

Economics of Clam Exploitation from Backwaters at Azhicode - A Case Study

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The fishery for clams at Azhicode is dealt with. The clams are exploited mainly for the shell which is used in cement manufacture and in paddy fields and prawn culture ponds for neutralising soil and adjusting pH. Their annual exploitation was estimated to be about 1,050 tonnes. Observations on the craft and gear, fishing method, season and the size of clams fished are presented. Economics of the operation and the daily income per fishermen were calculated. Against the investment of Rs.7,150/- on a unit, an annual income of 266% is obtained. Management measures for conservation and optimum exploitation of the resource are highlighted.

Clams are harvested from the backwaters and estuaries of the west and east coast of India, mainly for shell used in lime and cement industry and to a minor extent for the meat. Information on the resources and exploitation from areas other than Azhicode are available in Jones (1969), Alagarwamy & Narasimham (1973), Achari (1988 a), Appukuttan *et al.* (1988) and Syda Rao *et al.* (1989). Alagarwami & Narasimham (1973) give the value of shells sold to lime and cement industry. Rasalam & Sebastian (1976) review the fishery of Vembanad lake, with reference to the per capita income. At Azhicode, north of Kochi fishing by 25-30 traditional fishermen families with a maximum of about 15 units, exists between Kottapuram bridge in the east and bar mouth in the west in an area of 4 sq km. This, with emphasis on the economics of exploitation is presented here.

Fishery

Plank-built boat of 5-6 m length and 0.75 - 1.00 m width and a dugout canoe of 3.5 - 4.5 m length and 0.50 - 0.75 m width with one fisherman in each form a unit.

The fishing implement used is a dredge made of an iron frame having a slightly inwardly curved horizontal plate of 45 cm length and a 90 cm long, 0.9 cm thick rod

arched and rivetted/welded to its end. There are about 40 spikes pointing downward at the lower edge of the plate. There are 6 holes on the plate to tie the net. The width of the plate including the spikes is 4 cm. An iron flat of 12 cm length and 2.5 cm width is attached vertically to the base plate at its middle on which a wooden reaper of 75 x 6 x 3 cm size is firmly rivetted. The height of the arch here is 30 cm. A 5-6 m long bamboo pole will be tied to this spoke as handle to facilitate dredging. A 60 cm long conical bag net of uniform mesh is tied to the frame for operation. Depending on the size of clams at different seasons the mesh size may vary between 7.5 and 30 mm. A nylon rope of 2 m length with its ends tied to the arch a little above the junction where it is fixed to the base plate forms a loop to which a lead rope of 6 m is tied to drag and lift the dredge. The dredge lasts only for a year.

During operation, the plank-built boat stands horizontally against the low tide flow, tide at both ends to the dugout canoe, anchored perpendicular to it, 5 m ahead. The person in the plank-built boat holds the dredge tight at the bottom and the person in the canoe drags it towards him by pulling the rope. The clams gathered are washed and emptied in the plank-built boat. Dredging may continue for an hour or so

and lasts for about 4.5 hours a day with three anchorages before the tide reverses. Fishing is restricted to an average of 15 days a month during low tide only.

The exploitation of clams at Azhicode takes place throughout the year. At the onset of southwest monsoon the flood water washes down the clam shells and accumulates them near the bar mouth from where they are immediately fished. At the height of monsoon, the sand at the bar mouth gets washed off exposing the weathered white sub-soil shell. Consequently the fishing activity becomes more intense here than at other times when it is comparatively less. From September to May the fishing spreads back to the entire ground. January to June is the season, with peak falling in April-May (Fig. 1). September to November happens to be the lean period.

Meretrix casta is the most common species found in the area. Three average size groups such as 16, 25 and 34 mm contributes to its fishery in a year. *Villorita cyprinoides* occurs in the middle and upper reaches and is constituted by 14 and 26 mm size groups only. The marine clam, *Sunetta scripta* is concentrated at the bar mouth and the size groups involved are 16, 26 and 38 mm.

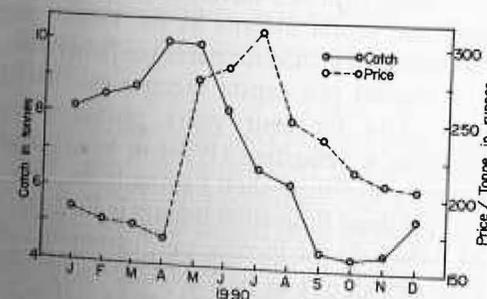


Fig. 1. Monthly catch/unit area and price/t of Clam at Azhicode

Exploitation and utilization

The catch per haul varies from 2.6 - 10.0 kg, and at one anchorage from 80 - 300 kg. Data collected from ten fishermen for 1990 show the average catch to be 7.26 tonnes/month/unit. With an average of 12 units in operation at the place, the total annual exploitation works out to be around 1050 tonnes. The catch is unloaded according to the size into enclosures made of poles and palm fronds in a side canal near the bank. Clams fishing by a unit a day will comprise of only a single size and species. The clams are allowed to decay for 3 to 4 or more days, and get cleaned by tidal flows. The catch from all the units are unloaded in these enclosures maintained by the agents, who buy it at the time of unloading. For cement and lime manufacture the shells are cleaned in the canal itself by sifting. A negligible percentage of meat extracted from clams, sold at market rate for shells, is consumed around the area. Locally, the fishermen families take live clams free of cost for meat with the understanding to return the shells cleaned to the agent.

Economics

Investment

The major investment is on the boats. The plank-built boat used for drift net fishing in sea for five years or more are purchased second hand and used in backwaters after some modifications. The dugout canoe of good wood is also purchased second hand or fabricated new in cheap wood. The owners of the craft themselves are engaged in fishing.

The crafts are generally used for a year and disposed off, may be at a higher price. Normally no fisherman at Azhicode keeps a boat for more than two years. The boats are oiled once a year either with cashewnut oil or sardine oil. Occasional repairs to prevent leakage or damages are to be carried out.

The investment on a fishing unit is as follows:

i) Purchase of plank-built boat	Rs. 2,500/-
ii) Cost of modification	
a. Two carpenters @ Rs. 55/day for 3 days	Rs. 330/-
b. Cost of planks	Rs. 170/-
iii) Cost of dugout canoe (whether second hand or new)	Rs. 3,000/-
iv) Cost on oiling of crafts	Rs. 400/-
v) cost of gear	Rs. 250/-
vi) Miscellaneous expenditure	Rs. 500/-
Total	Rs. 7150/-

Income

The chief income is from the sale of shells. Clean and weathered shells fished during May-July fetch more price (Fig.1). Though the catch is high during January-April the price is low on account of live undersized clams being exploited. The price varied from Rs.2.70 per tin of 16 kg small clams to Rs.5.00 per tin of 16 kg clean and weathered shell. The actual average price per tin, however is Rs.3.63. The fishermen occasionally get work of cleaning and loading shells also as additional source of income.

The income is as follows:

i) Sale of shell @ Rs.3.63/tin for an average of 30 tins/day for 180 days	Rs. 19,602/-
ii) Cleaning and loading by two fishermen Rs.7.50/basket for 20 baskets for 30 days only in a year	Rs. 4,500/-
iii) Loading @ Rs.35/- per day for two fishermen for 60 days only in a year	Rs. 2,100/-
Total	Rs. 26,202/-

Profit

As a fishing unit is meant to use only for a year, the entire investment is deducted as recurring expenditure for calculating the profit. As the investment is

annual in nature no depreciation on it is accounted.

a. As self employment

i) Investment	Rs. 7,150/-
ii) Total income	Rs. 26,202/-
iii) Profit	Rs. 19,052/-
iv) Returns to investment when cost on labour is not taken into account	266%

b. With labour involvement

i) Fixed cost (Rs.7,150-5,500)	Rs. 1,650/-
ii) Imputed wages for 360 labour days @ Rs.35/day	Rs. 12,600/-
iii) Interest @ 14% on Rs.7150 invested	Rs. 1,001/-
	Rs. 15,251/-
iv) Net profit	Rs. 10,951/-
v) Profit-investment-ratio, $\frac{\text{Net profit} \times 100}{\text{Investment}} = 153\%$	

Discussion

The production of shells per sq.km from the clam fishery at Azhicode is around 260 tonnes a year. This is much less than the 769 tonnes per sq.km at Coondapur estuary (Syda Rao, 1983). This low density, probably limits the fishing to the traditional fishermen families of the area.

Narasimham *et al.* (1981) in a socio-economic survey of fishermen engaged in lime shell fisheries have calculated the annual per capita income as Rs. 1,850/- for full time and Rs.434 for part time fisherman. The annual per capita income calculated from data for four years provided by Rasalam & Sebastian (1976) in Vembanad Lake for live lime-shell fishing is Rs. 756/- and for dead lime-shell fishing is Rs.2000/- At Azhicode the income per fishermen per year works out to be Rs.9,526/- with 180 fishing days a year or Rs.52.92 per day. Madhyastha *et al.* (1990) reports the average earning of a fisherman at Dakshina Kan

nada to be Rs. 50 per day. Compared to this the earning at Azhicode is good due to higher price obtained. As against Rs.1.25-1.50 for 10 kg at Manakkadavu area in Kanjirakottu Kayal and Rs.1.50 per basket of about 20 kg at Kumbalam in Kumbalathu Kayal, both in Ashtamudi lake (Appukuttan *et al.*, 1988) and Rs.1.50 to 2.00 per basket of about 30 kg blood clam at Kakinada (Alagarwami & Narasimham, 1973), the price realised at Azhicode, as already stated, is on an average Rs.3.63 within the range of Rs.2.70 and 5.00 per tin of 16 kg.

The clam fishery at Azhicode is limited for the following reasons:

1. The area of the ground is only 4 sq.km as against the vast ones in the Ashtamudi lake, Vembanad lake and Coondapur estuary.
2. There does not seem to be any sub-soil deposit except a little annual accumulation at the bar mouth.
3. Fishery, barring the monsoon months depends on annual replenished stock of comparatively smaller size.
4. The fishery as worked out in the economics does not support paid employment leaving only Rs. 10,951/- (if labour is employed) for the two fishermen after investing Rs.7,150/-.

The study thus indicates that the exploitation is profitable only as self employment.

Disturbance by mechanised crafts and exploitation of undersized clams resulted in reduced clam properties. At Azhicode the clams are harvested from 14-16 mm size onwards and in the case of *V. cyprinoides* larger ones are not encountered. Clams of sizes below 15 mm are considered as seeds (Achary 1988b). Restriction on mesh size and fishing of seed clams have to be im-

posed as conservation measures. Transplanting of seeds to augment production may also be made.

The clam count for export is 1000. At present the exploited count at Azhicode is between 1300 and 1500. Hence there is no fishing of clams for meat. According to a recent report, the exploitation of undersized clam in Vembanad lake for shell has adversely affected the production of meat (Anon., 1991). The management measures besides improving the population may provide meat for export also.

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