Padal fishing - A unique fishing method in the Ashtamudi Estuary of Kerala (south India)

J.V. Thomas and B.M. Kurup

Abstract

Bush park fishing / *padal* fishing is an indigenous fishing method widely employed in the Ashtamudi estuary of Kerala (south India). An artificial reef made from twigs and leaves of trees is planted in the shallow areas of the estuary. The aim is to harvest fish that find shelter in these structures for the purpose of feeding and breeding. Though the State Department of Fisheries has banned this method of fishing in the inland waters of Kerala, 400 *padals* are operating in this estuary. About 300 of them are anchored in the western parts of the estuary (west Kayal). Fish are harvested in the *padals* at monthly intervals almost round the year and this results in the destruction of a sizeable quantity of juveniles and sub-adults of the commercially important fishes, such as Pearl spot and mullets, from the estuary. These *padals* pose a major threat to the sustainability of the fishery resources of this estuary and, therefore, need to be phased out by providing alternative occupations for the fishermen who are dependant on the *padals*.

Introduction

The Ashtamudi estuary is a tropical backwater habitat in the Kollam district of Kerala, situated on the southwest coast of India along the Arabian Sea (Figure 1). The estuary, the second largest on the southwest coast of India, is palm-shaped, has eight branches, covers an area of about 32 km^2 and lies between latitudes 80.52' and 80.60' N and longitudes 76^{0}30' and 76^{0}40' E (Divakaran et al. 1982). This estuary is one of the foremost centres of marine fish production and landings along the Kerala coast (Thressiama and Nair 1980) and receives much attention due to its rich and varied fishery resources and an annual production of 23 000 t of fish (Kurup and Thomas 2001). The fishery resources are comprised of migrant stock of both estuarine and marine species of commercially important finfishes, such as *Etroplus suratensis* (pearlspot), *Arius* spp. (catfish), *Mugil* spp. (mullets), *Chanos chanos* (milkfish), shrimps (like *Penaeus indicus*, *P. monodon* and *Metapenaeus dobsoni)*, mud crabs (*Scylla serrata)* and portunid crab (*Portunus pelagicus),* and bivalves (*Villorita cyprinoids, Katalesia opima, Paphia malabaricus, Meretrix meretrix* and *M. casta)* .This estuary differs from other estuaries in Kerala by virtue of its unique structure and fishery resources: it is situated perpendicular to the shore and has unusual species like oil sardines and *Crassostrea madrasensis* (edible oyster) (Kurup and Thomas 2001). Gill nets, cast nets, pole and line, hook and line, seine, diving and dredging are the major types of fishing methods used in the estuary (Table 1). In addition to this, a special type of fishing method, popularly known as *pada*l fishing or bush park fishing, is also

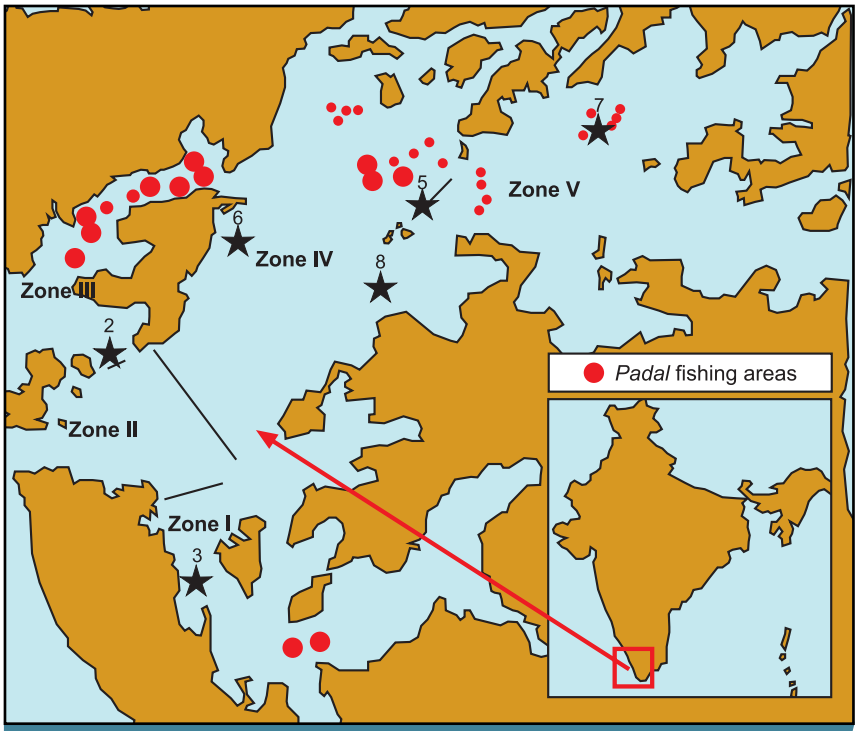

Figure 1. Location of *Padal* fishing in the Ashtamudi estuary.

Table 1. Fishing gears used in the Ashtamudi estuary.
(Note: refer to Figure 1 for location of zones).

Gear		Common name	Zone I	Zone II	Zone III	Zone IV	Zone V
Major division	**Subdivision**						
Gill Net	Crab net	*Njandu vala*	50			25	
	Prawn net	*Chemmeen vala*	100	50	2	300	2 5
	Fish net	*Kuzhalivala*	75			25	
	Fish net	*Chooda vala*				8	
	Fish net	*Neetu vala*				40	60
	Fish net	*Chalavala*				70	
		Vaisali vala	100				20
		Nandan vala			2		
Seine	2 men operated			100			50
	3 men operated	*Koruvala*				34	
	9 men operated	*Koruvala*	33			100	
Cast net		*Veesuvala*	75		80	100	200
Pole and line							1
Hook and line		*Ayiram choonda*	15		2	15	
Scoop net	Light fishing		30		60		36
	Stupefying	*Olavali*					
Dredge							
	Chinese net		33	32	60	19	
	Hand picking		350				30
	Padal		**10**		**300**	**70**	**20**
Stationary gear	Stake net			250			

extensively practiced in the Ashthamudi estuary (Figure 1). Even though *padal* fishing is also practised in the Vemband estuary in Kerala (Harikrishnan 1997) and the floating islands are found in the Loktak estuary of Manipur state (Suresh 2000), the *padal* system of the Ashtamudi estuary differs from other estuaries by virtue of its structural differences and operational peculiarities. At present, about 400 *padals* are being operated on the western side of the estuary and the fishing method is spreading to other parts of the estuary (Table 1) due to its productivity.

Materials and methods

Two fishery survey cruises were undertaken in the months of December 2000 and April 2001. The fishing activity prevalent in each zone was observed continuously for a period of 24 hours (day and night) with a team of trained observers. The total number of units of similar gear being operated in each zone was enumerated and catches from not less than 30 percent of the fishers were observed. The catches were recorded at the species level by type, weight, length and sex. The fishing time of the observed catch and total hours of fishing per day were also recorded in structured questionnaires.

Observations: The structure

Padals are built during the early months of the year, predominantly in March, by dumping bunches of plant twigs and leaves tied together by a rope, covering an area ranging from 10 to 30 m^2, mainly anchored in the shallow regions of the estuary. Twigs collected from locally available trees such as *Calophyllum inophyllum* (Punna), *Anacardium occidentale* (Cashew) and *Mangifera indica* (Mango) are commonly used for making the *padal*. These *padals* are characterized by single or collective ownership. People who live in the vicinity usually own a greater number of *padals*. These *padals* are operated to catch fishes such as *Etroplus suratensis*, (locally known as karimeen or pearlspot), *Penaeusindicus* (known as naran chemmen), *Chanos chanos* (milkfish), *Liza parsia* and *Mugil cephalus* (mullets). *Padals* act as fish aggregating devices as a large number of fingerlings and post larvae of shrimps find shelter beneath the *padals*, foraging the peri and epiphyton developed from the submerged twigs and other structures used to construct them.

The decaying plant materials augment the rich organic material at the vicinity, which in turn attracts a large quantity of fishes towards these stationary structures. It was observed that *padal* fishing serves as a source of livelihood either directly from fishing or indirectly through the supply of materials such as twigs and leaves required for the assembly of the *padals*. Normally it takes two to four people to fabricate a single unit. The quantity of plant material needed for the fabrication of the *padals* depends on the area and water depth selected for the structure.

Fishing methods

Fish are harvested during the lunar period of every month and at least two people are involved in the fishing associated with a single unit. Harvesting may take more than one day, depending on the size of the *padal* and number of persons engaged in fishing it. The operation commences in the morning when the fishers arrive at the *padal* sites on a small wooden canoe. They erect wooden poles around the *padal* and then encircle it with a small mesh nylon net to prevent the fish sheltered beneath from escaping. The plant materials (twigs) are removed from the enclosed structure

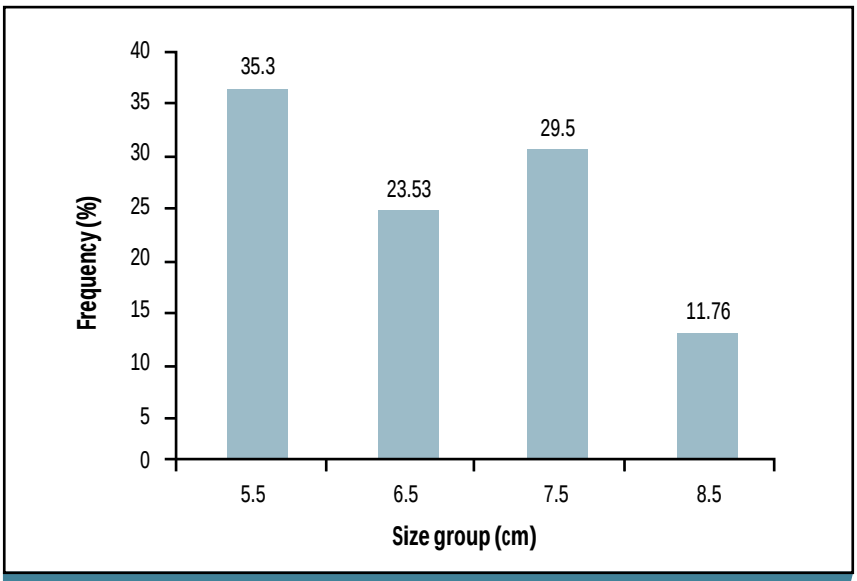

Figure 2. Size composition of *Etroplus surratensis* (Pearlspot) harvested from *Padals*.

and fishing is carried out in the enclosed area using a scoop net or cast net. In deeper areas, cast nets are mainly used. After harvesting the catch from the encircled area, the bamboo poles and surrounding nets are removed and the plant materials are redeposited, either in the same area or in an adjacent area for the next cycle of operation. Sometimes fresh plant materials are added to provide more shelter for the shrimp and fishes. Each *padal* is operated year round, yeilding about 10-12 harvests per year. The peak fishing harvest coincides with the post-monsoon months when the size of the *Etroplus* and shrimps caught are relatively larger and the quantity landed is higher. Exploitation of fishes is also greater during this period in Vemband lake (Kurup et al.1993).

In the pre-monsoon period (especially during April), large quantities of juveniles and sub-adults of commercially important finfishes and shelf fishes are indiscriminately fished from the *padals*. During these periods, the average catch registered was 2-5 kg per haul and the size group of pearlspot was in the range of 5-8 cm (Figure 2), with a preponderance at 5-6 cm. The shrimp catch comprised juveniles in the size range 4-6 cm, with a modal value at 4 cm. On average, 800-2 000 kg of juveniles and sub-adults are caught in this one month, 10-20 kg of fishes are obtained from a single unit during an average monthly harvest, and about 48-96 t of fishes are caught from these *padal* grounds in a year.

Cost of *padal* fishing

The main investment in the assembly of the *padals* is for the plant materials and the nets used for harvesting. The cost of assembling of one *padal* with an area of 20-25 m^2 is about Rs.1 000-1 500.[1] Most of the fabrication work is carried out by the owners of the *padal* themselves in order to minimize the labor cost. If the cost of one *padal* is calculated to include labor as well, it will be around Rs.2 500-3 000. Depending on its size, the catch from a single *padal* varies between 120 to 240 kg per year and the fisherman generate an annual income in the range of Rs.54 000 to 100 000 from each *padal*.

Discussion

As an estuary is common property like rivers and the sea, the right of exploitation of fishery resources is open to all. Among the various fishing methods prevailing in the Ashtamudi estuary, *padal* fishing is the most destructive fishing method because of the extent of destruction caused to juvenile populations of commercially important fish, such as pearlspot, mullet, shrimp and perch (Suresh 2000). A large number of juveniles and sub-adults of commercially important fishes are removed each month almost year round especially during the pre-monsoon period. If the juveniles are allowed to grow to a marketable size with judicious exploitation by statutory gears, it would replenish the stock of the estuary by at least 600 t (Kurup and Thomas 2001). So far, there has been no attempt to restrict the fishing operations using *padals* in the nursery periods, as is being done in the Vembanad estuary where *padal* fishing is permitted during the months of June-November (Harikrishnan 1997).

Stake nets are also a destructive fishing method as the majority of fishers use small meshed cod ends of less than 10 mm, against the statutory mesh size of 20 mm. They catch a large quantity of juvenile prawns returning to the sea after completing their larval stage in the backwaters, and post-larvae migrating into the estuary from the adjoining sea. The cod end mesh regulation of 20 mm should be strictly enforced as a conservation measure for the sustainable and rational exploitation of the backwater fishery of Kerala (Pauly et al. 1990). *Padal* fishing, which is illegal, will be phased out from the estuary within five years. The indiscriminate removal of juvenile fish, if continued will eventually have a deleterious effect on the fishery wealth of Ashtamudi estuary and ultimately result in the depletion of the resource. Meanwhile, it is also necessary to control any increase in the number and size of *padals* in the estuary as this will cause further damage to the fishery.

[1] 1 US$ = 47.78 Indian Rupees (Rs).

There is an abundance of phytoplankton in the Ashtamudi estuary during the monsoon season due to the enrichment of the water with organic matter (Thressiama and Nair 1980). Even though the productivity of the water around the *padals* may be higher due to the decay of the plant materials, it may lead to a change in the natural habitat of the estuary.

Overexploitation by large purse seines of small mesh size has resulted in the dwindling of the oil sardine resources in the waters of Kerala and Karnataka and a strict control and regulation of the purse seines has been suggested (Dhulkhed and Bhat 1982; Silas et al. 1980). Many complaints have been raised by local fishermen that fishing operations other than in *padals* end up with meagre catches in areas where *padals* are being deployed. Moreover, the operation of boats and canoes becomes risky, especially during the night because of the presence of *padals* submerged in the water. This could result in conflict between the *padal* fishermen and others. Such a case has been identified in Cochin harbor between purse seine fishers and artisanal fishermen (Nair and Prakash 1983).

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Joice V. Thomas is senior research fellow and **B.M. Kurup** is Professor (Fisheries) at the School of Industrial Fisheries, Cochin University of Science and Technology, Fine Arts Avenue, Cochin-16, India.
Email: joicethomas@hotmail.com