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MARINE LIVING RESOURCES OF THE UNION TERRITORY OF LAKSHADWEEP —

An Indicative Survey With Suggestions For Development

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4. TUNA RESOURCES AND PLAN FOR DEVELOPMENT

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INTRODUCTION

In recent years attention has been focused towards the development of Fisheries in the Lakshadweep by the Government to improve the life style and economy of the islanders. Introduction of mechanisation in the early sixties has resulted in the increase of tuna production at Minicoy, where a traditional fishery employing 'Masodis' was in existance. Coupled with this, the spread of pole and line fishing practise towards the northern islands such as Agatti, Bangaram, Perumul Par, Suheli and Bitra has resulted in the production of tuna from a few hundred tonnes in the 60's to about 4807 tonnes in 1986.

Oceanic tunas such as skipjack (*Katsu wonus pelames*) and young ones of yellowfin tuna (*Thunnus albacares*) constitute the major resources of this area taken by the pole and line live-bait fishery during September to May period every year. Surface trolling also land yellowfin, skipjack and billfishes in the order of their abundance, especially during the monsoon period.

CRAFTS AND GEARS

The crafts and gears engaged in the tuna fishery has been dealt with recently by Silas and Pillai (1982), Madan Mohan *et al* (1986), George Varghese (1987) and Livingston (1987 a, 1987 b, 1987 c). The statistics of crafts and gears presently engaged in the tuna fishery are summarised by James *et al* (1988: in the same volume).

PRODUCTION

The total tuna catch in the Lakshadweep Island during the period 1977-86 is presented in Fig. 1. It is evident that the total catch increased from about 1165 tonnes in 1977 to 2794 tonnes in 1979, after which the catch declined to 1759 tonnes in 1980. In 1981 about 2236 tonnes of tunas were taken. Subsequently, the tuna catch increased steadily with minor fluctuations and reached an all time peak of 4807 tonnes in 1986.

Based on the data from Minicoy (1976-1987) and Agatti (1976-1987) and Agatti (1977-1985), if the average annual catch of tunas which amounts to about 2900 tonnes

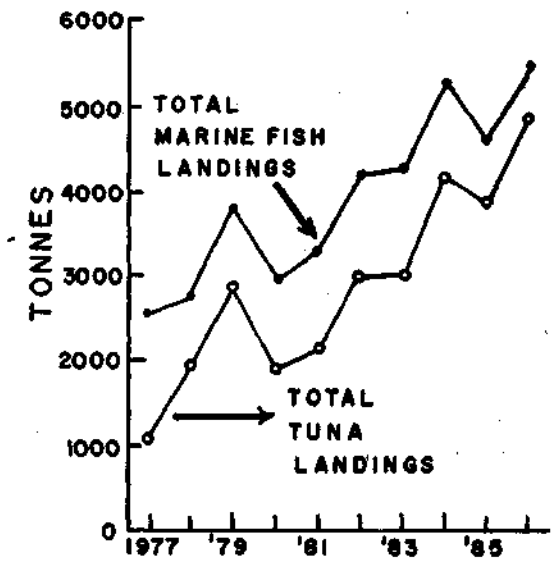

Fig. 1. Total marine fish and tuna landings in Lakhshadweep during 1977 1986

(1977-86) at Lakshadweep is aportioned group-wise, the skipjack tuna may constitute on an average 2156 tonnes, yellowfin tuna 560 tonnes and other tunas and billfishes 84 tonnes during this period.

Island-wise production of tunas during the period 1977-86 is indicated in Figs 2-12. It is evident from the data that Agatti Island ranks first with an annual average catch of 1114 tonnes, followed by Suheli (626 tonnes), Minicoy (483 tonnes) and Bitra (185 tonnes). According to Varghese (1987), the annual average CPUE at Agatti, Minicoy and Bitra are 419 tonnes, 180 tonnes and 252 tonnes respectively during the period 1977-86.

At present the information available on the catch, effort, CPUE and biology of tunas are

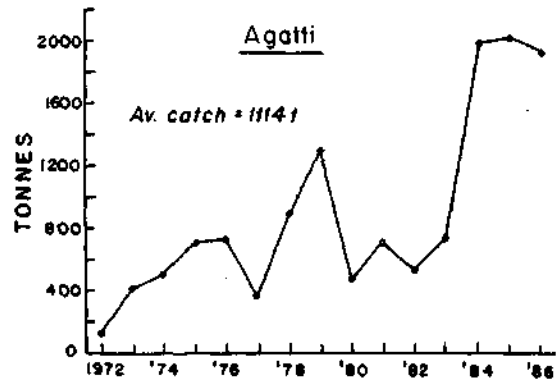

Fig. 2. Year-wise tuna landings in Agatti

from Agatti (1971-85) and from Minicoy (1979-87). The trend of these factors at Minicoy has been described by Madan Mohan *et al* (1986) and at Agatti by Varghese and Shanmugham (1987). In both the islands, relatively high catch rates were observed during March - April and November - December periods.

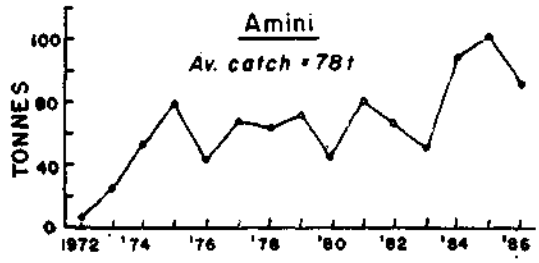

Fig. 3. Year-wise tuna landings in Amini

Biological information on the growth parameters of skipjack tuna and spawning biology of skipjack tuna are also available (Silas *et al.*, 1986; Madan Mohan and Kunhikoya, 1986). Information on sex ratio, spawning season and food and feeding habits of skipjack tuna at Agatti has been presented by Varghese and Shanmughom (1987) for the period 1977-79.

Basic data on the stock structure and growth parameters of these two species have been described by Silas *et al.* (1986), and the results obtained were as follows:-

	Silas et al (1986)	*James et al* (1986)
	K. pelamis	
$L\alpha$	90.0 cm	90.0 cm
K (annual)	0.4898	0.4898
t_o	-0.0600	-0.0600
Z	2.56	1.89
E_p	0.71	—
	T. albacares	
$L\alpha$	145 cm	
K (annual)	0.3200	
t_o	-0.3400	
Z	3.488	
E_p	0.85	

In both the studies, it was indicated that the present level of exploitation of the skipjack tuna does not affect the species stock and the capture of this species has not reached the MSY level. Studies conducted on the yellowfin tuna (young ones) by Silas *et al.* (1986) revealed that expansion of the fishing operations to areas beyond the present zone of exploitation would widen the scope for realising higher yields.

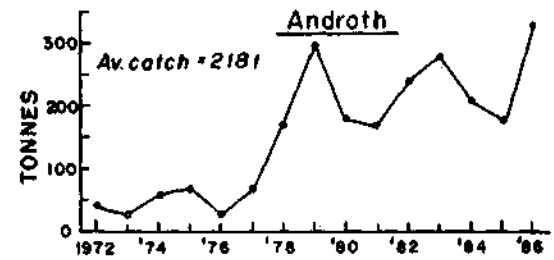

Fig. 4. Year-wise tuna landings in Androth

Expansion of pole and line fishery is limited by the availability of suitable live-bait resources in quantity, their maintenance and transportation, availability of tuna shoals in the fishing ground, response to chumming, expertise of fishermen etc (James and Pillai, 1987). Recent aimed resource survey on baitfishes conducted by CMFRI in the Lakshadweep have proved beyond doubt the vast resources of potential tuna live-bait species belonging to the families

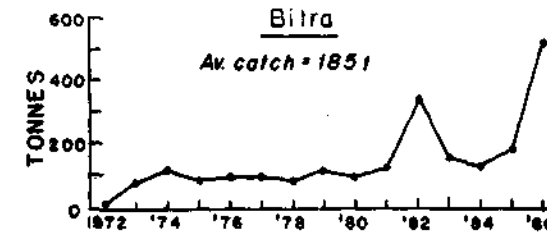

Fig. 5. Year-wise tuna landings in Bitra

Dussumieridae, Apogonidae, Caesionidae, Pomacentridae and Atherinidae (other than the traditionally used sprat *Spratelloides delicatulus*) around Agatti, Bangaram, Perumul Par, Suheli Par, Kadmat, Kalpeni and Bitra. *S. delicatulus* with positive chumming quality and easily fished

by surrounding nets is the only species currently exploited for the tuna pole and line fishery in all the northern islands other than Minicoy. Major constraints in the utilisation of this species are the large scale mortality at the time of capture, storing and transportion. Since the fishery is chiefly dependent on the availability of this species, its scarcity often results in abrupt suspension of tuna fishery in these islands. Exploitation of the alternate bait fishes belonging to Apogonidae, Caesionidae and Pomacentridae

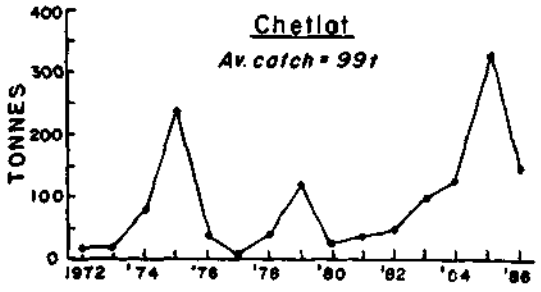

Fig. 6. Year-wise tuna landings in Chetlat

should be encouraged in all the islands which would lead to the augmentation of live-bait production and dispel the threat of overfishing and consequent depletion of the exploitable stocks of *S. delicatulus*.

In this context, it is worthwhile to mention that experiments/attempts have already been commenced at Minicoy by the CMFRI for rearing and culture of selected species of tuna live-baits

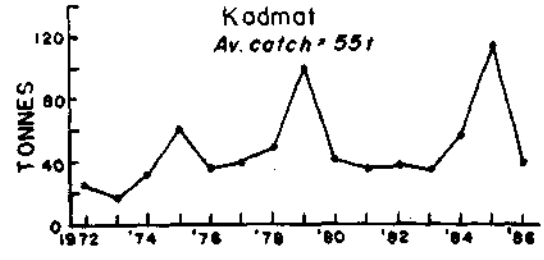

Fig. 7 Year-wise tuna landings in Kadmat

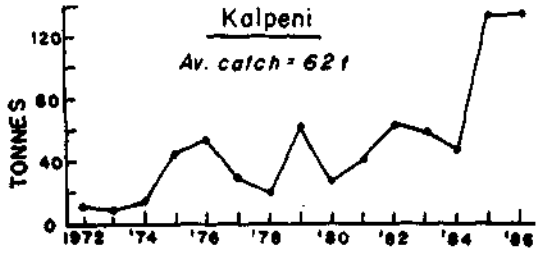

Fig. 8. Year-wise tuna landings in Kalpeni

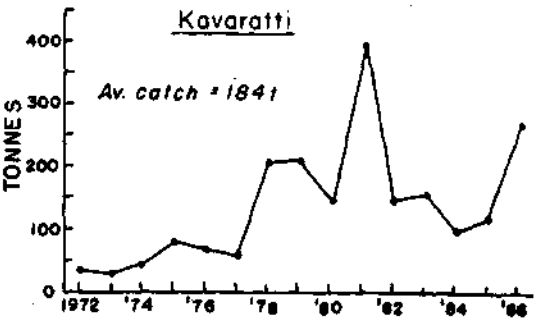

Fig. 9. Year wise tuna landings in Kavaratti

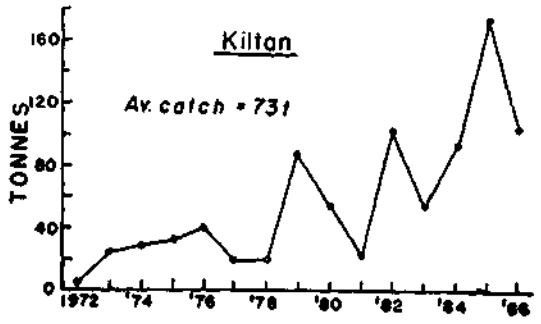

Fig. 10. Year-wise tuna landings in Kiltan

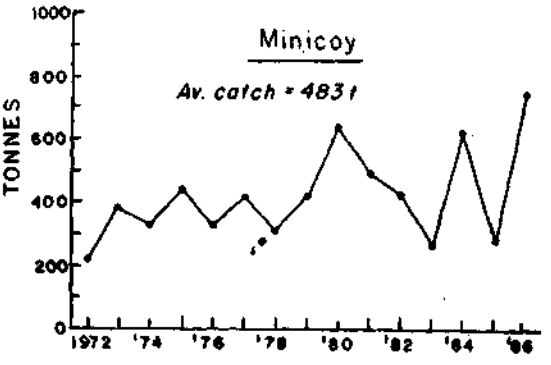

Fig. 11. Year-wise tuna landings in Minicoy

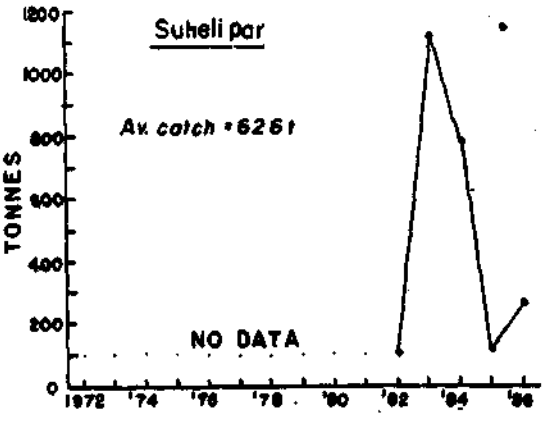

Fig. 12. Year-wise tuna landings in Suheil Par

such as *Chromis caeruleus* in the field and lagoon to evaluate their sturdyness, behaviour and production under captivity.

As opined by Silas and Pillai (1986) and James and Pillai (1987), at the modest estimation of production 60-100 tonnes of tunas per season per boat of OAL 15-20 m OAL and estimating average as 120 kg/production of tunas/per kg of baitfish, the requirement of each boat per season will be about 0.6-08 tonnes. Introduction of about 100 boats of the above size would enhance the production of skipjack and yellowfin tuna (young ones) to about 10,000 tonnes by 2000 AD.

FUTURE DEVELOPMENT AND MANAGEMENT OF TUNA FISHERY IN THE LAKSHADWEEP

Development of the infrastructure, technology and human resources in addition to harvesting, processing, marketing, servicing and material supply to enable the country to harnes the fishery resources are important in the fishery development plans. In the development of small-scale pole and line tuna fishery in the Lakshadweep, the following strategies appear to be pertinent:

1. *Information Base*

Statistics on all aspects of fisheries are needed for planning, implementation and subsequent monitoring of fishery management and development, Departmental capability to collect data and information at sub-regional level in the Lakshadweep need strengthening.

2. *Man power*

According to Varghese (1986), the major problem faced by the fishery sector is the shortage of manpower, and blocking of manpower in the nonproductive sector. A feasible proposal for providing employment and income generation for the local population would seem to be to make fishing in the small-scale sector more lucrative by introduction of enhanced per capita income plans by IRDP/NREP agencies.

3. *Conservation of coral ecosystem*

Development and management plans should take into account the need to protect marine habitat around the island ecosystem from any form of degradation. The coral colonies which harbour the live-bait fishes are prone to natural senescence. Indiscriminate dredging and blasting of the lagoon habitat may cause altered current patterns, which may result in the siltation in the areas of coral growth, thereby causing the death of coral colonies and the resident live-bait species. Environmental damage should be kept minimum while implementing development programmes for navigation. Installation of artificial reefs and habitat studies should be given priority to attract coral associated bait fishes to these habitats. Further, rejuvenation and trials to regrow corals by transplanting live corals into regions where they thrived earlier need consideration,

4. *Bait fishes*

Aimed exploratory tuna bait resources surveys conducted in the Lakshadweep by scientists attached to the CMFRI establisments at Minicoy and Agatti (Nov. 86 to March, 87) have proved that vast resources of potential bait fish species, both migrants and resident forms are available around Agatti, Bangaram Perumul par, Suheli Par, Kadmat and Bitra. Results of these surveys, coupled with the encouragement to use economically viable confinement and transportation methods for hardy live-baits would contribute much in planning the utilisation of bait species of these areas, without exhausting their resources.

The sprats being shallow water species can easily be fished in desired numbers using encircling type of nets. The major constraint in the utilisation of this species is the large scale mortality at the time of capture, storing in live-bait tanks and transportation, due mainly to osmoregulatory stress, Since the fishery is dependent on the availability of this single species, scarcity of the same often causes abrupt suspension of fishing activities even during peak fishing months, and also the threat of over exploitation of stock can be anticipated. Steps should, therefore, be taken and fishermen encouraged for exploiting the baitfishes belonging to pomacentridae, apogonidae and caesionidae which are associated with coral colonies in the deeper parts of the lagoon by means of lift nets. Species belonging to the above groups also exhibit good chumming qualities. In view of the vast resources of bait fishes in the lagoons and outside around most islands it is suggested

that they could be harvested by small purse seines and other suitable gear and transported to adjacent areas where they could be impounded in the lagoons for further use on demand. Necessary infrastructure for such operations should be provided by the Department of Fisheries.

Future programmes of CMFRI include large scale rearing, attempts on culture and estimation of the natural stocks of live baits in Lakshadweep. Night fishing through lights will also be experimented upon. Research on transportation of live-bait, holding them in large impoundments, compatibility and density of species in such impoundments etc. would also be undertaken.

5. *Tuna fishery*

An average of about 2900 t o tunas were annually exploited by the small scale pole and line fishery during 1977-86, and in recent years the approximate contribution by Agatti, Minicoy, Suheli Par and Bitra are 51%, 22%, 29% and 9% respectively. Of these, at Minicoy its isolated geographical location and the consequent immobility of small pole and line boats for expanding the area of fishing without navigational aids, and the live-bait scarcity often experienced by the fishermen are the main constraints for the further expansion of the fishery. On the contrary, Agatti, Suheli Par and Bitra, due to their proximity to other islands and reefs and also due to the added advantage of getting enough live-baits. offer further scope for the present small-scale pole and line fishery.

The introduction of a new generation of larger pole and line vessels (15.20m OAL) with adequate navigational, chilling and storing facilities for 4-5 days of fishing as recommended by Silas and Pillai (1982) is particularly significant to Minicoy Island due to its isolated geographical location. In this connection, it is worth mentioning that a radio beacon station and a radar transponder beacon (RACON), (9300 to 9500 MHZ) can be made use of by the fishermen with the help of a simple direction finder/ radar equipment. For commercial exploitation of tuna it was proposed to operate large purse seiners in collaboration with other countries, and to operate a mother vessel to enhance the operational range of smaller boats (Varghese, 1987).

The high catch rate of fishing from schools associated with flotsam at Minicoy, indicate that installation of fish Aggregating Devices (FADs) may be successful in augmenting tuna production. The major impact of FADs, as observed by Silas and Pillai (1982) and James *et al.* 1987) will be in the small-scale sector such as pole and line fishery as tuna fishery around these structures result in increased catches, reduction in scouting and voyage time and as well save fuel. The method with modifications if needed can be extended to the whole region for increasing tuna catches.

6. *Product development marketing and post-harvest technology*

At Lakshadweep the main catch disposal method is by converting it to *masmin.* At Agatti, Suheli Par and Bitra, the catch after removing a fraction for domestic consumption is converted to *masmin.* Approximately about 500 tonnes of *masmin* is produced annually from Lakshadweep in recent years. The price of *masmin* varied from Rs. 30 to Rs. 40 per kg. The development of an organised marketing system will be beneficial to the tuna fishermen since it can solve to some extent the present problems of getting proper market and sudden price fall of the product. At Minicoy, a portion of the catch (average 70 tonnes annually) is canned by the Govt. Canning Factory, and a scheme for establishing canning factory at Agatti has recently been proposed. However, in view of the economical returns, steady markets for *masmin* inside the country and export should be explored and developed.

Utilisation of waste

Disposal of waste is another aspect deserving immediate attention. At present, the head, bones, fins etc of the fish are discarded on the beach of the islands, which get decayed and act as breeding sites of house flies, causing health hazards during the fishing season. A small-scale waste utilisation method by converting them to fish meal may be advisable since the product can be used as an excellent manure for coconut plantations in the islands or the possibility of converting the waste from tunas as ensilage should be explored.

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