CMFRI
bulletin 44
Part Three

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NATIONAL SYMPOSIUM ON RESEARCH AND DEVELOPMENT IN MARINE FISHERIES

MANDAPAM CAMP

16-18 September 1987

Papers Presented
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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

Central Marine Fisheries Research Institute
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Bulletins are issued periodically by Central Marine Fisheries Research Institute to interpret current knowledge in the various fields of research on marine fisheries and allied subjects in India.

Published by
Dr. P. S. B. R. JAMES
Director
Central Marine Fisheries Research Institute
E. R. G. Road
Cochin-682 031, India

Limited Circulation

Technical Session VII

MANAGEMENT OF MARINE FISHERIES

Paper 81

MANAGEMENT AND CONSERVATION OF MARINE FISHERY RESOURCES

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ABSTRACT

The marine fisheries resources of India including the EE Zone of about 2 million sq. km are of considerable magnitude. It is estimated that the Economic Zone may support about 4.5 million tonnes. They consist of demersal fishes, shoaling pelagic fishes, large pelagic fishes, crustaceans, cephalopods, sedentary molluscs, seaweeds, etc.

At present, the landings are confined mostly to inshore belt up to 50 metres in depth. Prawn resources are intensively fished. Pelagic fisheries like mackerel and sardine are highly fluctuating in this belt, due possibly to the limitations in operations and to migrating and breeding influences. Bombayducks are intensively fished. There is no fishing effort for cephalopods, tuna and tuna-like fishes worth mentioning, though their potential is rich.

Shell fisheries like oysters, mussels, clams, etc, cannot now be considered as organised fisheries, though there is subsistence fishing in selected regions. Pearl oyster fishery is highly fluctuating.

In view of the different nature of fisheries at different levels and in coastal, off-shore, deep sea and high sea areas, the varying intensities of fishing at different seasons, their behaviour, characteristics and the stocks, they call for different approaches for management. Conservation of the fisheries and the methods to be adopted will also naturally be different. The approach and strategy for each of these fisheries will have to be worked out carefully, taking into consideration the biological, economic, social and political problems, providing each type of fishery. Some of these aspects are highlighted in the paper.

INTRODUCTION

The marine fishing industry of India, though capable of becoming an important sector in the natural output has been growing at a slow rate. The present relatively low production is mainly due to the marine fisheries being not fully exploited in the inshore waters upto about 50m depth and being practically unexploited in the economic zone beyond 50m depth. The zone upto 50m is estimated to be capable of yielding a substantial quantity of fish additionally, while the deep sea fishery resources beyond 50m depth are of such a potential that the distantly based fishing fleets from USSR, Japan, Taiwan, S.Korea, Thailand etc. had found their exploitation in these waters economical.

EXCLUSIVE ECONOMIC ZONE OF INDIA

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

The extent of the areas of EEZ of India is indicated below:

1. The estimated area under
   EEZ of India - 20,00,000 sq.km
2. Area off West Coast including
   Lakshadweep (Lakshadweep 15%)
   - 8,60,000 sq.km (42%)
3. Off East Coast - 5,60,000 sq.km (28%)
4. Andamans and Nicobar Islands
   - 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:

Group	million t
(a) Demersal fishes	7.4
(b) Shoaling pelagic fishes	6.0
(c) Large pelagic fishes	0.7
(d) Crustacean and squids	0.3

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 be commercially exploitable fish stocks.

FISHERY RESOURCES

The marine fishery resource of India in the four main regions in north west, south west, lower east and upper east coasts comprise chiefly of

(1) Major pelagic resources, such as oil sardine, mackerel, seer fish, tuna and other pelagic resources of regional importance, such as lesser sardine, anchovies and ribbon fishes;

(2) Demersal fishery resources, such as perches, sciaenids, cat fishes, polynemids, flat fishes, pomfrets, eels, sharks and rays;

(3) Midwater fishery resources constituted by Bombay duck, silver bellies and horse mackerel;

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

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

(6) Sea weed resources.

The details of the fisheries potential in different depth ranges on both the coasts and the present production in these regions are presented in Tables 1 and 2. Joseph (1984) in his observations on potential resources from Indian EEZ has indicated the catch/hr in three sectors on the west coast and in three sectors on the east coast, as also in Wadge Bank and Gulf of Mannar for certain fisheries, which are of significance and abundance. It will be seen that thread fin bream, horse mackerel, cat fish, squids and cuttle fish and black ruff are abundant on the west coast; horse mackerel, perches, mackerel & squids on the east coast; thread fin bream, perches and squids on the Wadge Bank and perches and horse mackerel in the Gulf of Mannar.

Besides, cuttle fish and squids are abundant on the north west, south west and south east regions, including Wadge Bank. These are evident from the landings of the vessels which operated under charter in the eighties. Details of analyses of over 75 pair-trawlers which operated for about 3 years are not yet available. Deep sea lobsters and deep sea prawns are also present in large quantities in the south west and south east regions.

OCEANIC RESOURCES

The oceanic resources of India and their estimated potential are assessed at:

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

Their catch details are given in Table 3.

Table 3 - Region-wise and species-wise details of hooking rate of tunas as gathered from November '83 to October, 1985

Species	West coast	East coast	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
Sharks	1.28	0.75	0.68	0.57
Others	0.18	0.32	0.13	0.10
Total	2.13	2.03	1.54	2.66

Shrimp Fisheries

There are about 20,000 mechanised fishing boats in the country. Most of these mechanised vessels have been predominantly concentrating on shrimps. There have been apprehensions that heavy mechanised fishing have caused over exploitation of shrimp resources in most areas. Immediate steps both directly and indirectly are required for conservation of shrimp resources in certain areas. It is considered necessary to carefully control and monitor the entry of additional mechanised boats except for crafts designed for diversified fishing operations and for exploring new areas - for efforts other than shrimp trawling. This calls for an urgent study and assessment.

There should be an endeavour to introduce new technoloty in the inshore waters by constructing and distributing FRP/Ferrocement boats of about 6-9m size and motorising them for gill nets and about 14-15m mechanised boats for bull trawling, gill netting and long lining.

Shrimp fishing with trawlers of more than 23m long is being done from Visakhapatnam and the fleet is on the increase. It is desirable to undertake a study on the impact of these vessels on the shrimp fisheries in the N.E. grounds, so as to take suitable restrictive and conservation measures.

Pelagic shoaling fishes

Pelagic fisheries like mackerel and sardines on the southwest coast are highly fluctuating due perhaps to limitations in operations, migrating and breeding influences. Eventhough investigations on these fisheries in the inshore areas

Table 1 - Details of the fishery potential in different depth ranges on the two coasts of India and the present production

Sl. No.	Regions	Fisheries Potential of EEZ x 10^6t	Potential yield t/sq.km upto 40m	40-160m	160-320m	Current Production(t) (1981)	Gap	Remarks
1.	Northwest region	1.0	5	4	1.90	500,000	47%	Deeper areas to be exploited for crustacean & cephalopod. 80% of present production is from inshore areas.
2.	Southwest region	1.15	*K 8.4 G 5.2	4.4 4.3	2.0 1.9	462,242	50%	60% of the potential are from deeper waters of EEZ pelagic/midwater.
3.	Southeast region	0.67	Not available			435,000	-	Midwater & demersal stocks, crustaceans & cephalopod.
4.	Northeast region	0.74	Not available-though Shrimp trawlers and Fishery Survey vessels are operating.					Crustaceans-mid water and demersal.
5.	Andamans & Nicobar	0.16						Tuna 1000,000 t pelagic shoaling fish 40,000 t; demersal stock 20,000 t.
6.	Lakshadweep	0.09	Tuna-Squids and Cuttle fish.					

*K - Kerala; G - Goa

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.	Northwest region	51	8	21	14	53% to come from deeper waters.
2.	Southwest region	51	18	16	15	
3.	Southeast region	52	-	40	-	
4.	Andamans & Nicobar	12	-	63	25	100,000 t tuna and allied fish (25,000 t Yellow fin and 50,000 t of Skipjack)
5.	Northeast coast	Though all shrimp trawlers are based here; the data have not been analysed and made available, as also the results of fishing vessels on charter; which operated earlier from Port Blair.				
6.	Lakshadweep	(Details not available)				

have been undertaken for sometime, factors affecting the stocks remain to be studied in detail to understand the pressure of fishing on the stocks.

APPROACH TO DEVELOPMENT OF DEEP SEA AND HIGH SEA FISHERIES

Of the many unexploited and underexploited fish stocks in our deep sea and high sea areas, for which no economic assessment of the potential is available and which as a consequence, have not been developed, tunas, squids, cuttle fish, deep sea prawns and lobsters require attention on a priority basis. These are essetially export items with demand in world markets and are oceanic in distribution and occur not only in EEZ but even beyond in the international waters. Fishing operations for such fisheries will be important not only for exploitation of EEZ but also to extend 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 out carefully.

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

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 deeep sea fishing for bottom fish, the importance of tuna, squids and cuttle fish has been recognised and very little has been done so far in encouraging fishing for these fisheries, mainly because these require highly specialised types of fishing, involving heavy capital, organisation and management.

INDIAN TUNA FISHERY DEVELOPMENT - PERSPECTIVES AND A MANAGEMENT PLAN

Speaking at an International Conference "Fisheries Development in 2000 A.D" (New Delhi, 1985) Dr.W. Philip Appleyard, in a global context, opined that the marine demersal catches could be increased from 22 million to 37 million tonnes; the marine pelagic catches from 24 million to 50 million tonnes; tuna catches from around 3 million to at least 8 million tonnes and cephalopods from around 1 million to 10 million tonnes. A potential saving of post-harvest losses of 11 million tonnes may also be added to these to exceed 110 million tonnes of fishes needed by 2000 A.D.

A review of the production trend of tunas in recent years for the Indian Ocean and for India has been presented here. The prime requirement in the planning of tuna fishery development is to maintain and improve production targets with good management measures. By 2000 AD it has been proposed that tuna fishery development programme by India should achieve a commercial production target as follows :

Areas	Present Catch(t)	Catch (t) by 1990 (Silas & Pillai 1982)	Catch (t) by 2000 AD
Coastal species (Drift gillnetting, pole and line fishing and other methods of coastal fishing)	19,000	45,000	75,000
Skipjack and young Yellowfin tunas (Purse seining)	-	50,000	1,50,000
Large oceanic tunas (Long lining)	100	20,000	60,000 - 75,000
		1,15,000	2,85,000 - 3,00,000

In order to achieve the above objectives, the major input-output items in the tuna fishery development programme and the sectors through which they could be effectively implemented are;

(i) Augmenting production through improvement in the traditional small scale fishery sector (drift-gillnetting, coastal purse-seining, surface trolling).

(ii) Development and improvement of medium commercial fishery sector (Pole and line fishing and FAD's).

(iii) Development of large scale commercial fishery sector (large scale high sea purse seining and long-lining).

Tuna fishing is an international fishery and an export oriented industry. It is one of the important fisheries in the EEZ and in the contiguous international waters and cover the high seas. The Govt. of India have been trying to attract joint venture in Tuna fishing from 1965 onwards but with no effective result till date.

It is evident that Japan, USA, S.Korea and Taiwan have the necessary experience and expertise of tuna fishing in the Indian Ocean. It is important to consider programmes from these countries having a better knowledge of the fishing grounds and ready experience by sharing part of the cost. Studies undertaken by CMFRI in 1982 and 1985 indicate that India can certainly benefit from foreign expertise in specific areas like tuna fishing, fleet management, purse seining, long lining, post harvest technology and product development for different export markets.

Longlining from within and outside the EEZ

More information is available today on the longline fishery. The new effort is towards developing deep sea longlining. Continuous monitoring of the catch and effort of species taken by the longline fishery is needed. The longline fishery is also known to take the fish in ripe running condition, and restrictions on fishing of spawning stocks will be necessary. In the exploitation of the southern bluefin tuna, some amount of voluntary restrictive measures are already in vogue in the feeding and spawning grounds of this species.

One of the constraints in the proper stock assessment studies is that the catch and effort data by the foreign fleets are only partly available. Information is still wanting on catch and effort by the tuna vessels of the Republic of Korea as is evidenced by the catch statistics published by the FAO.

The collection of information should be standardised to include uniform type of log books for catch and effort data and data on biology and environment for stock assessment. Unless these are instituted under law it will be practically impossible to implement an effective monitoring system. The Government of India has developed a chartering policy which enables seeking collaborative arrangement for tuna fishing. All such arrangements, which are licensed, should take into consideration the use of standardised logs on board and the data collected should be fed into the National Fishery Data Centre.

Modality of controls for mangement plans for the fisheries of the EEZ of the Republic of Maldives has been suggested. The Government of the Republic of Seyschelles by promulgation of a Decree has indicated modalities for issue of licences for tuna longliners within its EEZ. While states may develop unilateral approaches towards licensing fishing from their EEZ by foreign fleets, the need for uniformity in data collection is also important.

Insufficiency of such information hamper estimations of the requirements and such vitally important assessments. While the cost of monitoring and collection of data on different species from the oceanic waters may be an expensive one, special "skipjack survey programmes" could be developed easily for specified regions. International collaboration in such programmes could be encouraged and a concerted effort be initiated on the lines of the South Pacific Commission for a Tuna Development Foundation.

For the proper development and management of the purse seine fishery, environmental parameters such as the thermocline structure and current pattern are pre-requisites and these need mapping. The thermocline structure would have an important role in the development of fishery for surface species and more ocean wide information on this would be needed. Satellite imagery of sea surface characteristics will eventually be an important tool to pinpoint areas of concentration of surface shoaling tunas such as

Skipjack, young Yellowfin and Albacore.

Surveillance

An ocean wide concern for such a resource is necessary. Within the EEZ one has to plan areas of fishing with diverse gears to prevent conflicts of interests, in other words limited entry into the fishery; total allowable catch for species/resources ie. quota; closed seasons or any regulations in fishing gear designs.

Surveillance has to be aimed at finding out the number of fishing vessels which are exploiting the resources and any infringements. Surveillance could be carried out by aerial reconnaissance or by our own fishing, Coast Guard and defence vessels. There is a need for developing such an integrated surveillance system and also a rapid transmission of information so that poaching could be curbed within our EEZ.

THE NEED FOR AN INTERNATIONAL COMMISSION FOR THE CONSERVATION OF INDIAN OCEAN TUNA

Many of the problems connected with the management of the tuna fishery transend national boundaries and EEZ. An effective implementation of monitoring, control and Surveillance cannot be a function of only the Coastal and island states of the Indian Ocean, as foreign countries, particularly Japan, Taiwan and Republic of Korea are also involved. Hence, a major international effort is necessary to see that the fisheries for the coastal and island states are developed and the tuna resources of the Indian Ocean are properly managed without generating conflicts or developing protective/exclusive attitude which may impede long-term policies.

Today's state of affairs permits unlimited entry into the tuna fishery. Added to this, estimates of catch and effort are not always available. Information on biological parameters such as size composition of the catch are wanting. The need for careful monitoring is evident from the experience gained from the expansion of the surface fishery in the Atlantic Ocean in 1960's which resulted in about 40 percent decline in the catches of Yellowfin tuna in the longline fishery (Joseph and Greenough, 1979). Added to this another factor to contend with is the great mobility of the fishing fleets. Hence, it is desirable to have an ocean-wide organisation to effectively collect and disseminate data to help in the management programmes. To achieve this end international cooperation is needed. It will be necessary to estimate the carrying capacity presently available in the Indian Ocean for tuna fishing along with the potential resources that could be tapped at levels of optimum sustainable yield. This would also need a centralised monitoring agency to estimate levels of abundance and effort expended and advise accordingly. The present mandate of the "Indo Pacific Fisheries Council" (IPFC) and "Indian Ocean Fishery Commission"(IOFC) will not be able to fulfill these objectives. As these organisations work under the U.N. There is an anomalous situation for non U.N. members cannot be a party. It is necessary to consider setting up of Tuna Development Foundation and International Commission for the Conservation of Indian Ocean Tuna.

Cephalopod Fishery

Cephalopods, though fished from the seas around India from very early times, the landings were less than 1,400 tonnes until 1972 and have been gradually increasing only from 1973 onwards with the commencement of export of frozen cephalopod products to several countries - a transition from a discarded to a state of elevation. The production rose steeply from 6,776 in 1974 to 29,964 tonnes in 1984. The bulk of the production includes cuttle fishes which account for about 60% and the rest consists of squids and negligible quantities of Octopii.

Cephalopod fishery accounts for 1 to 1.5 million tonnes form all oceans. More than half of the total are taken in the northwest and northeast Pacific and Atlantic oceans. Japanese fishery vessels in 1981 accounted for over 700,000 tonnes and she is also a major consumer. The potential yield of squids & cuttle fish in the Indian Ocean has been estimated at several hundred of thousands of tonnes and the Bay of Bengal accomodates the largest nursery of squid in the Indian Ocean (Gulland, 1973). Voss (1973) estimated the production potential of the region to be 500,000 tonnes. The exploitable production potential from the continental shelf waters is around 1,80,000 tonnes against the present pro-

duction of about 20,000 tonnes.

The Norwegian vessel, R/v. *Dr.Fridtjof nansen*, which surveyed northern Arabian Sea has frequently taken the oceanic squid *Symplectoteuthis oualaniensis* in such quantities as 8 kg at 21°57'N, 62°41'E and 58 kg at 23°37'N, 59°22'E. (Institute of Marine Research, 1975). The Fishery Agency of Japan (1976,1977) and Yamanaka *et al.* (1976) report that one of the most important findings during the cruises of *R.V. Shoyo maru* in the northern Arabian Sea Survey was the occurance of the potential pelagic squid, *Symplectoteuthis oualaniensis* (23-50cm) taken in jig fishing from wide areas in the northern Arabian Sea and central portion of the southern Arabian Sea. Recognizing the importance of cephalopods as a potential fishery resource, which is now not properly exploited, a major research project was initiated at the Central Marine Fisheries Research Institute on the spatial distribution, fisheries and biological aspects of economically important species in different areas along the east and west coasts of India. The present knowledge of the identity, distribution, existing fisheries, results of the exploratory fishing programmes and biological aspects of cephalopods of India are presented comprehensively, in CMFRI Bulletin No. 37 (1985).

The Landings and export of Capholopods in India are given below:-

	1976	1980	1984	1985
1. Total annual landings of cephalaopods in India(t)	10,826	11,335	29,964	NA
2. Annual exports from India (x 1000 Rs)	648	1,603	1,689	4,139

(Source-MPEDA Statistics, 1985)

This effort should be considered as an initiation to a much enhanced national programme to be closely linked with both the artisanal and commercial fisheries sectors. Immense potential exists in these sectors for the development of major fisheries for squids and cuttlefishes. The projects taken up at the Central Marine Fisheries Research Institute should help in improved data acquisition, stock assessment of important species and rapid dissemination of results with proper infrastructure facilities in manpower and vessel facilities. An active cooperative programme on product development and marketing of cephalo pod products, both domestic and export markets, should closely be linked with resources surveys and harvesting. This approach is necessary as the fishery exploitation is to commence now effectively. There is scope for increasing landings by specialised crafts and gear with bases in Veraval, Malpe, Tuticorin, Vizag and Port Blair.

Mussels and oysters

Pearl oyster fishery is characterised by wide fluctuations and is not an annual feature. The reasons attributed for the oysters not reaching fishable size in the natural beds are biological and physical *viz*-growth of *Modiolus* on oyster bed, excessive fish browsing on oysters, sea star migration, natural sand drift and fierce underwater current. As a large number of factors influence the spatfall and their growth on the pearl banks away from the coast, the management becomes difficult but they can be grown in sheltered bays among coral islands.

Mussels are gregarious and sessile and favour damp ledges and platforms rather than vertical edges. They grow on rocks, shingle and flats of mid littoral region. Rainfall, temperature, phyto-plankton production, pollution, predation, excessive despersal to areas where suitable sites do not exist, are some factors influencing the fisheries.

Based on a thorough knowledge of the resources and their biological and environment aspects, the management and conservation measures will have to be formulated (directed) for recommeding a minimum size, closed areas and closed seasons.

Outline and strategy

Commercial exploitation of the important fisheries in the EEZ and Indian Ocean are specialised and capital intensive and can be effectively inititated 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 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 resouces. As regards the unexploited fish stocks in the deeper and high sea areas of the Indian economic zone and the Indian Ocean, estimates of biomass have been used together with estimates of natural mortality and recruitment to derive estimates of potential annual yield.

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

Information on fish stocks in an area is important to enable planning a rational exploitation programme, to know how catches can be expected to respond to any increase or decrease in the fishing effort and the level of effort necessary to achieve the optimum yield. This information would also provide a basis for the management of the resources. But an assessment of the viability of exploiting these resources is equally important as this would form the motivation force for investment and as long as fishing is profitable, the area of exploitation will continue to expand. The demands for stock assessment advice are increasing. Many stocks especially in the near shore waters are heavily fished and therefore need management. Advice is needed for national planning and management, as well as the possibilities of 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 fereign vessels under charter, joint venture or licence may be the most suitable way of finding out whether good offshore resources exist and if so, their distribution and approximate magnitude. The coastal state should apply appropriate controls to ensure getting full information.

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

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 Indian Ocean no systematic study has been made. This is necessary to obtain the most valuable fishery resources information which comes from actual fishing and advantageous disposal of catch. This 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 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.

CONCLUSION

A distinction has to be made between preexploration surveys, to provide and initial estimate of the 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 management and conservation for maintaining a balance. Of the many unexploited/under exploited fish stocks in our deeper and high sea areas, for which no economic assessment of the potential is available and which, as a consequence have not been developed, tunas, squids, cuttle fish, deep sea prawns and lobsters require attention on a priority basis, as

these are essentially export items with demand in the world markets and are oceanic in distribution and occur not only in the EEZ but even beyond in the international seas. Fishing operations for such fisheries will be important not only for exploitation and protection of EEZ but also to extend the range of fishing in the international areas and protect the resources, taking note of the influence of basic ocean characterisation on these resources. The approach and strategy for the development of each of these fisheries will have to be worked out seperately.

In view of the different nature of fisheries at different levels and in coastal, offshore, deepsea and high sea areas, the varying intensities of fishing at different seasons, their behaviour, characteristics and the stocks, they call for different approaches for management and conservation of the fisheries and the methods adopted will also naturally be different. The approach and strategy for each of these fisheries will have to be worked out carefully, taking into consideration the biological, economic, social and political problems, facing each fishery.

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