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MARINE LIVING RESOURCES OF THE UNION TERRITORY OF LAKSHADWEEP —

**An Indicative Survey
With Suggestions For Development**

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Limited Circulation

21. MARICULTURE POTENTIALS

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INTRODUCTION

The protected bays and lagoons of the island provide suitable sites for mariculture. Further there are many potential candidates for mariculture - food fishes, bait fishes, ornamental fishes, holothurians, turtles and sea weeds. Apart from the indigenous varieties of culturable species, fry of fast growing fishes and prawns can be transported from the mainland and cultured. But so far no serious attempts have been made to utilise the mariculture potentials of islands.

CULTURE SITES

The lagoons serve as an ideal site for culture of fishes and other organisms. The coral reefs protect the lagoons preventing the heavy breakers.

Fish pens can be located in the lagoon with the aid of nylon webbings supported by poles. The foot rope of the webbing can be buried in the sand, with the aid of stones as sinkers. The organisms can be stocked during September and harvested in March. Fast growing fishes, prawns and holothurians can be reared in it.

Floating cages also can be suspended in the lagoons. There can be a battery of small cages. The cages can be made of nylon webbings, or velon screens as the case may be. Carnivorous fishes like *Serranus* spp, *Lutianus* spp, and *Caranx* spp, can be cultured in the system. The stock has to be fed artificially.

The low lying areas can be converted into fish farms. Though there are not many such areas in the islands, a few places are identified in Minicoy and Kalpeni.

At Minicoy the fish farm near the helipad in the Southern part of the island can be renovated. It has sluice gate and partly damaged bunds. The accumulation of decaying sea grass has to be removed from the farm. The water flows out during lowtide. This farm can be used by deepening it and strengthening the bunds.

Apart from these areas, the lagoons can be utilised for culture of mussels in the rafts and the seaweeds in the coir net frames.

Candidates for culture :

Fish culture :- Making use of the recent technology evolved for culture, food fishes, bait fishes and ornamental fishes can be cultured in the island. There are many species of food fishes, bait fishes and ornamental fishes that can be cultured in the islands.

Culture of food fishes :- Food fishes like *Mugil* sp. *Caranx* sp. can be cultured in the fish pens. The tuna-waste available in large quantities during fishing season can serve as food for the carnivorous fishes. Seeds of fishes like chanos can be transported from the mainland and cultured in the lagoons in fish pens, feeding them artificially.

Bait fish culture :- The culture of bait fishes has attained importance due to the demand for it in the pole and line fishing for tuna. The *Spratelloides delicatulus* and *Spratelloides japonicus*, are the two species which are in the great demand. Culture of other bait fishes can also be tried. Due to the specific habitat of these fishes and due to their sensitive nature culturing them may require the infrastructural facilities like aquarium, suitable feed and other ecological requirements.

Culture of ornamental fishes : Lakshadweep lagoons are rich in ornamental fishes. The ornamental fishes have acquired importance due to its export potentials. Many species of ornamental fishes occur in the islands (Please refer to the chapter on ornamental fishes of this volume). But they may not withstand commercial exploitation from the natural habitat. Supply of ornamental fishes from the island will be possible only if it can be cultured in large numbers. Here also due to the specialised habitat and food habits it will be difficult to culture them without proper infrastructural facilities. But survival of the ornamental fishes

in the Kavarati aquarium indicates the feasibility of rearing them, It will be possible to develop a hatchery for the ornamental fishes by creating the necessary infrastructural facilities like running water, aeration, storage facilities, filtration and feeding. Seeds of ornamental fishes are found during the months of March and April. They can be collected by using specially made nets.

Prawn culture : The nonavailability of prawn seeds in the lagoon is the major constraints for developing prawn culture in the island. Nevertheless due to the availability of proper site for culture the fast growing species of prawns can be grown in the lagoons of the islands. Intensive culture of prawns can be tried in the floating cages made up of nylon webbing. The seeds of *P. indicus* can be transported from the main land.

The low laying areas also can be utilised for prawn culture. The fish farm at the southern end of Minicoy island can be converted into a prawn farm after making necessary alteration.

Culture of holothurians :

Large scale culture of holothurians, *Stichopus* sp. is being carried out in the main land of China with considerable success (Anon. 1983). James, (1983) conducted preliminary trials on the culture of *Holothuria scabra* at Port Blair in Andaman islands and obtained promising results. There is a great demand for *beche-de-mer* in South eastern countries. Hong-kong and Singapore alone require about 500 tonnes of *beche-de-mer* annually. But the demand outstrips the production. Further the natural resources of holothurian will not withstand commercial exploitation as the holothurian beds in the lagoons are not very extensive. Its exploitation may also affect the ecology of the lagoons. Hence culture of holothurians will be a means of increasing the production of holothurians in large number without depleting the natural stock.

Holothuria nobilis, *H. scabra*, *Actinopyga mauritiana*, *Thelenota ananas* and *Stichopus chloronotus* are some of the *beche-de-mer* yielding holothurians found in Lakshadweep. Of the above species *Holothuria scabra* and *Stichopus* sp can be cultured. The other species like *Thelenota ananas* and *Actinopyga mauritiana*

may also prove to be potential candidates for culture. But we have no information on the food, growth, reproduction, survival and recruitment potential of these holothurians.

The culture of holothurians can be taken up in two ways. The juveniles can be collected in large numbers and stocked in the pens with nylon webbing. It can be fed with the calcareous algae like *Halmida* spp., the favoured food of holothurians, found abundantly in the lagoons.

For any large scale culture, hatchery system has to be developed. Mortensen (1937, 1938) reported spawning of the holothurian, *Actinopyga mauritiana* in the Egyptian Coast. The auricularia larvae can be produced by keeping a number of specimens in a large tank. The depth of the tank should be more than 1 metre, (Mortensen, 1921). The auricularia larvae are planktonic and have to be fed with microalgae. The planktonic phase of the larvae being short, soon they are transformed into doliolaria larva and settle on the bottom. At this stage it feeds on fine mud and sand deriving the nutrients from the organic matter present in them. The calcareous algae, *Halimeda* spp also can be provided as food. *Holothuria scabra* was found to grow from 65 to 160 mm, to 190 mm to 290 mm, during 5 months, February 1978 to July 1978 indicating fast growth in Port Blair, (James, 1983). The advantage of the holothurian culture is the very low inputs in its farming. The expenses involved in the maintenances of the farm, feed making and other infrastructural facilities are very low. But the returns from the culture is very high. The low grade *beche-de-mer* from *Holothuria scabra* costs Rs. 140/kg. at Hongkong market. The cost of high grade *beche-de-mer* from other holothurians like *Holothuria nobilis* and *A. mauritiana* is much higher (about Rs. 900/kg.). The post harvest technology of processing and preparation of *beche-de-mer* is also not costly.

The southern parts of Kalpeni, Kavaratti, Amini and Kadmat lagoons are suitable for holothurian farms. These lagoons have a natural population of holothurians and the holothurian farms can be established in these islands.

4. Molluscan Culture:-

a) **Pearl Culture:-** The experiments conducted at the Bangaram lagoon in culturing pearl oyster

(*Pinctada vulgaris*) demonstrated the possibility of pearl culture in the island. It has been reported that the pearl oyster transported from the mainland of India has established well. During the survey a few stray numbers of *Pinctada fucata* were also collected. Culture of Pearl oysters can be tried in other island also.

b) *Mussel culture*:- It has been demonstrated that very high production can be obtained from culturing the mussels, *Perna viridis* (green mussel) and *Perna indica* (brown mussel) in floating rafts in open sea along the South West Coast of India (Kuriakose, 1980, Appukuttan *et al.*, 1981). The lagoons offer suitable sites for floating mussel culture rafts. Seedling can be transported from mainland and grown in the mussel culture rafts on coir ropes. The seedlings also can be produced by establishing a hatchery in the islands to meet the seed requirement.

Turtle farming :

There are large turtle farms in the Grand-cayman island in Carribean which began its operation in 1968. Turtle farms are found in Torres strait in Australia, in Seychelles, South Yenam, Malayasia, Philippines, Indonesian Surinam and other places. (Dodd, 1981). Farming is carried out with different views of protecting the natural nesting populations, getting supply of high source of protein and other products, salvaging the eggs that are doomed to be destroyed and to augment research. (Reiger, 1975; Hendricksoe, 1976).

A small turtle farm can be established in Suheli Valiyakara with an annual stocking of 200 neo-nates of *Chelonia mydas*.

Lakshadweep is one of the few places in the Indian Ocean where the green turtles *Chelonia mydas* nest. It has been observed that about 30 green turtles nest in Suheli Valiyakara (Kar and Bhaskar, 1982). Usually these turtles nest three times in season depositing about 100-130 eggs at each nesting. About 9000 eggs are laid in Suheli Valiyakara during each season. If removal of 5% of the eggs is considered to be safe, it will be possible to collect about 200 neo-nates, for rearing without affecting the population.

The low lying areas near the northern end of the Suheli lagoon can be converted into a Turtle pen. Suheli lagoon also has a good growth of seagrass and seaweeds on which the turtles feed. These seaweeds also can be fed to the turtles in addition to the seaweeds available from the natural bed.

Culture of Seaweeds:

Mariculture of economic seaweeds has been practised successfully in countries such as Japan, China, Korea, Philippines and Taiwan. The Central Marine Fisheries Research Institute and Central Salt & Marine Chemicals Research Institute have made attempts to cultivate *G. acerosa* (Krishnamurthy *et al.*, 1975; Subbaramaiah *et al.*, 1975;) and *G. edulis* (Raju and Thomas, 1971; Rao, 1973 and 1974; Krishnamurthy *et al.*, 1975; Chennubhotla *et al.*, 1978; Anon, 1983) using different techniques. The suitable methods for cultivation of *G. edulis* and *G. acerosa* were found to be coir rope net method and coral stone method respectively.

The survey indicated the availability of culturable agarophytes, alginophytes, edible seaweeds and the seaweeds used for cattle feed and fertilisers, in the island. But due to the small size of the lagoon the prospects of harvest of the seaweeds from the natural bed for commercial use is limited. Hence seaweeds have to be cultured if large scale production is required. The common culturable agarophytes found in the island are *Galidiella acerosa* and *Gracilaria edulis*. The alginophytes available in the island are *Sargassum* spp. and *Turbinaria* spp. The edible seaweeds observed in the lagoon are *Hypnea* spp. and *Acanthophora* spp. Though the demand for edible species of seaweed is very low, agarophytes and alginophytes are in great demand. The availability of natural stock of seedling, suitable site for farm, highly productive lagoons and clear water devoid of sediments are great assets for sea weed culture.

It has been demonstrated that 5m x 2m, coir net frame yield 30 kg of wet sea weeds (*Gracilaria edulis*) in about 60 days in Gulf of Mannar. (Ramalingam and Selvaraj, 1979.) Though we have a wealth of information on the seaweeds of mainland of India (Rao, 1971)

we have no information on the culture of seaweeds in Lakshadweep. However there is high potentials for the culture of seaweeds in the islands.

Cultivation of *G. acerosa* is successful by coral stone method. In this method, the fragments of *G. acerosa* were tied to nylon twines at regular intervals and the seeded twines were then wound round the nails erected on coral stones. Seed material is available in all islands except Bitra.

Almost all the lagoon where the water level is about 1-2 m can be utilised for seaweed culture. Wooden frames of 5 x 2 m with coir net can be seeded with fragments of seaweeds like *G. edulis*. The coir rafts can be harvested after two months. As the fair season of the islands extends from September to March it will be able to make atleast 3 harvest in a year.

The main constraint in the seaweed culture is that the islanders are not familiar with the seaweeds and its culture. As it is a new area for them the work has to be demonstrated and the benefits explained to them. The culture sites should not be of any hindrance to the fishing operations or to the boat traffic in the lagoon. It will be possible to establish a small agar-agar cottage industry based on the seaweed cultured in the island.

SUGGESTIONS

1. The mariculture is new to the islanders hence experimental farms should be started sponsored by the public sector to demonstrate its feasibilities and benefits.

2. We have no information on the culture of various species available in the island. Hence for a better scientific base more research inputs are required. For instance, many species of culturable holothurians are available in the island. But we have no information on its rate of growth, reproductive parameters, survival, etc. The same thing can be said about bait fishes, ornamental fishes and seaweeds.

3. The lagoons are small hence proper care should be taken so that the ecology of the lagoon is not disturbed resulting in the damage to the eco-system. The interaction of the culture system and the natural population has

to be monitored carefully. This aspect requires more attention when transplantation of culturable species is attempted.

4. Literacy rates in the island is very high. Hence it will not be difficult to motivate the local people and impart training to them. The mariculture activities like seaweed culture, holothurian culture and ornamental fish culture can be taken up with proper initiative and financial assistance from the government agencies. involvement of the local people in these activities is very essential for its success.

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