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SEMINAR ON POTENTIAL MARINE FISHERY RESOURCES

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Central Marine Fisheries Research Institute
(Indian Council of Agricultural Research)
P. B. No. 2704, E. R. G. Road, Cochin-682 031, India
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MANAGEMENT OF POTENTIAL FISHERY RESOURCES

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INTRODUCTION

The marine fishing industry of India, though capable of becoming an important sector in the national output, has been growing at a slow rate, at an annual average rate of 3.4% during the period 1970-1979.

The marine fish landings of India, which averages about 0.62 tonnes per sq. km and which is mostly from the inshore waters up to about 50 m depth, is low, as compared to the estimated total marine fisheries potential of about 4.5 million tonnes in the entire economic zone. The present relatively low production is mainly due to the marine fisheries being not fully exploited in the inshore waters up to about 50 m depth and practically unexploited in the economic zone beyond 50 m depth.

The zone up to 50 m is estimated to be capable of yielding a substantial quantity of fish additionally, while the deepsea fishery resources beyond 50 m depth are of such a potential that the distantly based fishing fleets from USSR, Japan, Taiwan, South Korea, Thailand etc. had found their exploitation economical.

With the introduction of "Territorial waters, Continental shelf, Exclusive Economic Zone and other Maritime Zone Act, 1976", which came into force on the 15 January 1977, India has assumed a great responsibility for the optimum exploitation of living and non-living resources from about 2 million sq. km area.

EXCLUSIVE ECONOMIC ZONE OF INDIA

The extent of the areas of EEZ of India is as follows:

Total area under EEZ off India	... 2 million sq. km.
Off west coast including Lakshadweep	... 8,60,000 sq km. (42%)
Off east coast	... 5,60,000 sq. km. (28%)
Andamans and Nicobar	... 6,00,000 sq. km. (30%)

The fisheries potential of the Indian Ocean is estimated at 14.4 million tonnes, which can be classified into:

(a)	Demersal fishes	... 7.4 million tonnes
(b)	Shoaling pelagic fishes	... 6.0 million tonnes
(c)	Large pelagic fishes	... 0.7 million tonnes
(d)	Crustaceans and squids	... 0.25 million tonnes

Detailed information on the actual fish stocks in the Economic Zone of India is not available; it is, however, estimated that the Economic Zone may support about 4.5 million tonnes of living resources, of which a sizable part could the be commerially exploitable fish stocks.

FISHERY RFSOURCES

The Marine fishery resources of India in the four main regions, in northwest, southwest, southeast and northeast, consist chiefly of:

(1) Major pelagic resources, such as oil sardine, mackerel, seerfish, tuna, and other pelagic resources of regional importance, such as lesser sardine, anchovies and ribbonfishes;

(2) Demersal fishery resources, such as perches, sciaenids, catfishes, polynemids, flatfishes, pomfrets, eels, sharks, rays;

(3) Midwater fishery resources consistituted by bombay duck, silverbellies and horse mackerel;

(4) Crustacean fishery resources, consting of prawns shrimps, lobsters and crabs;

(5) Molluscan fishery resources such as chank, oysters, mussels, clams, squids and cuttlefishes; and

(6) Seaweed resources.

K. M. Joseph (1986) in his observations on potential resources from Indian EEZ has analysed the data and indicated the catch/h in three sectors on the west coast and in three sectors on east coast, as also in Wadge Bank and Gulf of Manner for certain fisheries which are of significance and are abundant. These fisheries are thread fin bream, carangids, perches, catfish mackerel, squids, cuttlefish, big eye and black ruff. It may be, seen that threadfin bream, horse mackerel, catfish, squids and cuttlefish and black ruff are abudant on the west coast, horse mackerel, perches and mackerel on the east coast; thread fin bream and perches on the wadge bank and perches and horsemackerel in the Gulf of Mannar.

Besides, cuttlefish and squids are abundant on the northwest, southwest and southeast regions, including Wadge Bank. These are evident from the landings of the vessels which operated in charter. Unforunately, details of analysis of over 75 pairtrawlers which operated for about 3 years are not yet available. Deepsea lobsters and deepsea prawn are also in large quantities in the southwest and southeast regions.

The ocean resources of India and their estimated potentials are assessed to be as follows:

Tuna and skipjack	—	500,000 to 800,000 t.
Larger tunas	—	150,000 t.
Oceanic sharks	—	1,000,000 t.

The details of hooking rate of these forms, regionwise and specieswise, as gathered from November '83 to October 1985, are given below:

Species	West coast	East cost	Andaman sea	Equatorial sea
Yellow fin	0.72	0.61	0.49	1.05
Big-eye	0.05	—	0.02	0.12
Skipjack	0.07	0.13	0.02	0.12
Albacore	—	—	0.01	—
Marlin	0.13	0.22	0.18	0.70
Pelagic Sharks	1.28	0.75	0.68	0.57
Others	0.18	0.32	0.13	0.10
Total	2.13	2.03	1.53	2.66

Of the many unexploited and underexploited fish stocks in our deepsea and high sea areas, for which no economic assessment of the potential is available and which, as a consequence, have not been developed, such as tunas, squids, cuttlefish, deepsea prawns and lobsters, require attention on a priority basis. These are essentially export items with demand in world markets and are oceanic in distribution. They occur not only in EEZ but even beyond in the international waters. Fishing operations for such fisheries will be important not only for exploitation and protection of EEZ but also for extending the range of fishing into the international areas and to conserve, protect and manage the resources, taking note of the influence of basic ocean characteristics on these resources. The approach and strategy for the development of each of these fisheries will have to be worked at carefully.

TRADITIONAL FISHING

The production from the traditional fishing craft can be increased by improvement in efficiency of the traditional fishing craft and gear in the different regions, increasing the marketing system to provide an increase in the price for producers and incentive for increasing landings, provision of basic amenities and services at landing centres and by covering a group of fishing villages and landing centres by fishery industrial estates.

With timber becoming increasingly scarce and expensive, the introduction of craft with alternative raw materials like FRP, ferrocement, etc. for canoes and craft for surf-beaten coast will have to be taken up. It is necessary to provide craft acceptable to the fishermen at a reasonable cost. There should be promotional effort by waiving excise duty on raw material components and a grant of subsidy for a period of five years.

As the outboard motors will greatly benefit the traditional fishermen to reach the ground quickly and come back on time for the market with quality fish, increasing their productivity, it is necessary to allow import of OBMs freely with complete exemption from import duty. There is no manufacturer of OBMs in this country, though licence was given periodically for the last twenty years. It is necessary to provide an incentive of 50% subsidy for new areas and modernisation of craft.

MECHANISED FISHING

There are about 20,000 mechanised fishing boats in the country, Most of these mechanised vessels have been predominantly concentrating on catches of shrimps. There have been apprehensions that heavy mechanised fishing have caused over-exploitation of shrimp resources. It is considered necessary to control carefully and monitor the entry of additional mechanised boats, except for craft designed for diversified fishing operations and for exploring new areas for efforts other than shrimp trawling.

Immediate steps are required for conservation of shrimp resources in certain areas, both directly and indirectly.

It is necessary to standardise the designs of these new types of fishing craft and their number to rationalise the cost, especially when new raw materials are introduced for the different functions, and the designs should be restricted to the minimum. It is also desirable and necessary to consider development of alternative designs and with alternative raw materials like FRP and ferrocement from competent agencies.

Most of the mechanised boats are engaged essentially in shrimp trawling due to its high value. There should be an endeavour to introduce new technology in the inshore waters by constructing and distributing FRP/ferrocement boats of about 6-9 m size and motorising them for gill nets and about 14-15 m mechanised boats for bull trawling, gillnetting and longlining.

Designs of smaller size can perform the functions of larger size vessels now in operation for shrimp trawlers of 23 metres. A few such craft are operating in Vizag and Gujarat coasts. The economic assessment will bring out comparative saving in fuel. It is necessary to arrive at standardised designs of such craft for construction in different materials. The SDFC fund is only for steel craft and this may be extended to all fishing craft of different materials and for sizes above 15 metres.

APPROACH TO DEVELOPMENT OF DEEPSEA FISHERY AND TUNA FISHERY

The steps required to be taken to achieve immediate results and to streamline the procedures for accelerating the programme of deep sea fishing and tuna fishing are immediate and important, especially in the light of international competition both in exploitation, and in the export markets, in terms of quality, prices, and quantities honouring the commitments and contracts.

The guidelines issued early in 1981 for charter for fishing vessels have not accelerated the programme for commissioning of larger number of vessels difficulties in the procedures laid down for the acquisition of these vessels, frequent shifts in policy, rules and regulations and application of certain criteria on an adhoc basis for reasons not necessarily on merits,as well as certain delays in monitoring.

All the operators of chartered vessels have expressed difficulty in meeting with the procedures involved in obtaining the initial clearance and subsequently at intermediate clearance at ports from the D. G. (Shipping) and Coast Guard. Besides the procedural formalities, there has also been considerable delay in obtaining the clearance at ports for deck personnel causing con-

siderable loss of fishing time and consequent loss in catches and value. The operational phases are also beset with impractical restrictions. The use of telecommunication system from ship to ship and from ship to shore is restricted, especially when vessels of other nations are using satellite communication; it should be under the Fish Terminal Authority; it should be possible to draw up a clear set of guidelines and instructions to the regional and local officers of the D. G. Shipping, Coast Guard, Navy, Customs and Ports—decentralising and delegating powers. Such powers are exercised by them in the case of merchant shipping for national and international carriers and similar procedure may be adopted for the employment of crew, use of equipment and for clearance by customs, port and Coast Guard in the ports.

The objectives for charter of fishing vessels are for identifying the suitable craft and gear for different fisheries in the different areas, training of personnel and providing the experience, a clearer picture of the composition of the catches and the markets for them in export and domestic markets. The experience gained in the operation of these vessels will have to be built into joint venture arrangement and establishment of Indian companies.

The scheme of charter of fishing vessels have to be continued for another 5 years and the question of phasing out this facility for specific types of fishing vessels may be taken up after a period of 3 years and with proper monitoring, acquisition and transmission of the knowledge gained by this experience. It is necessary that charter arrangement be linked up with joint venture programme, especially because of the need for the continued market promotion and development, both for export and domestic markets. The charter policy should lead to joint venture operations.

Based on the status of each fishery, a proper approach and strategy will have to be planned covering technical, financial and administrative support for accelerating its development and taking into consideration the biological, economic, social and political problems posing each fishery.

Besides deepsea fishing for bottom fish, the importance of tuna and squids and cuttlefish has been recognised, but very little has been done so far in encouraging fishing for these fisheries, mainly because of the highly specialised types of fishing, involving heavy capital, organisation and management, It has also not been possible to achieve anything concrete because of the difficulties in securing clear guidelines and policies on tuna fishing and foreign collaboration and in identifying the craft and gear and personnel.

Tuna fishery is an international fishery and an export oriented industry. It is one of the important fisheries in the EEZ, which are contiguous in the international waters and cover the high sea fisheries. The Govt. of India have been taking up the issue of attracting joint venture on tuna fishing from 1965 onwards but with no result till date.

It will be evident that besides Japan and USA, S. Korea and Taiwan have the necessary experience and expertise on tuna fishing operations in the Indian Ocean area and India should take advantage of this situation. Tuna fishing can be carried on in the International waters beyond our EEZ. It is important to consider programmes from these countries having a better knowledge of the fishing grounds with ready experience and attracting them to exploit the tuna fisheries of EEZ and share part of this cost.

A study undertaken by CMFRI in 1982 indicates that India will certainly benefit from foreign expertise in specific areas like Tuna fishing, fleet management, purse seining, longlining, post harvest technology and product development for different export markets.

Tuna fishing, an essentially export oriented operation, requires very careful handling and freezing on board to meet the special markets of Japan and USA. In view of the highly sophisticated nature of operations, it is desirable to consider some more relief than what was extended to the trawler operations by charter, mainly with a view to identify the

economic size of tuna fishing boats. One or two applications for tuna on 100% export oriented basis are facing rough weather due to certain controversies.

The foreign collaborating firms specialised in selective fishing would like to undertake prefeasibility (test) fishing to be convinced of the commercial viability of such ventures and the cost of such test fishing is to be met by the Government and it should be treated as a development cost.

OUTLINE AND STRATEGY

The investigations and studies in EEZ on the living resources are yet to be directed in a systematic manner and the manpower required for collection of data, though available to a limited extent, will have to be increased after suitable training programmes.

Commercial exploitation of the important fisheries in the EEZ and Indian ocean are specialised and capital intensive, and can be effectively initiated only as joint ventures in collaboration with fishing company (s) from foreign country (s) who have the expertise, equipment, capital and market for the resources. Therefore, considerable effort in planning at the national level is needed to generate interest among the Indian entrepreneurs and the foreign firms in this field of development. The most important preparatory study required for this plan of development is an economic assessment of resources potential.

The varying nature of fisheries and fish resources complicates the adoption of a rigid system of economic zones, particularly in areas where resources are shared. The difficult task in such areas is to apportion the rights to resources.

Economics and other data are vital when considering the practicability of developing fisheries on stocks of fish that are at present lightly or not exploited, e. g. tuna, squids. It is not sufficient to know that there is a potential for taking out in hundreds of thousands annually. Development also requires the knowledge of how fish can be caught economically and how they are to be processed and marketed.

The demands for stock assessment advice are increasing. Many stocks especially in the near shore waters are heavily fished and need management. Advice is needed for national planning and management, as well as for increasing production from resources further offshore. The law of the sea places the responsibility on the coastal states to determine the potential of the resources in the EEZ and to manage them. Under the new regime of the sea, operations of foreign vessels under charter, joint venture or licence may be the most suitable way for finding out whether good offshore resources exist, and if so, their distribution and approximate magnitude. The coastal state should apply appropriate controls, e.g. placing observers on board each such vessel to ensure getting full information.

Some work has been done in the country on the economic assessment of a few of the exploited inshore resources, using the actual production and marketing arrangements. As regards the unexploited fish stocks in the deeper and high sea areas of the Indian Economic Zone and the Indian Ocean, no systematic study has been made to obtain the most valuable fishery resources information, which comes from actual fishing and advantageous disposal of catch and which would provide data not only on the quantity and the quality of the resources available in a particular area but also on the fishing cost and the comparative economic return. Economic assessment of the fishery resources potential is very important and requires to be considered on a priority basis in the development plan for establishing joint venture, so as to infuse adequate interest and confidence in the Indian entrepreneur and invite participation from the foreign collaborator towards the commercial exploitation of the deep sea and high sea fisheries and thus the management of these living resources.

A distinction has to be made between pre-exploration surveys, to provide an inital estimate of biomass and potential yield and regular monitoring surveys-carried out at regular intervals to determine changes in the abundance of fish stock and continuous understanding of the fisheries for proper conservation and management, maintaning a balance.

The National Research Institutes may be encouraged to augment their capabilities into the area of projectisation of the available technology from the point of view of fishermen, industry and trade. The commercial use of available technology would involve looking into the aspects of market organisation, financial and economic viability of projects based on the technology developed by such Institutes.

Deepsea fishing is highly capital-intensive industry. It requires sophisticated craft and equipment and high skills and support from the beginning. Efficiency of operation will depend to a great extent on the infrastructure for bunkering, maintenance and repairs and trained personnel for fishing. This calls for a Fishing Terminal Authority.

Deep sea fishing activity calls for efficient management skills with a strong organisational build up to take decisions for a quick turn round of fishing vessels at ports and ensure immediate repairs, proper handling of fish, marketing, efficient use of working capital and get the maximum number of days of fishing by vessels with full utilisation of the catches.

As for the infrastructural facilities required for berthing and handling fishing vessels, major and minor fishing harbours have to be brought to effective use by proper organisation, management and regulations through Fishing Terminal Authority.

The problems of fish marketing are basically related to a combination of certain factors, viz. production characteristics influencing supply and demand and consumption pattern of fish and processed fish of diverse products. The whole concept of marketing of fish is undergoing a change with the declaration of Exclusive Economic Zone by the coastal nations.

NATIONAL POLICY

It is important to evolve a national policy in clear terms and also ensure prompt and effective implementation policy in a practical manner. The policy for charter/joint venture/foreign collaboration for acquisition of fishing vessels, for engagement of foreign technicians and for attracting investments to accelerate the programmes of deepsea fishing should be practical and

realistic and the procedures laid down should be simple and cleared as at one time by one agency/committee representing all interests involving:

a) opportunity for Indian investor to negotiate with minimum risk, credit facilities, deferred payment, share of the catch etc,

b) collaboration for a minimum period of five years with a possible extension for improvement, diversification and expansion

c) investors to be given greater freedom in the choice of the size and type of boats from different countries

d) duty free imports of fishing vessels, gear, equipment– navigational electronic, communication, refrigeration and spare parts and to be spelt out clearly without giving any room for wrong interpretations for restrictive measures; and

e) proper monitoring of the operation for management and conservation.

The main objectives of the early phase of the project for deepsea fishing should cover:

1. Exploitation of deepsea demersal and midwater fishery through charter of fishing vessels to identify the extent of commercial feasibility, suitable types of fishing vessels and equipment and the additional infrastructure required for economically viable operations and subsequently on a fully commercial basis.
2. Developmenet of the processing technology suitable for adding value to fishes for domestic and export markets.

The fisheries resources potential in the EEZ is there, but there has been efforts to exploit these resources but not in a positive direction. It is essential to have a bold national policy for providing the necessary inputs, support and encouragement to this industry from Government for an accelerated development on the lines adopted in most of the countries in the Far East.

ORGANISATION OF FISHERY

The fisheries activities are closely associated with various other agencies and disciplines. The fisheries organisations, and

fisheries research and educational institutions, both Central and State, have direct bearing and involvement. The interplay of the various disciplines is so much that any delay or an impractical step will affect the fishing activity, due to the highly perishable nature of the commodity and the need for maintaining a high quality of the products for reasons of health and competitive nature in export markets.

It is important to evolve a national policy in clear terms and also ensure prompt and effective implementation policy for joint venture/foreign collaboration for the various activities.

The studies by IIM, Ahmedabad, on the survey of marine and inland fishery have stressed the importance of the formation of the National Fisheries Development Board; it has also drawn attention to the many interdependent issues regarding production, consumption and marketing of marine fish.

The National Fisheries Development Board will have wings for:

a) Policy formulation and planning;

b) Developmental activities and support services;

c) Commercial operations;

d) Research and training;

e) Financial support;

f) Legislative action and enforcement; and

g) Administration and accounts.

The various legislative measures are enforced by the different departments in their own ways, encroaching on other activities, rather than a coordinated and cooperative approach to achieve the national objectives. It should be possible to have effective approach coordinated for enforcement by these Departments. It is important and essential to see that any organisation built up does not lead to unhealthy practices, which will be more damaging to the cause than the intentions.

The Board will be represented by the Ministries, States, Industry and Trade. It will have an Executive Committee. There will be separate Committees in each wing.

Table 1 – *Details of the fishery potential in different depth ranges on the two coasts & present production*

Sl. No.	Regions	Fisheries potential of EEZ	Potential yield t/sq. km.			Production in Tonnes		Remarks
			upto 40m	40-160m	160-320m	Current production (1981)	Gap	
1.	Northwest region	1.0 million tonnes	5	4	1.90	500,000	47%	Deeper areas to be exploited - crustacean & cephaloped. 80% of present production is from inshore areas
2.	Southwest region	1.15 million tonnes	*K 8.4 G 5.2	4.4 4.3	2.0 1.9	462,242	50%	60% of the potential to come from deeper waters of EEZ, Pelagic mid water

3.	Southeast region	0.67 million tonnes	Not available	435,000 —	Mid water & demersal stocks, crustaceans & cephalopods
4.	Northeast region	0.74 million	Not available though shrimps trawlers and Fishery Survey vessels are operating		Crustaceans - mid water and demersal.
5.	Andamans & Nicobar	160,000 Tonnes			Tuna 100,000 t Pelagic Shoaling fish 40,000 t;
6.	Lakshadweep	90,000 Tonnes	Tuna – squids and cuttle fish		Demersal stock - 20,000 t.

Table 2 - *Availability of fishery resources in the different regions off the Indian coast*

Sl. No.	Region	Demersal high value %	Demersal low value %	Pelagic M.W. high value %	Pelagic M.W. low value %	Remarks
1.	N.W. region	51%	8%	21%	14%	53% to come from deeper waters.
2.	S. W. region	51%	18%	16%	15%	
3.	S. E. region	52%	—	40%	—	
4.	Andamans & Nicobars	12%	—	63%	25%	100,000 T Tuna and allied fish (25000 T yellow fin and 50,000 T of Skipjack)
5.	N. E. Coast	Though all Shrimps trawlers are based here; the data have not been analysed and made available, as also the results of fishing vessels on charter; which operated from Port Blair.				
6.	Lakshadweep	(Details not available)				

For undertaking all these functions, the NFDB must have a very sound organizational structure, managerial skills and leadership. The required structure, skill, leadership and financial resource needs should be carefully assessed.

REFERENCES

CHIDAMBARAM, K. 1986. Potential resources and possibilities of exploiting the same to increase marine fish production in India - INTERNATIONAL SEMINAR - CIFNET - COCHIN.

DIXITULU, J.V.H. 1986. Integrated Development of fishing in the Indian Exclusive Economic Zone - INTERNATIONAL SEMINAR – CIFNET - COCHIN.

GEORGE, P. C., B. T ANTONY RAJA AND K. C. GEORGE 1977. Fishery resources of the Indian Economic Zone.SEMINAR-INTERNATIONAL FISHERIES PROJECT SILVER JUBILEE - pp: 70-120.

JAMES, P. S. B. R. 1986. The potential Marine Fisheries Resources and possibilities of exploiting the same to increase marine fish production INTERNATIONAL SEMINAR CIFNET – COCHIN.

JOSEPH, K. M. 1986. Some observations on potential fishery resources from the Indian Exclusive Economic Zone (EEZ); INTERNATIONAL - SEMINAR - CIFNET – COCHIN.

PILLAI, V. N. AND R. SATHIRAJAN. Observations on the fishery potentiality of the shelf and slope waters along the South West Coast of India, based on the results of IFP vessels – INTERNATIONAL SEMINAR – CIFNET - COCHIN.

SILAS, E. G. AND P. P. PILLAI 1982. Resources of Tunas and related species and their fisheries in the Indian Ocean. CMFRI - BULLETIN 32; pp. 174.