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Present Status and Future Exploitation Strategies for Tuna Fishing in Indian EEZ

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Tuna and tuna like fishery resources are underexploited in coastal waters as well as in Indian EEZ. Fishing regulations in certain areas and inadequacy of suitable gear to be employed in a significant and dedicated manner are cited as reasons for the present situation. This communication traces the present status of the fishery, the gear employed at present, the fishing season, the future fishing effort and strategies for optimum exploitation of this valuable stock which at present is exploited to the level of only 1.7% of the available coastal resources, leaving the oceanic stock totally unexploited.

Key words: Production trend, species composition, future effort, exploitation strategies

Tunas are a major constituent of the pelagic oceanic fisheries in the tropical and sub-tropical seas around the world. Most of them are migratory and their movements are related to the shifting features of the oceanic environments and hence are rightly called as 'Straddling stock'. As the fishing grounds are generally beyond the territorial waters, different nations exploit the resources from the same productive regions. More than 95% of the world's tuna like fish harvested commercially are caught using either one of the following three methods viz. pole and line fishing, purse-seining or long lining.

Pole and line fishing, popular in all the tropical and temperate oceans of the world, accounts for more than 40% of the world catch of the principal market species, a category which includes six species of 'true' tuna viz. Skipjack, Yellow fin, Big eye, Albacore, northern blue fin and southern blue fin tuna. Purse-seining, also a surface fishery, depends on the tendency of these species to form 'schools' and has become an important fishing method accounting for 30% while long lining and other miscellaneous fishing techniques contributing to the rest of the world tuna catch.

Tuna resources in Indian EEZ are estimated to have an annual potential yield of 50,000 t along the main land coast (beyond 50.0m depth), 50,000t from Lakshadweep archipelago and 1,00,000 t from Andaman waters apart from 2,00,000 t from oceanic waters. The total harvested resource, at present, is only round 3500 t leaving a big gap with that of the available coastal resources of over 2,00,000 t while another 0.2 million tons of estimated oceanic resources are obviously left totally unexploited.

Tuna fishing in our country is in its nascent stage and receives negligible inputs from the industrial sector probably due to the lack of information at their disposal with regard to the methodologies to be employed or due to the prohibitive cost of exclusive craft and gadgets required for the purpose. There are positive indications of the resource availability and rich tuna grounds in the Indian EEZ and the contiguous high seas. Judicious exploitation of these resources is an absolute necessity to improve economic viability and optimum utilization of Indian deep sea fishing fleet.

Tuna fishing comprises of *Euthynnus affinis, Auxis thazard, A. rochei, Thunnus tonggol* and *Sarda orientalis* in the coastal waters, in the order of abundance. Oceanic species are *Thunnus albacores* (Yellow fin) *T.*

obesus (Big eye), *Katsuwonus pelamis*, *T. alalunga* (Albacore) and the main fishing gear employed for their capture is long line. The predominant species caught by pole and line and troll line in Lakshadweep are skipjack and young ones of yellow fin tuna.

Even though marked fluctuations could be observed, a progressive increase could be recorded in tuna landing during the period from 1965 to 1996. Drift nets contributed 38.5% of the total catch realized. The share of hook and line was 19.8%, Pole and line 16.5%, Trawls 2.5%, Purse-seine 1% and the rest by other fishing efforts. From 1981 to 1996, on an average, 77.6% of the catch of tuna obtained was from west coast, 16.8% from East coast, 5.15% from Lakshadweep and 0.5% from Andaman and Nicobar Islands.

In West coast, Kerala ranked first (56.8%) followed by Gujarat (19.2%), Karnataka (11.6%), Maharashtra (10.2%) and Goa (2.2%). East coast production was in the following order. Tamil Nadu (69.0%), Andhra Pradesh (24.5%), Pondichery (3.0%), Orissa (3.0%) and West Bengal (0.5%).

In Lakshadweep, tuna landings showed a steady increase from 1980 to 1987, remained more or less steady till 1993, with an all time peak of 11566 t in 1994. The main catch constituents being Skipjack (78%) followed by young ones of Yellow fin (12%) and the rest by *E. affinis*, *A. thazard* and *Cymnosarda unicolor* (Dog tooth tuna) (Anon, 2000).

Pre-monsoon and monsoon periods along the South West Coast and post-monsoon along the Maharashtra and Gujarat Coasts are productive, giving a clean indication of a seasonal shift in their concentration. In Lakshadweep, maximum productivity could be observed during December to February. Changed pattern of mechanization has also resulted in continued operation during monsoon.

In traditional grounds, tuna stocks are exploited to the optimum level. *T. tonggol* and *T. albacares* are predominantly caught by drift nets in the North West Coast, due to expansion in the area of operation brought about by extensive mechanization of fishing craft.

A round table conference of over 30 experts from Ministry of Agriculture, MPEDA and AIFI was held in June 1999 at Visakhapatnam and recommended conversion of 30% of the existing fleet of Indian trawlers of 23-27m OAL for undertaking monofilament tuna long lining. Mexican type deep sea shrimp trawlers have less freeboard height and are most suitable for conversion in to long liner and gill netters. Suitable alteration in the deck with an addition of line hauler or net drum will ease the operational part.

The Govt. of India while accepting the recommendation in principle, rightly decided to assist in the conversion of two deep sea fishing trawlers – one from the Govt. sector and one from the Industry's fleet to initially conduct the feasibility survey with the guidance from a fishing expert who could also oversee conversion modification. On establishing a methodology for effective capture, the fishing fleet can be increased to the suggested level of 30 in number, for the systematic harvest of the rich tuna resources and to counteract the activities of foreign vessels operating in Indian EEZ, particularly around A & N Islands.

Motorization of small drift gill netters will have to be speeded up to enable the small scale sector to expand the operation for higher yields as exemplified along the South West Coast. Initiation of Purse-seining in the Indian EEZ is also worth a try. Purse-seining in the Western Indian Ocean and the resultant catch of Yellow fin and Skipjack tuna in the tropical Indian Ocean is encouraging. Successful seasons are November to May in Lakshadweep and March to May in A & N Islands. Under the

circumstances, employment of10-20purse-seiners of 59.0 to 72.0 OAL (industrial type) with annual capacity of 6000 t each and another 20 purse-seiners with annual capacity of 4000 t would lead to production of 1,10,000 t from the oceanic waters of Indian EEZ and contiguous areas which will account for 55% of the annual potential yield (Pillai & Pillai, 1998).

In view of the strategic importance of insular areas coupled with anticipated imbalances in the small scale sector by the introduction of large scale inputs, the following plans are suggested for tuna fishing in Lakshadweep.

1. Existing pole and line fishing fleet could be modernized with storage facility. Mechanized seawater spraying system can economize utilization of live baits.
2. Introduction of 5 nos. of 14-24 m purse seiners to operate 1400 m purse-seine with a depth of 120 m to exploit surface school of Skipjack, Long tail and Little tuna in the Indian EEZ, as an initial step.
3. Construction and installation of FADs (Payaos) made of cheaper and long lasting materials to reduce scouting time.
4. Development of fishery forecasting system

Pelagic resources like tuna and tuna like fishes continue to be underexploited as suitable gear for the purpose have not yet been employed in a significant and dedicated manner. The fishery is at present confined to small-scale sector for coastal specimens. Great scope exists for expansion through long lining as an industrial type of fishing to cater to the internal (masmin and canned tunas) as well as export market (Sashimi). Adults of Yellow fin and Big eye tunas are inhabiting in areas between 200-300m and 100-300m depth respectively in the seas around Lakshadweep and A & N Islands, whereas Skipjack appears in the surface waters along with young ones of yellow fin. These areas are conducive for successful long line operations.

Mono lining has progressed globally in a systematic manner and fishing vessels of 20.0 m OAL and above could be equipped for under taking mono lining for tuna by incorporating such additional equipment and machinery as required like adequate engine power, generator, compressors, optimal refrigerated fish hold capacities and onboard processing facilities. The endurance of the vessel will have to be kept at maximum possible level and the fishing system should consist of facilities for trawling and long lining, so that fishing can be conducted round the year. An attempt on this line is being made by Lakshadweep Development Corporation around Lakshadweep oceanic waters and the initial trials are successful.

Acquisition of modern super seiners of over 100.0 m OAL with 7000-9000 hp main engine to develop a cruising speed of 15 to 20 knots with sophisticated navigational and processing equipments along with deck machinery like purse-winch and power block can also be envisaged in view of the availability of totally untapped oceanic resources. Considering the huge capital investment involved, conversion of existing trawlers for long lining will be the practicable suggestion as at present.

It is well known that tuna gather around areas of upwelling and areas where thermocline is shallower. Maximum hooking rate is localized either in the marginal areas or water boundaries or along oceanic fronts (Uda & Nakamura, 1973). Upwelling in and around Minicoy is reportedly due to divergence of current in the vicinity of the island during late November and this phenomenon has considerable impact on the tuna landings in the region during the period from December to March (Rao & Jayaraman, 1966). According to Pillai & Perumal (1975)

it is likely that the divergence zone which leads to a favourable environment is shifting from one area to another depending on the direction and velocity of prevailing currents, geographical locale of the islands, bottom topography of the atolls etc. Probable fishing areas for Skipjack in Lakshadweep waters can be predicted sufficiently in advance by keeping a constant watch on the formation and shifting of divergence zones around the islands during September to April, the season for Skipjack fishing. Satellite imageries can be utilized for locating oceanic features such as ocean temperature, chlorophyll distribution, current boundaries, slicks and ocean fronts to understand likely areas of concentration of tunas, especially Skipjack and Yellow fin (Silas & Pillai, 1981).

The PFZ advisories brought out by NRSA give indication of the presence of thermal boundaries originating out of divergence and resultant upwelling, current boundaries etc. Skipjack fishery being pelagic in nature is expected to show better correlation with PFZ advisories generated out of sea surface temperature data provided by satellite imageries. Evolving a suitable prediction system will help in reducing the searching time for Skipjack schools, thus effecting overall reduction in operational costs (Pillai, 1998).

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