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Gill Nets for Inland Fishing in North Kerala

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Results of the study on fishing gear conducted along the inland waters of Kozhikode, Kannur and Kasargod districts of North Kerala during 2003-2004 are reported. The salient features and operational aspects of different types of gill nets in operation are discussed. Most of the gill nets were found to be fabricated with polymide (PA) monofilament of 0.16 mm dia. Gill nets for fish, prawn and crab with mesh size ranging from 12 mm to 220 mm were in use. Trammel nets made of PA mono and multifilament were in operation in some places.

Key words: Gill net, PA, monofilament, inland fishing, north Kerala

Fish harvesting from the inland water bodies entirely depends on the artisanal fishing methods. Gill nets are the predominant fishing gear in inland fishing. The simplicity of its design, fabrication and low manpower and energy requirement for operation make the gear very popular especially in the traditional sector (Thomas, 2002). Gill nets can be operated in waters, which are unsuitable for gears such as trawls and seines.

Different types of gill nets operated in inland waters of India have been described by Jones (1959a, 1959 b), George (1971, 2002), gill nets of Hoogly-Matlah by Dutta (1973) and Sunderban by Banerjea and Chakravarthy (1972).

Gill nets for reservoir fishing have been described by Khan *et. al.* (1991) and George (2002).

Different types of gill nets operated in Indian rivers have been reported by Sreekrishna and Shenoy (1987), Saxena (1988). Gill nets of River Brahmaputra by Joseph, and Narayanan (1965), Ganga river by Saxena (1964), and in Rajasthan by Kulshreshtha (1986).

Details of gill nets operated in coastal waters of Kerala have been given by Thomas, (2002) and Vijayan *et al.* (1993). Gill nets of 18 rivers and Vembanad lake of Kerala have been studied by Kurup, (1995) and Muvattupuzha river by Baiju and Hridayanathan (2002). This paper reports results of a study on the gill nets operated in inland waters of 3 districts of north Kerala.

Materials and Methods

The study was undertaken during March 2003 to June 2004. Three districts viz. Kozhikode, Kannur and Kasargod were selected based on the density of rivers and associated water bodies as well as the inland fishermen population. Details regarding design, mounting, operation and catch of all types of gill nets were collected from major fishing centers of each district. Gear details were collected from all places by checking representative samples of different categories of gill nets. Data collected was supplemented by interviewing fishermen and net makers and observations made from the fishing sites.

Results and Discussion

There are 20 rivers in these districts together with a catchment area of 10,105 sq.km. and 24 small backwaters with total area of about 10,096 ha. The two reservoirs namely, Pazhassi and Kuttiyadi, together contribute a water spread area of 1700 ha

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(Anon, 2001). About 80% of the inland fishermen use gill nets as the main gear. Net is operated from wooden canoes of size ranging from 3 to 6 m. A few fishermen use wooden canoes coated with fiberglass.

Details of major types of gill nets operated in inland waters of north Kerala are given in Table 1. Length of the net depends on the width of the area of operation and it varies from 50 to 400 m. Mounted depth of the net ranges from 2.4 to 8 m. According to Jones (1959) the length of gill nets for hilsa varies from about 60 to over 300 m and the depth from about 5 to 8 m according to the area and depth of the water body. Depending on the area and type of operation they increase the fleet length by joining a few nets.

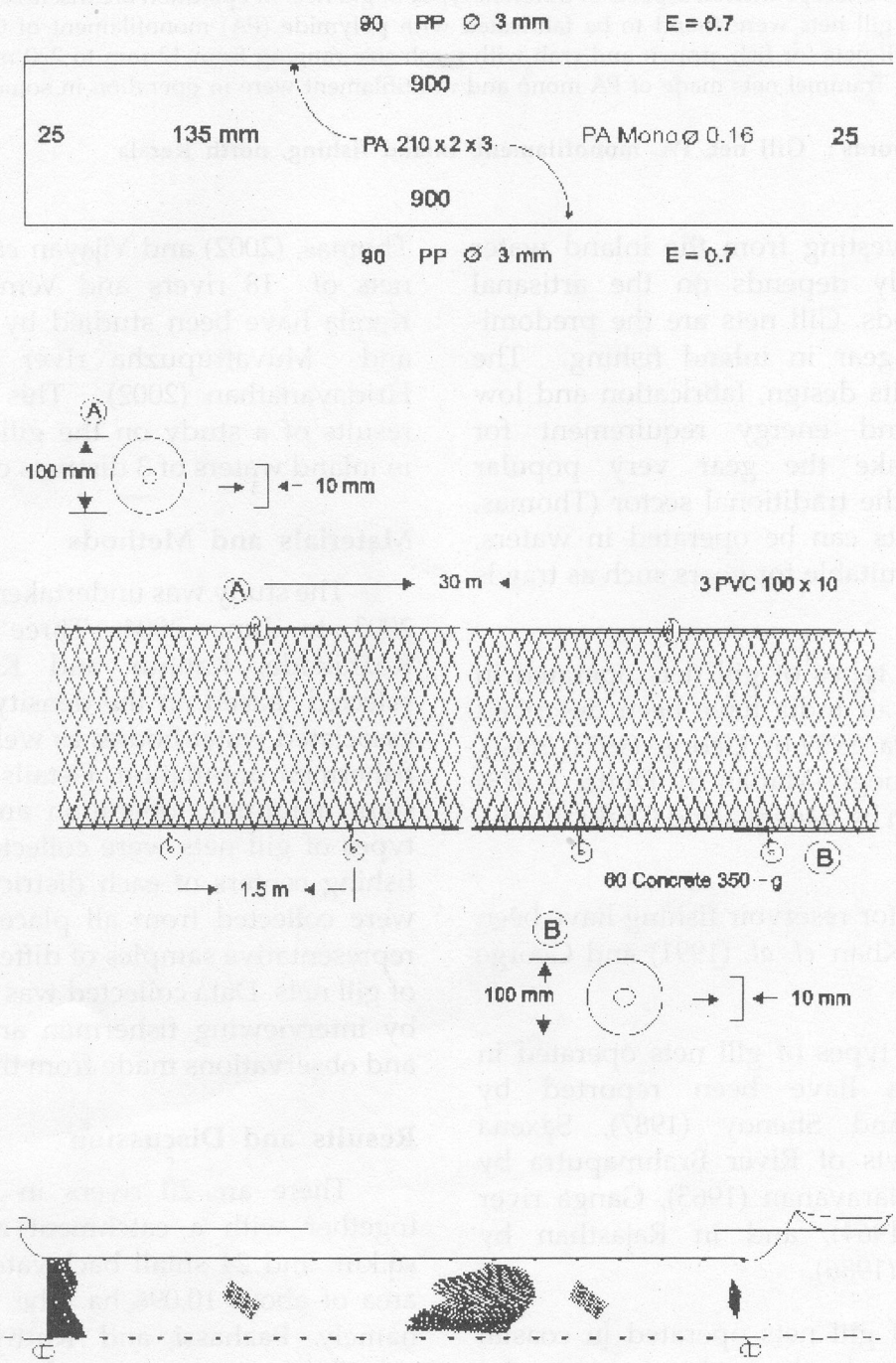

Fig. 1. Design details of *Saddamvala* operated in Tellicherry river

Table 1. Details of major types of gill nets operated in inland waters of north Kerala

District River/ Water body	Local name of the net	Type of operation	Material	Length of the net (m)	Mesh size (mm)	Material size (mm)	Mesh in depth (No.)	Hanging coefficient	Mounted height (m)	Target species
Kasargod										
Manjeswaram Chandragiri	*Nandevala*	Bottom set	PA mono-filament	100-200	100-160	0.32	30-35	0.5-0.7	4.00**	*Scylla serrata*
Kariangode Chithari	*Thiruthavala*	Surface drift	-do-	150-300	75-100	0.23-0.28	50	0.4 - 0.6	4.00**	*Mugil cephalus*
Mogral Bekkal	*Chemmeen vala*	Bottom drift	-do-	130-150	28-32	0.16	100	0.5	2.80	*M.monoceros F.indicus*
Kumbala Shiriya	*Maalanvala*	Surface drift	-do-	100-150	35-40	0.16-0.20	100	0.5	3.50	*Lisa spp., Valamugil sp. Mugil cephalus*
Kannur	*Nandevala*	Bottom set	-do-	90-100	100-150	0.32&0.35	25	0.7	3.00	*Scylla serrata*
Thalasseri Valapatanam	*Thiruthavala*	Surface drift	-do- PA	80-160	80-115	0.23 -0.32 210x1x3	35 - 42	0.45-0.7	3.40**	*Mugil cephalus*
Kavvayi Kuppam	*Maalanvala*	Surface drift	PA mono.	50-150	25-40	0.16 & 0.20	100 & 150	0.4-0.7	4.30**	*Liza spp., Valamugil sp. Mugil cephalus*
Perumba Mahe	*Chemmeen vala*	Bottom drift/set	-do-	60-225	12-40	0.16	100-200	0.5-0.6	6.40**	*F.indicus, P.monodon M.monoceros, M.dobsoni*
Kuttikol Ancharakandy	*Nongolvala/ Ettavala*	-do-	-do-	50-200	50-80	0.16-0.30	30-100	0.4-0.5	7.00	*Sillago sihama Catfish, Cynoglossus sp. Etroplus suratensis Elythronema tetradactylum*
Kozhikode	*Nandevala*	Bottom set	-do-	100-150	90-160	0.32	9-25	0.3-0.7	3.00**	*Scylla serrata*
Kuttiyadi/ Korapuzha	*Thiruthavala*	Surface drift	-do-		70-110	0.28-0.32	40-50	0.4-0.5	5.00**	*Mugil cephalus*
Chaliyar Kadalundi	*Maalanvala*	Surface drift	-do-	100-200	50-60	0.16-0.23	40-150	0.5	8.00	*Liza spp., Valamugil sp. Mugil cephalus*
	Chemmeen vala	Bottom drift/set	-do-	90-625	24-45	0.16	25-200	0.5-0.74	6.10**	*F.indicus, P.monodon M.monoceros, M.dobsoni*
	Ganessevala/	Bottom	-do-	100-750*	60-70	0.20&0.23	20-50	0.3-0.5	3.00**	*Sillago sihama*
Kuttiyadi reservoir	*Thandadivala*	Column set	-do-	40-100	155	0.32	14-18	0.5	2.40	*Labeio rohita, Cirhinus mrigala*
	Thandadivala	Column set	-do-	50-100	70	0.20 &0.23	100	0.7	5.00	*Oriochromis mossambicus*
	Kandadivala	drift/set	PA mul	50-100	200-250	210x1x2& 210x2x3	20-30	0.5-0.6	5.20	*Catla catla*

*net is operated in sea also

**largest mesh size and highest hanging ratio is taken for calculation

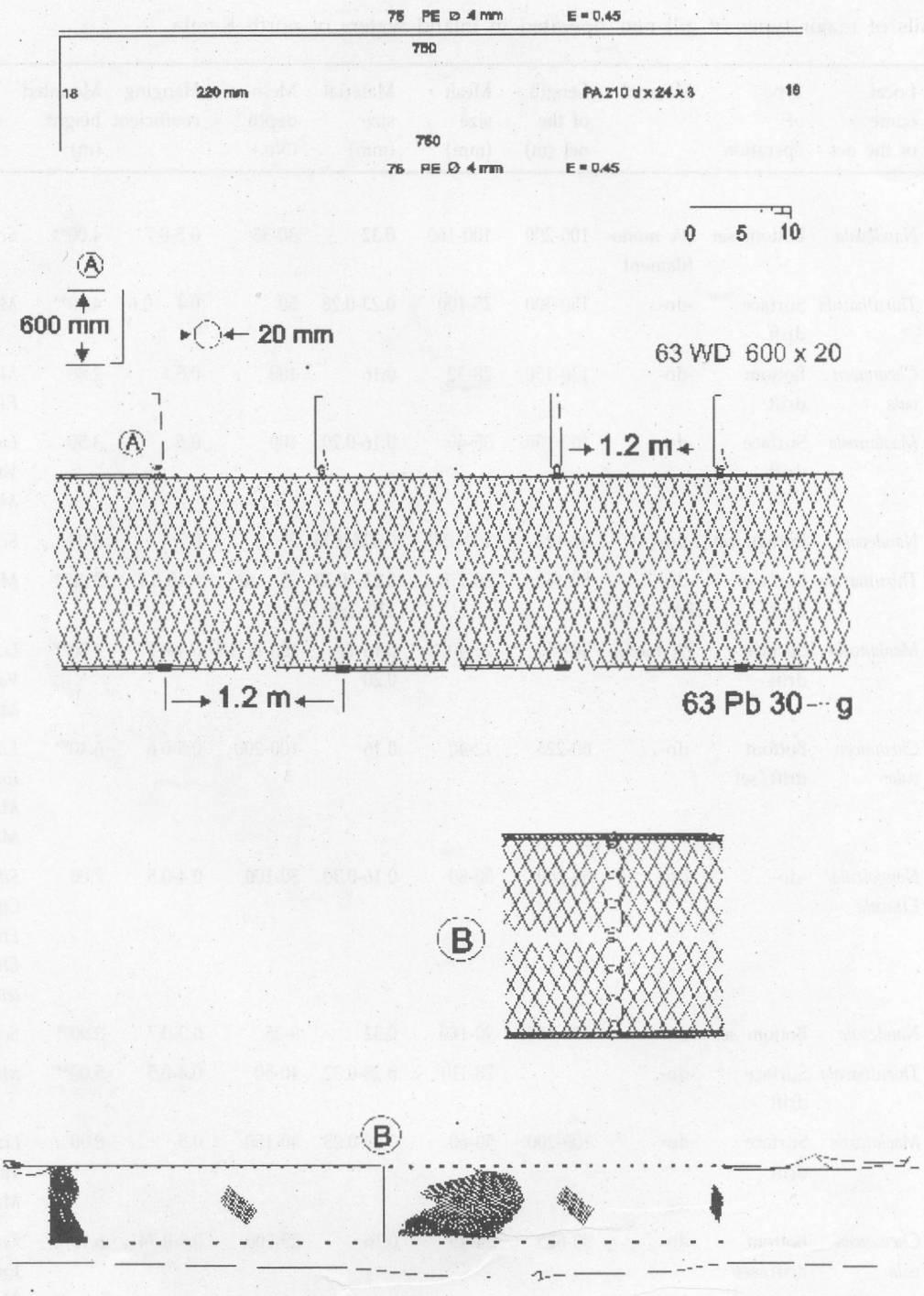

Fig. 2. Design details of a PA multifilament gill net in Chaliyar river

Most of the gill nets operated in these districts are made of PA monofilament and the rest using PA multifilament. According to George, (2002) there is a gradual shift from PA multifilament to PA monofilament as gill net material. Baiju and Hridayanathan (2002) reported that polyamide monofilament is generally used for the main body of the gill nets. Most of the gill nets for mullets and prawn are made with material having a thickness of 0.16 mm dia, popularly known as *zero*. Filament having thickness of 0.2 mm dia is used for mullet, whiting and tilapia gillnets. *Thiruthavala* (Big *Mugil cephalus* net) is mostly fabricated with material having 0.28 mm dia. Gill nets are exclusively

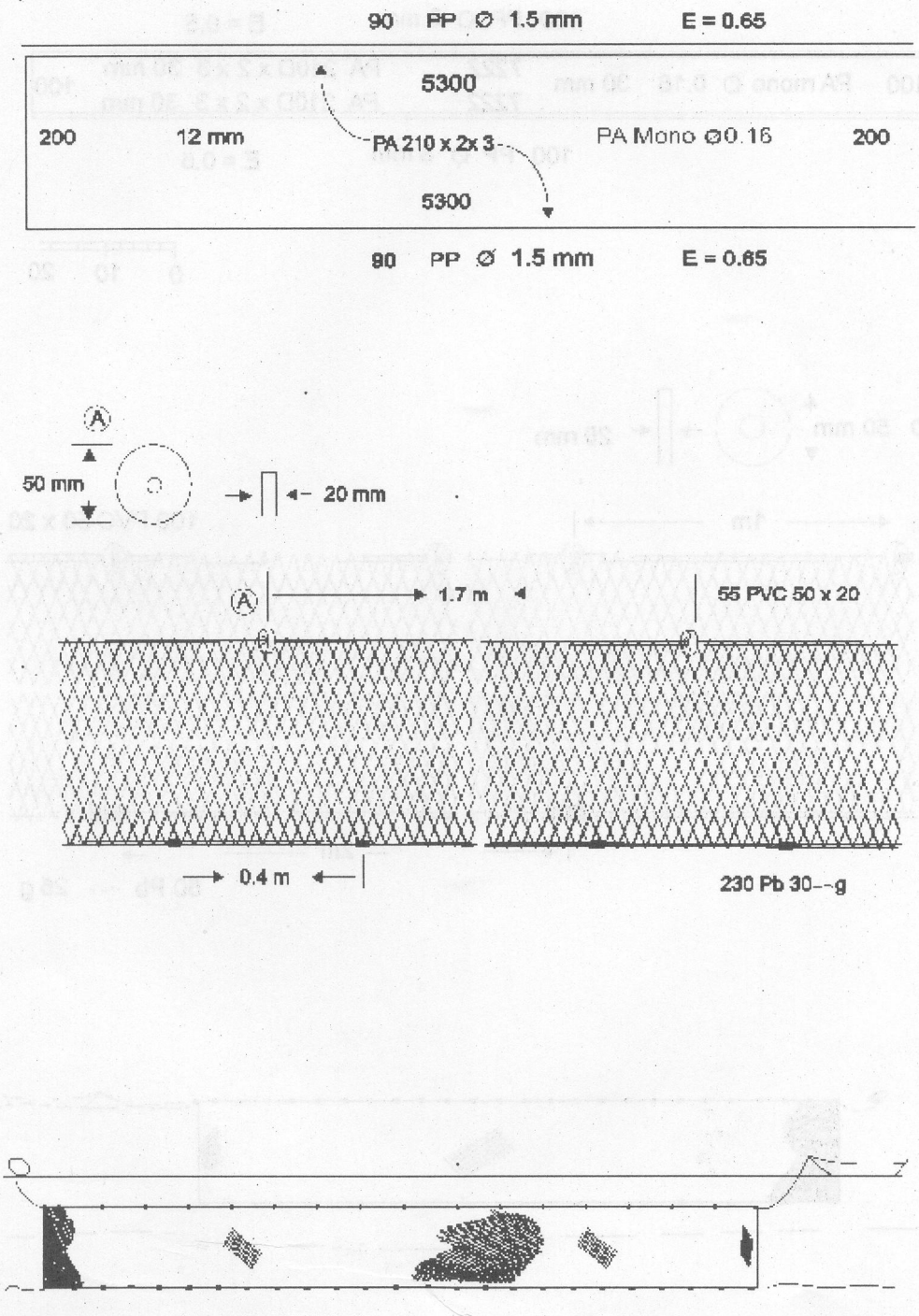

Fig. 3. Design details of *Thellyvala* operated in Valapatanam river

operated for catching *Scylla serrata* in north Kerala. This type of gill nets, (entangling net) made of 0.32 and 0.35 mm dia green monofilament, is popularly known as *Saddamvala* in Kannur (Fig.1). According to Jones and Sujansingani (1952) *Noli-jal* is a gill net operated in Chilka lake for mud crab and it is similar to the *nandu-valai* described by Prasad and Tampi (1951). Gill nets for crabs are operated in South Kanara coast, Gujarat, Andhra Pradesh Maharashtra, and Goa. Depth of the mud crab gill net in north Kerala varies from 3-4 m with 120 – 160 mm mesh size and it is operated as bottom set. Gill nets fabricated using PA webbing of 210x1x2 and 210x1x3 are seen in few places

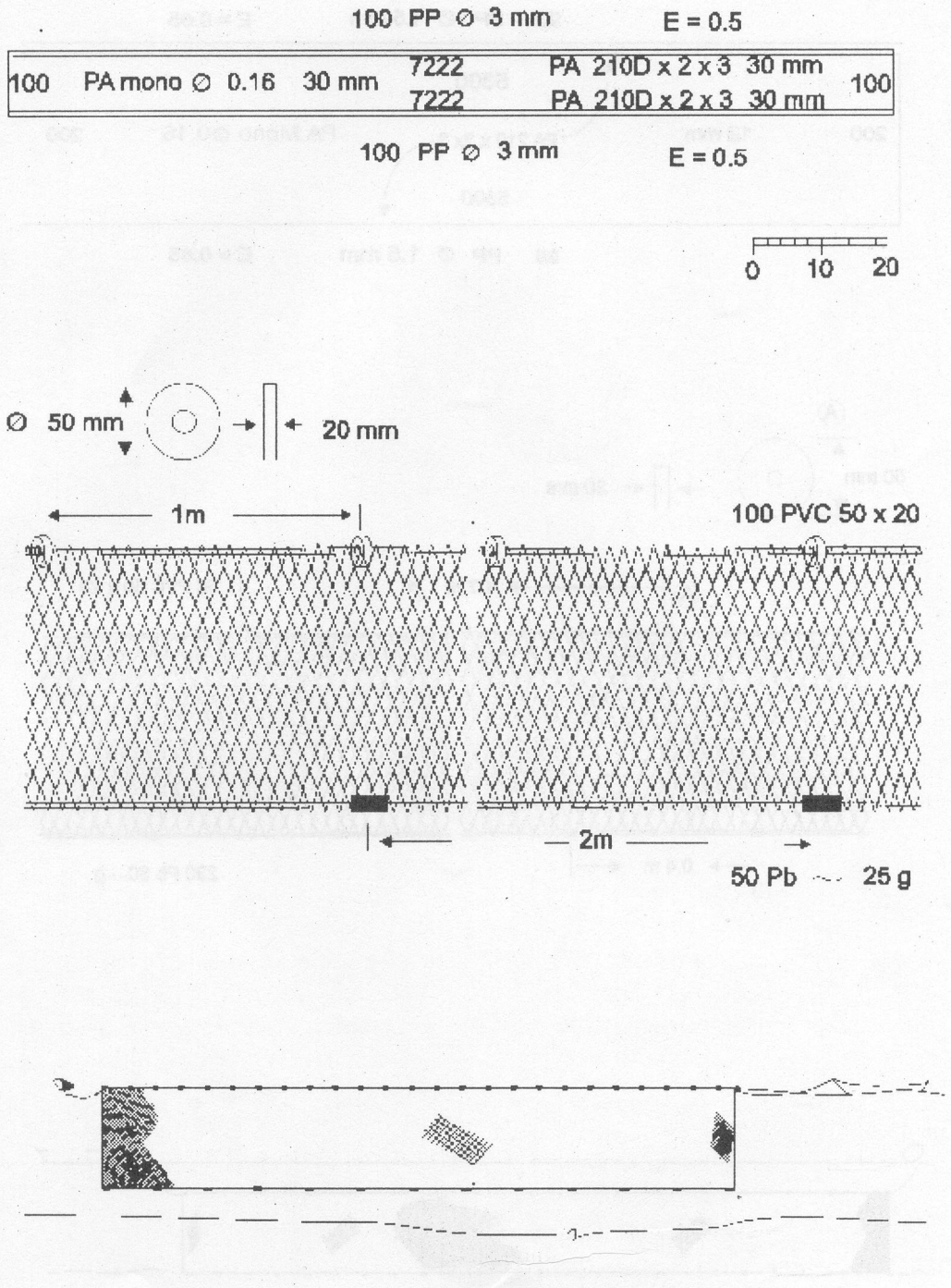

Fig. 4. Design details of a surface drift PA monofilament gill net for mullets

for catching snakeheads and carps. There is one gill net fabricated with PA multifilament of 210x24x3, exclusively operated for catching bigger *Lates calcarifer* (Fig.2). During monsoon season the net is allowed to drift in turbid waters in the middle reaches of Chaliyar river. During post monsoon season the same net is set across the river at night. Then two canoes positioned away from the net, drag a scare line towards the net simultaneously beating the sides of these canoes to make sound to scare the fish and drive towards the net.

Generally mesh size of gillnets of the region varies from 28 mm to 150 mm. A gill

net with 12 mm mesh size was found in Valapatanam river for catching *Metapeneaus dobsoni* (Fig. 3). Similarly maximum mesh size observed is 220 mm for the *Lates calcarifer* gill net. *Malaanvala* is a surface drift gill net for mullets with mesh size ranging from 40 mm to 50 mm. This is the most common net in all places of north Kerala (Fig.4). Mesh size for prawn usually varies from 28 mm to 50 mm.

Number of meshes in depth for gill nets varies from 10 - 200 based on the depth of ground, type of operation and mesh size. Large mesh and bottom set gill nets like crab nets are fabricated in some places with only 10-15 meshes in depth. 200 are the highest number of meshes noticed as in the case of prawn gill nets. Some fishermen cut the webbing horizontally and make two nets of equal width. In such cases selvedge will be only on one edge. Usually selvedge is one mesh depth and is made of PA multifilament with 210x2x2 or 210x2x3 twine size.

Polypropylene (PP) with 2-4 mm diameter is the most common material used as head rope and foot rope. Polyethylene monofilament twisted or braided and PA multifilament are also used. In some places old PA multifilament webbing is hand twisted and used as foot rope for bottom set gill nets. Gill nets without foot rope and sinkers are operated in reservoirs, where current is insignificant.

Disc shaped PVC floats were predominantly used for gill nets in all places. Size of these floats varied from 30x10 mm to 150x15 mm. Plastic floats and thermocole pieces were also used in a few nets. Fishermen split larger disc floats into two halves and use in bottom gill nets, where the buoyancy requirement is less. *Lates calcarifer* gill net in Chaliyar river use wooden sticks of about 600x20 mm size as floats. Floats made of reeds collected from nearby areas are used as floats by the migratory fishermen from Karnataka. Distribution of floats in the head rope depends on the size of the float as well as mode of operation. While mounting, floats are inserted at regular interval and is tied to the head rope after adjusting the distance. Some fishermen use a separate float line, usually thinner than the head rope, which is attached to the head rope.

Lead is the common sinker in gill nets, the size, shape and weight varies according to the type of net and mode of operation. Some fishermen use burnt clay and concrete disc. Stones and pieces of earthen tiles are also in use. Depending on the season and

Table 2. Details of gill nets operated by fishermen from Karnataka

Type of operation	Material	Twine size (mm)	Length (m)	Mesh size (mm)	Meshes in depth (No)	Hanging coefficient	Type of Float	Type of sinker	Target spp.
Bottom set	Nylon monofilament	0.16-0.23	50 - 100	55-70	14-15	0.4 - 0.6	Reed	Lead/ Burnt clay	Small fish & crab
Bottom set	-do-	0.16-0.20	50 - 80	30-40	26	0.5-0.6	Reed	-do-	Prawn and small fishes
Bottom set	-do-	0.20-0.23	50-100	40-60	16-17	0.3-0.4	Reed	Burnt clay	Small fishes
Encircling/ Bottom set	-do-	0.16-0.23	80-100	70-80	16-17	0.4-0.5	Reed	Burnt clay	Pearl spot *Gerres* sp, etc.
Bottom set	-do-	0.20-0.25	80-100	60-90	30	0.4-0.5	PVC	Lead	Catfish, Scianeids, *Gerres sp*, Pearl spot Whiting & Crab

availability of fish in water, fishermen add or remove sinkers from the net to keep it near the surface or bottom. Some of the set gill nets operated for Pearl spot, Spotted scat and catfishes in Kavvayi river use old hand twisted PA multifilament webbing as foot rope. According to the users the webbing absorbs water and sinks to the bottom without the help of sinkers.

Trammel nets, locally known as *saarivala*, are operated in Valapatanam river for fish. Outer layer is made of either PA monofilament of 0.4 mm dia. or multifilament (210x1x3, 210x2x3) with mesh size ranging from 145-280 mm. Middle layer is also made of PA monofilament with 0.20 & 0.23 mm diameter or PA multifilament (210x1x3) with 50-70 mm mesh size.

Operation

Gill nets are operated throughout the length of the river, unlike other gears, with more concentration in the lower reaches. It is operated during day and night throughout the season. Gill net is usually operated as drift or set anywhere in the water column by one or two fishermen from a canoe. Some times it is operated as encircling with the help of two canoes and 2-3 nets. After joining the nets they encircle an area. Then the fishermen enter inside the circle and splash water to scare the fishes and drive them into the net. Sometime they make noise by beating the sides of the canoes using poles. Same method is used to capture fish hiding under large obstructions.

Set net is operated during the interface between tides and it is hauled back within 15 to 20 minutes. Otherwise they attach heavy stones at bottom corners of the net to prevent drifting. Surface set net in Kuppam river is often set in the form of an arc with both ends coiled inside. According to fishermen 50-60% of the catch is obtained from the coiled end. The central part of the net might be acting as leader line to drive the fish into the coiled ends.

All types of gill nets are having one or two large floats attached on either end of the net to locate the same. Usually thermocole piece or empty plastic oil cans are used and are tied to the net using a piece of rope the length of which depends on the depth of operation. Bottom set gill nets are anchored to the ground using two stones attached to the bottom corners of the net.

The migratory fisher folk from Karnataka is also operating gill nets in almost all inland waters of Kerála. They operate bottom set gill nets made of PA monofilament using coracle as fishing craft. Ladies and children also assist the male members of their family in fishing. Details of gill nets of the Karnataka fishermen are given in Table 2.

There are minor variations in the construction and operation of gill nets from place to place due to the difference in topography of the area, current, depth of water, target species and mode of operation. Fishermen often keep surface and bottom gill nets in their canoes and depending on the species availability and area they select the net.

Income per head usually varies from Rs. 50–200 per day. According to some fishermen returns are better during summer season as the catch is dominated by prawns. During peak period per head income increase upto Rs. 200 – 400 per day. During monsoon they get better price for their catch as the marine fish availability in the local markets becomes less.

Monofilament gill net is very efficient but the problem is it may not last for more than few months. Nobody is interested in mending the damaged net, as it is very tedious and time consuming. Since the cost of material is also less they are purchasing netting and fabricating new nets.

Due to unemployment problems more number of young people are entering in

fishing field, which resulted in proliferation of all types of gears, especially in the lower reaches of the rivers. The competition is severe during monsoon when the sea going fishermen also participate in this race to find their livelihood. Neither statistics on the number and use of the gear nor any agencies to monitor the fishery are available at present. The practice of disposing unused gillnets into water bodies should be avoided to prevent ghost fishing. In this situation the thoughts of responsible fishing should come from the fishermen community.

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