

Status of Windowpane oyster *Placuna placenta* (Linnaeus) population in Goa

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Abstract

The ecological status of windowpane oyster *Placuna placenta* (Linnaeus) has been discussed along with its potential for commercial exploitation in Goa. *P. placenta* is one of the important constituents of the molluscan resources of the Indian waters. The shells of *P. placenta* were traditionally used in windows instead of glass in Asian continent and Goa during the 16th century and, more recently, in handicraft industry. The flesh is considered as a delicacy in some parts due to its higher protein content. The size of the shell varies from 18 to 131 mm. Adult *P. placenta* can survive for about three years. The most striking feature of this species is that it can produce small pearls, which are used mainly in the pharmaceutical industry in preparation of medicines under the Indian system. The percentage of pearl formation in the natural population of *P. placenta* is higher in Goa (about 35%) compared to other regions in India. There is considerable scope of this important resource particularly for extracting pearls, as food source and shells for ornamental purpose. Further, *P. placenta* is known as very efficient bioaccumulator, and thus it can be used in coastal environmental monitoring.

Introduction

Bivalves are commercially exploited worldwide, due to their high productivity, abundance in shallow coastal waters and high nutritional value. In addition, bivalves are exploited for pearls and their shell, as well as the soft edible tissues. These 'exotic' products form the basis of multi-million dollar exports from some parts of the world. Mussels, oysters, scallops and clams dominate the world production of bivalves for food from fisheries and aquaculture industry. Demand for these products has also led to overfishing, which resulted in the development of highly specialized pearl-culture technologies and the aquaculture of bivalves for conservation and restoration.

The windowpane oyster *Placuna placenta* (Linnaeus, 1758) is a bivalve with a very translucent shell that was traditionally used in windows, more recently, for shell-craft items.

It also produces pearls that are exploited commercially. The species has a wide distribution including the Gulf of Aden and around India, the Malay Peninsula, and

the southern coasts of China and along the northern coasts of Borneo to the Philippines (Gallardo et al; 1995). Four congeneric species are currently recognized in the family Placunidae: *Placuna placenta*; *P. (Ephippium) lincolnii* (Gray, 1849); *P. (Ephippium) ephippium* (Philipsson, 1788) and *P. (Ephippium) lobata* (Sowerby, 1871), but only *P. placenta* has a shell that is sufficiently translucent for commercial use (Gallardo et al; 1995).

Economic Importance

The windowpane oyster is commonly known as "kapis" which is commercially and economically important because of its translucent shell. The shell is large, very flat, thin and rounded. The inner surface is smooth, glossy and displays a brilliant pearly iridescence (Pl.64). The shell can be made into beautiful handicrafts like windowsills, lampshades, flower vases, chandeliers, chessboards, coasters, wind chimes, wall panels and many other decorative accessories. According to Gallardo (2003) Kapis shells can be grown in areas with water temperature 24.5-30°C, salinity 18-38 ppt, pH 6.4-7.7 and dissolved oxygen 2.5-5 ppm.

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Ideally in transplanted areas density should be limited to approximately 150-200 per m² (1.5-2.0 million seedlings per hectare) to allow normal growth and prevent overcrowding.

Although Kapis meat is consumed by local population however, the most of its value comes from its shells which are used in making animal glue, chalk, shellac, soldering lead and paint as well as decorative material. While the windowpane shells are harvested in many parts of the world such as India, China and Malaysia, the major producing country is the Philippines, which exported US\$36 million worth of Kapis products during 1986 - 1991. Kapis ranked fifth after prawns, tuna, seaweeds and octopus among the major fishery exports of the Philippines (Philippine Fisheries Profile 1991). Major markets include U.S.A, Japan, Germany and the most of Europe. Kapis shells are gathered from the wild by hand, diving and dredging and graded according to size and quality. Shells that are bigger than 75 mm are classified as first class while those less than 60 mm are fourth class. To reduce damage to the shells, they are allowed to dry and open naturally. The meat is then removed due to its high protein content and often used as a component for poultry and shrimp feeds.

Placuna was identified as the second priority mollusc species for research during the Second Conference on Aquaculture Development in Southeast Asia (ADSEA) held in the Philippines in 1994. Attempts have been made to artificially propagate this species in the Philippines and in India because of the very wide fluctuations in natural recruitment from year to year (Gallardo, 2003).

It is one of the important constituents of the molluscan resources of the Indian waters and is found near Tuticorin and Kilakarai, also abound in Balapur areas, the Rann Bay in the Gulf of Kutch, Mumbai and its vicinities and the Corangi Bay of Kakinada. The availability of dead shells along the southwest as well as the southeast Indian coast suggests the possibility of wider distribution of windowpane oyster (Hornell, 1949).

Status of *Placuna placenta* in Goa

In Goa, the windowpane oyster contributes to the fishery industry significantly at the Nauxim Bay of Zuari estuary, which inhabits a large population of about 8,000- 10,000 oysters being fished per day. Kapis are harvested throughout the year, except the monsoon season. The oyster meat is consumed locally and the shells are used for making curios. Although the meat is eaten by a restricted community, the dead shells of *P. placenta* are widely collected as seen from the variety of curios available in the local market (Pl.65). Even though the meat content is very less, it is of superior quality with high protein content than mussels and oysters. However, its consumption in restricted areas is due to the lack of knowledge about its edibility as well as non- availability in the local markets.

Archeological significance

The record of *P. placenta* being used in Goa is dated as early as the 16th century (www.loriente.com). In Indo-Portuguese the term 'Carepo' (from the Konkani word *karap* 'shell') was also used to designate translucent shell of the *Placuna placenta* oyster, called 'Bhilgaci' in konkani, which was used for making windows. For a warm climate windows like these were beneficial; they filtered direct sunlight providing the inside of a building with soft and gentle light, dispensed with the need for curtains and blinds and were stronger and longer lasting. The traveller Pyrad de Laval (The voyage of Francois Pyrad of Laval to the East Indies, The Maldives, The Molucas and Brazil) wrote in 1616 " they do not use windowpanes [in Goa], but instead very fine and smooth oyster shells, which allow the light to pass through as if they were paper as

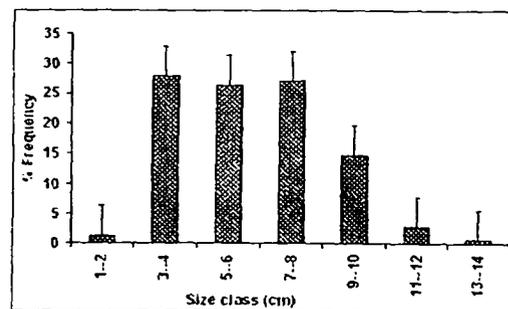


Figure 1. Size frequency of the oyster *Placuna placenta* at Nauxim Bay, Goa

they are not transparent as glass." The Portuguese linguist Graciete Nogueira Batalha has described that these type of windows called as 'Adufas', measured upto half the height of the windows made from sheets of shells set in wooden frames, were used in Macao (China) as in India (www.loriente.com).

The trading of windowpane oyster shells for their use instead of glass mostly in lanterns and windows is evident from the shipwrecks of San Antonio de Tana, which sank in Mombasa harbour off Fort Jesus in 1697 (Piercy, 1982). Among the numerous items recovered from the wreck, the most abundant were small rectangular pieces of *P. placenta* shells. Evidence suggest that the ship carrying these shells sailed from Mumbai harbour, probably the shells were harvested from the coast of Mumbai and Gujarat which supported a very high density of windowpane population then.

Placuna placenta and pearls

Pearls are produced in particular varieties of bivalve molluscs (having two shells, such as mussels and oysters), but only in those with a "pearly" lining on the interior of the shell. Today, most of the world's wild, natural pearl producing molluscs have vanished because of over fishing and pollution, so eye-catching natural pearls are rarer than ever before. The largest, most beautiful pearls sought throughout history are produced by saltwater molluscs, which are referred to pearl producing oysters belonging to the genus *Pinctada*. However, *Placuna* is also known to produce pearls which may not be comparable in size to the ones produced by *Pinctada* but can be used for ornamental purposes. In India, *Placuna* is known to produce small pearls of low quality, which are used entirely in the pharmaceutical preparation of medicines under the Indian system, though bigger pearls in some places are known to be use in ornaments (Hornell; 1949, Bhavanarayana and Raghunath; 1973).

Scope of the present study

In recent years, molluscs especially bivalves have emerged as a delicacy and luxury food item throughout the world. To meet the market demand the molluscs are indiscriminately exploited resulting in decline of

natural population. Commercially exploited bivalve resources has been declining worldwide owing to different anthropogenic activities involving mining, sand extraction, overfishing and industrial pollution. The way forward for the human use of the bivalve species is through sustainable harvesting.

In view of the above scenario, it becomes apparent to popularize other less known local species. The need to popularize bivalves as food is very essential, particularly in a country like India where need of cheap nutritious food is a long-standing problem and any means to tackle it should be tried on priority basis.

However, despite the economic importance and food value, *P. placenta* has received little attention. Available information is not sufficient to meet the state wide planning goal. Additional information thus is necessary to determine the short-term and long-term effects of commercial harvesting of the windowpane oyster, which will help in proper management of its fishery, and conserving the diverse muddy ecosystems, in which it inhabits.

Observations at Nauxim Bay, Goa

The Nauxim Bay (Lat. 15°26'N; Long. 73°51'E) of Zuari estuary in Goa inhabits a large population of windowpane oysters with about 8,000- 10,000 oysters being fished per day (Ingole per. Obs.). During the present study, very few live specimens were collected hence measurements were done on recently deposited dead shells. The total shells collected (140 nos.) comprised of 7 size classes of 1cm interval (l.66). Size (Total Length) ranged from 1.8 to 13.1cm. Maximum shells belonged to 3-4cm size class with the smallest (1-2cm) and the largest (13-14cm) size class with only one organism each. Since shells were hand picked, the collection was probably biased towards the 3-8 cm range as smaller oysters are found in the sediments. Oysters with more than 14cm must be undergoing natural mortality as no shells of that size were observed. The density of oyster shells ranged between 335 to 420 nos. m².

Pearls were recovered from one of the live oysters (13cm Pl.66). Altogether fourteen pearls were recovered with size (dia) ranging from 0.2mm to 1mm (Fig.

5). About more than two decades ago, Achuthankutty et al. (1979) conducted study in the same area on this species. However even after a long lapse of period wherein pollution and other man made activities has taken a toll on most of the flourishing resources of the past, the present scenario of these oysters appears to be promising. The number of oysters per square meter recorded in the present study is comparable with those observed earlier (Achutankutty et. al; 1979). Moreover, maximum number of pearls recorded in an oyster by Achutankutty et. al (1979) were eight whereas during this study a very high number of fourteen pearls could be recovered from a single oyster measuring ~13 cm (Pl. 66 & 67). The pearls however were comparatively small in size.

From the present findings, setting up of *Placuna* fishery both for the purpose of food value as well as its valuable pearls and shell products appears very promising which can be achieved only through a comprehensive study of this species. Such study is a prerequisite for the conservation and management of this ecologically and economically important marine resource of Goa.

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Plate 64. Specimen of *Placuna placenta*



Plate 66. Windowpane oyster (*Placuna placenta*) with the intact pearls



Plate 65. A lantern made from *Placuna placenta* shells

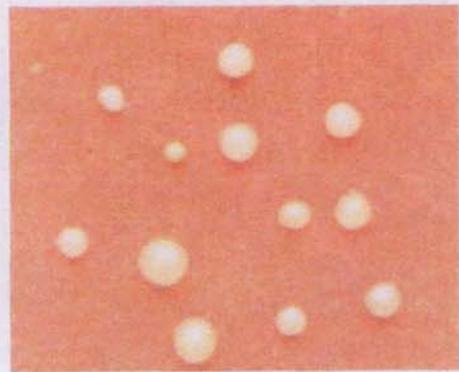


Plate 67. Various sizes of intact pearls.