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Deep-sea fishing in the Exclusive Economic Zone of India, resources, performance and new approaches to development

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Abstract

The Exclusive Economic Zone (EEZ) of India, declared in 1977, placed an onus on the country to exploit fully the inherited rich wealth of living and non-living marine fishery resources. The potential of marine fishery resources of the EEZ was revalidated at 3.92 million t., of which, currently, about 3.20 m.t. are being exploited mainly from the coastal area. The balance of less than one million t. comprising mainly the underexploited and unexploited resources needs to be harvested from the offshore and deep sea regions. Apart from certain conventional resources, the most promising, typical oceanic resources include the tunas and related fishes, oceanic squids and oceanic sharks. Several steps initiated in the past to develop deep-sea fishing have been futile. The recent successful indigenous efforts at deep-sea fishing needs to be encouraged and supported from all angles, by putting an end to foreign invasions for fishing in the Indian EEZ. Large investments in infrastructure and funds are considered unnecessary. A firm and explicit National Fishery Policy, incorporating a specific deep-sea fishing policy to be implemented in a practical manner would usher in the long awaited true deep-sea fishing. A Ministry of Fisheries and a National Fisheries Mission are suggested for better coordination and priority action.

The paper highlights the major resources available in the deep sea, their exploitation and new approaches to achieve the goals for development.

Keywords : Deep-sea, Fishing, EEZ, Resources, Development.

Introduction

It has now been established beyond doubt that there is little scope for enhancement of fish production from the inshore waters.

The total production from this area reached 3.2 m.t. (2008) by continuous and intense exploitation over the past six decades extending fishing operations occasionally even upto 400 m. depth. The catch trends and potential yield estimates for major groups of finfishes, crustaceans and cephalopods are given in Table 1. While the total potential resources of the EEZ estimated earlier varied but the recent revalidation of the potential indicated it to be 3.92 m.t.[1,2]. With reference to this, the balance of the resources available for exploitation would be 0.72 m.t. or less than a million t. Exploratory, experimental and commercial fishing activities through charters, joint ventures, leases, test fishing and letters of permission (LOPs) indicate that these resources are basically constituted by those groups of finfishes, crustaceans and mollusks which are already being exploited from the coastal areas and the typical deep-sea resources comprising deep-sea non-conventional finfishes, prawns, lobsters and oceanic fishes like tunas, marlins, swordfishes, saifishes, sharks and squids. Rao[3] and Vivekanandan[4] gave excellent reviews of deep-sea fisheries in India. The potentional marine fishery resources of India, some aspects of exploratory fishing, deep-sea and oceanic fisheries resources have been dealt with by James *et.al.*[5], Mohammed and Suseelan[6] Oomen Varghese[7,8], Rao and George[9] Silas[10], Silas and Pilla[11] and Swaminath *et.al.*[12].

The declaration of the Exclusive Economic Zone (EEZ) in 1977 was a historic event, providing a great opportunity and challenge to the nation to exploit and utilize the offshore and deep-sea fishery resources. Since then, precious little has been done in this regard. On the other hand, fishing pressure has increased in the coastal area which lead to overcapitalization, overcapacity and over-fishing of some stocks. It was also not possible to exploit deep-sea fishery resources in a short time as it needed larger vessels fully equipped for the purpose, necessary expertise and trained crew and huge capital. In order to protect its sovereign rights to exploit the fishery resources of the EEZ, the county

entered into chartering of vessels, joint ventures, leasing of vessels and test fishing with simultaneous arrangements to become self-sufficient.

Table 1 : Catch trends and potential yield estimates.

Groups	Average catch (t)			Group contribution (%)	Potential yield* (t)
	1985-89	1999-2003	2004-2008		
Elasmobranchs	54027	62799	49831	1.8	71408
Oil sardine	141831	319419	410498	15	294869
Other sardines	76541	101130	91286	3.3	101490
Anchovies	68630	115598	49544	1.8	141817
other Clupeoids	132626	43987	50711	1.9	78932
Bombay duck	93185	105601	114183	4.2	116227
Ribbonfishes	78384	172102	151465	5.5	193670
Carangids	111040	120608	137806	5	238148
Indian Mackerel	123832	128430	149629	5.5	295040
Seerfishes	35171	48905	50983	1.9	61719
Coastal Tunas	34185	50337	49028	1.8	65472
Barracudas	–	17125	17170	0.6	20849
Catfishes	50630	53711	62155	2.3	51255
Eels	6317	9637	10089	0.4	9081
Croakers	102934	141933	140743	5.2	273027
Perches	90083	189093	196138	7.2	226793
Flatfishes	29612	45482	38579	1.4	47304
Silverbellies	60766	53849	63196	2.3	67247

Cont.

Pomfrets	37356	38378	45653	1.7	46088
Penaeid shrimps	143073	196464	185870	6.8	194192
Non-penaeid shrimps	48057	142929	146857	5.4	138711
Stomatopods	–	43663	27901	1.0	120351
Lobster	–	1938	1503	0.1	3874
Cephalopods	39799	107415	121443	4.4	101259
Others	40034	239327	367398	13.5	975594
Total	1598113	549860	2729657	100	3934417

The Maritime Zones of India Act came into force in 1981 which enabled the government to regulate deep-sea fishing activities. The objectives, stated briefly, were to establish the abundance of fishery resources of the EEZ, assess suitable craft and gear for the purpose, enlarge the fleet on ownership basis, transfer of technology of deep-sea fishing and establish domestic and overseas markets for non-conventional species. The area available at different depths in the EEZ is shown in Table 2.

The Resources

The major resources of the deep-sea comprise of underexploited conventional species, unexploited deep-sea finfishes, prawns, lobsters, oceanic tunas and related fishes, oceanic squids and oceanic sharks. The estimated potential of fishery resources in the EEZ (Table 3) are given by Somvanshi[13].

The major pelagic fish resources include anchovies, mackerel carangids, scads, ribbon-fishes, barracudas, tunas and sharks. The anchovies are abundant in the Gulf of Mannar and off the south-

Table 2 : Area available (000 km^2) in different depth (m) strata in the Indian EEZ (after Anon, 2001).

Region	0-100	100-200	200-500	EEZ
Northwest coast ($15^0 - 23^0N$)	196.9	16.5	7.7	
Southwest coast (8^0 - 15^0N)	58.6	10.2	10.1	
West coast	255.5	26.7	17.8	860.0*
Wadge Bank and Gulf of Mannar Southeast coast ($10^0 - 15^0N$)	16.8	5.8	3.3	
Northeast coast ($15^0 - 21^0N$)	33.8	4.8	1.8	
	56.6	14.5	3.9	
East coast	107.2	25.1	9	561.4
A and N Islands	248	10.1	9	596.5
Total	387.5	61.9	35.8	2017.9

Table 3 : Estimated potential (m t) of fishery resources in the Indian EEZ. (after Anon, 1991, 2001, Somvanshi, 2001)

Resource	Depth (m)			Total
	1-50	51-500	501 to EEX	
Demersal	1.28	0.55	–	1.93
Pelagic	1.00	0.74	–	1.74
Oceanic	–	–	0.25	0.25
Total	2.28	1.39	0.25	3.92

west coast. The magnitude of the additional yield was estimated to range from 100 to 150 thousand tones, particularly in the midcontinent shelf region. The erstwhile Pelagic Fisheries Project estimated an average annual biomass of mackerel at 0.27 m.t. off the southwest coast and the Gulf of Mannar. Large stocks of mackerel in the depth Zone 50-200m have also been detected in surveys along the east and west coasts of India. Surveys conducted by FORV Sagar Sampada confirmed the availability of fishable concentrations of mackerel at depths between 70 and 85m along the northeast and centraleast coast, Wadge Bank and centralwest coast[14]. The potential yield for ribbon-fishes in the EEZ was estimated to be around 2,70,000 t, found concentrated along the northwest, centralwest, southwest and northeast coasts with a catch per-unit of effort (CPUE) of 900-1900 kg/hr. Barracudas were found distributed all along the east coast, the Wadge Bank and parts of westcoast, yielding one to five tones/ hr. Comparatively rich grounds were found for the scads along the northeast coast with a maximum CPUE of six tones/ hr. Carangids, including the scads, horse-mackerel and travellys were distributed from 50-125m along the southwest and northeast coast. The estimated potential was 2,00,000 t. Coastal tuna potential was estimated at about 50,000 t of the mainland coast beyond 50m and 1,00,000 t. in the Andaman waters. Pelagic sharks in the 50-200m depth are mostly available in the northwest (1500 t) and southwest (29,00 t) coasts. The estimated potential of pelagic resources in the 51-500m depth region is given in Table 4.

The major demersal fisheries resources in the 51-500 m depth region include the thread-fin bream, lizard fish, catfish, Bull's eye, drift fish and elasmobranchs. The potential yield of perches within the EEZ was estimated to be about 2,50,00 t. Threadfin bream is mainly concentrated along the southwest, centralwest and northwest coasts. The CPUE along different parts of the coast varied from 500 kg - 10 t/hr. Lizard fishes occur all along the west coast but in abundance along the southwest coast and northeast coasts

Table 4 : Estimated potential (000 t) of pelagic resources in 51-500 depth strata. (after Sudarsan et. al., 1990; Anon, 1991, 2001, Somvanshi, 2001)

Group	North-west coast	South-west coast	Lower east coast	Upper east coast	A & N Islands	Laksha-dweep	Total
Lesser sardines	0.0	0.0	0.0	0.0	10.0	0.0	10.0
Anchovies	0.0	0.0	0.0	0.0	1.0	0.0	1.0
Other clupeids	6.2	0.0	0.6	7.5	10.0	5.0	29.3
Indian mackerel	9.0	2.5	0.0	0.0	0.9	49.8	62.2
Coastal and Oceanic Tunas	11.0	67.0	10.0	4.0	100.0	50.0	242.0
Horse mackerel	62.0	0.0	0.8	3.2	0.0	0.0	66.0
Carangids	67.0	73.0	36.0	21.0	1.0	0.0	198.0
Scads	2.9	8.6	2.6	9.3	–	–	23.4
Trevallies	8.3	3.3	2.5	3.0	–	–	17.1
Seerfishes	0.0	0.0	0.0	0.0	5.0	0.0	5.0
Ribbonfishes	113.8	76.3	10.1	16.1	0.0	0.0	216.3
Barracudas	0.8	0.0	1.2	1.2	–	–	3.2
Pelagic sharks	15.0	29.0	4.0	5.0	5.0	0.0	58.0
Others	1.0	2.0	1.0	1.0	2.0	8.0	15.0
Total	297.0	261.7	68.8	71.3	134.9	112.8	946.5

with a CPUE of 100-250 kg/hr. The potential yield of catfish in the EEZ was estimated to be around 3,10,000 t, mainly distributed

along the southwest, centralwest and northeast coasts with higher concentrations, yielding a CPUE of 1-5t/hr. Rich grounds for the Bull,'s eye were found in the Wadge Bank off Goa, and off Andhra Pradesh. The CPUE varied between 800 kg and 4.9 t/hr, with a maximum at 120m. Drift fish was found all along the east and west coasts. A CPUE of 1t/hr was obtained along the northeast coast at depths 62 and 68m. Off Orissa coast, a CPUE of 7.5 t/hr was recorded. Elasmobranchs are mainly harvested from the northwest coast. Other demersal resources available in the 50-200m region are several other perches and croakers. The non-conventional finfish species include *Priacanthus* spp. *Centrolophus niger, Chlorophthalmus spp. Ariomma indica, Neopinnula orientalis, Cubiceps natalensis, Pseneopsis cyanea* and *Lampadena luminosa.* In the deep scattering larger (DSL) biomass, *Vinciguerra* spp. in the northwest and southwest waters of the Indian EEZ and the myctophid, *Benthosema pterotum* in the northwestern Arabian sea were found to be abundant, the latter estimated to be about 100 m.t.[15]. They form an important link in the food web and hence cautious harvesting of such resources is advisable. The estimated potential of demersal resources in the 51-500 m. depth region is shown in Table 5.

The shrimp resources in the depth 51-80 m comprise of two groups, one represented by the larger species found in the coastal waters, namely *Penaeus semisulcatus* and *Metapenaeus monoceros.* The second group consists of smaller varieties of deep water species, *Trachupenaeus* sp., *Solenocera* sp., and *Metapenaeopsis* sp. The exploitable yield was estimated as 3,000 t. each in the northwest and southwest coasts, 1800 t. in the lower east coast and 8000 t. in the upper east coast. The shrimp resources beyond 80 m depth on the continental shelf, shelf edge and upper continental slope are composed of eleven species, five belonging to Pandalidae and six to Pinaeidae. These were located off southwest and southeast coasts at depths 150-375 m. The potential yield of deep-sea prawns within the Indian EEZ was estimated to be about

3,00 t. The vessel Sagar Sampada found fishable concentrations of deep-sea prawns (*Potocaris* sp., *Parapandalus* sp. and *Aristaeus* sp.) along the southwest, centralwest and centraleast coasts between depths of 130 and 770 m. Comparatively rich grounds were located in the Quilon Bank. The CPUE varied from 1 to 5 t/hr. The major deep sea pandalid shrimps landed from southwest coast include *Heterocarpus woodmasoni, H. gibbosus, Plesionika spinipes, Aristeus alcocki, Metapenaepsis andamanensis, Solencera hextii, and Penaeopsis jerryi.*

Table 5 : Estimated potential (000 t) of demersal resources in 51-500 m depth strata.
(after Sudarsan et. al., 1990; Anon, 1991, 2001, Somvanshi, 2001)

Group	North-west coast	South-west coast	Wad-ge Bank	Gulf of Man-nar	Lower east coast	Upper east coast	Total
Threadfin	71.7	25.0	10.1	0.3	0.4	3.1	110.6
breams	42.5	11.0	0.7	0.0	0.2	9.0	63.4
Catfishes	10.5	0.8	0.5	0.2	0.1	0.9	13.0
Elamobranchs	25.5	18.2	0.5	0.2	3.4	7.0	54.8
Bulls eye	9.9	1.2	1.3	0.5	0.3	1.4	14.6
Perches	14.8	4.7	0.5	0.2	0.1	0.3	20.6
Cephalopods	3.5	0.0	0.0	0.0	0.0	0.6	4.1
Ghol	14.6	0.1	0.0	0.0	0.1	3.1	17.9
Other Sciaenids	11.6	7.2	1.7	0.0	0.2	0.2	20.9
Lizard fishes	10.0	0.0	0.0	0.0	0.0	2.0	12.0
Pomfrets	0.0	7.7	0.0	0.0	0.8	0.8	9.3
Blackruff	0.0	4.8	1.0	2.0	0.1	0.3	8.2
Crabs	0.0	1.6	0.6	0.2	0.7	4.0	7.1
Drift fish	0.0	0.0	0.0	0.2	0.6	2.7	3.5
Silverbellies	0.0	3.1	0.0	0.0	0.1	0.1	3.3
Deepsea Prawns	0.0	4.5	0.1	0.7	0.0	0.0	5.3

Deepsea Lobsters Others	55.4	5.7	1.0	0.6	1.0	7.6	71.3
Total	270.0	95.6	18.0	5.1	8.1	43.1	439.9

The sustainable potential for the deep-sea lobster, *Puerulus sewelli* has been estimated at 8000 t for the southwest coast and 1200 t. for the southeast coast. Fishable concentrations of deep-sea lobster were found off the Kerala coast at depths between 200 and 400 m, with maximum abundance between 180 and 270 m. The CPUE varied from 125 to 250 kg/ hr.

Oceanic Tunas

The surveys conducted by the Fishery Survey of India (FSI) by longlines in the oceanic region have shown that yellowfin and skipjack tunas are abundant in the Indian EEZ. The estimated potential of tunas is 209, 400-242,000[2,13]. Of this, the potential of yellowfin is 90,000t. At Visakhapatanam, the Central Marine Fisheries Research Institute (CMFRI) survey indicated that traditional fishermen landed 1500 t of yellowfin in 2006-07. About 1500-2000 small non mechanised and motorized units from different centres along the Andhra Pradesh coast landed an estimated quantity of 6,500 t. Large sized yellowfin, more than 80 cm are fished from oceanic regions and small ones from coastal areas. This lead to conversion of some shrimp trawlers, OAL 22-24 m into tuna longliners to fish for 6 to 8 days in the central and southern Bay of Bengal in 2005. In each trip they landed an average of 40-50 t of yellowfin tuna. For two years they landed about 4,000 t of yellowfin tuna, two third of it was exported as sashimi-grade and the rest converted into loins and fillets. This could be considered the first exclusively India-owned successful oceanic fishing operation. The approximate annual estimated total landings by these trawlers and by the traditional fishermen was 8500 t from the central and southern Bay of Bengal during 2006 and 2007. The great demand for the yellowfin tuna in international

market encouraged further conversion of trawlers into longliners along both the coasts of India in 2007 and 2008. The Marine Products Export Development Authority (MPEDA) has financed and subsidized for conversion of trawlers into longliners. With this oceanic fishing seems to be set for further expansion in the country to exploit tuna potential, especially that of yellowfin. The huge potential of tunas in the Andaman and Nicobar islands and the Lakshadweep has also to be suitably exploited by longliners, purse seines and pole and line. There is need to develop oceanic fishing bases at both the island groups, including for processing, product development and airlifting of catches and products for marketing and export.

Oceanic sharks:

Shark fisheries in the EEZ were studied by Vivekanandan and Sivaraj[16]. The Oceanic sharks are underexploited in the seas around India. Exploratory surveys indicated sharks constitute 53% by number in tuna longliners. In the Andaman seas, FSI survey indicated occurrence of pelagic oceanic sharks. In 1989-1998 two survey vessels indicated an average hooking rate of 1.1% for sharks and aggregate hooking rate of 2.3%. The hooking rate varied from 0.6% to 1.7% in different months. Longliner survey in 2005 in the oceanic region of Bay of Bengal recorded the occurrence of *Carcharhinus longimanus, C. limbatus, C. dussumieri, C. melanopterus, C. sorrah, C. macloti, C. albimarginatus, Prionace glauca, Galeocerda cuvier, Alopias vulpinus, A.pelagicus, Isurus oxyrinchus, Sphyrna lewini* and *S.zygaena.* Larger mehanished vessels, OAL 15-18 m. operate gillnets and longlines extending to oceanic waters. In recent years, the CMFRI recorded several oceanic sharks not landed two decades ago. The dominant species were *Sphyrna lewini* (27.1%) *Carcharhinus limbatus* (24.5%), *Rhizoprionodon acutus* (15.4%) and *C.sorrah* (11.1%). Very large oceanic sharks include

C.limbatus, Alopias superciliosus, Echinorhinus brucus, S.lewini, Nebrius ferrugineus, Negaprion acutidens, Etmopterus Lucifer.

The shark fishery seems to be poised to shift from artisanal coastal fishery to the oceanic fishery using gillnets and hooks and lines operated from mechanized craft. This resulted in increased catch and reduction of coastal stocks. The potential yield of sharks in the continental shelf has been estimated at 45,064 t and 26, 200 t beyond the shelf[1,2], the total estimated potential being 71,264 t. Since the current annual average catch is only 36,021 t, there is much scope to increase the catch of oceanic pelagic sharks.

Sharks are exploited by traditional fishermen using catamaran with handlines, motorized canoes with bottom set gillnets and hooks and lines, motorized wooden and FRP catamarans, by traditional longlines and bottom longlining and pelagic lines from mechanized boats especially by the fishermen of Thoothoor, Kanyakumari Dt, Tamil Nadu. They operate bottom longlines in depths between 100 and 300 m but recently in depths more than 1000 m with pelagic lines. They have also diversified to large mesh drift gillnetting for seer fish, hand lines for perches, and longlines for yellowfin. Approximately 15,000 to 20,000 fishermen depend exclusively on shark fishing in India[17].

Oceanic Squids:

The Arabian sea is considered to be one of the richest regions for the oceanic purple back flying squid, *Sthenoteuthis ovalaniensis*[18] where the squid biomass reaches several tones per km^2 but commercial fishing activity for this resource is still low. There seems to be good prospect to develop a commercial fishery with hooks and lines or by squid jigging although preliminary experiments and trials proved futile. However, their abundance in space and time, their life-history, information on suitable craft and gear, economics of squid jigging are yet to be investigated. Similarly, production, processing, marketing and consumer preference for oceanic squids are yet to be investigated.

Bycatch and discards

Even though small quantities of unintended catch composed of less valuable species, juveniles of high priced species and non-edible component of a variety of biota are landed in small scale coastal fisheries, they have not posed a serious problem since greater part of it is landed and utilized in fresh or processed form. Discards in India include about 300 species. Rao[3] estimated the discards of all fleets at Vishakhapatnam in 1988-89 to be 32,421 t. However, the bycatch causes concern in large shrimp trawls, tuna longliners and industrial fisheries. More than 40 species of fishes, marine mammals, pelagic oceanic sharks, rainbow runners, dolphin fishes, trigger fishes, wahoo, mobulas, mantas, mackerel, scad, barracuda, turtles and others have been reported from the bycatches world over. In 1994, the FAO estimated the average annual discards all over the world at 27m.t.[3] Bycatch reduction devices (BRDs) and turtle excluder devices (TRDs) are also being used in the country but fishermen do not welcome these contrivances as they find them cumbersome, reduce the normal catches, damage the gears and cause financial losses. With the tempo of deep-sea fishing increasing in India, bycatch and discards have to be saved as it goes a long way in the conservation of fisheries resources. Recently (the Hindu, dt 29.10.2011) the EU fisheries chief, Maria Damanaki, suggested the unwanted fish (discards and low value fish) to be given to the poor from European waters as part of a proposed new deal with fishermen (with some compensation), thus arriving at ending the wastful practice of discarding edible fish at sea. India should emulate such methods to provide nutritional benefits to the poor by saving such fish.

Performance

During the IVth five year plan (1969-74) period, steps have been initiated by the Govt. of India for developing deep-sea fishing

through import of trawlers, indigenous construction of trawlers, strengthening of infrastructure facilities, expansion of export trade and intensification of exploratory fishery surveys and research. Exploration of fishery resources in the deep-sea regions continued in the Vth (1974-79) and VIth (1980-85) Five year plans aimed at establishing commercial feasibility of deep sea fishing. These surveys were essentially conducted by the Fishery Survey of India (FSI), New India Fisheries Company, Indo-Norwegian Project (NP), Polish Vessel MT Murena, Pelagic Fisheries project (PFP). FORV Sagar Sampada, Central Institute of Fisheries Navigation Engineering Training (CIFNET), University research vessels, and West Bengal Cutters for about 50 years, using various types of fishing gears. The vessels of these organizations, covered the northwest, southwest, southeast, northeast, Andaman and Nicobar islands and the Lakshadweep. These surveys broadly indicated the possibility of commercial fishing in offshore and deep sea areas. The Quilon Bank and the Wadge Bank have been found to be especially rich in a variety of finfishes and shellfishes.

Charter fishing fleets

In the VIIth Five Year Plan, completed in 1990, the development of deep sea fishing received further momentum, particularly under the charter policy of 1989. Deep sea fishing operations, apart from large vessels, required several infrastructural and technological facilities and financial investments. Under the charter fishing policy 1981, a total of 187 vessels (above 23 m. OAL) were introduced. Charter policy was revised in 1986 and 1989, but the industry faced several constraints for operating the vessels. The vessels operated longliners, stern trawlers and pair trawlers but full information on their operations was not forthcoming. In the longliners (1985-1995) yellowfin tuna dominated the catches. Others were big eye, skipjack, marlins, swordfish, sailfish and sharks. The stern trawlers operated during 1985-1995 landed 13 groups of demersal fishes which included the

threadfin breams, ribbonfishes, snappers, emperors, croakers, Bull's eye, lizardfish, mackerel, elasmobrachs, reef cod, travelly, seabream, perches, shrimps and cephalopods. Pair trawlers (1985-1997) landed similar catches as stern trawlers. Since the charter policy in general failed to deliver the expected benefits, fishermen opposed operation of foreign fishing vessels. The government closed down the scheme in 1993.

Joint ventures

These arrangements with foreign fishing companies became popular with the declaration of the EEZ, for sharing costs of vessels, availing services of the technicians and for building the industry. Since the country had not developed all the necessary facilities for exploitation of the fisheries resources, joint ventures were expected to fill this void. If the country is unable to develop its own fleet to harvest the resources of the EEZ and utilize them, under the United Nations Conference on the Law of the Sea (UNCLOS), littoral countries would be obliged to share the resources with other countries. Under the programme there were several advantages for the foreign companies and disadvantages for the host country.

The joint ventures had to go through cumbersome procedures to get the clearances from the government for their operations. Several foreign countries entered joint ventures but had to close down due to several problems like delays in approvals, losses in operation, imposition of new clauses, revised procedures, labour and crew problems, rise in fuel prices, inadequate harbour infrastructure, global fall in prices, handling of matters by different ministries and departments etc.

Deep-sea fishing policy

A new deep-sea fishing policy was introduced in 1991. Three new schemes, leasing, test fishing and joint ventures were permitted. Under long term leasing, foreign vessels, new or old

were permitted. Under test fishing, trawling for deep sea prawns and lobsters, longlining and purse seining for tunas and squid jigging and hand lining were permitted with certain conditions. Joint ventures were meant for trawling for deep-sea lobsters, deep-sea prawns, longlining and purse seining for tuna and jigging and hand lining for squids.

Traditional fishermen and others criticized the deep sea fishing policy since 1994 stating that it has become detrimental to their interests and livelihoods. The government appointed the Murari committee to review the deep sea fishing activities. The 21 recommendations made by the committee were accepted by the government with certain modifications but they still remain unimplemented. However, the government rescinded all earlier policies on deep-sea fishing and closed all sorts of charter of foreign fishing vessels. Out of a total of 187 vessels introduced, only 45 are reported to be operating at present.

Late in 2002, the government gave new guidelines for deep-sea fishing with focus on registration status of vessels. Foreign companies can register as Indian companies and fly Indian flags, and also operate in other countries simultaneously, thus legally, flying different flags ('flag of convenience'). The advantages expected were increase in Indian fleet and earning of foreign exchange. The new guidelines issued are more or less same as for charters and joint ventures. The draft National Fisheries Policy does not cover several important aspects and is too general to be effective. There was no decision to declare the policy or implement it[3]. However, a comprehensive marine fisheries policy was declared in November 2004. Major provisions under this policy include introduction of more resource specific vessels, specially for tuna long lining and squid jigging, development of infrastructure for deep sea fishing, control of fishing activities, incentives for wholly Indian owned vessels, conservation of resources, code of conduct for responsible fishing, monitoring, control and surveillance, legal frame work for operation of foreign

vessels, international laws and conventions, human resource development, new generation of fishing vessels for fishing in the EEZ, joint ventures for harvest and post-harvest operations to be based in Andamans and Lakshadweep, skilled manpower and specialized requirements.

However, the policy does not touch upon certain very important aspects like the establishment of a separate Ministry of Fisheries for effective coordination of all activities, incentives for deep-sea fishing, specific number of vessels to be introduced, integrated research, unsuitable regulations, correct perspectives and knowledge for advancement of deep-sea fishing, quicker decisions and more teeth and functional autonomy for the National Fisheries Development Board (NFDB). Certain new guidelines were issued but in essence, they are nothing new. The do not represent India's new deep-sea fishing policy which was under development since 1996[3].

New approaches for development

It is common knowledge that even after declaring the EEZ in 1977, the country had not developed the basic requirements to usher in the deep-sea fishing to cover the entire EEZ. In the meanwhile, foreign countries had taken full advantage to plunder the fish wealth of our country to the detriment of local fishermen. Thirty seven years is not a short period to atleast develop the industry in some segments. Adequate fishery surveys have been conducted by several competent organizations in the country but they too lack in pin-pointing the resources and adequately demonstrate the commercial viability of the ventures. The fishing industry has also been shy to diversify fishing operations away from shrimp fishing for obvious reasons. It was only after about 50 years of intense shrimp fishing in the coastal areas that some thinking dawned to exploit other resources, though the emphasis was again on the limited deep-sea prawns and lobsters. The less valuable deep-sea resources were not cared for. As briefly outlined

earlier, the government initiated several steps to develop deep-sea fishing, though not on the basis of indigenous capabilities. To develop the necessary infrastructure and technical know-how it would have taken a long time. But the short cut policies have also not yielded the desired results and the foreign companies appear to have made good of the situation. Indigenisation of the efforts bogged down, especially due to stringent financial rules and regulations, inconsistent policies and impractical decisions which are often inordinately delayed.

There has been no information on the economics of offshore and deep-sea fishing operations based on either commercial operations or simulated operations. Results of some deep-sea fishing operations by private entrepreneurs and some chartered vessels did indicate the economic feasibility. However, it is time for the industry to diversify their fishing activities. It is also essential to demonstrate and provide necessary information on the technical and economic viability of deep-sea fishing on the basis of actual data to completely ward off the apprehensions of the entrepreneurs. Commercial type of fishing using bottom, mid-water and pelagic trawls, gill netting, purse seining, longlining and squid jigging, linked with processing, product development and marketing should be undertaken to obtain exclusively the economics of offshore/ deep-sea fishing operations along the mainland coast and around the island groups.

Efforts so far made on all fronts to survey and estimate the deep-sea resources indicated that except for a few of them, majority are composed of non-conventional low value species. Exploratory, experimental and commercial fishing for the high value deep-sea prawns and lobsters off the southwest and southeast coasts indicated that they cannot withstand intense fishing for long. The option therefore, should be to determine the specific number and type of vessels to be built in Indian shipyards and duration of fishing, including the quantities permissible. Indigenous vessels and indigenous fishermen only should be allowed to harvest the

resources. For this purpose, the vessels have to be equipped with all modern equipments and communication facilities. The fishermen have to be ensured safety at sea. Similarly, experimental and simulated commercial fishing for squids by jigging did not prove successful. All the same, since the Arabian sea has been indentified as the most promising region to develop a fishery for these squids, further efforts are needed to harvest these resources rationally. Specific training for indigenous fishermen and technicians should be arranged locally, and if necessary, in other countries for manning large vessels and operating different types of gear. The truly deep water, queer finfishes, apparently of low value, including the bulk quantities of myctophids available in the Arabian sea, have to be harvested and converted into suitable products for domestic and export markets. The oceanic fisheries resources of high commercial value are the tunas and related fishes and the oceanic sharks. Several foreign countries have been taking full advantage to harvest these resources from the Indian EEZ through all the schemes operated so far. The infrastructure is badly lacking for harvesting the oceanic resources, for which priority has to be accorded for development. Onshore landing facilities at fishing harbours providing all necessary facilities for supplies, repairs, processing, preservation, packaging, marketing and export are a dire need. At sea, facilities for collecting, preserving, processing and air-lifting the catches and products need immediate development. Location, tracking and monitoring of schools of fish using modern remote sensing, satellite imageries, GPS etc. have to be facilitated. Tuna fishing has to be modernised and conducted scientifically with oceanographic observations on the occurrence of thermocline and thermal fonts.

The ingenuity of fishermen of Andhra Pradesh and Tamil Nadu and the entrepreneurs to improvise local craft and gear for oceanic fishing for tunas and oceanic sharks in recent years has to be appreciated, fully supported and encouraged from all angles. Efforts are needed to financially support the conversion of shrimp

trawlers, 22-24 m. OAL to longliners for oceanic fishing. Bottom longlining and pelagic longlining, as demonstrated by the Tamil Nadu fishermen for exploiting the deep-sea sharks should be widely employed. For harvesting both these resources, the number, type and power of vessels have to be assessed and the fleets deployed at strategic locations along the main land coast and oceanic islands. The economic and speedy way to harvest these resources could also thwart foreign interference at high seas for poaching and plundering the national wealth.

India remained a coastal fishing nation, inspite of establishing sovereign rights for fishing in the expansive EEZ. Exploitation of deep sea fishery resources has never been consistently successful in India till recently when indigenous fishermen and entrepreneurs had shown the way. All indications are, only less than one million t. of fishery resources would be available for harvesting from the offshore/ deep-sea regions. It is the author's conviction that huge investments on building large vessels and other infrastructure would not be necessary for exploiting the identified deep-sea resources. Our own fishermen and industry who are quite capable should be empowered to do this. Government incentives and financial support on easy terms would be required. Suitable bases for fishing and processing with all necessary infrastructure have to be established along both the coasts and in the oceanic islands.

Fish marketing is one of the least developed and poorly organized sectors in India. Strong domestic and export markets have to be organized. Other than the tunas, squids, deep-sea prawns and lobsters, the bulk of the deep-sea catch would be composed of non-conventional finfishes not preferred by consumers. For such resources, a price support scheme would be necessary. The NFDB should be made responsible for procurement and for implementing the price support scheme. The export markets so far established by the MPEDA deal mostly with shrimps and lobsters. Suitable markets for deepsea finfishes and their products have to be identified. The success of deep-sea

fishing depends on how best the domestic and export markets are developed, promoted and expanded.

Deep-sea fishing is a multi disciplinary subject and necessitates the input of several activities in an integrated manner for its development. Any impractical step could affect its development. It should be based on an explicit national policy for prompt and effective implementation. In consideration of all the constraints identified and experiences gained so far, the sector should be developed on a functional system and mission-oriented zeal. The realities of augmenting the future protein food for our growing population perhaps lie in this regime.

It is not only the deep-sea fishing segment that needs coordinated action but the entire fisheries sector of the country whose various functions are now handled by a multitude of ministries, departments and organizations. It would be in the interest of the fisheries sector, its growth and development that all its functions are bought under the umbrella of a Ministry of Fisheries and priority developmental projects under a National Fisheries Mission for speedy results.

Conclusions

As against the estimated fishery potential of 3.92 million t. from the Indian EEZ, a total of about 3.20 million t. of fish are produced at present. The balance of about 0.72 m.t. or less than one m.t. only would be available for harvesting from the offshore/ deep-sea regions.

The deep sea resources are essentially constituted by tunas and related fishes, oceanic sharks, oceanic squids, deep sea prawns, lobster and several groups of non-conventional fin fishes of low value.

Though oceanic squid resources are known to be abundant in the seas around India, especially in the Arabian Sea, precise resource in formation and effective methods of capture are yet

unknown. Therefore, detailed studies have to be conducted in this regard before any attempts are made for their exploitation.

Of the promising resources, tunas and oceanic sharks have to be exploited on priority basis. Deep sea prawns and lobsters which are rather limited and have restricted distribution, can be reasonably harvested very cautiously under a quota system. The deep sea fishes have to be converted to value added products.

Recent fishing results by fishermen of Andhra Pradesh and Tamil Nadu for tuna and oceanic sharks respectively indicate these resources can be harvested by local fishermen even with traditional craft and gear from the far sea up to a depth of 1000 m.

The traditional fishing success triggered conversion of some existing shrimp trawlers (OAL 22-24 m) to tuna longliners with chilling facilities by Indian entrepreneurs for ocean fishing which, if encouraged, could lead to the development of a deep sea fishing fleet purely by indigenous efforts. For constructing new and suitable vessels, if required, the Indian shipyards have to be activated specially for this purpose. Well equipped, modified/ new fishing vessels constructed within the country and operated by trained crew and empowered local fishermen should suffice to harvest the balance fishery resources from the deep sea.

The Andaman and Nicobar Islands and Lakshadweep have to be developed as ideal ocean fishing bases with supporting infrastructure and facilities for processing value addition, packaging, marketing and airlifting the catches and products to domestic and export markets.

In the interest of developing indigenous capability for deep sea fishing, all plans of permitting and encouraging foreign fishing vessels access to the Indian EEZ should be totally terminated. The imbroglio that resulted due to earlier policies is not worth going through with the cumbersome, unrealistic, and impractical procedures and heavy investments. Indian fishermen, entrepreneurs

and the industry would be able to deliver the goods, if their requirements are speedily met.

For speedy development of required infrastructure including vessels, gear, processing, marketing and harbor facilities, a separate funding agency exclusively for deep sea fishing would be necessary.

Since all the efforts made earlier to develop deep sea fishing mostly failed without yielding the desired results, alternate and new approaches have to be based on hard ground realities. The bureaucratic tangles involved have to be dispensed with for smooth development.

For better coordination and functional autonomy, all activities of the fisheries sector are suggested to be brought under the umbrella of a Ministry of Fisheries and a National Fisheries Mission. A comprehensive national Fisheries Policy and a National Fisheries Development Plan are essential.

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