



**BAY OF BENGAL PROGRAMME
DEVELOPMENT OF SMALL-SCALE FISHERIES**



**TRIALS IN BANGLADESH OF LARGE-MESH
DRIFTNETS OF LIGHT CONSTRUCTION**

BOBP/WP/12

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BOBP/WP/12
GCP/RAS/040/SWE

TRIALS IN BANGLADESH OF LARGE-MESH
DRIFTNETS OF LIGHT CONSTRUCTION

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PREFACE

This document is the second report of a fishing gear improvement project in Bangladesh. It describes the rationale, the mechanics and the findings of experiments with large-mesh driftnets of thin twine conducted near Chittagong from October 1980 to February 1981.

The experiments were carried out in cooperation with the Kalidaha Fishing Project of CARITAS, a social service agency. In a parallel activity, experimental thin-twine large-mesh driftnets were also tried out by private fishermen in commercial fishing operations along with their own traditional fishing gear.

The experiments yielded the finding that driftnets of thinner twine, which are about 40% cheaper than the traditional nets, also catch more fish than the traditional nets.

Experiments were also carried out by BOBP with driftnets of different mesh sizes in cooperation with the Kalidaha Fishing Project. Here the conclusion was that large-mesh sizes are more effective than the smaller.

The Ministry of Fisheries and Livestock, Bangladesh, participated in the fishing gear improvement project as a cooperating agency. The project is an activity of the Programme for the Development of Small-Scale Fisheries in the Bay of Bengal, referred to in brief as the Bay of Bengal Programme. This is a regional FAO programme that seeks to develop and demonstrate appropriate technologies and methodologies in many areas of small-scale fisheries such as fishing craft, fishing gear, fishing methods and utilization and coastal aquaculture. The Programme's goals are to improve the conditions of small-scale fisherfolk and the supply of fish from the small-scale sector in five countries that border the Bay of Bengal – Bangladesh, India, Malaysia, Sri Lanka and Thailand.

This document is a working paper and has not been officially cleared either by the Bangladesh Government or by the FAO.

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1. INTRODUCTION

Artisanal fisheries account for about 95% of the marine fish catch in Bangladesh. The set bagnet is the most important method of capture; about 40% of the total marine catch is taken by this means. Driftnets account for approximately 30%. There are two main types of driftnet: the small-mesh (75-115 mm stretched mesh) driftnet for capturing hilsa, pomfret, etc., which is the most widely used; and the large-mesh (180-220 mm stretched mesh) driftnet used for catching larger species such as Indian salmon, triple-tail, jewfish, snapper, cock-up, shark, etc. The large-mesh type is used by fishermen from Chittagong during the winter season (October to March), when hilsa and other small-sized species are scarce.

Earlier investigations suggested that considerable savings could be effected by reducing the twine size of the netting material of the large-mesh nets and that this, according to experience in other fisheries, should also result in better catches.

An experimental project was therefore conducted during the winter season 1979-80 in order to compare the catching effectiveness of nylon driftnets made of different sizes of twine. The experimental nylon driftnets made of thinner (210d 27) twine seemed far superior to the traditional driftnets of thicker (210 d 45) twine: besides being 40% cheaper, they caught more fish.

The impression was gained during these trials that the mesh size normally used in the large-mesh driftnet fishery might be too large for optimum performance. Moreover the trials were of rather short duration. It was therefore decided that further commercially-oriented experiments should be undertaken; in the meantime fishermen were informed of the results obtained so far.

2. OBJECTIVES

The second series of trials was therefore undertaken during the winter season (October to February) 1980-81 with the following objectives:

- (i) To confirm the superiority of nylon large-mesh driftnet made of twine 210 denier 27 over traditional large-mesh nylon driftnet made of twine 210 denier 45.
- (ii) To demonstrate to small-scale fishermen/boat owners the benefits which can thus be derived.
- (iii) To determine the optimum mesh size in relation to the catching performance of large-mesh driftnets in this fishery.

It was also decided to carry out training of counterparts – junior technologists and fishermen – and to give some of them an opportunity to study similar fisheries in neighbouring countries. The trials, demonstration and training work would also provide an opportunity to identify other possible ways of improving the productivity or the profitability of the large-mesh driftnet fishery.

3. CONDUCT OF TRIALS

3.1 Organization

3.1.1 The trials were carried out in cooperation with CARITAS (a social service agency) through its Kalidaha Fishing Project (KFP) near Chittagong. Under an agreement between BOBP and KFP, BOBP provided a full set of large-mesh (180 mm) nylon driftnets made of thinner twine (210d 27) (20 pieces 1000x50 meshes); KFP used them in normal commercial fishing operations and (as for their other large-mesh driftnetters) they recorded the fishing data, catch, running expenses, etc. All the proceeds from the sale of catches went to KFP as compensation for running expenses and services rendered in the course of the trials.

3.1.2 At the same time, BOBP entered into agreements with the fishermen and owners of three other commercial boats, whereby BOBP provided 30 pieces of 1000 x 50 meshes driftnet made of thinner twine. The fishermen used them along with their own traditional nets in normal commercial fishing operations and to the best of their ability recorded the catches of the different types of net. All proceeds of fish sale went to the fishermen and boat owners.

3.1.3 The experiments with driftnets of different mesh sizes (100 - 125 - 150 - 175 mm stretched mesh) were carried out in cooperation with KFP. KFP provided a boat with crew and paid all the running expenses. All the proceeds from the sale of fish went to KFP as compensation for the running expenses, management and other services rendered in the course of the experiment. Since it was by no means certain that the nets of unorthodox mesh size would produce the same quantities and values of fish as the orthodox design, BOBP guaranteed to KFP that the gross earnings of the boat for the full season (November 1980 to February 1981) would be made up to at least Taka 75,000 by supplementing the income from sales of catch if necessary. The catch was recorded daily by the Assistant Technologist in charge, assisted by extension workers.

3.2 Vessels and gear

3.2.1 The boats used for the fishing trials made available by the KFP and private fishermen/boat owners were of local construction and of a design commonly used for commercial drift-netting of which the principal characteristics are:

Length (m)	11.50 - 13.00
Breadth (m)	2.50 - 3.50
Draft (m)	1.00
Engine (hp)	22 - 33

(See Appendix 1)

3.2.2 Descriptive data of the traditional large-mesh driftnet being used in the commercial fishery, the BOBP net of thinner twine and the experimental nets of different mesh sizes are presented in Appendices 2, 3 and 4.

3.3 Fishing operations

3.3.1 Practical work began early October 1980. The driftnets were rigged by the fishermen under close supervision by the BOBP staff and the counterpart Assistant Fishing Technologist. The boats were made available early in November 1980. The fishing trials and experiments began 11 November 1980 and continued until 1 March 1981.

During this period the boats were based at Chittagong. Large-mesh driftnet fishing operations were conducted in a fishing area traditionally fished by commercial driftnetters and located 30-40 miles off the east coast of Bangladesh between Chittagong and Cox's Bazar (See Appendix 5).

3.3.2 Data to enable comparison of the catches and the relative fishing effectiveness of the different nets were collected daily by the Assistant Technologist, extension workers and head fishermen of the KFP, who also provided data on the landings for each driftnetter and on detailed running expenses. These data were processed and analysed by the staff of the Directorate of Fisheries and BOBP.

3.4 Study tour

Two fishing assistants attached to the BOBP Programme and one fisherman/boat operator were sent to Sri Lanka to study a large-mesh driftnet fishery employing driftnets of much thinner twine than used in Bangladesh. The arrangements were made by the Ministry of Fisheries and the BOBP.

4. FINDINGS

4.1 Trials of nylon driftnet of thinner twine

4.1.1 *KFP Trials:* Table 1 gives the catch data recorded during the full season. The average catch per net set was 0.54 pieces for the nets made of 210 d 27 twine and 0.35, 0.27, 0.30 pieces for the nets made of 210 d 45 twine. There was no significant difference in the catch composition which would affect the comparative earnings. A close watch was kept on damage; the nets made of 210 d 27 twine required slightly more mending than the heavier nets, but this was not regarded as significant. The lighter nets were at least 40% cheaper, this represents a considerable saving to the fishermen and also in foreign exchange.

Table 2 (record of the KFP cost and earnings of the large-mesh driftnetters for the full winter season 1980-81) indicates the estimated benefits by way of costs and earnings.

4.1.2 *Trials by other fishermen/owners*

The fishermen who used them found that the driftnets made of thinner twine caught more fish, and fish of the same high market value, as the thicker traditional nets. No extra wear-and-tear was observed. The fishermen expressed a desire to use the thinner nets in the future.

The boat owners accepted the fishermen's assessment; they asked to be allowed to keep the BOBP nets and expressed the intention of buying more. What is perhaps most significant, the fishermen/boat owners bought the BOBP nets at full cost.

4.2 Comparative performance of driftnets of different mesh sizes

The average catch, per net set, of driftnets of 100, 125, 150, 180 mm stretched mesh were respectively 9.70, 29.70, 32.25 and 51.20 kg. Table 3 gives the respective catches recorded during the trials. There are significant differences in catching effectiveness, and in catch composition, in favour of the larger mesh nets. The value of the catch from the nets of different mesh sizes varies accordingly. No significant variation of catching performance and catch composition with respect to mesh size was observed.

4.3 Study tour of the large-mesh driftnet fishery in Sri Lanka

The two Assistant Fishing Technologists and the fisherman found the study tour to Sri Lanka useful; they came to realise that time-honoured orthodox methods and equipment were not necessarily always the best, and that other communities possessed knowledge and experience which might be applicable to their own situation. They quickly grasped the financial and economic implications of the use of thinner twines, and the desirability of trials to investigate the operational and economic usefulness, or otherwise, of such departures from accepted designs and practices.

4.4 Possible further improvements

Further improvements in the performance of the fishermen and boats, leading to increased earnings or reduced costs or both, seem possible of attainment. Some but by no means all require further effort by way of technical development. They include:

4.4.1 *Boats*

The standard design of boat could be improved in several respects, including the siting of engine controls and the insulation of fish holds. More straightforward methods of handling the fishing gear seem possible. Simple modifications could be the subject of trial and demonstration in the course of the further work planned on fishing gear development.

The standard boat designs could also be improved as regards sea-worthiness and crew accommodation.

4.4.2 *Energy costs*

Fuel is one of the major items of cost. Since there is a reliable wind for much of the year, the use of sail as an auxiliary means of propulsion seems attractive.

4.4.3 *Supply of nets*

Many boats are operating with fewer nets than the number it is generally accepted can be handled; this is not the most economic use of capital, labour and fuel. The reason is shortage of supply of nets. A consequent problem is theft of nets. The use of thinner twines should improve the supply position in as far as the problem is caused by shortage of money and of foreign exchange.

4.4.4 *Supply of ice*

Ice is also a major item of cost. In the winter season, there is a greater demand than the ice-making plants are capable of meeting; the results are high prices and poor quality. This leads to unnecessary deterioration of catches and higher costs of production.

4.4.5 *Extension and training*

The small-scale marine fisheries of Bangladesh will be of growing importance as a source of fish supplies for many years to come. The pace of development will be set by the ability of the fishermen to absorb new knowledge and skills and to acquire thorough familiarity with, and experience of, all the fishing opportunities open to them. Because of the present comparatively low level of technology and narrow experience, and the general lack of education, progress will be slow. Wherever such circumstances obtain, progress is best achieved by skilled and experienced fishing technologists and other experts working directly with the fishermen. Innovations will best be disseminated by extension workers also working directly with the fishermen. There are as yet very few if any extension workers or skilled fishing technologists and other experts working directly with the fishermen in the small-scale marine fisheries.

5. RECOMMENDATIONS

5.1 More driftnets made of thinner twine (210 d27) should be made available for trial to selected traditional fishermen, at cost, for the next fishing season

5.1.1 A consultation should be organised on the subject with the Directorate of Fisheries officers, twine importers, net manufacturers and fishermen.

5.1.2 An information leaflet and/or poster should be produced and distributed or exhibited to traditional fishermen at major fishing centres.

5.2 To confirm the superior catching performance of driftnets of 180 mm mesh and above, further commercially oriented fishing experiments should be undertaken during the next fishing season.

5.3 In the course of the trials recommended in 5.1.1 and 5.1.2 above, trials and demonstrations should also be undertaken of the following:

5.3.1 more straightforward methods of handling the gear

5.3.2 re-designed and re-located engine controls to enable steering and propulsion to be controlled by one man

5.3.3 better insulation of fish hold

5.3.4 use of sail as an auxiliary means of propulsion.

5.4 The Government should consider what steps, if any, are necessary, in addition to use of thinner twines, to ensure adequate supplies of nets.

5.5 The Government should consider what steps are necessary to reorganize and expand ice-making facilities in major small-scale marine fishing centres such as Chittagong, in order to ensure that this fishery has access to regular and adequate supplies of ice of good quality at a reasonable price.

5.6 The Government should consider what steps should be taken to create an adequate development and extension service to support the growing and changing small-scale marine fisheries industry. In the first instance, selected extension officers and a selected assistant technologist should undergo special courses of training to equip them for this task and to act as the nucleus of an expanded service.

Table 1
Catch records of large-mesh driftnets used by KFP

Boat name or number	F.B. Miriam - 4		F.B. Miriam - 8		F.B. Miriam - 9		F.B. Miriam - 15	
Period	11-11-80 to 22-1 -81		11-11-80 to 2-3-81		11-11-80 to 23-2-81		15-11-80 to 1-3-81	
Unit	1 (Traditional net)		2 (Traditional net)		3 (Traditional net)		4 (Improved net)	
Netting material	Nylon Multifilament (PA)		Nylon Multifilament (PA)		Nylon Multifilament (PA)		Nylon Multifilament (PA)	
Mesh size (stretched mm)	180-200 (7"-8")		180 (7")		180 (7")		180 (7")	
Twinesize	R 1135-1515 tex (210d45-60)		R 1135 tex (210 d 45)		R 1135tex (210d45)		R 680 tex (210d27)	
Fishing days	42		66		75		60	
Total set made	53		106		132		101	
Netset(Hung-36m)	2332		3710		5808		5050	
Species-Group of species	Pieces	%	Pieces	%	Pieces	%	Pieces	%
Jewfish	96	11.88	109	10.58	342	19.34	640	23.66
Snapper	148	18.32	98	9.51	159	8.99	618	22.85
Indian Salmon	45	5.57	146	14.18	145	8.20	296	10.94
Catfish	163	20.17	224	21.75	445	25.17	245	9.06
Triple tail	159	19.68	136	13.20	286	16.18	168	6.21
Cock-up	7	0.87	12	1.17	10	0.57	161	5.95
Spanish mackerel	10	1.24	54	5.24	43	2.43	60	2.22
Four thread tassel	1	0.12	—	—	17	0.96	29	1.07
Pomfret	—	—	—	—	—	—	22	0.81
Shark	142	17.57	161	15.63	163	9.22	59	2.18
Saw fish	—	—	9	0.87	—	—	28	1.04
Rays and skates	19	2.35	32	3.11	38	2.15	331	12.24
Miscellaneous	18	2.23	49	4.76	120	6.79	48	1.77
Total	808	100	1030	100	1768	100	2705	100
Catch per net set	0.35		0.27		0.30		0.54	
Total proceeds of sale (Taka)	30975		55740		83675		159374	
Average income per net set (Taka)	13.28		15.00		14.41		31.56	

Table 2**Records of the KFP large-mesh driftnet fishing operation**

Boat number	4	8	9	15
Unit	Traditional net	Traditional net	Traditional net	Improved net
Fishing period	11-11-80to22-1-81	11-11-80 to 2-3-81	11-11-80 to 23-2-81	15-11-80 to 1-3-81
Number of trips	6	8	9	10
Fishing days	42	66	75	60
Total sets	53	106	132	101
Total net sets (hung 36 m)	2332	3710	5808	5050
Total number of fish (pieces)	808	1030	1768	2705
Total proceeds of sale (1K)	30975.00	55740.00	83675.00	159374.00
Running costs:				
Fuel & lubricant	10098.50	15306.00	10556.00	13112.50
Ice	5582.82	11701.79	10910.79	18556.15
Food	4243.70	8513.53	6505.14	8406.27
Wages of supporting personnel	4140.38	4140.38	4140.38	4140.38
Miscellaneous	1138.09	589.13	71.50	764.44
Total	25203.49	39980.83	32183.81	44679.74
Gross profit (TK)	5771.50	15759.17	51491.19	114394.26
Boat share (60%)	3462.90	9455.50	30894.71	68636.55
Crew share (40%)	2308.68	6303.67	20596.48	45754.70

Table 3
Comparative efficiency of driftnets of different mesh sizes

Boat name or number		Fishing Ground: Kalidaha				Period: 15-11-80 to 1-3-81			
F.B. Miriam -14		1		2		3		4	
Unit		Nylon Multifilament (PA)		Nylon Multifilament (PA)		Nylon Multifilament (PA)		Nylon Multifilament (PA)	
Netting material		100 (4")		125 (5")		150 (6")		180 (7")	
Mesh size (mm)		R 300 tex (210 d12)		R 450 tex (210d 18)		R 530 tex (210 d 21)		R 680 tex (210d27)	
Twine size		450 m		450 m		450 m		450 m	
Length of each size of net (Hung)		33		47		60		60	
Fishing days		43		70		95		95	
Net/set (Hung 450 m)									
Species/Group of species	Pieces	Weight (kg)	Pieces	Weight (kg)	Pieces	Weight (kg)	Pieces	Weight (kg)	
Indiansalmon	—	—	3	34.00	10	103.80	24	272.00	
Cock-up	—	—	1	8.00	2	24.00	7	49.90	
Jew fish	3	5.80	126	773.50	99	724.75	177	1839.70	
Grunter	—	—	—	—	5	12.70	11	9.00	
Trippletail	12	33.75	31	83.75	136	409.25	101	474.80	
Red snapper	3	15.50	43	234.80	115	587.65	197	1009.25	
Spanish mackerel	15	22.70	43	101.60	61	159.10	30	81.40	
Four thread tassel	5	3.95	12	10.40	19	14.00	9	5.75	
Catfish	219	42.55	116	253.55	211	464.45	100	372.75	
Pomfret	173	25.75	117	48.75	105	47.05	46	23.75	
Shad	244	155.35	122	129.90	31	28.25	6	4.50	
Queen fish	—	—	4	31.00	11	68.00	10	70.50	
Wolf herring	9	18.25	10	17.75	12	11.75	3	1.50	
Tuna	—	—	—	—	2	20.00	5	32.50	
Saw fish	1	1.00	—	—	3	9.00	1	3.20	
Shark	15	59.30	100	251.60	76	241.20	53	372.30	
Ray and skates	2	1.50	14	52.70	28	113.00	56	236.20	
Eel	—	—	2	16.00	2	18.20	1	3.00	
Miscellaneous	382	31.60	1193	32.75	54	7.30	13	2.00	
Total	1083	417.00	1937	2080.05	982	3063.45	840	4864.20	
Average catch per net set (kg)		9.70		29.70		32.25		51.20	

APPENDIX-1

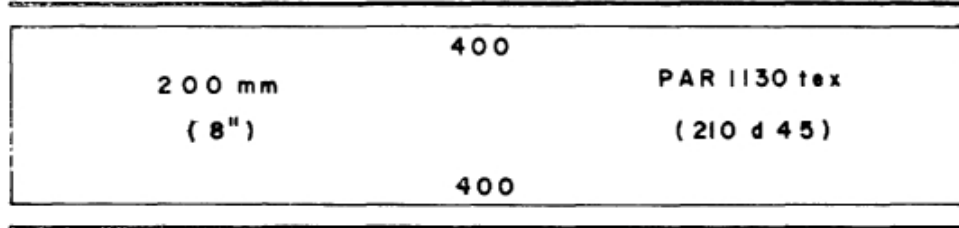
Boats used in the experiments with large-mesh driftnets in Bangladesh



APPENDIX-2
DESIGN OF TRADITIONAL LARGE-MESH DRIFTNET

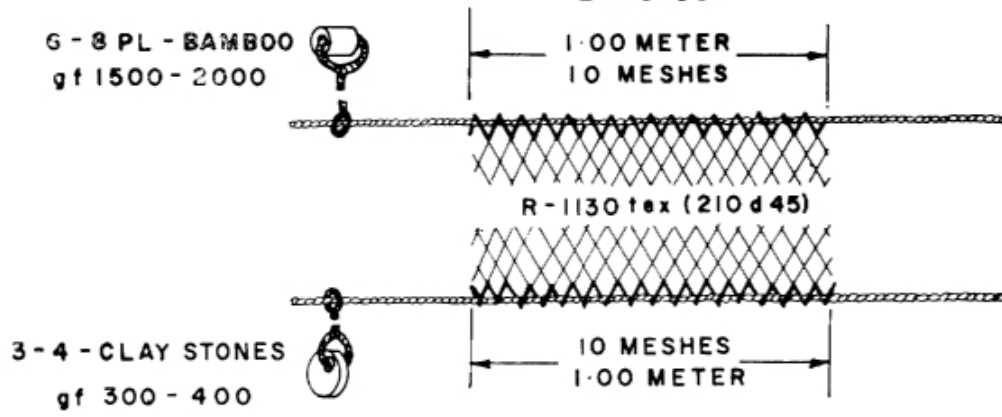
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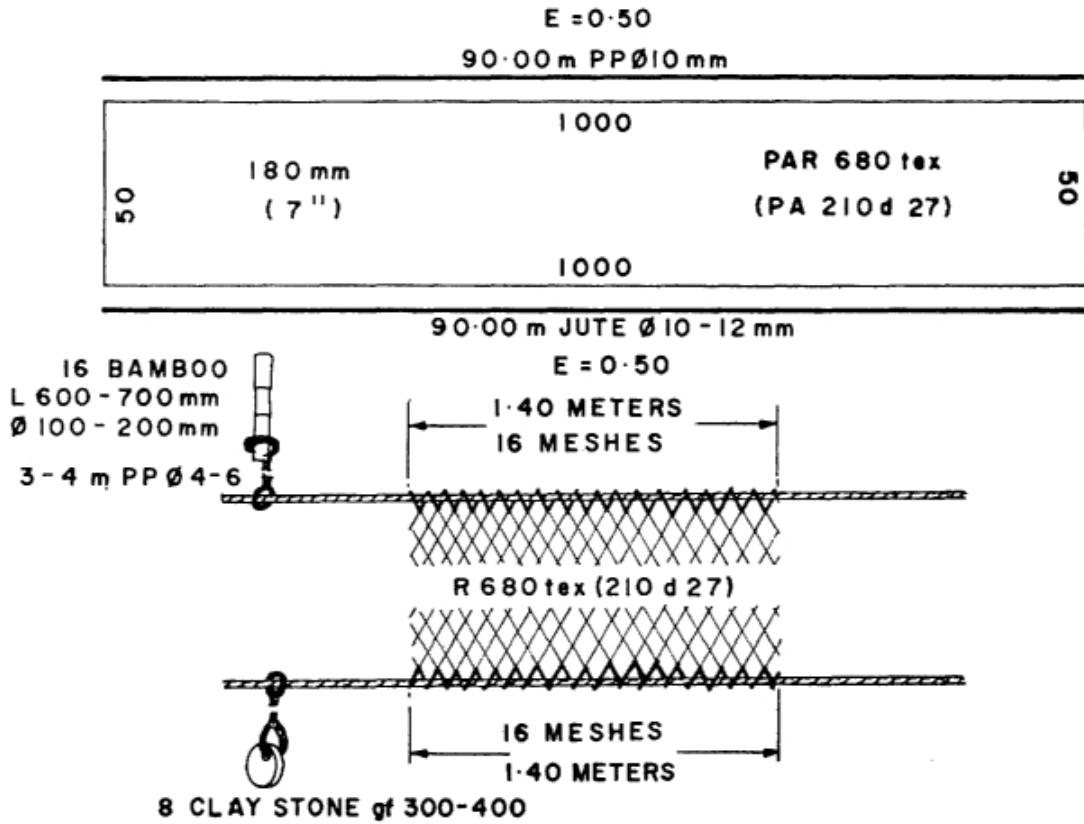
40.00 m JUTE ϕ 10-12 mm

E = 0.50

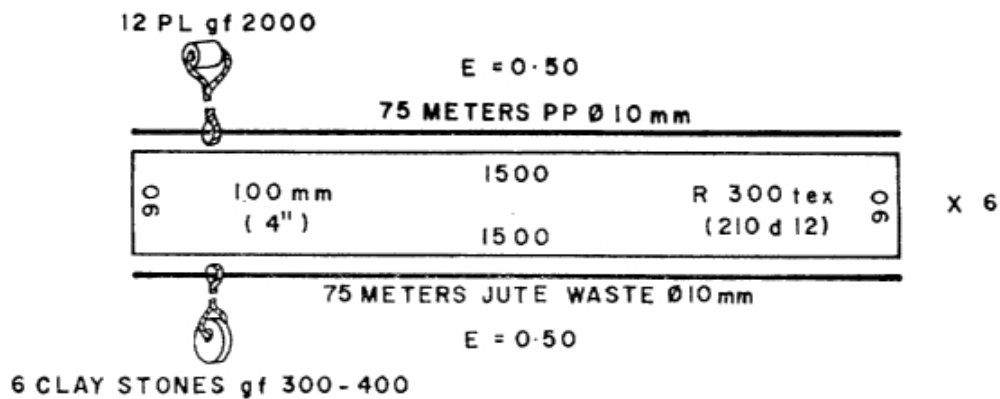
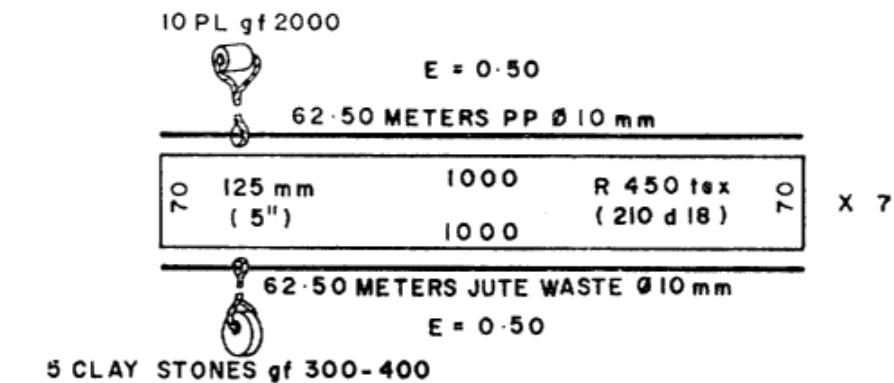
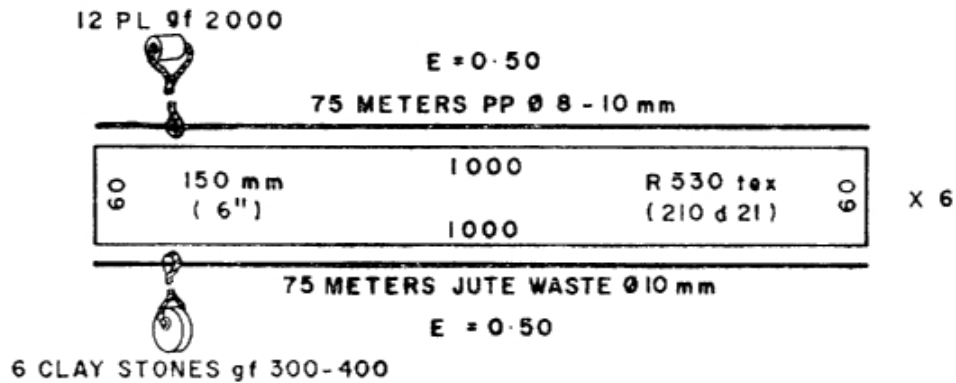
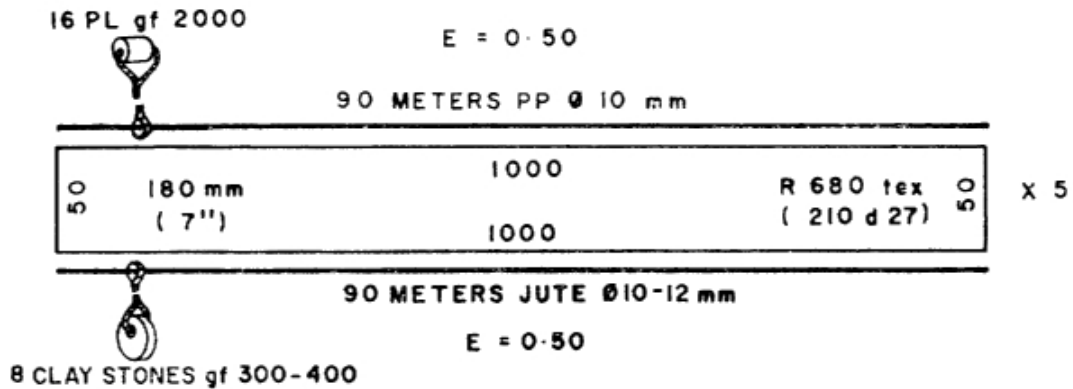


APPENDIX- 3

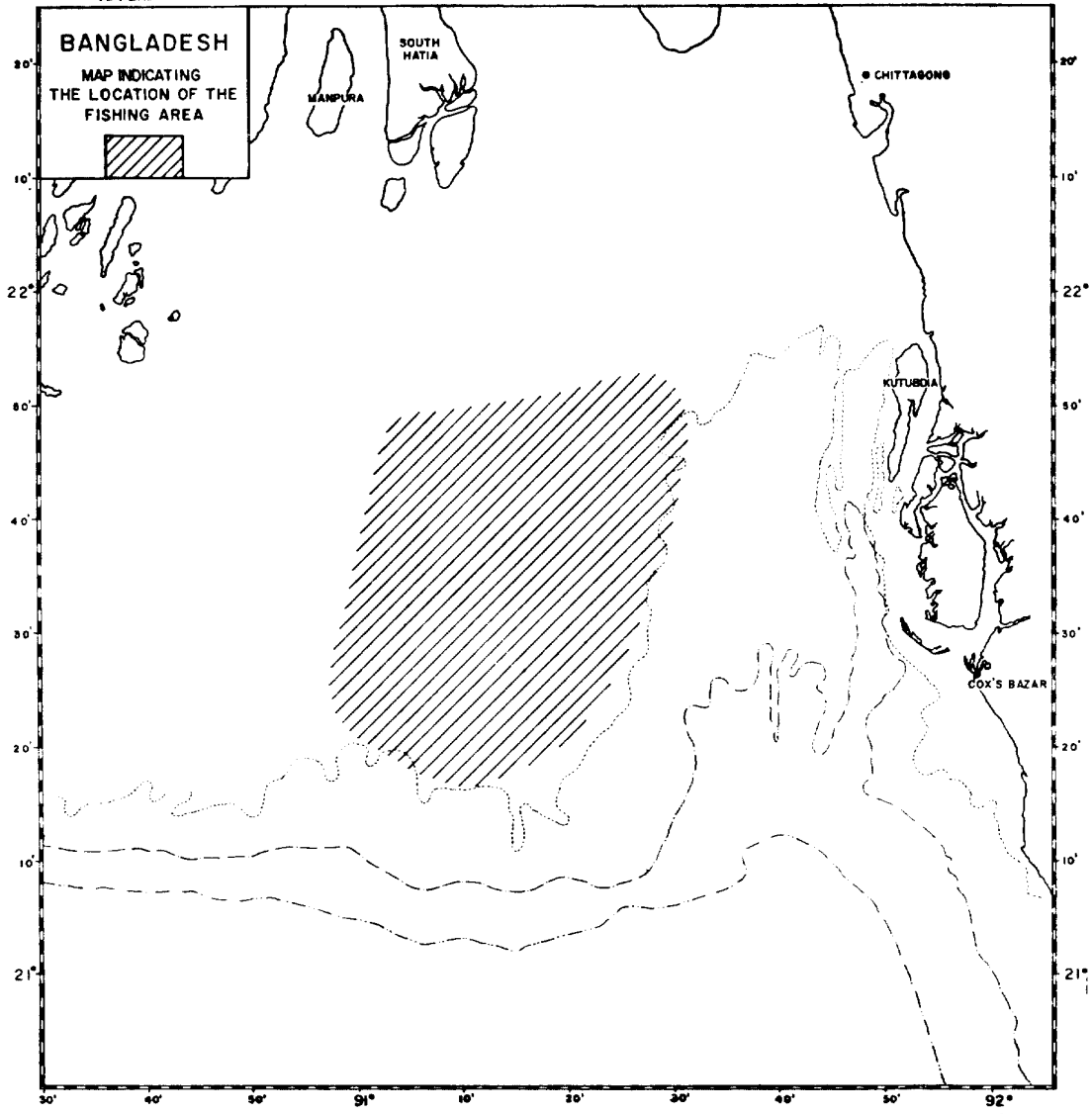
DESIGN OF THE EXPERIMENTAL DRIFTNET



APPENDIX-4
MESH SIZE EXPERIMENTS
DESIGN OF DRIFTNETS USED



APPENDIX - 5



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Development of Small-Scale Fisheries (GCP/RAS/040/SWE)

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