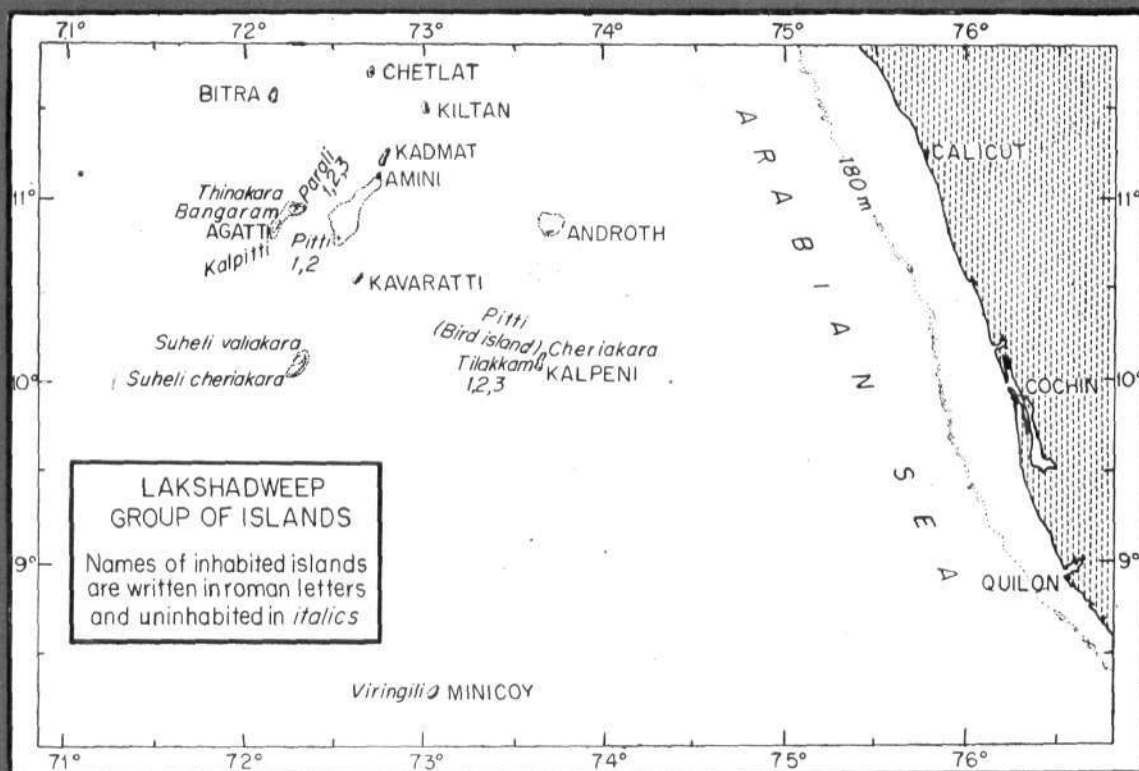




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PROSPECTS OF DEVELOPMENT OF MARINE FISHERIES RESOURCES IN LAKSHADWEEP

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Introduction

The Central Marine Fisheries Research Institute in the past has carried out a number of research programmes in Lakshadweep especially around Minicoy, through its research centre located there. The investigations covered studies on the survey of fauna and flora of the Lakshadweep, the biology and fishery of tunas, the biology and fishery of live-bait fishes, other ancillary resources like sea weeds, sea cucumbers, lobsters and molluscs, oceanographic phenomena affecting the fish resources and coral reef eco-system. However, in recent times, the concentration of efforts was on corals, tunas and live-bait fishes.

A good data base has already been developed by the Institute on various marine resources of the islands and related conservation problems. However, the studies have been mostly confined to the seas around the Minicoy Island. Due to acute limitations of staff, residential facilities, vessel and other infrastructural facilities, the Institute was not in a position to undertake several other important programmes of the region. The Institute has now proposed certain priority projects which will be implemented as soon as the required facilities become available.

In the present paper, the potentialities and the areas where future research and developmental activities need to be directed are briefly discussed.

Tuna resources

Stock assessment studies have shown that there is good potential of tuna resources around the islands (Silas and Pillai, 1982, 1986). Currently, exploitation is in the near shore waters through pole and line fishing. Introduction of larger pole and line boats with storage facilities and simple navigational aids would facilitate the fishermen to move beyond the traditional grounds to scout for tuna shoals and obtain better catches. Apart from pole and line fishing, other operations like gill-netting, surface-trolling and long-lining suited for local conditions could be tried and

popularised for tuna fishing which incidentally would help in reducing the pressure on live-bait requirements.

It is now well established that tunas are attracted by floating objects. Trials on fish aggregating devices have been conducted by a number of countries and several methods are now available. In Lakshadweep, a beginning has already been made in the setting up of 'Payao' type of fish aggregating device off Kavaratti Island by the Fisheries Department. The aggregating tunas are caught by the traditional gears. The method with modifications if needed can be extended to the whole region for increasing tuna catches in the small-scale sector.

Live-bait resources

An important component of pole and line fishing is the availability of coral-associated bait fishes. In recent times, acute shortage of live-bait fishes for the tuna fishery has been faced. The Institute, based on the continuous observations which were made over the past years attributed the following reasons for the shortage of live-bait fishes in the Lakshadweep.

Due to heavy exploitation of the live and dead corals from the islands, the bottom of the sea has been greatly disturbed, which resulted in siltation of the reefs and consequent large scale mortality of the live corals. This has also caused some amount of erosion around the island. The periodic dredging of the lagoon also contributed to disturbances of the bottom and consequent siltation killing the live corals. Since several invertebrate and vertebrate organisms are closely associated with the coral reef ecosystem, any damage caused to the coral reef results in damage to the populations of different organisms inhabiting the coral reef. The live-bait fishes form an important component of the eco-system and hence the populations appear to have deserted the disturbed areas.

The second reason for shortage of live-bait is the lack of recruitment of the young ones of these fishes to

the populations. The live-bait fishes of Lakshadweep are broadly classified into resident and non-resident or migratory species. If continuous exploitation of the live-bait takes place without proper recruitment, there would be a decline in the total populations of live-bait fish. The recruitments may also be affected by the meteorological conditions through strong wind and currents, which drive away the eggs and larvae of live-bait fishes to regions other than the conventional lagoon waters.

The third reason in declining the live-bait fish population is the increasing demand of these fish to meet the pole and line fishery for tuna. The tuna fishery a decade or so ago was restricted only to the Minicoy Island. But in recent times, the fishery has expanded to other islands as well, bringing in a catch of about 5,000 tonnes per year. This enlarged fishery naturally required more live-bait and hence exploitation of limited resources of live-bait has led to depletion of stocks.

The catch statistics for tuna and live-bait resources are mainly taken by the Institute from the information available with the local administration. Although the staff of the Administration have been trained by the Institute, comprehensive data on these resources are still wanting to cover effectively all the islands from where tunas are captured. For a proper management of the tuna fishery and steady supply of live-bait fishes for the local tuna fishery, reliable estimates of potential and exploited stocks are necessary. Through critical analyses of data collected systematically, it would be possible to plan ways and means of augmenting the live-bait resources. Therefore, future research programmes of CMFRI would concentrate on estimation of exploited and potential resources separately of tuna and the live-bait. In addition, surveys should be conducted to identify suitable resources of live-bait in the vicinity of the islands and develop methods to transport and maintain the stock for later use in the tuna fishery. Attempts should be made to identify promising species of fishes for artificial propagation and development of stocks to be used as live-bait. Since it is suspected that natural populations of live-bait are available in regions presently not exploited by fishermen, fishing at night through lights could be experimented upon. Attempts will also be made to identify alternate species which could be used as live-baits, for which experiments could be conducted. The possibilities of using artificial bait for catching tuna could also be a part of the over-all programme on live-bait fishes.

Coral conservation

As stated earlier, coral reefs form the habitat of live-bait fishes. At present the stock of these fishes is on a declining trend which in turn affects the pole and line tuna fishery. It is essential to preserve the coral reef eco-system of the islands if the marine resources of the region are to be stabilised (Gopinadha Pillai, 1983, 1985). This programme should involve (i) declaration of a few undisturbed and undamaged areas in the region as a marine park for the protection and preservation of the marine wealth. This would have the advantage of not only preserving the nature but also providing excellent tourist attraction; (ii) conducting experiments to rejuvenate and re-grow the corals by transplanting live and suitable species of corals into regions where they thrived earlier and (iii) adoption of a cautious approach to dredging and blasting operations in the lagoons.

Conservation of the eco-system and the marine resources assumes paramount importance in any future plans for the development of Lakshadweep.

Resources other than tuna

Tuna fishing and production of '*mas min*' are traditional occupations and the islanders have little attraction for other fishes. However, even without much organised efforts, one fourth of the landings in Lakshadweep is accounted for by fishes other than tuna which include important fishes like sharks, perches, carangids, half-beaks, belonids and seer fishes. (Jones and Kumaran, 1980). It may not be possible to exploit these groups of fishes by following the traditional methods like dragnets and castnets. Diversified fishing efforts like drift/gill-netting coupled with improvements in crafts to fish in farther waters would go a long way in tapping these resources. Commercially important crustaceans like lobsters and crabs and molluscs could be developed as minor fisheries, which in addition to enhancing production, will promote exports. Diversification of fishing effort would also help in providing employment and income to the fishermen during the tuna off season.

Several coral reef fishes are considered as excellent ornamental fishes for aquaria in many parts of the world. Many countries import marine ornamental fishes. Studies have shown that there are a number of small but colourful coral reef fishes like butterfly fish, surgeon fish and parrot fish in plenty in Lakshadweep. Collection methods, packaging technologies and transportation

facilities need to be developed so as to tap those resources for export trade.

The lagoons of Lakshadweep are rich in sea-weeds which have good potential for industrial purposes. However, indiscriminate harvesting would adversely affect the stocks. The sea-weed resources will have to be monitored continuously so as to arrive at yield levels which would be sustainable and at the same time do not affect the live-bait and ornamental fisheries.

Limited experiments conducted in Bangaram lagoon for pearl oyster culture showed encouraging results. Further research will be required to study the technical feasibility and economic viability before large-scale programme can be introduced. It may also be worthwhile to undertake investigations on the feasibility of introducing aquaculture programmes for resources suitable to the island conditions.

Storage, product development and marketing

With increased production of tuna and other fishes through developmental efforts in the coming years, preservation, processing and marketing assume great importance. Suitable post-harvest technologies and the needed infrastructure will have to be provided. Even though smoked and cured '*mas min*' from tuna prepared indigenously, is the major product today, methods for improving the quality of '*mas min*' and development of new products from tunas and other fishes will have to be attempted keeping in view the market preferences. Through proper extension methods, utilization of unconventional fishes and their products can be popularised for local markets. But the bulk of the extra production will have to find markets in the main land or in other countries.

Remote sensing

The problems of Lakshadweep are varied and peculiar. For achieving rapid progress, the government has earmarked funds in VII Plan for several development projects with more emphasis on science and technology. The Institute from its side would be able to employ the latest techniques for exploration, research and management. Use of remote sensing for delineating productive areas of the sea is one such attempt where the Institute has developed expertise in collaboration with Indian Space Research Organisation.

Quantification of biological parameters such as phytoplankton pigments, using bio-optical algorithm is

possible through remote sensing techniques. These phytoplankton pigments are the prime synthesizers in the marine food chain and can serve as a link with commercially important fishes through its conversion to other levels in food chain.

By time-series maps from satellites such as IRSS, LANDSAT and NIMBUS-7 it would be possible to estimate the basic productivity in the sea around Lakshadweep so that aggregation of fish schools could be predicted. It would be also possible to evaluate the ecological changes, nature of vegetation, extent of pollution and shore-line changes using modern space technology methods.

Information base

A sound data base is a pre-requisite for planning of research and development of marine fisheries. Data will have to be collected through scientifically planned surveys. Information on physical, chemical, biological, meteorological and environmental parameters in relation to fisheries and data on fish landings, effort expended, economics of operations of various types of fishing units, marketing and socio-economics will have to be continuously gathered and studied. Shore as well as vessel-based programmes covering the entire region will have to be taken up for acquiring the requisite data. It would be possible then to estimate optimum sustainable yield of resources and inter-relationship of fishery dependent and fishery independent factors with fish abundance facilitating fishery forecasting. Such an information base would very much help not only in critically reviewing the progress of the on-going programmes, in identifying bottlenecks and arriving at remedial measures but also for planning objective development programmes for years ahead.

Need for systems approach

Knowledge of the location, density and variations of the marine living resources, developing suitable crafts and gears as means of exploitation, meeting the requirements of man-power including trained personnel, making available the credit needed and providing infrastructure facilities for fish landing, processing, transportation and marketing are some of the important aspects concerned with the development of marine fisheries. Simultaneously the problem of conservation of the environment has to be effectively tackled to prevent any short or long term deleterious effects on the marine resources.

Some of the factors governing the marine sector are complementary but some others may lead to conflicting interests. Keeping in view the prosperity of the islanders, the inter-relationships and interactions of various components will have to be correctly understood. In this context it is desirable to follow a systems approach where the various components are treated as essential parts of the system instead of dealing each problem or

a group of problems in isolation at their own merits. In fact, marine fishery itself could be taken as a major component of the total system for the development of the islands. Such an approach would help in bringing to light the complexities of the problem in the correct perspective, in building up proper linkages between the different components and to ensure a fast and balanced growth of the economy of the islands.

