

# Bay of Bengal Programme

Development of Small-Scale Fisheries

FISHING TRIALS WITH HIGH-OPENING  
BOTTOM TRAWLS FROM  
CHANDIPUR, ORISSA, INDIA

BOBP/WP/48



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BAY OF BENGAL PROGRAMME  
Development of Small-Scale Fisheries

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FISHING TRIALS WITH HIGH-OPENING BOTTOM TRAWLS FROM  
CHANDIPUR, ORISSA, INDIA

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This paper reports on the findings of fishing trials with one-boat bottom trawls conducted from Chandipur, in Balasore district, Orissa, in 1984/85. Detailed specifications and designs of some of the trawls are given.

Trials during 65 fishing days clearly demonstrated the superiority of the high-opening bottom trawls over the conventional bottom shrimp trawl. The trials were conducted along commercial lines employing private trawlers. The cooperating agency in Orissa was the Directorate of Fisheries.

The Orissa fishing trials were part of a wider project organized jointly by the small-scale fisheries project of the Bay of Bengal Programme (BOBP) and the Government of India—for developing and introducing high-opening bottom trawling for food fish and shrimp. Two earlier working papers (BOBP/WP/10 and BOBP/WP/20) document trials conducted in Tamil Nadu, while one other paper (BOBP/WP/21) suggests improvements to the deck machinery and layout of small coastal trawlers.

The small-scale fisheries project of the Bay of Bengal Programme began in 1979 and covers five countries bordering the Bay of Bengal—Bangladesh, India, Malaysia, Sri Lanka and Thailand. Funded by SIDA (Swedish International Development Authority) and executed by the FAO (Food and Agriculture Organization of the United Nations), the project seeks to develop, demonstrate and promote appropriate technologies and methodologies to improve the conditions of small-scale fisheries in member countries.

This document is a working paper and has not been officially cleared by the Governments concerned or the FAO.

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## 1. INTRODUCTION

During 1980-82 BOBP undertook commercially oriented fishing trials in Tamil Nadu, employing new bottom trawls of the high-opening type. The purpose was to introduce a new technology to capture larger quantities of food fish. (The common shrimp trawlers were catching only small quantities of low valued species as by-catch). An alternative trawling technique would also improve the year-round economy of the trawlers and perhaps even reduce the fishing pressure on shrimp resources. The main features of the new trawl-nets, besides the larger opening, were large meshes particularly in the cod end. Several different trawls for fish and shrimp for both one and two boats (pair trawling) were tested and demonstrated (BOBP/WP/10 and BOBP/WP/20). The fishing boats used were the common 32-footers equipped with engines of 60–70 hp. During the fishing trials several improvements to the deck layout, winches and other gear handling deck equipment were also made (BOBP/WP/21).

After extensive demonstrations and extension work by the Tamil Nadu Directorate of Fisheries, the high-opening bottom trawls were widely adopted by fishermen in Mandapam, Tuticorin, Madras and other fishing centres in Tamil Nadu. Two Orissa masterfishermen and a net-maker underwent short-term training in net-making and rigging in Tamil Nadu. A Fishing Technologist from CIFNET (Central Institute of Fisheries Nautical and Engineering Training, Cochin) also underwent long term in-service training in the new technology. On completion of the training, CIFNET launched a demonstration programme of high-opening bottom trawling in the State of Gujarat. The technology once again was quickly adopted, and hundreds of boats are reported to be using high-opening bottom trawls.

The Directorate of Fisheries (DOF) in Orissa also requested a similar demonstration programme. Although BOBP's aim of developing and demonstrating the new technology had been fulfilled, it was agreed that some backstopping would be provided through CIFNET for the demonstration. Eventually the input from CIFNET did not materialize, but since the work had already begun, BOBP continued it for a little over one year; this report describes the work.

The reason for taking up the work in Balasore district, Orissa, with Chandipur as base (see map in Fig. 1) was a request from the Directorate. However, it was attractive for two other reasons. The demersal fishery resources of Orissa are believed to be underexploited. Current production is about 31,000 t against an estimated potential of 1,00,000 t. The other reason was that trawlers operating in Balasore district were going more for fish than for shrimps. But all the boats were using conventional shrimp bottom trawls with small meshes and their performance could be improved by employing high-opening bottom trawls.

## 2. CONDUCT OF FISHING TRIALS

Towards the end of 1983 BOBP supplied the DOF with a one-boat high-opening bottom *fish* trawl with 320 meshes of 160 mm (Fig. 3), to be tested against a one-boat conventional bottom shrimp trawl (Fig. 2).

Trials were conducted by the DOF from mid-December 1983 to end-March 1984. The high-opening bottom fish trawl caught 60 per cent more fish than the conventional bottom shrimp trawl during 200 trawling hours over 36 days. This encouraged further trials and demonstration during the next season. These fishing trials were conducted from August 1984 to March 1985 with Chandipur in Balasore district as the base. This is a major fishing centre for coastal mechanized trawlers, motorized gillnetters and non-motorized country craft. Trawling is allowed only during the day, so as not to interfere with the gillnet fishery which is active at night. All trawlers therefore make day trips only. The trawls were thus also restricted to the inshore fishing grounds (Fig. 1).

The fishing operations were conducted along commercial lines in cooperation with a private boat owner. He made available three trawlers with crew—fully equipped for commercial fishing. He also undertook to:

- maintain boat, engine and other fishing equipment, obtain supplies of fuel, lubricating oil, food etc. as required;
- bear the running expenses, crew wages, diesel, food etc.;
- arrange for disposal of catches; and
- furnish catch data and costs and earnings records for each boat.

All proceeds of fish sales went to the owner as compensation for services rendered.

The boats were standard Indian coastal mechanized trawlers. They were of wood and had a length of about 11 m, beam 2.8 m and draft 1.2 m. They were equipped with engines of 60–70 hp. The deck machinery consisted of a two-drum mechanical winch.

The DOF assigned a masterfisherman and net-maker to the activity on a full-time basis and provided storage facilities in Chandipur. The Deputy Director of Fisheries in Balasore was responsible for the DOF input and liaised with BOBP.

The BOBP made available the services of a part-time Fishing Technologist and a qualified net-maker and provided the trawling gear required for the trials. All the nets were made in Chandipur (under the supervision of the BOBP net-maker) in order to train the local net-maker and the fishermen. This work started a couple of months before the actual fishing trials.

Five different types of one-boat high-opening bottom trawls were used during the fishing trials. Only two of them, however, were used over a relatively long period of time and then compared with the one-boat conventional bottom shrimp trawl. The new designs were of the two panel single boat fish and shrimp trawl type, and were based on earlier BOBP experiences in Tamil Nadu. The trawl nets used were as follows:

Type		Circumference in Meshes (no)	Mesh Size Stretched Mesh (mm)	Days Used (no)
1. Fish	(F)	320	160	2
2. Fish-cum-shrimp	(FS)	370	120	10
<b>3. Fish-cum-shrimp</b>	<b>(FS)</b>	<b>484</b>	<b>80</b>	<b>10</b>
4. Shrimp-cum-fish	(SF)	620	60	65
5. Shrimp-cum-fish (long wing)	(SF)	550	60	62
6. Conventional shrimp	(CS)	1,040	50	63

All the new trawls had a stretched mesh size of 40 mm in the cod end against 20 mm in the conventional trawl.

The F—320--160 was identical to the one already tried out by the DOF during the previous fishing season. It was discontinued because boat owners wanted to catch larger amounts of shrimp during the peak season than those obtained with the fish trawl.

Similarly, the FS—370—120 and FS—484—80 were not satisfactory for shrimp capture as compared to the conventional shrimp trawl, according to the boat owner.

The final solutions were SF—620—60 (Fig. 4) and SF—550—60 (Fig. 5), which were tested over a longer period and compared with the conventional shrimp trawl CS—1 040—50 (Fig. 2).

### 3. FINDINGS

During the four and a half months from November 1984 to mid-March 1985, detailed data of catches and their values were collected for two high-opening bottom shrimp-cum-fish trawls (SF—550—60 and SF—620—60) and a conventional shrimp bottom trawl (CS—1040—50). They are given in Table 1.

The SF—550—60 and SF—620—60 yielded 23 per cent and 30 per cent higher gross revenue respectively, in terms of rupees per trawling hour, than the CS-1 040—50. The operational costs of the three boats (including that of fuel per trawling hour) were for practical purposes identical. This means that the high-opening trawl is vastly superior in terms of net revenue.

- The average catch rate of fish (kg/h) during the entire period was 16 per cent and 18 per cent higher for the respective high-opening bottom trawls. During the latter part of the season, however, the difference was much less at relatively low catch rates and even reversed during the last few days of March.
- The price of fish caught in the one-boat high-opening bottom trawls was consistently about 10 per cent higher than that of fish caught in the conventional shrimp bottom trawl. This indicates that the former caught more high-priced varieties than the latter.
- The catch rate of “exportable” shrimps (kg/h) was about 30 per cent higher in the high-opening bottom trawls — except during the last two months, as in the case of the catch rate for fish.

The price of exportable shrimp, however, is more or less the same for all trawls, indicating that there is no difference in the average size caught.

- Although not very significant from an economic standpoint, the relatively high catch rate of “misc” shrimps in the conventional shrimp trawl is worth noting. The “misc” category also includes juveniles of penaeid shrimp.
- The seasonal variations are pronounced. The November-January period yields 2—3 times more in volume and value than the tail end of the season (February-March). The prices are fairly consistent except for shrimps (exportable) during the last month. This indicates that only small sizes are caught.
- The average contribution of fish catches to the gross revenue is about 60 per cent but varies between a low of 49 per cent in January when the shrimp catches are high, and a high of 94 per cent in March when all catches are low.

From the operational standpoint, all the new trawls tested during the trials were found technically suitable for the boats and for the fishing conditions. Each of them may during certain periods yield the best results. The availability of demersal fish and shrimp varies by year, season and fishing ground. The optimum yield will be obtained by the use of diversified trawling gears. It will take time and require further demonstrations before the fishermen gain the necessary experience to use different trawls in the best way. The fishing trials conducted have only exposed the operator to the possibilities. An indication of the response to these ideas is the request for new trawls. BOBP assisted in manufacturing two F—320—160, ten FS—370—120, and ten SF—620—60 trawls, which were paid for in full by the fishermen/boat owners. (A set of different trawls were also supplied to the DOF for use on board their two trawlers).

The trials demonstrated that it is not necessary to use small meshes – particularly not in the cod end – to attain high catches. It may be possible to introduce regulations for a minimum mesh size of 40 mm without much opposition. This would not of course solve the conservation problem but it would be a step in the right direction for management of the fishery. The standard Indian coastal trawlers are obsolete in many ways; the propulsion unit has low efficiency; the deck machinery and equipment need to be improved for higher efficiency and better comfort and safety of the operators; there is no insulated fish hold; crew accommodation is poor. A modified trawler design of higher efficiency allowing fishing trips of 2–3 days would improve the economy of trawling. It would also facilitate the harvesting of unexploited resources further out and could possibly also reduce the fishing pressure in the inshore areas.

It became evident during the trials that all the personnel involved have little or no knowledge of trawling beyond what is now practised. Any further demonstrations will have to include substantial training components for fishermen, net-makers and technical officers of the DOF.



Table 1

Catch and revenue record from two high-opening bottom shrimp-cum-fish trawls and one conventional bottom shrimp trawl

Month and Year	Trawl' (Type)	Days (no)	Hauls (no)	Fishing time (h)	CATCH AND VALUE												Total (Rs/h)	Value of fish of total (%)
					Fish						Shrimps							
					(kg)	(Rs)	(Rs/kg)	(kg/h)	(kg)	(Rs)	'Exports'		'Misc'					
Nov 1984	SF-550-60	16	42	81	12026	28017	2.3	148	214	16835	79	2.6	193	1066	45918	567	61	
1984	SF-620-60	19	47	102	15312	33653	2.2	150	254	20004	79	2.5	473	2711	56368	555	60	
	CS-1040-50	17	51	107	12680	26246	2.1	119	197	15340	78	1.8	586	3337	44923	422	58	
Dec 1984	SF-550-60	19	55	109	17022	40672	2.4	156	268	22177	83	2.5	59	351	63200	580	64	
	SF-620-60	19	51	99	16875	41159	2.4	170	329	27992	85	3.3	179	1191	70342	711	59	
	CS-1040-50	19	57	113	15705	35362	2.3	139	208	16772	81	1.8	90	2385	54519	482	65	
Jan 1985	SF-550-60	12	37	73	8403	16793	2.0	115	271	22191	82	3.7	69	518	39502	545	43	
	SF-620-60	12	37	75	7733	16626	2.2	103	248	20174	81	3.3	93	698	37498	500	44	
	CS-1040-50	12	37	73	6788	12649	1.9	93	222	18097	82	3.0	76	566	31312	429	40	
Feb 1985	SF-550-60	10	30	59	4718	10228	2.2	80	59	4583	78	1.0	28	228	15039	255	68	
	SF-620-60	10	29	59	4976	9960	2.0	84	63	4668	74	1.1	51	394	15022	257	66	
	CS-1040-50	10	29	59	4370	8203	1.9	74	63	4296	68	1.1	48	380	12879	217	64	
Mar 1985	SF-550-60	05	13	26	1613	4186	2.6	62	4	144	36	0.2	7	64	4394	166	95	
	SF-620-60	05	13	26	1522	3814	2.5	59	6	234	39	0.2	7	46	4094	155	93	
	CS-1040-50	05	13	26	1777	4170	2.4	68	6	164	27	0.2	11	76	4410	170	95	
Nov 1985	SF-550-60	62	177	348	43782	99896	2.3	126	816	65930	81	2.3	356	2227	168053	483	59	
Mar 1985	SF-620-60	65	177	361	46418	105212	2.3	129	900	73072	81	2.3	803	5040	183324	509	57	
	CS-1040-50	63	187	378	41320	86630	2.1	109	696	54669	79	1.8	1111	6744	148043	392	59	

<sup>1</sup>SF-550 One-Boat High Opening Bottom Shrimp-cum-Fish Trawl (long wing)

SF-620 One-Boat High Opening Bottom Shrimp-cum-Fish Trawl

CS-1040 One-Boat Conventional Shrimp Trawl

<sup>2</sup> "Export" shrimps recorded headless

Miscellaneous shrimp recorded whole

Figure 1 MAP OF COASTAL ORISSA SHOWING COASTLINE OF BALASORE DISTRICT AND TRAWLING GROUND

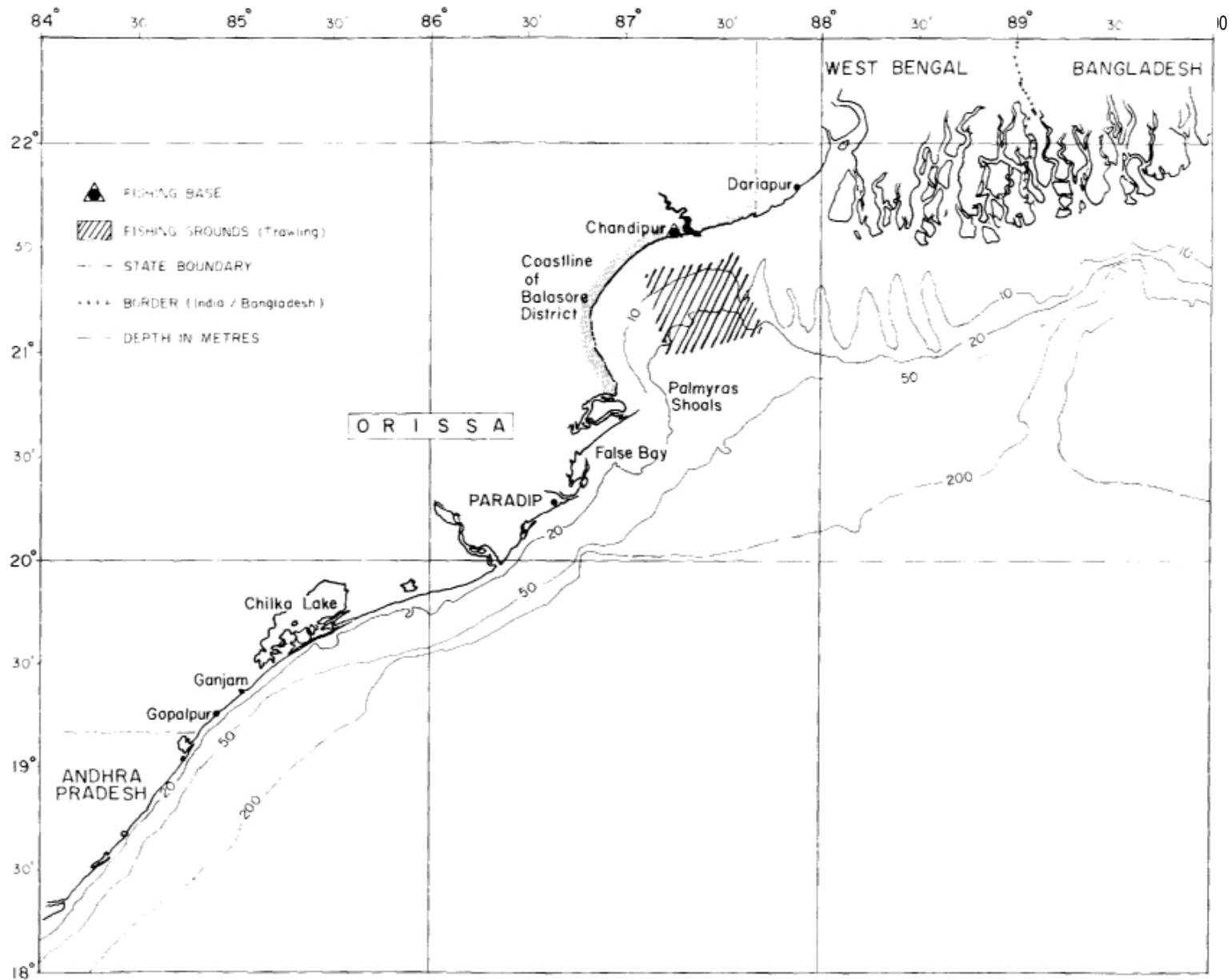


Figure 2

ONE -BOAT CONVENTIONAL BOTTOM SHRIMP TRAWL. 1040 MESHES OF 50 mm

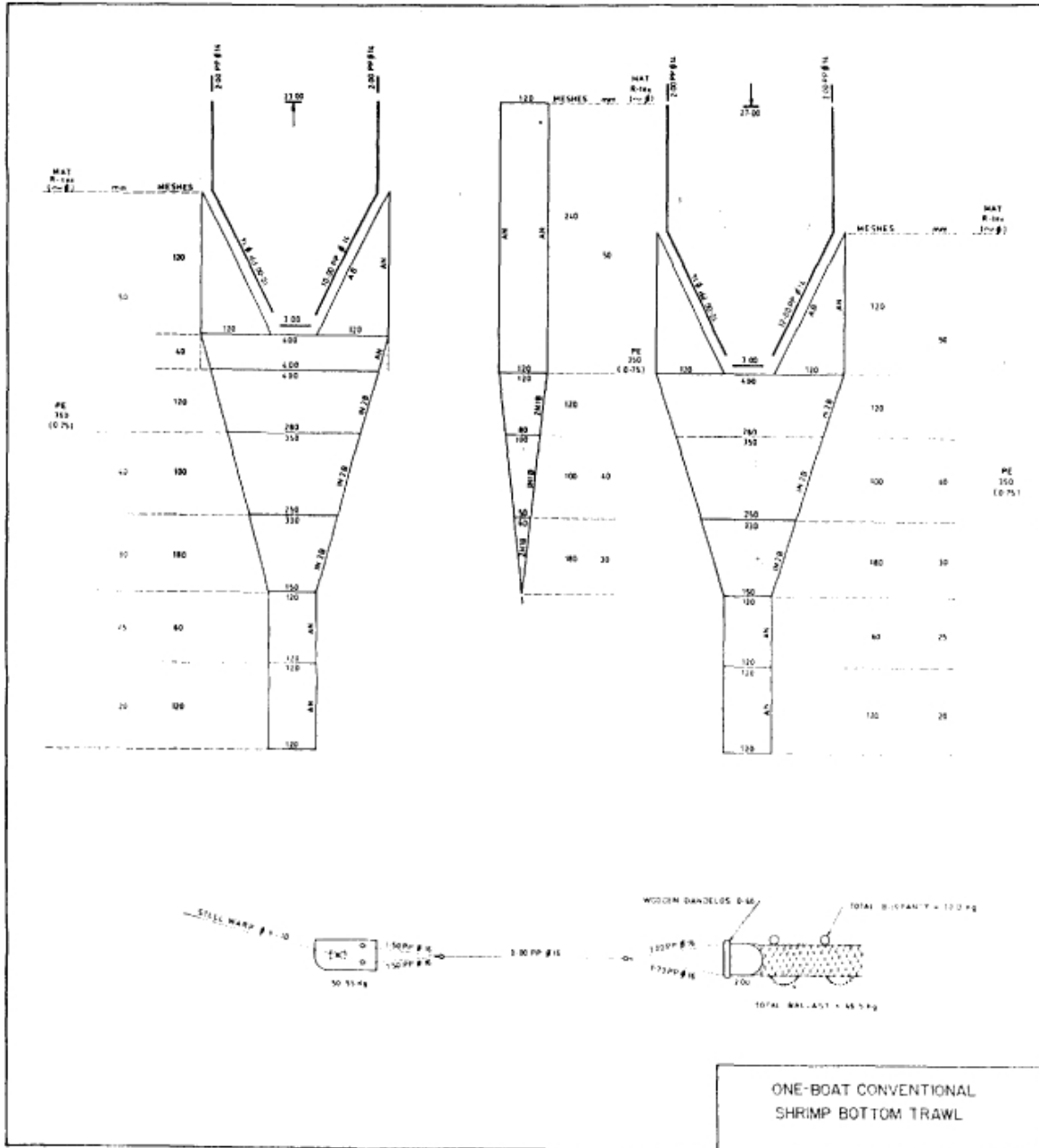


Figure 3

ONE BOAT HIGH-OPENING BOTTOM FISH TRAWL 320 MESHES OF 160 mm

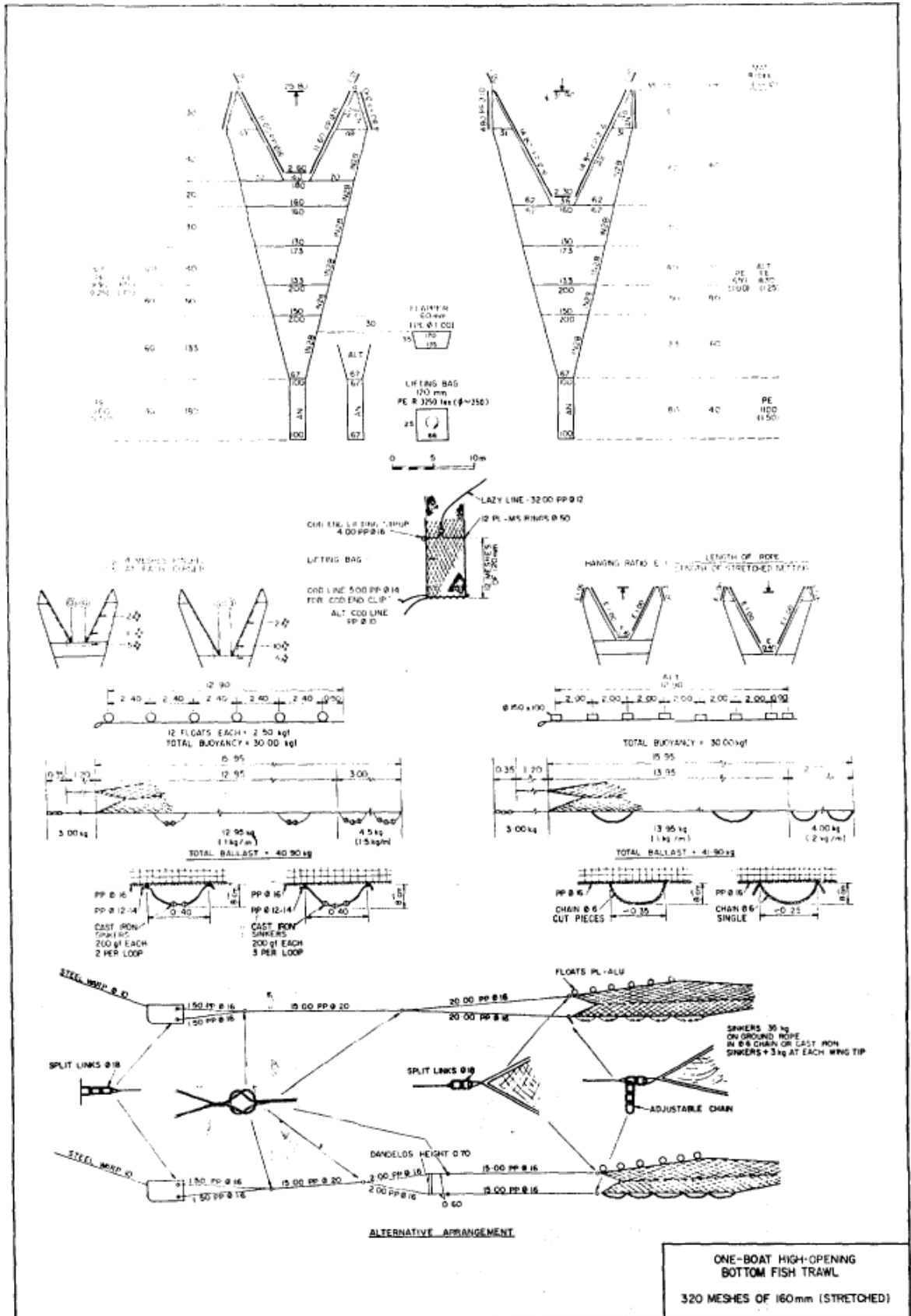
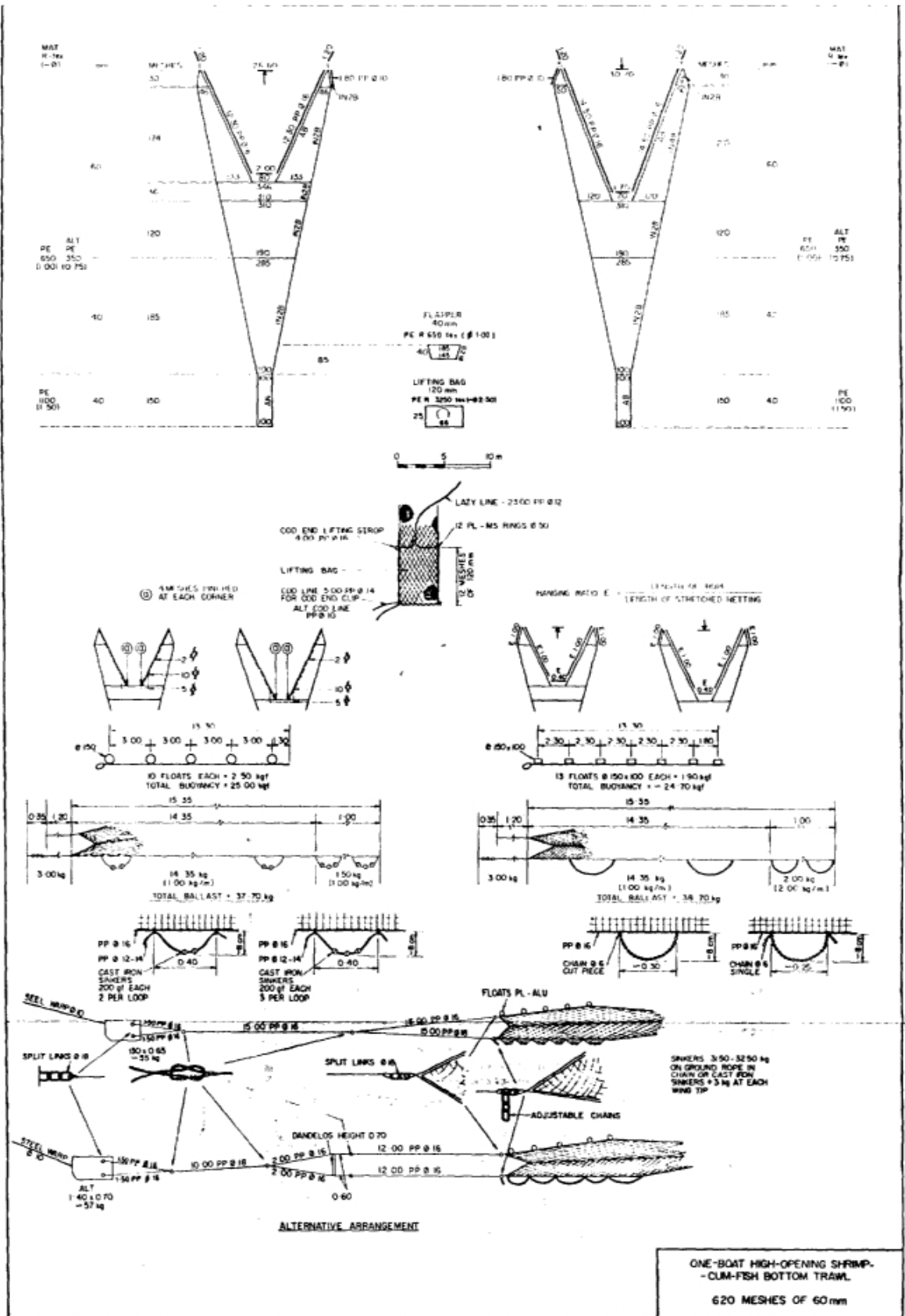
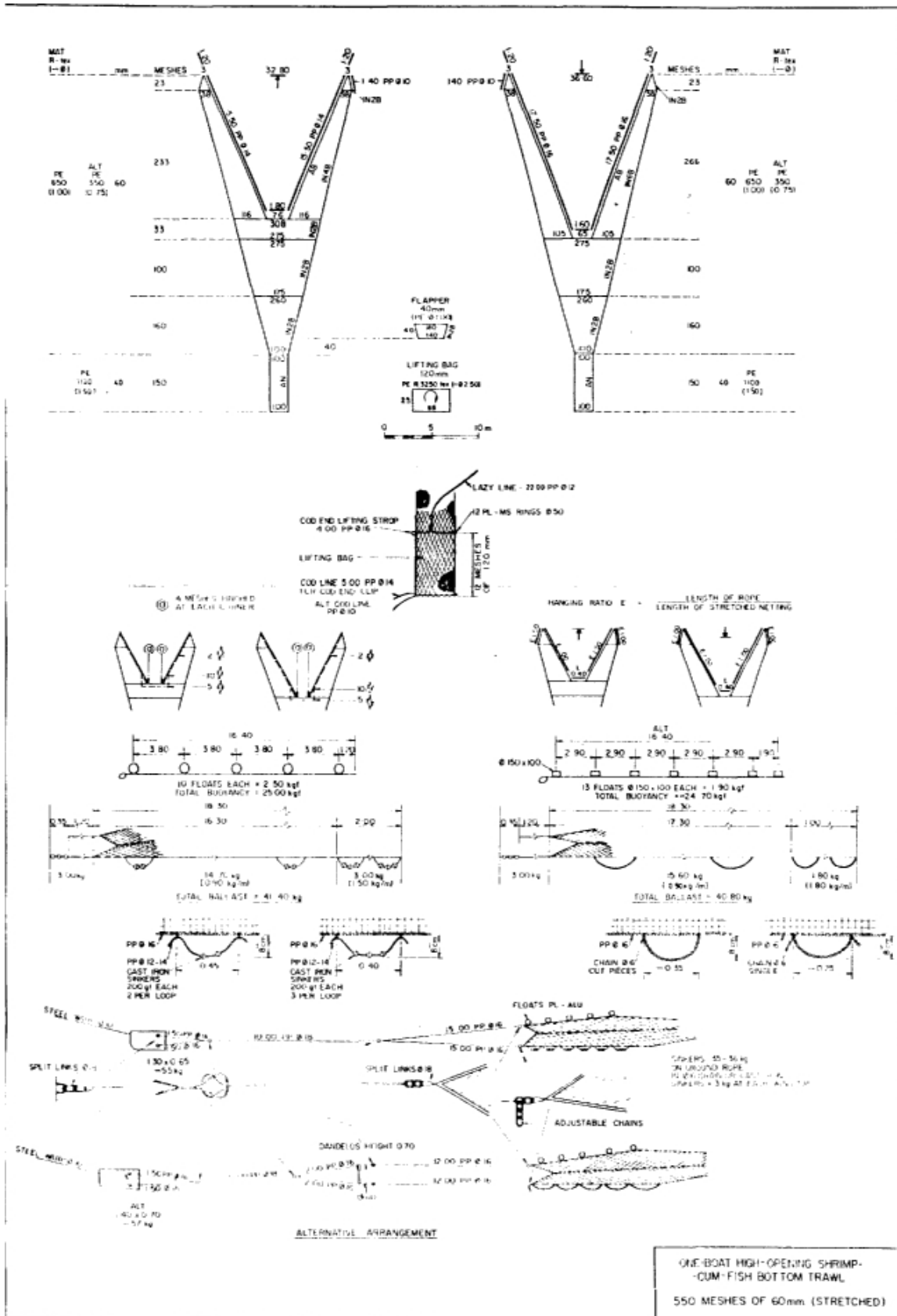


Figure 4

ONE-BOAT HIGH-OPENING SHRIMP-CUM-FISH BOTTOM TRAWL 620 MESHES OF 60 mm



Figur. 5 ONE-BOAT HIGH-OPENING SHRIMP-CUM-FISH BOTTOM TRAWL, 550 MESHES OF 60mm (LONG WING)



ONE-BOAT HIGH-OPENING SHRIMP-CUM-FISH BOTTOM TRAWL  
550 MESHES OF 60mm (STRETCHED)

## *Publications of the Bay of Bengal Programme (BOBP)*

The BOBP brings out six types of publications:

*Reports* (BOBP/REP/. . .) describe and analyze completed activities such as seminars, annual meetings of BOBP's Advisory Committee, and projects in member-countries for which BOBP inputs have ended.

*Working Papers* (BOBP/WP/. . .) are progress reports that discuss the findings of ongoing BOBP work.

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*Miscellaneous Papers* (BOBP/MIS/. . .) concern work not originated by BOBP — but which is relevant to the Programme's objectives.

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*Newsletters* (*Bay of Bengal News*), issued quarterly, contain illustrated articles and features in non—technical style on BOBP work and related subjects.

A list of publications follows.

### *Reports (BOBP/REP/. . .)*

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2. Report of the Second Meeting of the Advisory Committee. Madras, India, 29—30 June 1977. (Published as Appendix 2 of IOFC/DEV/78/44.1, FAO, Rome, 1978)
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