82 407	272 412
46								3 350	
Total	**7 04 034**	**1 68 544**	**5 82 389**	**4 89 038**	**91 185**	**11 400**	**24 476**	**20 71 066**	**30 70 264**

Source: Handbook of Fisheries Statistics. 2008.

Table 7: Trends in Export of Marine Products - 1961 to 2007-08

Year	Quantity (Tonnes)	Value (Rs. Crore)	Unit value (Rs./tonnes)	Unit value Index	Annual growth rate (%)	
					Quantity	Value
1961-62	15 732	3.92	2 491.74	100.00	-21.30	-15.52
1962-63	11 161	4.20	3 763.10	151.02	-29.06	7.14
1963-64	19 057	6.09	3 195.68	128.25	70.75	45.00
1964-65	21 122	7.14	3 380.36	135.66	10.84	17.24
1965-66	15 295	7.06	4 615.89	185.25	-27.59	-1.12
1966-67	21 116	17.37	8 225.99	330.13	38.06	146.03
1967-68	21 907	19.72	9 001.69	361.26	3.75	13.53
1968-69	26 811	24.70	9 212.64	369.73	22.39	25.25
1969-70	31 695	33.46	10 556.87	423.68	18.22	35.47
1970-71	35 883	35.07	9 773.43	392.23	13.21	4.81
1971-72	35 523	44.55	12 541.17	503.31	-1.00	27.03
1972-73	38 903	59.72	15 351.00	616.08	9.51	34.05
1973-74	52 279	89.51	17 121.60	687.14	34.38	49.88
1974-75	45 099	68.41	15 168.85	608.77	-13.73	-23.57
1975-76	54 463	124.53	22 865.06	917.64	20.76	82.03
1976-77	66 750	189.12	28 332.58	1 137.06	22.56	51.87
1977-78	56 967	180.12	31 618.31	1 268.93	-14.66	-4.76
1978-79	86 894	234.62	27 000.71	1 083.61	52.53	30.26
1979-80	86 401	248.82	28 798.28	1 155.75	-0.57	6.05
1980-81	75 591	234.84	31 067.19	1 246.81	-12.51	-5.62
1981-82	70 105	286.01	40 797.38	1 637.31	-7.26	21.79
1982-83	78 175	361.36	46 224.50	1 855.11	11.51	26.35
1983-84	92 187	373.02	40 463.41	1 623.90	17.92	3.23
1984-85	86 187	384.29	44 587.93	1 789.43	-6.51	3.02
1985-86	83 651	398.00	47 578.63	1 909.46	-2.94	3.57
1986-87	85 843	460.67	53 664.25	2 153.69	2.62	15.75

Table continued...

Year	Quantity (Tonnes)	Value (Rs. Crore)	Unit Value (Rs./tonnes)	Unit value Index	Annual growth rate (%)	
					Quantity	Value
1987-88	97 179	531.20	54 662.02	2 193.73	13.21	15.31
1988-89	99 777	597.85	59 918.62	2 404.69	2.67	12.55
1989-90	1 10 843	634.99	57 287.33	2 299.09	11.09	6.21
1990-91	1 39 419	893.37	64 078.07	2 571.62	25.78	40.69
1991-92	1 71 820	1 375.89	80 077.41	3 213.72	23.24	54.01
1992-93	2 09 025	1 768.56	84 609.97	3 395.62	21.65	28.54
1993-94	2 43 960	2 503.62	1 02 624.20	4 118.58	16.71	41.56
1994-95	3 07 337	3 575.27	1 16 330.61	4 668.66	25.98	42.80
1995-96	2 96 277	3 501.11	1 18 170.16	4 742.48	-3.60	-2.07
1996-97	3 78 199	4 121.36	1 08 973.32	4 373.39	27.65	17.72
1997-98	3 85 818	4 697.48	1 21 753.78	4 886.30	2.01	13.98
1998-99	3 02 934	4 626.87	1 52 735.25	6 129.67	-21.48	-1.50
1999-00	3 43 031	5 116.67	1 49 160.57	5 986.21	13.24	10.59
2000-01	4 40 473	6 443.89	1 46 294.78	5 871.20	28.41	25.94
2001-02	4 24 470	5 957.05	1 40 340.90	5 632.25	-3.63	-7.56
2002-03	4 67 297	6 881.31	1 47 257.74	5 909.84	10.09	15.52
2003-04	4 12 017	6 091.95	1 47 856.76	3 929.12	-11.83	-11.47
2004-05	4 82 223	6 459.89	1 33 960.64	4 191.73	17.04	6.04
2005-06	5 51 282	7 018.68	1 27 315.60	3 766.33	14.32	8.65
2006-07	6 12 641	8 363.53	136 516.00	2 957.52	19.62	15.43
2007-08	5 41 701	7 620.92	1 40 684.99	1 710.25	-11.58	-8.88

Source: Handbook of Fisheries Statistics. 2008.

Table 8: Fishing crafts - coastal States/UTs

Sl.No	State/ Union Territory	Traditional crafts	Motorised traditional crafts	Mechanised boats	Total
1	Andhra Pradesh	24 386	14 112	2 541	41 039
2	Goa	532	932	1 087	2 551
3	Gujarat	3 729	7 376	13 047	24 152
4	Karnataka	7 577	3 705	4 373	15 655
5	Kerala	9 522	14 151	5 504	29 177
6	Maharasthra	7 073	3 382	13 053	23 508
7	Orissa	15 444	4 719	3 577	23 740
8	Tamil Nadu	24 231	22 478	7 711	54 420
9	West Bengal	10 041	1 776	6 829	18 646
10	Andaman & Nicobar Islands	1 837	781	165	2 783
11	Daman & Diu	211	654	562	1 427
12	Lakshadweep	1 341	376	667	2 384
13	Puducherry	1 524	2 306	627	4 457
	Total	**1 07 448**	**76 748**	**59 743**	**2 43 939**

Source: Marine Fisheries Census, 2005.

Table 9: Total mechanized fishing crafts in coastal States and UTs

Sl.No.	States/UTs	Trawlers	Purse-seiners	Gillnetters	Dolnetters	Liners	Others
1	Andhra Pradesh	610	0	424	0	20	295
2	Goa	830	196	47	0	0	14
3	Gujarat	8 002	0	2 363	2 425	4	253
4	Karnataka	2 515	505	1 254	0	28	71
5	Kerala	3 982	54	428	0	10	1 030
6	Maharashtra	4 219	156	2 550	4 409	253	1 466
7	Orissa	1 340	22	1 760	254	28	173
8	Tamil Nadu	5 300	46	655	11	781	918
9	West Bengal	610	0	4 355	1 692	66	106
10	Andaman & Nicobar Islands	5	0	150	0	5	5
11	Daman and Diu	315	4	170	71	0	2
12	Lakshadweep	0	0	80	0	578	9
13	Pondicherry	326	0	177	0	0	124
	Total	**29 246**	**983**	**14 413**	**8 862**	**1 768**	**4 466**

Source: Handbook of Fisheries Statistics, 2008.

Table 10: Number of major and minor fishing harbours and fish landing centres in coastal States/UTs

Sl.No	State/UT	Major Fishing Harbour	Minor Fishing Harbour		Fish Landing Centres	
			Commissioned	Under construction	Commissioned	Under construction
1	Andhra Pradesh	1	4	-	10	6
2	Goa		-	-	3	1
3	Gujarat		5	2	21	1
4	Karnataka		6	3	11	2
5	Kerala	1	8	7	24	2
6	Maharashtra	1	2	-	35	1
7	Orissa		3	2	24	4
8	Tamil Nadu	1	7	2	16	5
9	West Bengal	1	4	2	12	1
10	A & N Island		1	-	-	5
11	Daman & Diu		-	-	2	-
12	Lakshadweep		-	-	3	-
13	Puducherry		1	2	1	-
	Total	**5**	**41**	**20**	**162**	**28**

Source: Handbook of Fisheries Statistics, 2008.

Table 11: Fisheries infrastructure

Sl.No.	States/UTs	Boat Yards	Ice factories	Cold storage	Freezing plans	Canning plants	Curing yards	Peeling sheds	Fishmeal plants
1	Andhra Pradesh	8	17	0	1	2	39	24	0
2	Goa	0	5	0	0	0	0	0	0
3	Gujarat	24	178	42	37	0	516	66	29
4	Karnataka	32	152	9	7	10	1	8	11
5	Kerala	112	315	31	56	0	414	153	4
6	Maharashtra	6	54	11	3	1	2	6	0
7	Orissa	12	27	6	5	0	11	6	0
8	Tamil Nadu	29	101	8	4	0	9	30	2
9	West Bengal	1	38	0	0	0	0	0	0
10	A&N Islands								
11	Daman and Diu	0	10	0	0	0	0	0	0
12	Lakshadweep								
13	Pondicherry	0	8	1	0	0	0	0	0
	Total	**224**	**905**	**108**	**113**	**13**	**992**	**293**	**46**

Source: Handbook of Fisheries Statistics, 2008.

Table 12 : Fisher population, 2005

State/U.T	Villages	Families	Male			Female			Total
			Adult	Children	Total	Adult	Children	Total	
West Bengal	346	53 816	86 532	55 490	1 42 022	76 945	50 598	1 27 543	2 69 565
Orissa	641	86 352	1 42 318	93 292	2 35 610	1 28 632	86 149	2 14 781	4 50 391
Andhra Pradesh	498	1 29 246	1 52 096	1 07 822	2 59 918	1 51 184	98 889	2 50 073	5 09 991
Tamil Nadu	581	1 92 152	2 75 556	1 30 234	4 05 790	2 62 847	1 21 771	3 84 618	7 90 408
Puducherry	28	11 541	14 697	7 036	21 733	14 738	6 557	21 295	43 028
Kerala	222	1 20 486	2 13 773	90 535	3 04 308	2 13 319	84 607	2 97 926	6 02 234
Karnataka	156	30 176	61 969	24 857	86 826	61 332	22 756	84 088	1 70 914
Goa	39	1 963	4 036	1 480	5 516	3 778	1 374	5 152	10 668
Maharashtra	406	65 313	1 11 665	51 698	1 63 363	1 09 331	46 703	1 56 034	3 19 397
Gujarat	263	59 889	97 907	68 907	1 66 814	92 958	63 443	1 56 401	3 23 215
Daman & Diu	22	5 278	8 952	5 953	14 905	8 860	5 540	14 400	29 305
Andaman & Nicobar	100	3 275	5 341	2 715	8 056	4 692	2 518	7 210	15 266
Total	**3 302**	**7 59 487**	**11 74 842**	**6 40 019**	**18 14 861**	**11 28 616**	**5 90 905**	**17 19 521**	**3 534 382**

Source: Marine Fisheries Census - 2005.

Table 13 : Fisheries cooperatives/National level cooperative federations in India

S.No	State/UTs	State federation	Central societies	Primary societies	Membership
1	Andhra Pradesh	1	10	3 646	3 59 021
2	Arunachal Pradesh	-	-	4	300
3	Assam	1	-	456	3 909
4	Bihar	1	5	532	40 000
5	Delhi	-	-	2	239
6	Goa	1	-	10	1 000
7	Gujarat	1	4	385	80 000
8	Haryana	-	-	59	1 005
9	Himachal Pradesh	-	1	28	7 09 610
10	J & K	-	-	-	-
11	Karnataka	1	3	296	76 136
12	Kerala	1	16	292	2 00 000
13	Madhya Pradesh	1	7	1 001	62 571
14	Maharashtra	1	21	2 024	2 08 273
15	Manipur	1	-	181	9 182
16	Meghalaya	-	-	58	2 569
17	Mizoram	-	-	36	808
18	Nagaland	-	-	168	4 285
19	Orissa	1	4	482	1 20 000
20	Punjab	-	-	4	60
21	Rajasthan	1	-	107	4 624
22	Sikkim	-	-	-	-
23	Tamil Nadu	1	10	675	4 44 866
24	Tripura	1	-	129	14 225
25	Uttar Pradesh	1	5	110	41 000
26	West Bengal	1	20	1 072	1 60 000
27	A & Nicobar	-	-	45	3 812
28	Chandigarh	-	-	1	-
29	D & N Haveli	-	-	-	-
30	Daman & Diu	-	-	6	2 993
31	Lakshadweep	-	-	2	-
32	Pondicherry	1	2	36	28 754
33	Chhatisgarh				31 427
34	Jharkhand				9 150
	Total	**17**	**108**	**11 847**	**19 17 305**

Source: Handbook of Fisheries Statistics, 2008.

Table 14 : Fish Marketing Units Established during the Tenth Five-Year Plan Period*

(Rs. in Lakhs)

S.No.	States/UTs	No.of units	Location	Amount released
1	Andhra Pradesh	1	Vijaywada	35.00
2	Arunachal Pradesh	2	Papumpare	100.00
			Subansiri	
3	Haryana	2	Bahudurgarh	42.32
			Gurgaon	
4	Himachal Pradesh	1	Kullu	50.00
5	Jharkhand	1	Daltonganj	18.00
6	Karnataka	6	Mangalore	124.50
			Malpe	
			Mysore	
			Bangalore	
			Tumkur	
			Kodagu	
7	Madhya Pradesh	2	Jabalpur	100.00
			Mandla	
8	Maharashtra	3	Mumbai	72.21
			Nagpur	
			Aurangabad	
9	Mizoram	3	Aizawl	32.50
			Kolasib	
			Champai	
10	Orissa	1	Bhubaneswar	18.00
11	Rajasthan	1	Banswara	32.25
12	Tamilnadu	1	Chennai	50.00
13	Tripura	1	Agartala	70.00
14	FISHCOPFED (Delhi)	2	New Delhi	8.35
			Yusuf Sarai	
	Total	**27**		**753.13**

** Developed under the Central Sector Scheme.*

Source: Handbook of Fisheries Statistics, 2008.

Table 15: Profile of plan schemes fisheries development during, Eleventh Five-Year Plan Period (2007-12)

(Rs. in Lakhs)

Sl. No	Scheme	Approved Outlay	BE	Exp	BE	Exp	Proposed Allocation	BE
		2007-12	2007-08	2007-08	2007-09	2008-09	2009-10	2009-10
1	Central Institute of Fisheries Nautical & Engineering Training (CIFNET)	6 000	1 030	439	700	653	2 846	700
2	Central Institute of Coastal Engineering for Fishery (CICEF)	100	0	0	10	13	285	10
3	National Institute for Fisheries Post-Harvest Technology and Training (NIFPHATT) (earlier IFP)	1 000	159	140	200	166	457	200
4	Fishery Survey of India (FSI)	30 000	3 004	2 813	3 850	3 020	5 299	3 850
5	Fisheries & Training Extension	0	150					
6	Strengthening of Database and Geographical Information System for the Fisheries Sector	2 500	280	253	300	240	631	500
7	Development of Marine Fisheries, Infrastructure and Post-Harvest Operations	30 000	4 050	4 149	4 500	4 499	6 400	6 000
8	Development of Inland Fisheries and Aquaculture	35 000	1 203	1 284	1 200	1 290	7 200	1 790
9	National Scheme of Welfare of Fishermen	18 000	2 088	2 138	2 500	2 514	4 000	3 300
10	National Fisheries Development Board (NFDB)	1 55 000	5 000	5 000	4 690	4 690	39 877	13 500
	Total	**2 77 600**	**16 964**	**16 216**	**17 950**	**17 085**	**66 995**	**29 850**

Source: Handbook of Fisheries Statistics, 2008.

BOBP/REP/116

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