

Marine fisheries Resources: Exploitation, Management and Regulations in India.

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Resources and Exploitation

The peninsular India extending between latitudes 8° 4' and 37° 6' north and longitudes 68° 7' and 97° 25' East has a coastline of about 8,219 km. The Indian Ocean covering the area between 30° and 150° and from the Asian land mass in the north to 50° south has a total area of 51 million sq km. After the declaration of the Exclusive Economic Zone (EEZ) in 1977, the area available to India is 2.02 million sq km comprising 0.86 million sq km on the East coast, 0.56 million sq km in the West coast and 0.60 million sq km around the Andaman and Nicobar islands. With the absolute right on the EEZ, India has also acquired the responsibility to conserve, protect, develop and optimally exploit the marine living resources up to 200 nautical miles of the coastline.

India has a significant marine fisheries sector that has long been an important source of occupation and livelihood for the coastal communities of the country. The committee constituted in 2000 for revalidation of potential yield from the Indian EEZ reported 3.9 million tonnes as the harvestable potential from the Indian EEZ. An estimation of the depth wise potential shows that about 58% of the resources are available in 0-50 m depth, 35 per cent in 50-200 m depth and 7 per cent in depths beyond 200 m.

India's marine fish production has increased more than five times, from 0.53 tonnes in 1950-51 to 3.20 tonnes in 2008 as the highest recorded catch. The average production from the coastal water

(roughly upto 100 m depth) for the last 5 years (2005-2009) is 2.85 million tonnes. Of the total marine fish landings that take place, a significant proportion of marine fish landings are from inshore waters. The major species landed can be grouped under pelagics, demersal, crustaceans and molluscs. Some of the important resources harvested from the coastal waters are oil Sardine, Penaeid prawns, Ribbon fishes, Non-penaeid prawns, Croakers, Mackerel, Cephalopods, Threadfin breams, Bombay duck, Lesser sardines, Catfishes, Silver bellies, Other carangids, Other perches, Other clupeids, Stolephorus, Crabs, Soles, Scads, Hilsa shad, Stomatopods, *S. commersoni*, *Coilia*, Sharks, *Thryssa*, Lizard fishes, Horse mackerel and Silver pomfrets.

Three-fourths of the total marine capture fish production is estimated to come from coastal waters. The higher productivity of coastal, inshore waters is also the main reason why maximum fishing effort is concentrated there. Efforts to protect the fragile and highly productive coastal ecosystems have been undertaken, and, at present there are several

marine sanctuaries, including the Gulf of Mannar and the Gulf of Kutch.

The contribution analysis of the landings by the territorial waters for the different coastal states have indicated that around 35-40 per cent is contributed by the territorial waters (upto 22 Kms) and the 60-65 per cent is accounted from beyond the territorial waters.

Contribution analysis of the marine landings

Region	State	Per cent Contribution	
		Territorial (upto 22 Kms)	Beyond Territorial
North East	West Bengal, Orissa,	39	61
South East	Andhra Pradesh, Tamil Nadu Puducherry	32	68
South East	Kerala, Karnataka, Goa	31	69
North West	Maharashtra, Gujarat, Daman & Diu	33	67

Sector

The marine fishing fleet comprises about 0.179 million traditional craft (including about 75,591 motorized traditional craft. In addition, there are 58,911 mechanized craft and about 170 large fishing vessels of 21 m overall length (OAL). The major fishing activities are still concentrated in the areas within 100 m depth zone. Trawling by larger vessels is confined to the north east coast. As compared to the west coast, concentration of traditional craft is more on the east coast (about 57% of the total). In mechanized vessels, the trend is reverse.

Approximately two-thirds of total production is from mechanized fishing units (using trawls, gill-nets and purse-seines), while the rest is from motorized fishing units (using gill-nets, lines and purse-seines with outboard motors) and from unpowered fishing units. Available reports indicate that fisheries resources in several parts of the country are under stress, with most of the major commercially exploited stocks showing signs of overexploitation. This has repercussions for the livelihoods of those dependent on these resources, and better management of resources is clearly called for.

Stakeholders dependency on the sector

Fishing efforts are largely confined to the inshore waters through artisanal, traditional, mechanized. It is estimated that at least 3 mn people derive their livelihood from marine capture fisheries in the over 3,600 fishing villages situated along the Indian coastline. The marine fishermen household accounts to more than 0.50 million

scattered over 3638 marine fishing villages and 251 fish landing centers. Other estimates put the number of people dependent on marine fisheries as much higher. The majority of those in the sector are small-scale and artisanal fish workers, who derive their livelihoods from fishing, cleaning, artisanal processing and small-scale trading activities it is the source of livelihood for a large section of economically backward population of the country.

The fishing craft/ gears/ vessels are normally owned singly, shared or leased. The compensation of the shared and leased fishing operations are rewarded with the fish landings. The fishing activities are mostly performed by individuals or in groups. But even then there exists boat owners association and fishermen groups who take care of in flagging off the issues to the government and policy planners. Micro enterprises are often recognized with the preprocessing and processing and other secondary sector associated with fishing related activities.

Normally the fishing operations are meant for subsistence. Factory / Commercial / Industrial fishing doesn't exist in the EEZ. The income levels of fish workers are of seasonal in nature with high income during the post monsoon followed by pre monsoon and monsoon season. The income level reaches very low level during the season of monsoon ban. But the income can be comparable with the agricultural workers in the country.

There has been sizeable growth of 70% in the mechanized fishing units and about 200% growth in motorized sector that are technically efficient (over the last 12 years until 2005). However, there has been a downtrend of 43% in the non mechanized units (traditional sector) denoting a gradual phasing out of less efficient units. The improved socio-economic status of fishers is reflected by increase in literacy level, reduction in dropouts, and improvement in

housing type. The proportion of owner operators in marine fisheries declined over the years with the increasing capital requirement for possessing motorized and mechanized fishing units. The fishermen involved in active fishing is more than the absorbing capacity of the fisheries sector leading to disguised unemployment and has led to lower per capita production, increased pressure on fishing, which results in juvenile catch, large level discards, and thus ultimately causing serious threats to resource sustainability and environmental stability. The non-mechanized sector is providing about 33% of the employment in active fishing, yet harvesting hardly 7% of the annual landings, whereas mechanized segment that employs 34% harvests 70% of total catch creating wide inter-sectoral income disparity. The annual per capita catch of fisher folk in mechanized segment is more than twice as those of the per capita catch of the motorized segment and nine times of the per capita catch of the non mechanized (traditional sector) segment clearly signifying growing inter-sectoral disparity in distribution of economic gains. The annual average price per kg of fish at landing centre level varies from Rs 6/- to Rs 175/- for penaeid prawns. Penaeid prawns alone accounted for about 40 % of the gross earning followed by carangids (8%) and cuttle fishes (8%).

average annual per capita earnings of fishing laborer range from Rs. 13,200 for a motorized dingi with bagnet to Rs. 1,27,200 for a mechanized purse seiner. Significant variation is also observed even within groups of crafts namely trawlers, gillnetters, purseseiners, motorized, and traditional crafts. The analysis indicate that there is high incidence of poverty in the coastal rural sector explicitly revealing that majority of these people still could not get much of the benefits of the economic development taken place in our country.

Resource management

During the earlier phases of marine capture fisheries development, the fisheries resources remained under-utilized whereas in the later phases (especially in the 1990s), most of the resources were either fully exploited or over exploited. Consequently the present status of marine fisheries calls for quick implementation of appropriate management measures to sustain the production. However, the marine fisheries sector, which has thus far enjoyed free access to the resources, is not prepared to face stringent restrictive management measures. Hence, regularization of common property rights and introduction of the concept of responsible fishing pose some difficulties.

However Central Marine Fisheries Research Institute has been

undertaking numerous stock assessment studies by way of data collection, modeling and assessment studies which have led to formulation of developing policy guidelines for the sustainability of the fisheries resources. CMFRI by and large provide advisory services to the different state department of fisheries through its wide network of regional centres and research stations. The marine fish stock assessment data on different species landed by different craft gear combination is collected regularly by CMFRI by following the scientific statistical sampling design, stratified multistage random sampling design. Biological data on length, weight, sex, maturity stage, food and feeding etc. are periodically collected from landing centres/Fisheries harbours. All these form input for fish stock assessment studies conducted at regular intervals for commercially important species. Standard stock assessment models/methods are used for arriving at status of stocks of different species. Von Bertalanffy Growth model, Thompson & Bell Yield models, Beverton & Holts Yield per recruit model, Schaefer's model, Ecopath model etc. are few of the important models used for stock assessment. These are accepted models for fish stock assessment throughout the world and the results are used for providing management advisories for sustained production from the coastal waters. Modeling is done by using computer softwares released by FAO such as 'Fisat' LFSA, ELEFAN, Ecopath etc.

Fisheries Regulations and management

Fish production from the EEZ the marine space beyond the 12-nautical mile territorial sea up to 200 nautical miles from the baseline—as well as major fishing harbours, fishing vessel industry, seafood export trade, and marine and inland research and training are on List I, or the Union List, which makes them the responsibility of the Union

Government. The Indian Parliament has exclusive power to make laws with respect to any of the matters enumerated in List I. Items under List I are dealt with by several agencies.

Under the Constitution of India, fisheries within the territorial waters, which extend up to a distance of twelve nautical miles from shore, is a state subject and the primary responsibility of its development rests with the state government.

There is no separate Ministry of Fisheries at the central level, and the two bodies of the Ministry of Agriculture - Department of Animal Husbandry and Dairying and Fisheries and the Indian Council for Agricultural Research- handle fisheries related activities. The responsibility for fisheries and the marine habitat is spread over several agencies and Ministries at the Central and State levels, according to the Seventh Schedule of the Constitution of India, which specifies subjects that are on the Union List, the State List and the Concurrent List. The regulatory measures formulated under the different acts and regulations by and large cover prohibition of exploitation of resources by destructive gears and poison. The other regulatory measures adopted are as follows:-

- i. Restriction of number boats.
- ii. Restriction in the number of fishing gears which exploits juveniles in the backwaters, estuaries and shallow inshore waters.
- iii. Mesh size regulation.
- iv. Minimum legal length for capture
- v. Seasonal ban of fishing
- vi. Restriction of fishing areas
- vii. Protection of endangered species
- viii. Marine protected areas

Mesh size:

At present even though the regulations exist with regard to mesh size with 35 mm as the chord end size, it is not being implemented which leads to indiscriminate fishing and exploitation of juveniles. Participatory approach involving the fisher can lead to the implementation of mesh regulation.

Closed Seasons:

Although seasonal fishing ban is one of many tools available for fisheries management, it is the only instrument which is being diligently followed in the country. Maritime states along the west

and east coast of India are implementing closed season of 45-75 days for mechanized vessels as a corollary to their marine fishing regulation acts. Earlier there was no uniformity of ban period, but after the intervention of the Ministry of Agriculture, Government of India, the ban has been made uniform. There exists a uniform closed seasons along the coast with a period of 45 days each. The period of closed season in the West Coast is during 15 June - 31 July and that for the East Coast is from 15 April to 31 May.

Indian Legal Instruments for Marine Fisheries Regulation:

Over the years the Government has enacted various legal instruments for the sustainability of the fisheries resources and to curtail indiscriminate, illegal and over fishing. The Government also taken care that the different sectoral and intersectoral conflicts may be prevented. Some of the major legal instruments are given below.

1. The Indian Fisheries Act, 1897. Act No. 4 of 1897
2. Marine Fisheries Regulation Act, 1978
3. Comprehensive Marine Fishing Policy, 2004
4. Operation of Deep Sea Fishing Vessels (20 m. OAL and above)
5. Coastal Aquaculture Authority Act, 2005,
6. The Disaster Management Bill, 2005
7. Coastal Aquaculture Authority Act, 2005
8. National Environment Policy
9. The Biological Diversity Act, 2002, Act No 18 of 2003
10. The Wildlife (Protection) Amendment Act, 2002,

11. Coastal Regulation Zone Notification, 1991 (as amended on 26th April 2003)

12. The Environment (Protection) Act, 1986

13. The Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Rules, 1982

14. The Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976, Act No. 80

15. Supreme Court Interim Order: Uniform ban on fishing by mechanized boats and trawlers during the monsoon period

The Union Government, however, also advises States on enactment of legislation for fisheries under their jurisdiction. For example, the Marine Fishing Regulation Act (MFRA) was adapted by all maritime States, from a Bill that the Union Government had prepared and circulated in 1979. There are also several Central Government schemes for fish production and fishers' welfare that are implemented by the State Fisheries Departments.

Other areas related to fisheries, such as the protection of wild animals and forests, including endangered species of wild fauna (for example, whale shark, marine turtles, several species of bivalves) and flora (for example, mangroves), protection of coastal zone and marine biodiversity, and prevention of land-based sources of pollution are on List III, or the Concurrent List, which places the responsibility on both the Union and the State Governments. List III also includes all ports other than major fishing harbours. Both the Indian Parliament and the Legislature of any State have powers to make laws with respect to the items in List III. The Ministry of Environment and Forests (MOEF), at the national level, and the Department of Forests, at the State level, are responsible for the protection of wild animals and forests, and marine biodiversity. Minor fishing ports are under the Ministry of Shipping, at the Centre, and the Port Departments, at the State level.

It is worth mentioning that the 73rd and 74th amendments to the Constitution of India provide panchayats (local governing councils) with the powers to perform functions mentioned in the Eleventh Schedule of the Constitution, in 29 subjects, including fisheries.

Role of the Union Government

In the Union Government, the following ministries play important roles in the fisheries sector—Ministry of Agriculture, Ministry of Commerce and Industry, Ministry of Environment and Forests, Ministry of Food Processing Industries, and Ministry of Defence. The

various departments under the Ministry of Agriculture (Department of Animal Husbandry and Dairying, Department of Agriculture Research and Extension and Department of Agriculture and Co-operation) are responsible for fisheries in the EEZ, survey and assessment of fisheries resources, exploration of resources in EEZ, fisheries development, fisheries technology and fisheries management, in addition to education, research, training and extension, as well as for aquaculture development.

The Planning Commission is responsible for the formulation of the Five-Year Plans for the most effective and balanced utilization and allocation of resources, while the policy and details of specific schemes are dealt with by the respective Ministries and departments.

Code of Conduct for Responsible Fisheries (CCRF) provides ample guidelines in the management of fisheries and aquaculture resources through sustainable development, management, conservation, and socioeconomic upliftment. India is a signatory to the CCRF guidelines. Any policy formulated must take into account the compliance of the CCRF.

Subsidy and Welfare Measures

Central and state governments and various non governmental agencies provide subsidy assistance to culture and capture fisheries sector in India. Government of India provides direct and indirect subsidies to the fisheries sector. Direct subsidies include those given for the purchase of vessels, gears and engines, fuel subsidy and assistance for aquaculture activities. Financial assistance for various welfare schemes, construction of ports,

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household income and preferences within the population. Consumption preferences for the Russian population are: herring, Pollock; mackerel, salmon and trout. Frozen fish is also traditionally popular.

Fish consumption is gradually expanding, and market analysts attribute this growth to four factors:

- Stabilizing consumer disposable income after economic downturn - particularly in Moscow, St. Petersburg, and other

metropolitan areas;

- New consumer preferences based on health, nutrition, and low-fat foods;
- Higher prices of other animal products;
- Greater availability of products, caused by higher investment in processing facilities; and improved distribution channels.

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fishing harbours and fish landing centres and development of post harvest and market infrastructure comes under indirect subsidies. The Marine Product Export Development Authority (MPEDA) provides subsidy assistance for export promotion in culture and capture fisheries sectors and development of infrastructure and market promotion schemes.

The subsidies at the national level is provided by MPEDA, NFDB, NCDC through cooperatives in different states. The various welfare schemes - Interest free loan to fish vending fisherwomen, Fin. assistance to workers Concessions for students to Women prawn peeling, Purchase of work tools and equipments under Tsuanmi, Housing, Group Insurance, Seed capital, Group insurance, UP gradation of pre processing facilities-MPEDA-237.5 LAKH, MOFP-122.5 LAKH for allied workers

During 2008-09 -the total amount of subsidies given by MPEDA for export promotion schemes was -Rs.33.30 crores (0.38 % of the export earnings). The Marine Product Export Development Authority (MPEDA) provides subsidy assistance for export promotion in culture and capture fisheries sectors and development of infrastructure and market promotion

schemes.) Subsidy assistance through various centrally sponsored schemes at Rs.255.81 crores - together with export subsidies account a negligible portion of the fisheries GDP in the country.

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Mid-term Growing in Sea Cage

In the past time, most cage farmers purchase fish seed (2.5-3.0 cm) from local hatcheries and reared them in a small cage (3;Ñ3;Ñ3m) to 9-12 cm. They are then transferred to a larger cage (6;Ñ6;Ñ8m or 10;Ñ10;Ñ10m) and kept rearing them to market size. After many years of field practice, cage farmers find out it would be much easier to manage and maintain the fries if they purchase them with same (grading) size and in good quality from large fry producers. After acclimated to the artificial feed and attaining to market size (9-10 cm), they will be transferred into the cage via live fish carrier (15 tons) or live fish boat (30-50 tons).

Centrally sponsored schemes

Heads	2008-09(in crores)	(11th plan period) 2007-08 to 2011-12
Development of marine fisheries	49.56	636 cr
Bioemtric cards to fishermen	80	
Soft Loan Package for Replacement of Fishing Vessels held in captivity in Pakistan	1	19.56 cr
Development of Inland Fisheries and Aquaculture	26.44	88.70 cr(10th plan)
Welfare of Fishermen	25	180 cr
Data Base and Geographical Information System of the Fisheries Sector	2.47	24.48
NFDB	71.34	1500 cr
Total	255.81	