

Studies on Drift Gillnet Fishing at Agatti Island (Lakshadweep)

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The results of experimental and pre-commercial fishing operations conducted at Agatti Island during 2003-2006 with large mesh high density polyethylene (HDPE) and polyamide (PA) drift gill nets are presented in the paper. Gill nets can be used effectively in the islands as a diversified fishing method to harvest the vast untapped resources like *Thunnus albacares* (yellowfin tuna), *Thunnus obesus* (bigeye tuna), *Istiophorus platypterus* (sailfish), *Makaira* spp (marlin) and other large pelagics. Results indicated that large mesh drift gillnets were effective in harvesting large pelagic fishes which are not being exploited by the existing pole and line fishing. This can be taken up successfully in a commercial scale in the Lakshadweep islands.

Key words: Drift gillnet, Lakshadweep, pre-commercial

Lakshadweep is rich in fishery resources, especially tunas. Pole and line fishing is the only fishing method employed in the islands to exploit mainly skipjack tunas. This fishing method entirely depends on the availability of live bait fish. The shortage of live baits, high consumption of fuel due to steaming to distant areas in locating the tuna shoals and the meager price realized for the catch are some of the problems faced by the pole and line fishermen of the islands. The large number of economically important fishes cannot be exploited by pole and line fishing alone. Diversified fishing methods like drift gillnetting and long lining coupled with improvements in the existing fishing craft would go a long way in tapping the hitherto unexploited resources like shark, sailfish, marlin, seerfish, barracuda, carangid and oceanic tunas like the yellowfin tuna and big eye tuna. Kumaran & Gopakumar (1986) suggested that diversification of fishing effort for exploiting the fishery resources other than tuna was essential for future development of the island fisheries. Panicker *et al.*, (1986) recommended the introduction

of surface trolling, long-line, drift gill net and trap fishing. This coupled with suitable craft for the exploitation of sub-surface tuna, seer, shark, rays, perches, caranx etc. would double the present fish production.

The trial fishing conducted inside the lagoon areas with large mesh high density polyethylene (HDPE) gill nets at Kalpeni Island, Lakshadweep during 1988 was found encouraging (Pillai, 1993). Large mesh drift gill nets were successfully operated for large pelagics in the east coast of India (Pajot, 1993) and off Gujarat (Pravin *et al.*, 1998). Polyamide multifilament which is widely used for the fabrication of gill nets in India, is gradually being replaced by Polyethylene multifilament (Pillai, 1989, Pravin *et al.* 1998 and Thomas & Hridayanathan 2002). Field trials were made to improve the drift gill nets for large pelagics by Pajot (1980 a, b), Radhalakshmi & Nayar (1985), Pillai *et al.* (1989) and Pillai (1993). Marine gill nets of India have been reviewed by Thomas *et al.* (2005). Large mesh drift gill net operations in deeper waters outside the lagoon areas for large pelagics showed very encouraging

results (Pravin *et al.*, 2004). Hence the present study was undertaken to find out the possibility of introducing drift gill netting to exploit the vast large pelagic resources including tunas of the island waters.

The paper focuses on the results obtained with the experimental and pre-commercial gill net fishing operations carried out by the Central Institute of Fisheries Technology at Agatti island, Lakshadweep in collaboration with the Department of Fisheries, U.T. of Lakshadweep and private boat operators.

Materials and Methods

The detailed specifications of gill nets used for the experimental and pre-commercial fishing operations are furnished in Table 1 and the design details of HDPE and PA multifilament drift gill nets are given in Figs. 1 & 2 respectively. Four units each, of HDPE having twine size of 1.5 mm (R 847 tex) and 2.0 mm (R 1280 tex) diameter with 100 and 120 mm mesh sizes respectively and PA 210 dx6x3 (R 482 tex) and 210dx9x3 (R 725 tex) with mesh sizes of 100 and 120 mm respectively were used for the experimental fishing operations. The average size of each unit operated was 50 m in length and 10 m in depth. A hanging coefficient of 0.5 was given in the head rope for mounting the webbing to rope. There was no footrope for the PA net but sinkers were attached at intervals. This was adjusted in PE by providing foot rope and more sinkers to account for the lesser specific gravity as referred by Carter and West (1964). Disc shaped PVC floats of size 100x20 mm were used for nets of 100 mm mesh size and 200x20 mm for 120 mm mesh size to avoid enmeshing of the floats with the main webbing. Disc shaped concrete sinkers of size 100x25 mm, each weighing approximately 250 g were used. The experimental

fishing nets were operated during the period 2003-2005. Forty five fishing operations were carried out with three fishing boats of Department of Fisheries, U.T. of Lakshadweep viz LACFISH - 4 and LACFISH - 5 both having an LOA of 9.7 m and MATSYASHIKARI of LOA 8.5 m. The drift gillnets were set late in the evening at a depth of 100-200 m off Agatti island and hauled after three hours of soaking. Based

Table 1. Technical specifications of gill nets

Main webbing	PA *	HDPE
Mesh size (mm)	100 & 120*	100 & 120
Twine type	Multifilament	Monofilament twisted
Twine specifications	210x6x3 (R 482 tex) & 210x9x3 (R 725 tex)	1.50 mm Ø (R 847 tex) & 2.00 mm Ø (R 1280 tex)
Hanging coefficient (E1)	0.50	0.50
No of meshes in length/unit	1000 & 834	1000 & 834
No. of meshes in depth	100	100
Average hung depth (m)	10	10
Ropes		
Material	Polypropylene	Polypropylene
Head rope dia (mm)	4.0	4.0
Foot rope dia (mm)	-	4.0
Floats and sinkers		
Float material	PVC	PVC
Floats per unit (No.)	34	17
Float size (mm)	150x20 & 200x20	150x20 & 200x20
Sinker material	Moulded cement	Moulded cement
Sinkers per unit (No.)	5	34
Sinker size (mm)	100x25	100x25
Sinker weight each (g)	250	250

* PA, 210x6x3 with 120 mm mesh size used for pre-commercial fishing operations

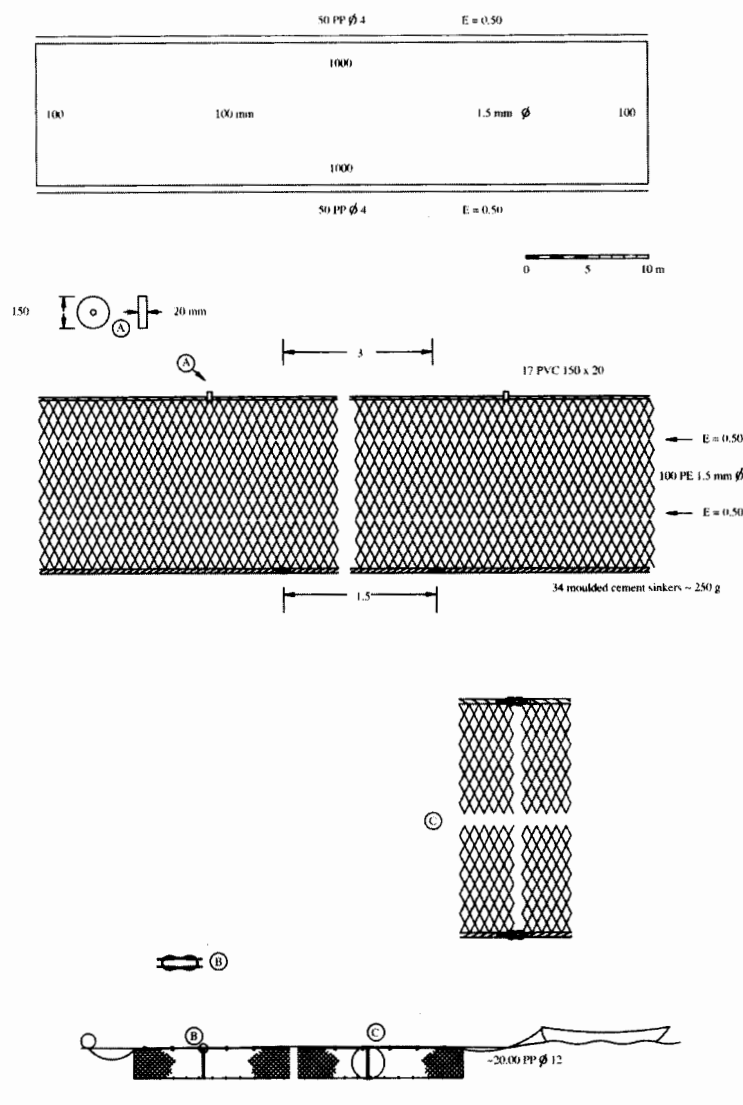


Fig. 1. Design of HDPE twisted monofilament drift gill net

on the results of these comparative experimental operations using different mesh sizes, pre-commercial fishing was carried out at Agatti, Lakshadweep, using PA gillnets with 210dx6x3 (R 482 tex) with 120 mm mesh size. Pre-commercial fishing operations were carried out through a local fisherman using four units of PA gillnets with 120 mm mesh size onboard his fishing vessel of LOA 8.5 m. These operations were carried out on the eastern part of Agatti Island during April 2005 to November 2006. A total of 25 operations were carried out and the species-wise catch details were recorded after each fishing operation.

Results and Discussion

The catch details obtained from experimental fishing operations are given in Table 2. Using ANOVA, the total catch obtained using PA gill nets of 100 mm and 120 mm mesh size was compared and it was found that the performance of the 120 mm mesh size was significantly different from 100 mm ($P < 0.01$). Hence PA gill nets of 120 mm mesh sizes were used for the pre-commercial operations. Total of 3,342 kg of fish were caught during 45 days of experimental fishing operations from March 2003 to February 2005 with an average daily catch of 74.30 kg.

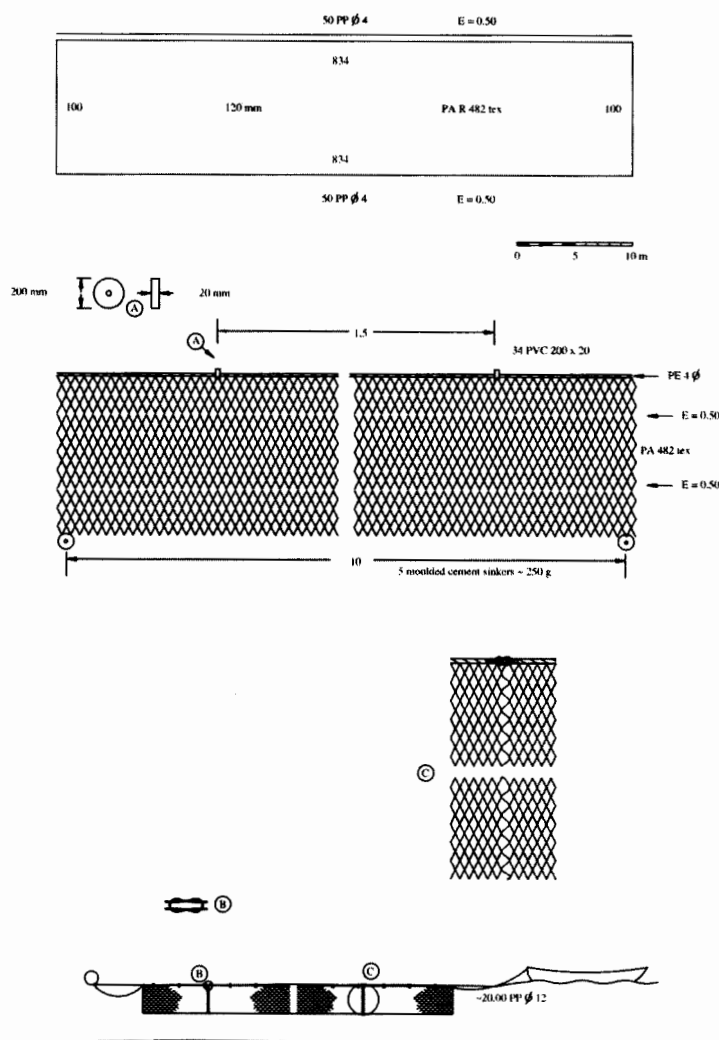


Fig. 2. Design of PA monofilament drift gill net

The details of the catch obtained from pre-commercial fishing operations are given in Table 3. A total catch of 4,760 kg of fish were caught during 25 days of pre-commercial fishing operations with an average daily catch of 190.40 kg fetching a return of Rs. 5712/- @ Rs 30/- per kg of fish. The average operating expenditure on fuel and crew for the fishing operation was about Rs.1410/- resulting in a net profit of Rs.4302/-.

The average catch/day of 74 and 190.4 kg from experimental and pre-commercial operations are very high compared to a catch of 29.7 kg reported by Pajot and Das (1981) in drift gill nets of similar design operated

in Bangladesh waters. Gallene and Hall (1992) reported 15.2 kg catch/day in nets operated between Kollam and cape Camorin.

The catch composition in both the experimental and pre-commercial fishing operations (Figs. 3 & 4) show a high percentage of yellowfin tuna viz. 40 and 56% of the total catch respectively indicating availability of *Thunnus albacares* (yellow fin tunas) in good quantities in and around the islands. This was followed by *Istiophorus platypterus* (sailfish) which accounted to 22 and 25% of the total catch in the experimental and pre-commercial fishing operations respectively. The average weight

Table 2. Catch details of experimental gillnet fishing operations conducted at Agatti island, Lakshadweep during 2003-2005

Gill nets	Species	Catch (kg)	
PA, 100 mm	<i>Thunnus albacares</i>	743	
	<i>Katsuwonus pelamis</i>	175	
	<i>Thunnus obesus</i>	10	
	<i>Istiophorus platypterus</i>	240	
	<i>Caranx</i> spp.	134	
	<i>Lutianus</i> spp.	17	
	<i>Carcharhinus</i> spp.	4	
	PA, 120 mm	<i>Thunnus albacares</i>	608
		<i>Katsuwonus pelamis</i>	71
<i>Thunnus obesus</i>		12	
<i>Istiophorus platypterus</i>		508	
<i>Caranx</i> spp.		306	
<i>Rhynchorhamphus</i> spp.		5	
<i>Carcharhinus</i> spp.		220	
PE, 100 mm		<i>Euthynnus affinis</i>	30
	<i>Manta</i> spp.	250	
PE, 120 mm	<i>Katsuwonus pelamis</i>	9	
Total		3342	

Average catch per day = 74.30 kg

Table 3. Catch details of pre-commercial gillnet, fishing operations (PA 120 mm) at Agatti island, Lakshadweep during 2005-2006

Species	Catch(kg)
<i>Thunnus albacares</i>	2675
<i>Katsuwonus pelamis</i>	309
<i>Thunnus obesus</i>	120
<i>Acanthocybium solandri</i>	137
<i>Istiophorus platypterus</i>	1199
<i>Chaetodon xanthocephalus</i>	8
<i>Caranx</i> spp.	279
<i>Hemiramphus</i> spp.	33
Total	4760

Average catch per day = 190.40 kg

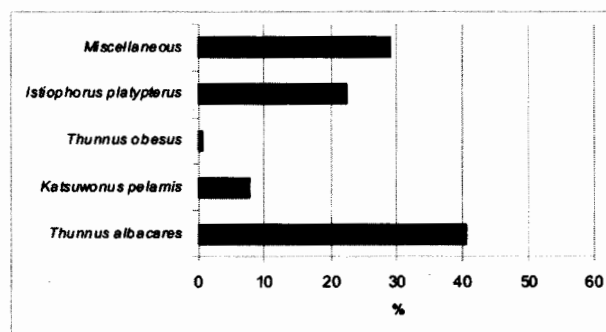


Fig. 3. Percentage composition of fish landed in experimental gill net operations

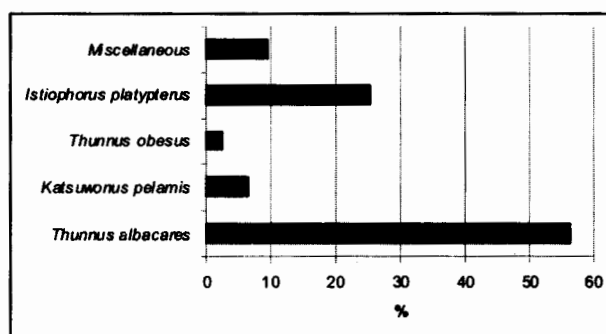


Fig. 4. Percentage composition of fish landed in pre-commercial gill net operations

of yellowfin tuna was 10 kg and average weight of sail fish was 30 kg. *Katsuwonus pelamis* (skipjack tuna) of average weight 6 kg, accounted to only 6 and 8% of the total catch in the experimental and pre-commercial fishing operations respectively. This shows that the large mesh gill nets were effective in harvesting large pelagic fishes which are not being exploited by the pole and line fishing vessels in Lakshadweep. In addition to the above species, high value pelagic fishes like bigeye tuna (3%) and seerfish (3%) were caught in the pre-commercial fishing operations. Higher percentage of sharks (56.7%) was observed when HDPE gill nets were operated at Lakshadweep islands (Pillai, 1993). The higher percentage of sharks landed in these nets could be due to the operations of gillnets inside the lagoon areas.

Table 4 show the comparative cost of operation of pole and line and gill net fishing. As gill net operations are simple, only three crew are required for the operation of the gear while pole and line operations require at least eight persons. Fuel consumption is very less as compared to pole and line operations. As the gill net fishing grounds are very near to the islands, the time required to reach the fishing ground and for operation of the gill nets is also very less as compared to pole and line fishing. Moreover, the fishermen can engage themselves with other occupation during day time as gill net operations are mainly carried out after dusk as the catches are good especially during the new moon phases. The fishermen also get sufficient rest after the gill net is set as it requires a minimum soak time of about 3-4 hours.

With the encouraging results obtained from the experimental and pre-commercial fishing operations, many fishermen have come forward to take up gillnetting mainly during lean season when the pole and line

fishing operations are not possible due to adverse weather conditions.

The experimental and pre-commercial fishing operations have shown that gillnetting can be a successful and profitable venture if taken up by the fishermen of the islands on a commercial scale. This diversified method would pave way to harvest the vast and rich pelagic resources like yellowfin tuna and big eye tuna which could fetch good price due to its export potential as sasumi grade. But lack of infrastructure like availability of ice, storage facilities, and marketing facilities hinder the enthusiasm of the fishermen to take it up as a full time occupation. Being a new fishing method for the islanders, CIFT organized series of training and demonstrations programmes on fabrication, rigging and operations of drift gillnets to groups of fishermen from different islands of Lakshadweep in collaboration with the Department of Fisheries, U.T. of Lakshadweep during 2003-2005 at Kavaratti and Agatti islands. Pre-commercial gillnet fishing operations were carried out by a trained fisherman of Agatti island. Gillnetting for large pelagics is a low energy fishing method which can be taken up by the fishermen of all the islands of Lakshadweep for full utilization of the rich resources, provided they are assisted with proper infrastructural facilities for storage and marketing their catch which would in turn boost the socio economic status of the fishermen.

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Table 4. Comparison of operation of pole and line and gill net fishing

Particulars	Pole and line	Gillnetting
Crew required	8	3
Cost of gear and accessories (Rs.)	2300 (8 units)	20000 (8 units)
Wages for crew @ Rs 200/day	1600.00	600.00
Engine running time (h)	10	3
Fuel consumption (l)@ 4.5 l/h	45	15
Cost of fuel per day @ Rs 35/l	1575.00	525.00
Average catch/day (kg)	400	380
Catch	Mainly skipjack tunas	Yellow fin tuna and other large pelagics

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