....On the commercially exploited edible bivalves off Mumbai

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Focal Points at a Glance

Molluscan meat constitutes a widely preferred item of palatable food, mostly available along prime coastal centres of Maharashtra, particularly along Mumbai. There is a good demand for molluscan meat in this zone, probably with a marginal extension to other Coastal States. While the authors highlight the need to form a Fishermen Welfare Society for Maharashtra to promote molluscan fisheries, the authorities concerned in the various coastal States too would have to pay special attention towards promoting molluscan fisheries development, not only for the benefit of the fishers but also to provide this nutritious food to the people.

Bivalves are benthic molluscs occurring in intertidal to subtidal areas. In the food chain they feed low, mainly on plankton and detritus, which are abundantly available in the natural waters circulated by the tides. Many species of bivalves occur abundantly along the Indian coast of which at least 50 species are commercially important. Edible oysters, clams, cockles, mussels and scallops are the prime groups, which contribute towards the fishery in the marine, estuarine and freshwater habitats.

Molluscs are affordable even to the poor. They are equally rich in protein, glycogen and minerals, same way as the other sea foods. The world production of bivalves has been steadily increasing since the 1990s to reach a new record of 12.4 million tonnes in 2002. The growth was mainly attributed to two main factors, the rapid growth in the molluscan aquaculture sector and a sharp increase in the bivalve production in China. Bivalves contributed around 9.4% to the total world aqua production in 2002. World exports of bivalves went up from 5,42,174 mt value at US$ 1.39 billion in 2000 to 6,36,591 mt worth US$1.41 billion in 2002.

In India, molluscan shellfishes are exploited not only for human consumption but also for use as a source of lime, as decorative articles, constituents for medical preparations and fertilisers. Molluscan shells are used for poultry feed and the flesh is used as feed for prawn broodstocks in hatcheries. Except for the States of Kerala, Karnataka and Andhra Pradesh there is no data available on its landings in India. In Kerala, the total bivalve production was 11,547t and the bivalve production from the inshore and estuarine waters was estimated at 61,280t. The annual clam catch from the estuaries of Karnataka was placed at 13.488 t and the annual mussel landings of the State were estimated as 9,627 t. The total estimated landings of bivalves and gastropods in Andhra Pradesh were 1,008 t for the period 2005-2006.

The bivalve resources of the inshore and estuarine waters of Maharashtra are exploited using a variety of fishing methods. However, the total production is not high, for the reason that its fishermen do not venture much far for harvesting the resource due to the difficulties and inconvenience associated with the exploitation of this fishery. Clam bed resource occurs in the sub tidal area up to 1.5 m depth. Apart from the coastal rocks in the intertidal area, sub-tidal rocks away from the coastal zone too have dense settlements of mussels. Fishing for them is done during low tide for the first eight days after the new moon or full moon phase. Calm water conditions and sunny days are helpful and sometimes early morning hours are preferred for harvesting them. Bivalves are generally either hand picked or scoop nets are used. Generally bivalves occur in clusters and in layers. The upper layer consist of young ones settled in a later Stage. An indigenous technique used for their collection is by the use of wooden planks mostly by children. The wooden planks are used to skate over the mud flats and children are involved in this activity because of their lesser body weight which facilitates easy skating over the mud. Traditional exploitation of mussels takes place during the monsoon months when fishing activities are stopped and come to a standstill. Fishermen and children take part in the catching of the molluscs during the monsoon season.

As part of the Post-harvest operation, the meat from the molluscs is separated by shucking, is i.e., the removal of the meat from the shells. This is done either manually or by☞

immersing the live molluscs in boiling water or by steam cooking until the shells open up. Women sell the separated meat in the local market. They play an important role in income generation for the fishermen along this region engaged in various activities related to the fishery sector. Such of the molluscs from which this meat is not separated are taken to the market in wet gunny bags and sold to the local marketing agents. The market price will be encouraging for large and medium sized bivalves. The level of the price realised depends on the quantity availability of the shells.

Mumbai is the largest of the metropolises of India with a 100 km long shoreline of the Arabian sea. With the development of urban areas and rapid population growth, the topography of inter-tidal area around Mumbai has changed, resulting in the displacement as well as change of trophic level distribution. The shoreline of Mumbai was once populated with varied diversity of bivalves and other shellfish. It is not so now. There has been a steady decline in the shell population level and its diversity. Locally all clams are known as *Tisare, Shivale, Tigari* or *Shimpale*. Oysters are known as *Kalaw* and mussels are known as *khadap shimple, Kakagi* or *Shenane*. Some of the most important edible bivalve resources of Mumbai are as follows:

i)*Arca granosa* (Lamarck): Class: Bivalvia, Order: Arcoida, Sub family: Arcacea, Family: Arcidae (Ark shells).

Arca granosa is popularly known as 'blood clam' because of the red coloured flesh, which is due to the presence of haemoglobin in the blood. They occur mainly from January to April and the size ranges between 40-80 mm in shell width. They shells are white in colour and are large, thick and heavy, bearing prominent sets of tubercles. They occur on sandy bottom in intertidal zone. They are generally hand picked or scooped. Once this fishery was very thriving in Mumbai but now this has declined alarmingly, almost to nil status. They are however found occasionally in Girgoan chowpaty area.

ii)*Meretrix meretrix* (Linne): Class: Bivalvia, Order: Veneroida, Family: Veneridae.

Meretrix meretrix, known as Venus shells or carpet shells, spawns throughout the year with peak season during April to August. There are four varieties of this bivalve. Its length ranges from 25 to 55 mm. Large sized ones are brought to Mumbai markets in gunny bags for sale from Ratnagiri. They are mostly straw yellow in colour with dark brown bands, but they are also come across with other colour variations. The shell is large, triangularly ovate, and thick with glossy and polished surface. They occur on sandy bottom in mesolittoral zone. They cost Rs.25 per bowl, which could contain 30-40 large ones or 40-60 small ones. They are commonly found in Girgoan chowpaty and Gorai creek.

iii)*Perna viridis* (Linne): Class: Bivalvia, Order: Mytiloida, Family: Mytilidae (Mussels).

Perna viridis is locally called as Kulate. Fishermen generally collect them during monsoon months when there is a lean fishing period. Commercial size ranges from 40-90 mm. The shell is deep greenish black in colour and is elongated and triangular with strong ligaments. They occur attached to subtidal rocks at low tide mark and in rock crevices. They are commonly found in Versova creek.

iv)*Gafrarium divaricata* (Chemntz): Class: Bivalvia, Order: Veneroida, Family: Veneridae.

Gafrarium divaricata, also known as Venus shells or carpet shells ranges in size between 30-40 mm. The shell is light yellow in colour, with pale brown angular markings with concentric radial ribs. They occur in sandy shores in intertidal waters. They are hand picked or scooped. These species occur in abundance along the Ratnagiri coast. They are also bought to Mumbai markets in gunny bags. They can be found in plenty at TIFR, NCPA and Bandstand.

v)*Paphia textile* (Gmelin): Class: Bivalvia, Order: Veneroida. Family: Vencridae (Venus shells or carpet shells).

These are also known as Venus or carpet shells. Each of these range in size between 45-55 mm. The shell is pale yellowish white in colour with a smooth and glossy surface, with attractive patterns. They occur in sandy bottom in mesolittoral zone. While they do not occur in abundance in Mumbai waters, they are commonly found in Girgoan chowpaty.

vi)*Paphia malabarica* (Chemnitz). Class: Bivalvia, Order: Veneroida, Family: Veneridae (Venus shells or carpet shells).

Also known as Venus shells or carpet shells, *Paphia malabarica* are hand picked. They are also scooped. They range in size from 45-55 mm. The shells of this bivalve are pale yellowish brown in colour and they occur in sandy bottom in mesolittoral zone. They are found very rarely along the Mumbai coast but could be collected from Girgoan chowpaty and Cuffe parade. A specimen as large as 76 mm was collected from Cuffe Parade during the month of December.

A proper assessment of bivalve resource of different areas of the Mumbai coast is very essential. Not much of information is available on this resource from Mumbai region, in respect of its annual production, seasonal variations in landings and biological characteristics of the exploited species. Studies on these aspects will be helpful for proper management. Judicious exploitation of this resource is required to ensure sustainable fishery.

A detailed study of the submarine rocky areas may bring to light unexploited beds of bivalves along Mumbai coast for intensification of exploitation. Culture activities can also be taken up. For this, studies on the physical, chemical conditions of water, bottom contours, sedimentation, movement of water, light penetration, distribution pattern of suspended materials, organic detritus and their nutritional value, availability of nutrients, trace elements at stratified depth levels, methods to understand the mechanism of the formation, growth and dissipation of phytoplankton bloom and the effects of this on the animals, monitoring heavy metals, pollutions and bacterial load particularly in its response of coliforms should be taken up.

Comprehensive studies on the market potential of bivalves, both within and outside the country to ensure the marketing of bivalves and bivalve products are essential. Further, monitoring of the dredging done for the exploitation of sub fossil deposits and pollutants is extremely essential.

Molluscs generally breed almost throughout the year. However, peak season for the breeding of all the species seems to take place during monsoon. The juveniles being abundant in post monsoon season, fishing for them or their collection should be completely stopped during this period. The need of the hour is to form a Fishermen Welfare Society in Maharashtra to support and sustainably promote this fishery, provide financial assistance to the fishermen and assist in the disposal of the catch.