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National Seminar on Shellfish Resources and Farming

Session I

MANAGEMENT AND DEVELOPMENT OF SHELLFISH RESOURCES AND FARMING

1. ON MANAGEMENT AND DEVELOPMENT OF SHELLFISH RESOURCES

— Theme Paper

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This paper is intended to review the present status of the molluscan resources of our country other than cephalopods and the existing management practices and suggest measures for an effective integrated approach to help in increasing the tempo of exploitation where it is in a low profile and recommend measures for conservation in such cases and areas which need a hard look. Management should be conceived and understood not as a constraint upon natural exploitation but as an essential tool for the sound, sustained development of fisheries. Hence, management is an integral part of the developmental process.

Molluscs like oyster, mussel, and clam have been always known to the fishermen as nutritious and tasty. But many countries have discarded the exploitation of these till recently due to the priority given to the fin fishes, prawns and crabs. In our country molluscan resources are aplently. But attention for exploitation, save for some zones of west coast had been very casual. In the all India fish landings of 1.4 million tonnes molluscs hardly occupy 1% status. Even this is mostly made up of cephalopods. The bivalves, except for mussels, do not find a place in

the landing data. This does not mean other bivalves are not fished. Recent investigations on the status of molluscan fisheries in selected segments give us some precise information on the small-scale and seasonal fishing effort. Particular mention may be made of the mussel fishery of the west coast where it is known that mussel landings fluctuate between 2500 to 4000 tonnes annually. Similarly clam fishery along the west coast in identified important clam fishing centres yields about 1500 tonnes of clam meat annually. The exact quantity is as yet to be properly estimated. The point is that proper assessment of the molluscan landings have not been done since there is no established assessment system for ascertaining these catches.

Fishery experts are of the opinion that to achieve greater production of food from the sea in the next few decades it is going to be difficult to rely solely on intensive capture fishery operations alone in the Exclusive Economic Zone and Oceanic Zone. These operations are fossil-fuel dependent and would be more expensive as time goes on. The current line of thinking is towards

promoting production of food resources of inshore forms which remain neglected due to disinterestedness or lack of knowledge of these forms and their potentialities. The acceptability of the molluscan meat as an item of diet has caught up amongst the Indian public and the present trends indicate very great interest in utilizing molluscan meat as diet, both exploiting natural beds and by trying to evolve suitable technologies in producing them by culture practices. These areas should receive greater attention and development. It is opportune for us to take note of this and strive to increase edible molluscan production. This can be done only by a greater understanding of the resources potentiality of all edible species and passing on the information to the fishing industry so that greater area coverage results. This will also make good use of the natural stock without allowing them to perish unutilized.

Along the 6100 km of coastline of India molluscan shellfish are valuable fisheries used either as food or source of lime, as decorative shells and in industrial purposes. 28 different species of bivalves and nearly 65 species of gastropods are of very great importance under these categories. Except for bivalves, gastropods are seldom exploited for the edible meat with the exception of chank, *Turbo* and *Trochus*, whose meat is utilised as food. Fishermen have been exploiting marine aquatic organisms for tens of centuries but the edible molluscan resources have remained as an augmentation to finfish landings rather than to have achieved a major industry status. Realising the need for updating the status of our knowledge of the potentialities of the edible molluscs Central Marine Fisheries Research Institute launched a resources survey project in 1976 which enabled us to get a broad picture of the status of fishing in selected segments of our country. Due to several handicaps the project could achieve only a limited success, leaving a big gap to be filled. I feel that this work needs intensification in the next few years. Most of the information existing pertains to the coast of Tamil Nadu, Kerala and Karnataka. For States like Orissa, Andhra Pradesh, Maharashtra and Gujarat hardly any valuable information, qualitative and quantitative assessment of

species and the population is available. The Institute with its capacity to provide expertise should take up the resources assessment at the regional or sub regional levels by collaborating with departments of fisheries and Agricultural Universities of the respective States. This work will enable us to get precise information of the areas of availability, population size, exploitable species and their seasonal stock recruitment to the fishery etc. A national molluscan Atlas should be prepared giving information on season of fishing, population size, species distribution and other relevant factors, region wise. This would help to improve the fishing for the edible molluscs particularly clams, mussels and oysters.

It is essential to enhance the capability of coastal states in stock assessment in order that they can determine the optimum catches of the living resources of the areas where they exercise the sovereign rights. Reliable and timely data and statistics on all aspects of fisheries are needed for planning, implementation and subsequent monitoring of fishery management and development. The natural capability to collect data and information on molluscs should be developed. Development plans should take account of all aspects of fishery sector, not only harvesting, processing, marketing and material supply but also the development of the infrastructure, technology and human resources to enable better exploitation, to increase the value added to the economy and to improve the employment opportunities. It is essential to note all those involved understand the social value of molluscan fisheries as a source of food, employment and profit. Hence, the need and the desirability of using fishing methods and processes which do not jeopardise economic viability by exhausting the resources. Majority of the known edible and economically important species that are landed in India are nearshore forms, open coastal, estuarine or backwater species. The pearl oyster and chank and the other commercially valuable molluscs can be broadly termed as non-edible group (though not strictly so) inhabit subtidal and deeper zones of the sea. Hence, the method of fishing for these bottom dwelling, either free moving or those attached to the substrata,

though slightly different involve comparatively non-costly inputs. Mostly handpicking is done in the case of coastal and estuarine forms while in the case of forms in the deeper area skin diving is in vogue. Scope for modernisation in fishing is therefore restricted to the non-edible group and hence can be considered easy and inexpensive operation otherwise. In the management of clam, oyster and mussel fishing the problem of overfishing does not seem to arise. On the other hand, there is scope for encouraging more fishermen and fisherwomen to resort to fishing of these.

The other method is to experiment with cultivable molluscs and establish farms to grow them. Mussels and oysters have been farm grown and found to grow faster than those in natural beds. The production rate per ha. is also very appreciable 300-400t/ha mussel and 135 t/ha of oysters. Intensification of the culture practices should be explored on all India basis by identifying suitable sites and viable techniques of growing in farms according to local conditions. This can contribute to other national objectives such as rural employment and earning.

Production of seed

a) *Utilisation of natural seed resources*

So far I have dealt with the fishable stock and their assessment. I have not talked about the utilization of seed resources of these forms. The potential coastal water area available in the country include about 8.5 million ha. of productive inshore waters and 1.7 million ha. of estuaries, backwaters, brackish-water lakes and swamps. This includes two major backwater spreads in the west coast and two in the east coast. It has been assessed that there are about 100 estuarine and tidal inlet systems along our coast including the deltaic regions of the major rivers. The settlement of the seeds of *Perna viridis*, *Meretrix casta* and *Crassostrea madrasensis* are commonly seen along the coastal areas in the slightly less saline areas of the estuarine system. Although these form the growing stock for the exploited molluscs there are several regions where

these seeds are subjected to fluctuations in environmental conditions resulting in large-scale mortality on account of seasonal exposure to reduced salinity conditions, siltation and constant exposure due to lack of enough tidal amplitude to permit sufficient column of water for survival. Thus enormous quantities of seed resources are known to go waste annually both in respect of mussel and oyster. As a matter of fact, the mussel settlement along the west coast in recent years has been found to be prolific but subsequent environmental incompatibility of the areas of the spat settlement causes total destruction of these valuable seed stock. It is necessary to plan proper utilization by process of transplantation of these to the agreeable areas so that a good fishery is established. These can be utilised to serve as raw materials for farming in areas where natural raw stock is not found. No assessment of these potential stocks appear to have been so far made. It would be useful to identify important zones in each maritime state's coastal waters and conduct a detailed survey to assess the seed resources. These seeds, if transplanted to ideal growing conditions would help to enrich the fishery in the area of transplantation. Thus what goes unutilized can be converted into protein giving marine resource

b. *Hatchery seed production*

Several countries spend huge amounts in the establishment of hatchery system for the production of seed just because of lack of adequate seed resources. In our country with bright future prospects for farming of oysters and mussels the seed resources of these appear to be enormous judging from earlier reports and through the results of directed research undertaken by the CMFR Institute. In order to be prepared to meet future demands the CMFR Institute has made a breakthrough in mass seed production of oysters in hatchery by developing a very good system of larval feed production to overcome the critical period of larval survival. This can be followed up in respect of mussels and clams also. It is difficult to establish a hatchery for each State because of cost involved. The hatchery at Tuticorin should serve as a national molluscan seed production centre.

Management problems present themselves in greater dimensions in respect of the shellfish

resources which are exploited on commercial lines not so much for edible value of their meat but for their industrial importance. I have in mind the pearl oyster, chank, *Trochus* and *Turbo* of Andamans and dead shell and subfossil shell deposit quarrying operations.

a) *Chank*

For centuries together the chank *Xancus pyrum* has been fished under the aegies of state monopoly in Tamil Nadu, Kerala and Gujarat. The chank bangle industry needs about 2.5 million shells annually for supporting the employment to artisans. The fisheries in India supplies only 2/3rd of the needs in good quality and size, of which the major share is from Tamil Nadu, from Palk Bay and Gulf of Mannar coast. 1000 fishermen by skin diving are able to fish out chanks only up to 10 fathoms. It is known that beds extend beyond this depth which can be effectively fished only by training them in SCUBA diving and establishing service centres to cater to their needs in supplying accessories and filling aqualungs with compressed air so that the efficiency in catches can be improved by reaching out to hitherto unexploited beds. The size landed also will improve. It is true mechanised trawling gets as much as 100000 chanks annually as bye catch. But this is undesirable due to the damage caused to the natural habitats and in the possible destruction of chank egg capsules affecting recruitment to population. Observation of 'protected zone' and 'close season' during the trimester January to March which happens to be the breeding season are called for.

It is also necessary to ascertain the size at first maturity of chanks, both for male and female, so as to stipulate the size that can be safely fished. The present 55 mm diameter size is arbitrary and may have to be raised. The state government has its own political and labour considerations with regard to leasing out chank fishing rights and departmental supervision. Whatever the case strict vigilance and effective patrolling the chank beds appear to be necessary to prevent catches being clandestinely sold. These measures will improve the status.

Researches on movement of chanks, their migratory habits, breeding, rate of growth,

longevity and laboratory production of baby chanks for sea ranching would help to expand the fisheries in future.

b) *Pearl oyster*

As for pearl oyster it is well known that there is irregular cyclic nature of fisheries. The last pearl fishery was in 1961 after which we had drawn blank. The reasons for poor fishery are far from human control undertaking culture pearl operations would help to produce pearls thus saving the country valuable foreign exchange. The Institute developed technology in this regard has been field tested and found to be a great success. The raw material seed available for farming has also been ensured by mass production of spat in hatchery at Tuticorin. The spat that could be produced annually can run to several billions. Portions of this can be broadcast over pearl beds periodically and allowed to replenish the paars. The chances of natural pearl fishery can also thus enhanced. Researches on how best the spat so produced can be effectively transplanted by standardising the technique of ranching appear to be necessary. A start has been made on these lines and the results are being monitored and watched. The possibilities of the establishment of more number of pearl culture farms by identifying areas in different maritime states should be explored so that employment opportunities also can improve. At present, the nucleus for the implantation are imported. This problem has to be studied carefully with reference to the possibility of utilizing some of the large shells of bivalves like *Tridacna* and gastropods like *Turbo* sp. and *Trochus* sp. of Andamans for making spherical nuclei of size from 3-8 mm dia.

c) *Turbo* and *Trochus*

Due to indiscriminate fishing for these shells in Andamans there seems to be a scarcity of shells. The status of these in fisheries has to be studied carefully so that restrictive action can follow. Our knowledge of the resources availability of these two is very restricted. A thorough survey of the beds and resources in the Andaman and Nicobar islands is very essential before planning for the future development.

d) *Shell quarrying for lime and industry*

This practice has been in vogue for several centuries wherein poor fisherfolk collect the

dead shells from the coastal waters and estuarine regions and sell them to industry. It is estimated that annually about 2.5-3.0 lakh tonnes of clam subfossil deposit shells are quarried from Vembanad lake in Kerala by resorting to mechanical removal. Similarly dead shells are removed by fishermen from the beds in Ashtamudi Kodungallore, Kadalundi and Korapuzha river estuary (50000-60000 t annually), in Kali river estuary in Karnataka (5000-10000 t annually) in Attankarai in Tamil Nadu (5000 t annually) at Sonapur estuary in Orissa (2000 t/ annually) ennore estuary, Tamil Nadu (1000 t), Buckingham canal and Pulicat lake (10000 t/annually). 200 t of window pane oyster shells in Kakinada; 100-150 t of the same in Gujarat State. Although this operation aims at the utilization of the buried shells remains very often the price fetched by the shell makes the fisherfolk and those interested in shell collection to remove, indiscriminately all live shells of clams, young and old. The operations done under the right of lease given by State Government is not only a potent activity in disturbing the habitat but also robs the fishermen of the long term benefit of utilizing the meat of the shells. It appears necessary to moderate the activities keeping in view also the interest of the industries concerned. Regulatory practices by declaring closed or protected zones in selected segments would help to increase natural population size giving greater scope for molluscan meat production. A Joint National Consultative or advisory body consisting of concerned fishermen representatives, of industries, department of minor mineral mining, and State Fisheries should go into the merits of each case and decide the future.

Clams and oysters have been well received both in the internal and external markets. Nearly 500 tonnes of this meat has been exported annually. This indicates the area of product development and scope for marketing. As at present trade for molluscan meat is bright. This can be expanded by increasing marketing possibilities in exchange for fishing possibilities. Obstacles remain which prevent us from reaping full benefits from international

trade. These include difficulties in the level of product, quality and quantity demanded by export market, limited trade information and contracts, tariff and nontariff barriers, restrictions of exports of raw material rather than finished products, low share in trade related services etc. There are also possible conflicts between the achievement of national nutritional goals and the objective of increased foreign exchange earning. Expansion of export trade in shellfish activity should be resolved by establishing priorities at the national level at the same time a well developed domestic market helps to reduce the high risks associated with industry based exclusively on export market. It is better to export final product than raw material as per the quality standards. Once this channel is steady and standardised the future holds out great possibilities for a spurt in the exploitation of these edible molluscs.

Disease

At present not much is known about the natural mortality in the molluscan beds. Most of the great fisheries of world have experienced fluctuations in supply. Causes of such fluctuations have been much discussed but rarely determined precisely. Among the factors implicated in reduction in abundance are over-fishing, inadequate food supply, disease, change in the environmental condition, drastic and sudden destruction of beds, toxins, predation and indiscriminate harvesting. It is necessary to document the reasons for large scale mortality of population. Whenever such instances are brought to notice it is essential to correctly diagnose the causative factor and study the etiology and take preventive steps. Most of the management practices recommended the establishment of disease diagnostic sections to serve as extension media

I have indicated only broad strategies for future management and development of molluscan resources and I hope this Seminar will throw more light on the problems and constraints faced in molluscan fisheries development and recommend tangible steps to be taken for achieving greater production.