

Bivalve fishery in the Kayamkulam Lake of Kerala

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Along the Kerala coast the National Waterway 3 extends from Kollam District in the south up to Kottapuram, Thrissur in the north. A portion of this National Waterway, from north of Ayiramthengu Bridge up to Thrikkunnappuzha is called Kayamkulam Lake. The area is well known for its rich bivalve resources which is exploited by local fishers as well as those from more distant areas. The bivalves that support the artisanal fishery here are *Paphia malabarica* (short neck clam, Kalli kakka, Poovan kakka), *Meretrix casta* (backwater clam, Manja kakka, Mona kakka), *Villorita cyprinoides* (black clam, karutha kakka), *Anadara granosa* (blood cockle, Chirava kakka), *Crassostrea madrasensis* (backwater oyster, Muringa, Chippi kakka) and *Perna viridis* (green mussel, Peelikakka, Kallumaikai). Among these, *P. malabarica* contributes maximum to the harvest followed by *P. viridis* and *C. madrasensis*. The data on landings of bivalves from this backwater is scanty since the catch is being auctioned and taken by local vendors as soon as it is landed. The livelihood of more than 300 fishers depend on the bivalve resources in the estuary. Therefore, a case study was conducted to the profile the bivalve fishery in Kayamkulam Lake and suggest

effective management measures.

Clam fishery: There are rich resources of clams near the barrage and clam collection is entirely based on the lunar phases (locally called as 'Thakkam'). The clam catches increases during the days close to full or new moon. During 'ekadashi', period stagnant water conditions are observed when clam picking is poor and hardly two boxes (approximately 40 kg each) of clams per boat is harvested. This lunar phase is followed by a flooding and fishers schedule clam harvesting according to the flood and ebb events. Clam fishery of Kayamkulam Lake occurs throughout the year and ensures a secure source of income to the fishers.

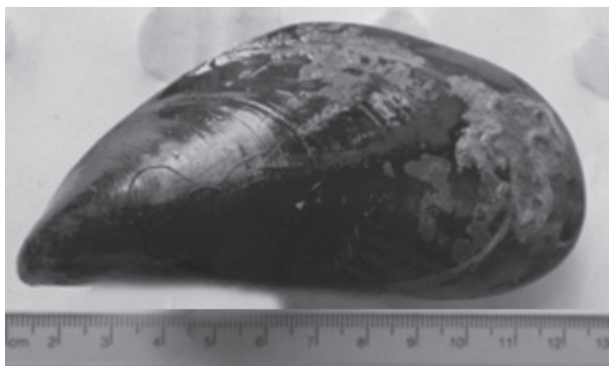
Clam collection is done either using hand dredge or collection aided by kicking the mud rich in clams into mouth of dredge. The other method is hand picking. Two to three fishers in a canoe fix poles of 4-7 m length tightly into the mud, when they reach the fishing ground. They make sure the presence of clam both in front and back side of the pole by feeling the sediment with their legs or hands. If the site is found meagre in clam, the fishers shift to another place and repeat the process until they locate a ground with sufficient clams. The dredge



Paphia malabarica



Crassostrea madrasensis

*Perna viridis*

having a mesh size of 30 mm and total length of 3 m is dragged through the sediment and lifted. Some fishers prefer clam collection by kicking the mud towards the mouth of the dredge, already fastened in a suitable site of depth 1.2 m. The mouth opening of such a dredge is considerably bigger than the normal hand dredge to enable maximum entry of clams. After 2 to 5 minutes of such operation the dredge is lifted and washed to dump the clam, free of sediment into the canoe. The clam collected by such methods includes both live clams and empty shells in equal percentage in the catch. Hand picking which is the principal fishing method adopted by the women fishers is limited to 0.5 to 1 m depths. Their catch per trip is approximately one full box of clam, free of any empty shells (Table 1).

Once the flood tide starts, the fishers wind up their collection for the day. There are women group who separate the live clam and empty shells. The pricing of clam is done once it is quantified. The clams are then filled into a net sack and submerged in the shallow backwater area for transport to Goa.

Women group engaged in sorting of *P. malabarica*

The women groups start packing the live clam early in the morning at 4 am by spreading the clams on the cement floor and showering it with brackish water. Plastic sacks of 10 kg capacity are used to pack the clams followed by an outer packing using jute sack, which ensures adequate moisture for their survival during transportation. The packets are then transported to Goa by train which is about 15 hours travel time, where the live clams have good demand. The empty shells are sold to lime industries



Net sack of sorted clams

Table 1. Details of different kinds of clam collection practiced in the Kayamkulam Lake

Particulars	Hand dredging	Kicking sediment	Hand picking
Gear	Dredge	Dredge	No gear
Craft	Plank built canoe	Plank built canoe	Plank built canoe
Number of fishers & Gender	1-3, Male	1-2, Male	1-3, Female
Depth of operation (m)	5	1-1.2	0.5-1
Average catch per trip (box)	1.5-9	1-5	1
Average catch per hour (kg)	15-90	10-50	10
Price per box (1box =40 kg)	750-2000	750-2000	750-2000
Size of the clam (cm)	4.3-5.5	4-5.5	4.3-5.1

Table 2. Details of bivalve fishery existing in Kayamkulam Lake

Particulars	Clam	Oyster	Mussel
Species caught	<i>P.malabarica</i> , <i>M.casta</i> , <i>V.cyprinooides</i> , <i>A. granosa</i>	<i>C.madrasensis</i>	<i>P. viridis</i>
Catch per trip (kg)	60-360	6-8 (meat)	120*
Number of boat operating	50	4-5	-
Number of fishers	112	15	-
Price per kg (₹)	20-50	130-150	100-150*
Pre-processing	None	Shucking	None
Marketing	Outside the state	Local	Local and outside the slate
Average size (cm)	4-5.5	15-25	10-13
Utilisation of shell	Lime industry	Land filling	-
Estimated annual catch (t)	2000 -3000 (Shell-on)	5-6 (meat)	200-250 (Shell-on)

* There is no active mussel fishery existing currently, the data presented is based on the catch in 2014-2015

in Tamil Nadu at the rate of ₹ 50-60 per box which weighs around 35 kg.

Mussel fishery: The fishery for *P. viridis* existed upto 2014-15, but was absent in the following year. The mussel fishery coincides with pre-monsoon (summer) period. They frequently settle on submerged empty shells, rocks and abandoned poles. Mussel fishers use underwater masks and collect mussel during the fishing season. The fishery is highly variable and in some years good spat settlement takes place. Mussels can survive and grow only when the estuary is totally marine as in the summer months while during monsoon, only few survive.

Oyster fishery: The oysters are harvested from hard bottom substratum such as rocks. Fishers dive to the bottom using masks and only experienced fishers are engaged in its collection. Oysters either as single ones or set of many are detached from its bed with a sharp knife. The meat is shucked using a knife and sold locally. The shell is widely used for land filling purpose in this area. Currently the fishers are not facing any scarcity for oysters in the areas surveyed.

Challenges to the bivalve fishery in Kayamkulam lake

1. Land reclamation and harbour construction works

The recollection of past events by the women fishers about clam harvesting reveals the rich history of the bivalve fishery in Kayamkulam Lake that sustained the livelihood of thousands of families. Clam collection by the members of each family living close to the Kayamkulam lake was quite common before the tsunami of 2004. After the tsunami, fishers report the creation of huge sand dunes in the areas where the subsistence fishery existed previously. The land reclamation and deepening of the Kayamkulam Lake at the barrage area for construction of a new harbour is another threat faced by the clam fishers.

2. Unsustainable fishing practices

Till 2015 the green mussel catch in Kayamkulam lake was good with average catches about 120 kg per day. The rich mussel bed at the estuary was exploited indiscriminately without leaving sufficient mussel stock to perpetuate for ensuring the fishery in the coming years. The local clam fishers have strong conflicts with fishermen coming from other parts of the district, who rely on the clam grounds in Kayamkulam Lake during the clam fishing ban period at Ashtamudi Lake. Unlike the local fishers, these fishers use underwater diving masks that enable them to see the clams at bottom and sediment containing clams is pushed into the dredge mouth with the help of a small metal rod, resulting in huge harvest of clams within 2 to 3 hours every day. The local fishers, who collect the clam in the

conventional way without any mask and supplementary hand tools, are apprehensive about the sustainability of the clam stock when they are subject to this kind of fishing methods.

3. Collection of juvenile bivalves

Small quantities of harvested juvenile clams which cannot be marketed in Goa due to their small size are sold locally. The harvesting of juvenile oysters is rare.

Recommendations

The clam fishery in Kayamkulam Lake was sustainable until the recently due to the vigilant and sustainable approach of the local fishers. The threats mentioned above are a matter of grave concern to the fishers and they themselves are keen

to implement scientific recommendations as adopted in the Ashtamudi Lake which are as follows

1. Strict implementation of ban in clam collection for at least three months during the breeding months.
2. Regulate the day's catch by each canoe within certain limit so that the clam stocks are sustained and not over exploited.
3. Strict implementation of the Minimum Legal Size for *Paphia malabarica* (20 mm Anterior Posterior Measurement/APM)
4. Demarcation of the fishing ground for clams.
5. Promote the releasing of small sized bivalves by the fishers to rebuild the stock.