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MARINE LIVING RESOURCES OF THE UNION TERRITORY OF LAKSHADWEEP —

An Indicative Survey With Suggestions For Development

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3. SOME OBSERVATIONS ON THE FISHERIES OF LAKSHADWEEP

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INTRODUCTION

Lakshadweep group of islands is constituted by 36 small islands, islets and submerged banks (reefs) lying scattered in the Arabian Sea between Lat. 8° and 12° 30'N. and Long. 71° and 74° E. This Union Territory has an area of 32 sq.km. and possesses 400,000 sq. km. of Exclusive Economic Zone. Of these, only ten islands are inhabited. Each island except Androth has a lagoon on the western side, and the lagoon and the reef provide ideal coral habitat for a variety of animals and plants. Water areas around these islands and submerged reefs which possess rich fishery resources are Agatti, Bangaram, Tinnakara, Parali, Perumul Par, Pitti, Suheli, Bitra Cheriyapaniam, Baliyapaniam, Kadmat, Kavaratte, Androth, Kiltan, Kalpeni, Elikalpeni and Minicoy. Of these, Minicoy, Agatti, Suheli and Bitra are important with regard to tuna pole and line fishery.

In recent years, Lakshadweep has assumed importance in view of the special consideration shown by the Government of India towards its alround development and welfare of the people. Marine fisheries has to play a major role in maintaining and upgrading the standard of the life of the islanders. In this context, contributions by CMFRI to the management of marine fishery resources are worth mentioning. Further steps are being taken by the Institute to expand research activities in particular fields in this Union Territory.

A series of recent publications have dealt with the status and Fishery of major and ancillary resources and ecological problems being faced by the islands, and management of the fishery (Alagaraja, 1987; George *et. al.* 1986; James, 1987; James and Pillai, 1987; James *et. al.* 1986 a, 1986b; 1987a, 1987 b; Jones, 1986; Kumaran and Gopakumar, 1986; Livingston, 1987a, 1987

b, 1987 c, 1987d, 1987e; Madan Mohan *et. al.* 1986; Piliai, 1983, 1985, 1986; Pillai and Madan Mohan 1986; Pillai *et al.* 1986; Pillai and Gopakumar, 1987; Silas and Pillai, 1982, 1986; Silas *et al.* 1986a, 1986b; Varghese, 1987a, 1987 b; Varghese and Shanmugham 1987).

FISH AND FISHERIES

Jones and Kumaran (1980) recorded 603 fish species from the Laccadive Archipelago. Planned programme for the development of fisheries in Lakshadweep commenced with the establishment of a Fisheries Section in 1959, with the objective of enhancing fish production by motivating local people by taking up modern methods of fishing, extension, education, training and providing subsidies. Prior to this, the fishing methods were primitive although a regular pole and line fishery was in existance in Minicoy using *Mas-odis*. Introduction of mechanisation and training of fishermen in modern methods of fishing, handling of mechanised boats and transfer of technology in fishing. processing, issue of mechanised boats to the islanders, establishment of boat building yards, workshop and processing units and providing infrastructural facilities such as jetties were the major achievements of the Fisheries Department in this field. Details of implementation of the schemes and impact of fisheries departmental activities on the socio-ecomic life of the islanders were dealt with earlier (Varghese, 1987b). However, according to Alagaraja (1987) there are about 3750 fishermen engaged in the actual fishing among whom 2100 persons are engaged in full time fishing, 200 in part time fishing and the rest 1450 in occasional fishing.

CRAFT AND GEAR

Details of mechanised and non-mechanised vessels engaged in different types of fishery in the Lakshadweep from early period were described by Jones (1958), Ben-Yami (1980) and Silas and Pillai (1982). Comparative merits of mechanised boats over non-mechanised boats in the skipjack tuna fishery was evaluated by Varghese (1971). Detailed description of mechanised crafts engaged in the pole and line fishery at Minicoy and Agatti islands has been provided recently by Madan Mohan *et al.*, (1986) and Varghese and Shanmugham (1987) respectively. Island-wise boats engaged in the pole and line, troll line and longline fishery as stated by the Department of Fisheries, Lakshadweep are as follows:-

Islands	*Pole and line Boats*	*Troll line Boats*	*long line Boats*
Agatti	51	6	—
Amini	2	2	19
Androth	—	—	34
Bitra	10	—	—
Chetlat	—	4	12
Kadmat	—	3	5
Kalpeni	—	—	5
Kavaratti	16	—	15
Kiltan	—	—	16
Minicoy	35	—	—

There are about 235 mechanised and 488 non mechanised plank built boats engaged in the fishery in the Lakshadweep group of islands (Alagaraja, 1987). Mechanised boats used for pole and line fishery number 114 (49%), followed by those for troll lines fishery (45% and longline fishery 15 (6%).

A variety of gears and implements such as pole and line, troll line, cast nets, shore seines, gillnets, harpoons, hand lines and long-lines are employed in the fishery from the lagoon and outside. Recently, Alagaraja (1987) summarised the fishing units in the fishery in the Lakshadweep, and according to him there are 115 units of pole and lines, about 600 gill nets, 210 boat seines (drag nets), 305 shore seines and 1360 cast nets. He also provided the gear-wise contribution during the five-year period 1980-84 (Table-1) and opined that the major contribution came from pole and line fishing, which accounted for about 56% of the total landing by all Gears. Troll and line contributed to about 22% followed by shore seines (11%), gillnets (3%), harpooning (2%), cast nets (1%) and the rest by hand lines. However, no clear-cut trend in the landings of these gears is evident as in the case of pole and line.

PRODUCTION

Year-wise production of the marine fishes in the Lakhshadweep during the 10 year period 1977-1986 is presented in Fig. 1 Ch. 4. The

average annual marine fish landings during the decade was estimated as 3903 tonnes. Though there were fluctuations in the annual landings during 1977-80 with the minimum of 2215 tonnes in 1977 and maximum of 3846 tonnes in 1979, a steady increase with minor oscillations from 2909 tonnes in 1980 to 5537 tonnes in 1986 has been noted during the rest of the period.

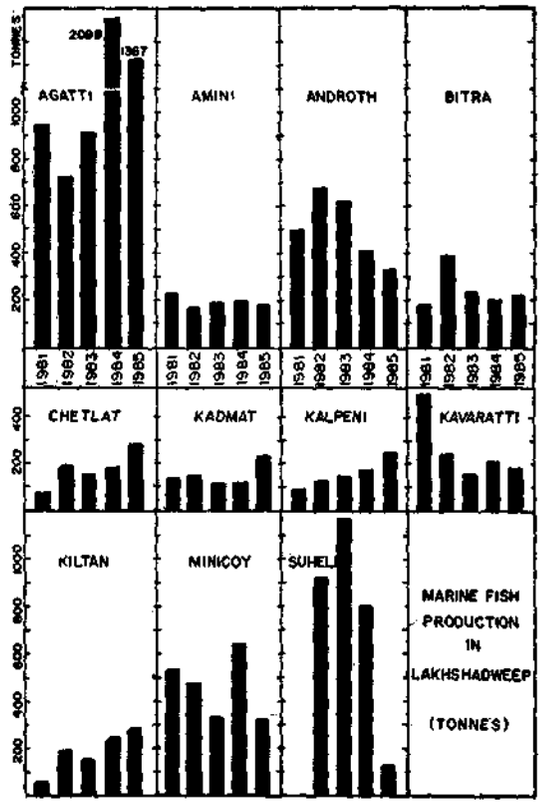

Fig. 1. Marine fish production in the different islands during 1981-85

The island-wise total marine fish production during 1981-85 is presented in Fig 1. The average annual production is indicated in Fig. 2. The major contribution to the total marine fish production came from Agatti, Suheli Par, Minicoy and Androth. There is year to year fluctuations. Compared to these islands, the landings in islands such as Amini, Bitra, Chetlat, Kadmat, Kalpeni, Kavaratti and Kiltan are low.

Average annual production of different marine groups for the period 1977-86 are presented below in their order of abundance:

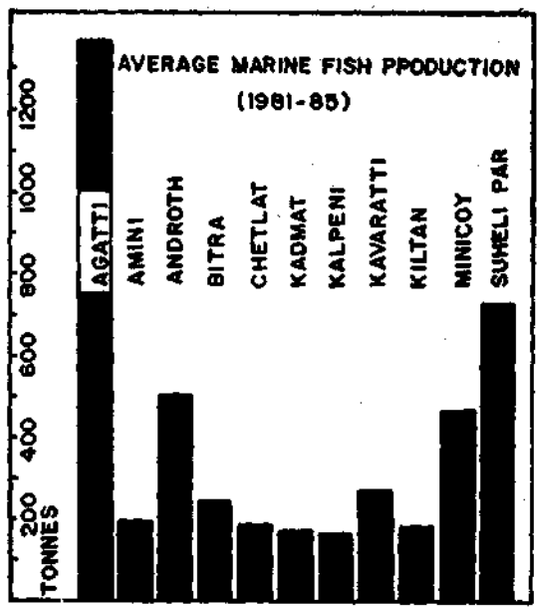

Fig. 2. Average (1981-85) marine fish production in the different islands of Lakshadweep.

(1977-1986)

Group	Average annual production (tonnes)	Percentage
Tunas	2873	73.9
Pelagic sharks	186	4.8
Perches	162	4.2
Garfishes	85	2.2
Rainbow runner	76	2.0
Rays	70	1.8
Carangids	66	1.7
Seerfishes	50	1.3
Sailfishes	33	0.8
Goatfishes	29	0,7
Coral fishes	26	0.7
Flying fishes	21	0.5
Octopi	16	0.4
Barracudas	13	0.3
Triggerfishes	8	0.2
Miscellaneous items not classified	174	4.5

Major share of total marine landings has been accounted for by tunas which formed about 74% in the average, and the trend of production of tunas follow the trend of total marine fish production. Further, the contribution of tunas increased from 71% in 1982 to 87% in 1986. These indicate the dependence of marine fisheries in the Lakshadweep on this group of scombroids. Other groups which contributed

to in a major scale were pelagic sharks, perches, gar fishes, rainbow runner, rays, carangids and seer fishes.

Total production of tunas in the Lakshadweep during the period 1977-86 is presented in Fig. 1(Ch. 4). The minimum landing of 1165 tonnes was in 1977 and maximum of 4807 tonnes was recorded in 1986. Skipjack tuna and young ones of yellowfin tuna contributed to 90% of the surface catch in the Lakshadweep. However, on an average,annually about 2873 tunas were landed in Lakshadweep during this period.

The status of total tuna landings in India and contribution of Lakshadweep in recent years are as follows:

	Total all India tuna landings (tonnes)*	*Tuna landings in Lakshadweep* (Tonnes)**
1983	17871	3037
1984	21618	4313
1985	32363	3774
1986	35607	4807

*Estimate by CMFRI

**Estimate by the Fisheries Department, Lakshadweep

From the above data it is evident that, the average contribution by Lakshadweep to the total tuna production in the country was about 18%.

Average annual island-wise landing of tunas during the period 1977-86 is presented below:

Island	*Tuna landing* (tonnes)	*Percentage*
Agatti	1114	51.1
Amini	78	3.6
Androth	218	10.0
Bitra	185	8.5
Chetlat	99	4.5
Kadmat	55	2.5
Kalpeni	62	2.8
Kavaratti	184	8.4
Kiltan	73	3.4
Suheli	626	28.8
Minicoy	483	22.2

The significant increase in the landing by pole and line (live-bait) fishery at Agatti, Suheli, Minicoy and Bitra contributed much to the total production of tunas in the Lakshadweep.

Varghese and Shanmugham (1987) indicated that based on average for the years 1976-85, the tuna catch at Agatti, Minicoy and Bitra accounted for about 63%, 27% and 9% respectively of the total tuna catch. At Agatti, a bimonthly peak in abundance in tuna catch was recorded by him viz., during March-April and November-December periods in most of the years under consideration. Similar trend in the peak periods of tunas were observed at Minicoy by Pillai and Gopakumar (1987) during 1984-87.

A comparative account on the annual average catch composition (%) of different groups of fishes in the fishery at Agatti (1976-85) and Minicoy (1984-87) islands is presented below:-

Groups	*Agatti Is*	*Minicoy Is*
Tunas	87.30	84.10
Billfishes	0.75	0.40
Carangids	0.76	1.60
Garfishes	1.05	No data
Perches	0.67	2.00
Pelagic sharks	4.30	3.20
Rainbow runner	0.20	3.33
Octopi	0.17	No data
Coryphaena	No data	0.50
Barracudas	No data	0.60
Seerfishes	No data	4.30
Miscellaneous	4.80	—

The differential composition in the catch may be due to the employment of different gears during monsoon and non-monsoon months in these islands.

DISCUSSION

The Central Marine Fisheries Research Institute has already developed a data base on various marine resources of the Lakshadweep islands and related conservation problems. Of recent, the concentration of efforts by the Institute was on coral reefs, tunas, tuna live-baits, ornamental fishes and other ancillary resources. The Institute has recently conducted an aimed survey on tuna live-baits around and

inside tha lagoons of all inhabited islands (Nov. 86-March, 87) and an overall survey of the fishery potential of the Lakshadweep (Jan-March, 87). The former aimed at indepth investigations on the habitat patterns and quantitative distribution and availability of the tuna live-bait resources, and the latter concentrated on an overall assessment of various types of fishery resources, their potential, impact of environmental damage to the coral reef ecosystems, evaluation of ancillary marine resources such as sponges, echinoderms and ornamental fishes and for identifying areas for mariculture, and measures that would help in perspective planning and development of fisheries and other marine living resources.

Skipjack tuna, *Katsuwonus pelamis* and young ones of yellowfin tuna, *Thunnus albacares* constitute the major tuna resources of these Islands taken by the pole and line fishery. At Minicoy, the pole and line fishery using live-baits has been in vogue for over a centuary. Introduction of mechanisation in the early 60's and the spread of pole and line fishing practice to some of the northern islands such as Agatti, Suheli, Bitra, Perumul Par etc are the two developments in this sector. The trend of tuna fishery in the Lakshadweep has been reviewed by Silas *et. al.* (1986 b) based on the information gathered at Minicoy. The present trends, constraints and strategies for future development of small scale pole and line fishery at Lakshadweep has been critically reviewed by James *et al.* (1987b). Strengthening and expansion of the pole and line fishery by the introduction of larger pole and line boats with adequate chilling and storing facilities needs attention. Introduction of medium sized purse seiners, especially in the northern islands, provided processing, marketing and handling are taken care of, is another proposal for better returns. Other operations like gillnetting, surface trolling and longlining suitable for local conditions could be tried and popularised for tuna fishing which would assist in reducing live-bait requirement. Further, for commercial exploitation, it is proposed to operate large purse seiners and pole and line vessels on collaborative terms with other countries, and to operate a mother vessel to enhance the range of operation of smaller vessels (Varghese, 1987a).

The impact of Fish Aggregating Devices (FAD) as observed by Silas and Pillai (1982) and James *et al.* (1986 b) will be on the small scale fishery sector such as pole and line tuna fishery. Tuna fishing around these structures will result in increased catches, reduction in scouting and voyage time, conservation of fuel energy and also it will be a safety factor. This method with modifications can be employed in the whole island realm for increasing tuna catch in the small scale sector.

Live-baits form an important component in the tuna fishery. In recent years the demand for live-baits has increased considerably, and shortage for the same has been faced. As described elsewhere by Pillai *et. al.* (1986), James *et al* (1987a) and Kumaran *et al.* (in this volume), the non-availability of live-baits in required quantities can be attributed to (1) tampering of the lagoon ecosystem, (2) seasonality in the recruitment pattern of migrant species, and (3) exploitation pressure. In Minicoy, fhe CMFRI is making attempts for rearing and culture of important live-baits such as *Chromis caeruleus* and *Spratelloides delicatulus*. In the northern islands, rational exploitation of *S. delicatulus* which is the only species utilised for tuna pole and line fishing, should be advised and management measures for the maintenance of the stocks implemented. Fishermen should be encouraged to exploit alternate species belonging to Pomacentridae, Apogonidae and Caesionidae which are associated with coral colonies in the deeper regions of the lagoon. The Department of fisheries may also provide necessary infrastructure and facilities to collect from open sea areas and outside the lagoons, transport and impound live-baits in the lagoon areas for future use.

Even without much organised effort, nearly 20% of the landings in Lakshadweep is accounted for by other fishes such as pelagic sharks, perches, carangids, seerfishes, rainbow runner etc. Diversified fishing efforts such as longlining for sharks, drift gillnetting for other groups coupled with improvements in crafts to fish in distant waters would help in a long way in tapping these resources.

Several coral reef fishes are considered as excellent ornamental fishes for aquarium in

many parts of the world. Cheap to very expensive ornamental fishes offer scope for export on a limited scale (Anon, 1985; Tomey, 1985, 1986; George *et al.* 1986; James *et al.* 1987b). More than 100 species of ornamental fishes belonging to 28 families could be exploited and marketed. Recent survey of the fishery potential of Lakshadweep carried out by the CMFRI has also proved the existance of exploitable quantities of ornamental fishes. Collection methods without tampering the reefs, packaging and transportation facilities needs to be developed so as to tap these resources for export trade. Resource surveys for the holothurians (*Beche-de-mer* industry) and sea weeds (*Agar Agar* Industry) were conducted by the Department of Fisheries, Lakshadweep and CMFRI. But the occurrence, abundance and replenishment of these resources for taking up commercial ventures are yet to be ascertained.

Tuna fishing is the mainstay of the Lakshadweep islands. The strategies for future development of the tuna fishery at Lakshadweep as suggested by Silas and Pillai (1986), James and Pillai (1987) and James *et al.* (1987), coupled with the future programme of development of fishing industry suggested by Varghese (1987a, 1987b) will go a long may in making the industry more lucrative, economical and beneficial for the people.

TABLE 1. *Annual gearwise catches (in tonnes) in Lakshadweep during 1980-84.*

Gear	1980	1981	1982	1983	1984
Pole and line	1160	1636	2366	2573	3713
Troll line	854	878	966	921	828
Castnet	56	25	27	35	24
Shoreseine	410	401	462	508	382
Gillnet	128	128	112	137	77
Harpooning	72	36	41	89	102
Handline	4	7	7	11	7
Longline	225	189	220	268	198
Total	2909	3300	4201	4542	5331

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