

FISHING FOR PEARLS IN INDIA

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The oysters of the genus *Pinctada* are valued and exploited in many countries for the pearls they produce although different species form the fishery in different parts of the world. In the case of Japan it is *P. martensi*, in Australia it is *P. Maxima* and in the Persian Gulf it is *P. margaritifera* which constitute the commercially important species.

In Indian waters six species of *Pinctada* occur viz. *P. fucata* (= *P. vulgaris*), *P. chemnitzii*, *P. margaritifera*, *P. artopurpurea* and *P. sugillata*. But only *P. fucata* occurs in very large numbers forming a distinct fishery. As such this species is considered to be the Indian Pearl Oyster.

OYSTER GROUNDS:

The pearl oyster in Indian waters finds an ideal habitat in the Gulf of Mannar on the south-east coast of India where the submarine plateau of the inshore area is dotted with extensive patches of flat rock made of dead, consolidated corals lying within 10 - 25 metres depth at a distance of 11 - 16 km. from the shore. The pearl oyster settles down and grows on the hard rocky substrata called 'Paar'. Starting from Pamban at the head of the Gulf and

ending with Manapad in the south, a distance of approximately 160 km. there exist more than 60 such well known paars.

Although the Palk Bay area also is considered as a potential oyster settling area, the sea bottom there does not appear to be quite conducive for the oyster settlement and growth. The sea floor is mostly sandy or muddy and the water turbid, except for a narrow stretch of 10 km. off Rameswaram Island where rocky bottom is met within very shallow waters. Apart from a freak fishery held in 1914 for a period of 20 days at Tondi, there is no record of any Pearl fishery having been conducted in the Palk Bay. On the other hand the record of Pearl fisheries held in the Gulf of Mannar from time immemorial, is impressive albeit sporadic in occurrence. From 1796 till 1961 a total of only 27 pearl fisheries had taken place in the Gulf of Mannar, the largest being the series from 1955 - 1961 which lasted for a period of 7 years when more than 7,59,44,242 oysters were fished, fetching a revenue of Rs. 21,05,920/- to the State Government.

In the Gulf of Kutch also the pearl oyster grows attached to the reefs known as 'Khaddas' which are scattered

along the Halar coast from Jodiya to Ajad. Pearl oyster occurs in that zone which marks the low tide sea-ward fringe of the reefs of Adatra, Poshetra Hanuman Dandi, Sachana, Salaya etc. But when compared to the magnitude of the Gulf of Mannar fisheries the Kutch fishery fades into insignificance both in the quantity of oysters fished and in the revenue derived.

Except for the above areas, pearl oyster does not occur and grow anywhere along the Indian coast. However, stray ones may be noticed here and there as in the case of the rocky ridges off Colachel and Muttom, in the extreme south west coast.

FISHING METHOD

Gulf of Mannar :

The main technique followed by the fishermen in removing the pearl oysters is by skin diving. The fishing season depends on the locality and the clarity of water in that area. During the period extending from November to middle of May, the Gulf of Mannar is calm and the water clear. Diving in the Gulf is best done in this period. The conditions during the south west monsoon period commencing from June till middle of October are not congenial for fishing.

Skin diving for pearl oysters has been in vogue for over several centuries in this area. And still this age-old method is being followed. It is felt worthwhile here to describe the skin diving as typically practised at Tuticorin, one of the main centres of such diving operations. The Tuticorin type of boat is used for carrying about 15 persons to the pearl fishing grounds. Apart from the helpers on board, the other essential items required for the diver in diving are (a) granite sinker stone

weighing approximately 8-10 kg., properly shaped to take the diver down (b) strong coir rope of length upto 30 metres for paying out and hauling in the sinker stone. The boat owner provides bamboo poles of 3 metre length to be tied abeam to serve for sliding the weighted stone down and (c) a waist bag of cotton yarn or nylon, close-meshed to accommodate the oysters taken. The divers wear only an underwear or loin cloth of dark colour.

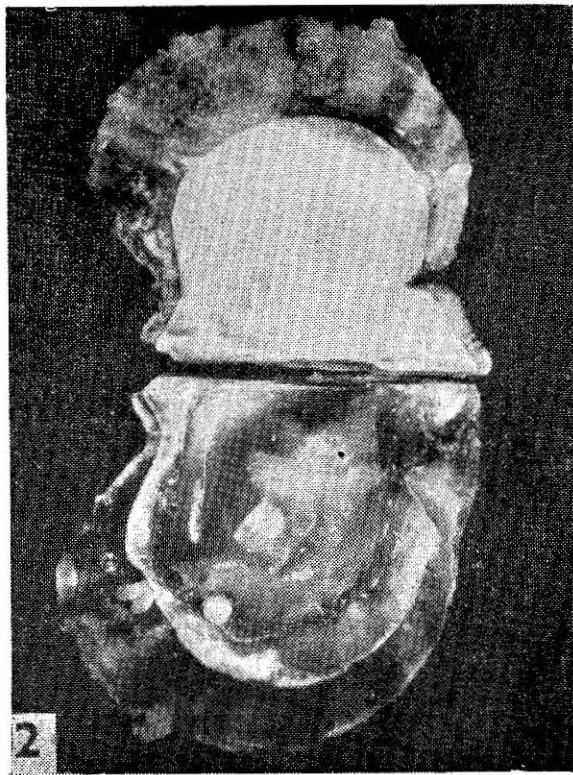
One of the vital factors in the diving operations is the part played by the helper called *Thodai* or *Munduk* who is the non-diving guardian-angel of the diver. Much depends on his intelligence and anticipation in guiding as well as restoring the diver back to his position in the boat during and after diving. Each helper takes care of two divers in a boat so that there are atleast 5 or 6 people on board the canoe forming the non-diving force. They are good swimmers, physically robust and active. The boat owner called *Sammatti* not only gets his share of money for hiring the boat but may be a good diver or a *Thodai*. His earning is therefore better than others. The relationship between these three is always cordial due to their mutual interest in getting the best income possible and therefore they work like a well-knit team. Usually one of the fishermen who is the most proficient in locating the paars accurately specializes in this line of work and is called the *Paar Mandadi* or the Rock-pilot. Being an expert, his knowledge of bearings in land in relation to the paars is very good. Many divers and boatmen who come from neighbouring districts depend on him for guidance; in addition, locally inexperienced and easy-going divers also follow his guidance.

On reaching the fishing area, the boat is anchored by means of a heavy anchor as well as a small lighter one. The *Thodais* get busy tying 4 or 5 bamboo poles abeam the boat in different places. The diver ties one end of the long coir rope firmly to the gunwhale plank and the other end is fastened securely to the sinker stone, passing through a hole drilled on the top of the stone. Each diver has his choice of stone weight. Removing the twist and tension in the case of new coir rope is done by the divers earlier by soaking the rope in sea-water for considerable time. The waist bag is tied round and the diver jumps into the water and clears his ears by doing some gurglings under water. The sinker stone is kept

suspended below the water line, the loop being passed over the projecting bamboo pole. The diver catches hold of the looped rope with his left hand, clips the rope below the water line with his left toes resting on the diving stone, takes a deep breath, grips his nostrills with his right hand and with his right leg stretched in the direction he wants to go underwater he looks at the helper who is watching him all the while. Next moment the diver disappears swiftly with the looped rope gliding down automatically. The diver reaches the bottom in less than 10 seconds. This is heralded by the rope becoming tensionless and also by the impact of the stone on the bottom felt by the nimble fingers



1. The Indian Pearl oyster *Pinctada fucata*
(= *Pinctada vulgaris*)



2. Pearl oyster with pearl *in situ*

of the *Thodai* through the rope. At once he watches for the diver who is spotted out as soon as he pops out.

Usually an expert diver is capable of remaining underwater for just over a minute at a depth of 18 metres. The *Thodai* shouts 'Hey' so that the diver knows his position and direction from his boat to which he swims back. Should the diver rise up from right below the boat the *thodai* seeing him at a depth in the clear water cautions him by drumming the boat. This noise is transmitted underwater and the diver avoids his head banging against the keel or the hull. While diving one set of 4 or 5 divers in each boat go down simultaneously. The younger and the novice is asked to go first and the others follow so as to avoid accidents caused by the landing of the diving stones at the bottom. Similarly only when one set of divers from a boat who had gone down have come up does the other set dive.

The diver who surfaces, with his catch gives them to his 'Thodai' for custody. When the diver does not find any but barren ground he splutters the water on surfacing showing the futility of his diving. Should the catch be unsatisfactory they adjust the anchor-rope called 'Ammar' and move down or up and try their luck. On days when surface current is very strong the divers find it difficult to swim against current to reach the boat on surfacing. A long line with a float is let loose from the stern plank and the diver reaches the float swimming with the current and come upto the boat holding the rope. When the oysters are more numerous for taking, the divers may take with them every time they dive a second thin coir line with a coir bag called 'Valaipani' for dumping the oysters

plucked. After the oyster collection they signal their wish to rise by a Jerk on the line which is then hauled up rapidly. The diver also at time hugs to this rope and the *Thodai* has a terrific time in hauling up the diver and his catch.

On an average a diver can make 10 - 15 dives an hour and in all 30 - 40 dives a day. But this is variable depending on many factors. A diver is credited with being able to clear at one descent an area of two and a half to three square yards (Hornell, 1922).¹ The diving begins around 10 a.m. and stops at 1 p.m. If they reach the banks late, they dive till 3 p.m. Their effort becomes less and less as time advances because of physical exhaustion due to diving and due to chillness of wind and water.

The pearl fishery is a Government monopoly. Therefore the diving operations are conducted under the supervision and arrangements of the Government. The catches of oysters of each canoe for the day is apportioned on a 2:1 basis, Government getting 2/3 share. Those oysters are later auctioned in public. The divers are allowed to sell their share to the public.

Gulf of Kutch :

The pearl fishery here is conducted once in three years and has been a state monopoly. The fishery lasts for three months starting after the inset of the monsoon. This period synchronises with the highest spring tides, exposing the reefs during the ebb tides. The fishermen walk in to the reefs and pick the oysters. They are paid at the rate Re. 0.25 for every oyster collected,

1. Mad. Fish. Bull., 16, 1922.

irrespective of the presence or absence of the pearls in them.

Before going into the details of the assessment of the oyster population and exploitation of the available resources as practised today, it is necessary to have some information of the oysters and the pearl formation in oysters.

Pearl oyster in the Gulf of Mannar is said to have two spawning periods, one in the south west monsoon period and the other in the north east monsoon period. Herdman (1906)² has stated that Ceylon oysters breed in May-July and November-January. Whatever the period, the veliger larvae, after the pelagic life of about 5 days as estimated by Herdman (1906) and Hornell (1922) may settle down as 'spat' on the rocky areas and grow. This spat settlement on the banks may be either by self effort or by surface cross drifts from Ceylon to India. Growth during the first two years of life is very quick under healthy conditions. During the third year the rate of increase is reduced and the fourth still further so. It was noticed by Herdman (1903)³ that the three year old oyster average 69.96 x 64.79 mm. and 3½ year old oyster average 70 x 64 mm. Pearl formation is said to begin at the beginning of the third year and the oysters are considered to be fishable in the third, fourth and fifth year of its life. The formation of pearl in the oysters has been dealt with by various pearl fishery scientists in the past. Pearls are the result of reaction to irritants and all modern theories on the process by which natural pearls are formed emphasise the importance of the outer epithelial cells of the mantle of the oyster in pearl formation. The accepted theory is that any small piece of foreign matter lodged in the outer epithelium is slowly covered by epi-

thelial cells. This proliferates by regeneration and forms a pearl sac within the tissue, independent of the outer epithelium. Under favourable conditions the nacre (pearl) secretion begins around the foreign matter within the sac. Pearson (1933)⁴ calculated the age of the oyster as five years and considered that oysters older than five years are rare and the best age for fishing is probably between 3½ to 4½ years. An oyster bed may contain oysters of only one age group (homogenous) or more frequently heterogenous because of the possibility of successive spat fall every year during the spawning season.

Assessment of oyster population:

To find out whether there is any possibility of a pearl fishery, many details will have to be ascertained from the pearl banks by employing divers. This process is called the inspection of the pearl banks.

To ascertain the presence and distribution of oysters over the whole of the effective pearl banks region, an exhaustive examination by circle inspection was felt desirable by Captain Donnan in 1902. This has been described in detail by Hornell (1905)⁵. This method will also help to chart the contour of the pearl banks. But at present this system is not followed by the Indian pearl fishery scientists due to obvious difficulties. Instead, they follow

2. Rept. on the Pearl Fisheries of the Gulf of Mannar to the Govt. of Ceylon. Part V. 1906
3. Rept. on the pearl fisheries of the Gulf of Mannar to the Govt. of Ceylon Part I 1903
4. Ceylon J. Sci. Sect. C.5: 1-29; 1933.
5. Report to the Govt. of Madras on the Indian Pearl Fisheries in the Gulf of Mannar Supdt. of Govt. press, 1905.

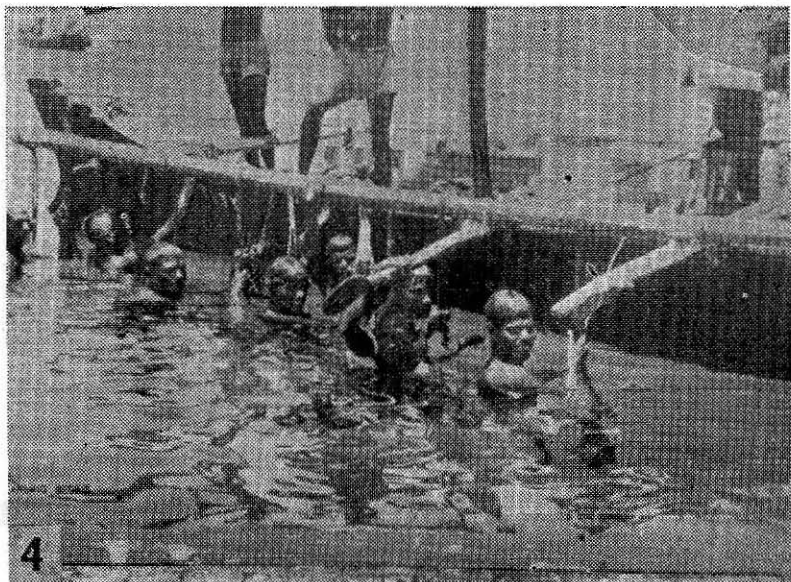


3. Pearl fishing canoes with divers being towed to pearl banks on calm days.

the rectangular methods of inspection. Here three canoes with a couple of divers in each take equidistant position at the northern edge of the paar area to be surveyed and dives are made at random, moving south. Thus three sets of parallel dives are made throughout

the length of the paar. The result of each dive is noted down in a square chart showing the oysters taken. The total number of oysters taken by the divers divided by the dives made will give the average oysters taken per dive (i. e. for 3 sq. yds. assuming that each

4. Divers ready for diving



diver covers only that area during a dive). The area of the bank is already known approximately. From this the approximate population of the oysters in the bank is calculated. Likewise the inspection is done for several banks and estimation of oyster population is made separately for each bank. This is the first step in the field.

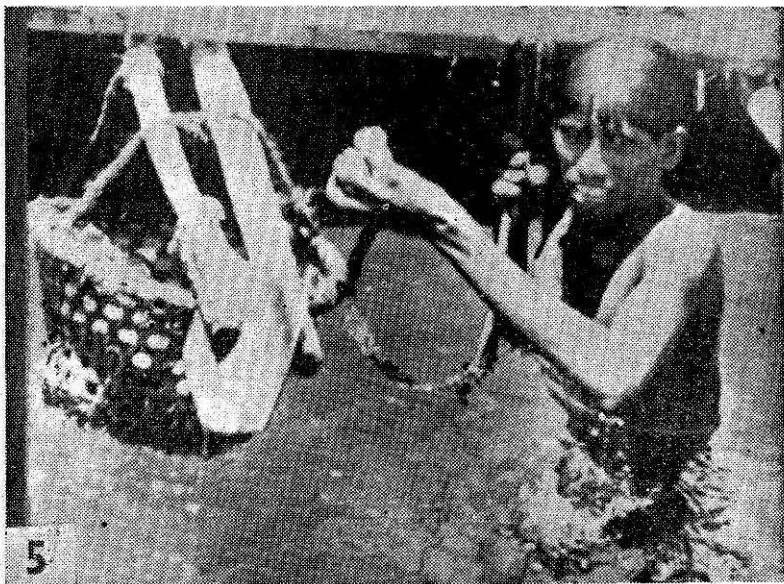
Secondly these oysters are taken to the laboratory and their length frequencies are studied to find out the percentage of different size groups. Based on this, the age of the oyster is ascertained. If more than 60% of the oysters in a bed is 3 years and more of age, then the bed is considered fishable.

The third step is to put all these oysters in a pot and allow them to rot. At the end of a week's period the oysters are washed and the pearls obtained are all separated, graded, weighed and their value and quality ascertained. The number of oysters allowed to rot is known; the weight and value of pearls are also known.

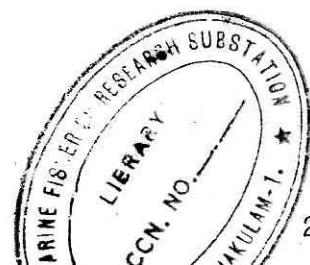
Hence the pearl value calculation is made for a lot of 1,000 oysters. If the value is considerable (i.e. more than Rs. 30 per 1,000 oysters) then it is considered feasible to exploit the bed for oysters.

Since the fishery will be attended to by over 800 or more divers, enough oyster population should be available for the success of the fishery. Each good diver can take anything between 1,500 - 2,000 oysters per day and on this basis in one day a minimum of at least 2,00,000 oysters should be available for exploitation giving allowance for other factors. Any fishery held for less than two months is not attractive or profitable. These are some of the practical considerations on the scientific side.

Inspecting the pearl banks in the entire Gulf has to be done periodically if a possible fishery is not to be missed. Even though oysters might be found in several banks in one year, that does not naturally lead to a pearl fishery, since these oyster populations



5. A diver has just brought pearl oysters from the sea-bed and is depositing his catch in a basket.



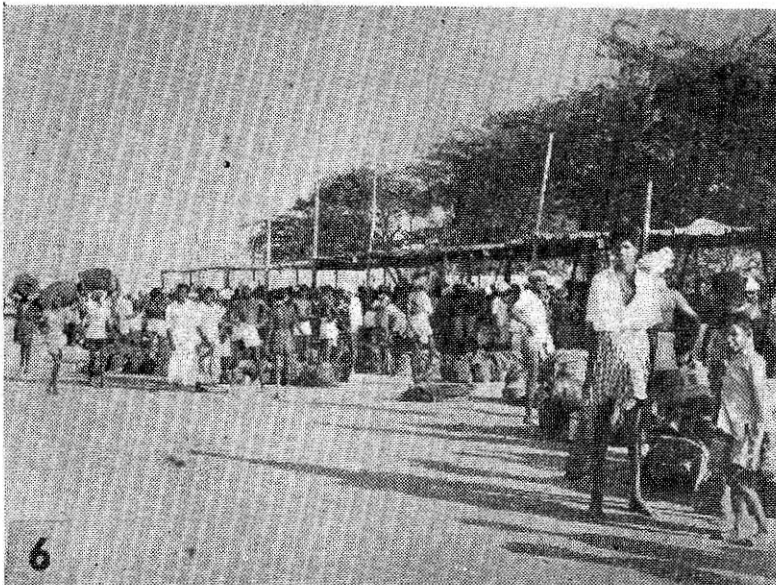
have to undergo many vicissitudes if they are to survive and sustain a fishery.

The reasons put forwarded by various Pearl fishery scientists for the oysters not reaching the fishable stage in the natural beds may be divided into biological and physical. They are:

- Biological:
1. Growth of Suram (*Modiolus*) population on oyster beds.
 2. Abundance of sharks, skates and rays and their depredatory attacks on oyster beds; in addition to these, fishes like *Balistes*, *Lethrinus*, *Serranus* and *Tetrodon* also eat away the young oysters.
 3. Menace from sea-stars crunching the young and old oysters.
 4. Natural mortality.

- Physical:
5. Migration of oysters from place to place (a very strange explanation).
 6. Sand drifting over and engulfing the oysters.
 7. Fierce underwater currents creating difficulties for oyster settlement in the spat stage.
 8. Clandestine fishing of mature oysters.
 9. Improper inspection of oyster beds.

If anything could be done by man to prevent these calamities overtaking the oysters in the vast sea, it is only possible with reference to items (8) and (9), the others being beyond human control. The irregular cyclic nature of the pearl fisheries and the undependability of oysters reaching the fishable size made Hornell and others to conclude that the only economically sound way of making the Indian pearl fisheries permanently and regularly remunerative is to con-



6. Pearl oysters in gunnies being brought ashore and apportionment of oysters is in progress in different booths.

concentrate upon the inducement of the pearls by artificial means and to avoid all expensive methods of controlling the natural beds in deeper waters. However, systematic and careful watch should be maintained to observe the natural resources by means of inspection done periodically so that we may ensure that beds of oysters do not go unfished if and when they reach the fishable size. This exploitation of the available stock should be done to the maximum extent possible. It is only with this object that the detailed inspection of the pearl banks is being done at present.

Notwithstanding the above efforts to harvest the natural resources, it becomes imperative on our part to resort to producing culture pearls as in Japan, so that pearl production can become a regular commercial proposition. The idea of culturing the oysters in captivity was tried at Tuticorin as early as in 1864 by Phipps. Actually the pearl oyster nursery in Tuticorin Hare Island was commenced in November 1864 and Prof. Huxley and de Broca (a French officer at that time) advised about the feasibility of successfully transplanting live molluscs from Bahrein to Tuticorin. After repeated trials the area chosen for culturing was found to be fouled by mud stirred up near the shore and they wanted the farm to be shifted from Tuticorin. It was kept in abeyance till Hornell acquired Krusadi Island for this purpose in 1916. The farm work started after nearly 12 years in 1928. But the experiments conducted in this line at Krusadi by several workers did not succeed in bringing out spherical pearl of value. The techniques still remain to be perfected. A scheme for the culture experiments is being prepared on a collaborative basis between the Madras Government and Indian Council of Agricultural Research for implementation.