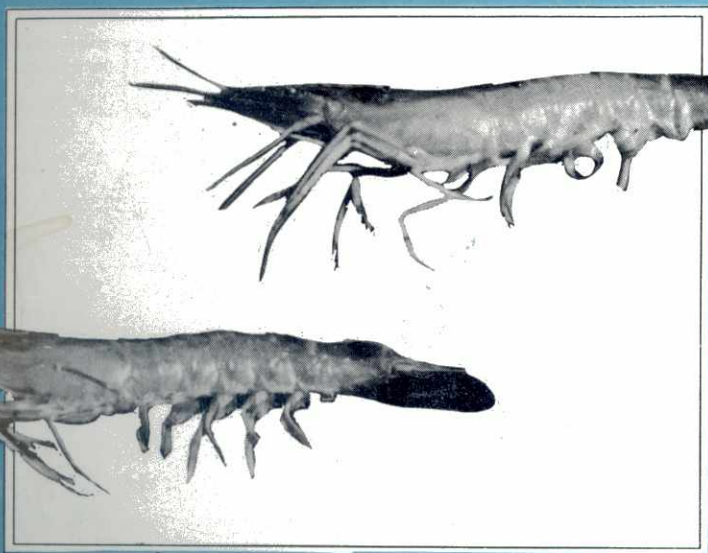


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## Bottom/Vertical Longline Fishing

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### ABSTRACT

To determine the catch efficiency of bottom vertical longline, 33 fishing operations were conducted in the Lamon Bay area, off the coast of Quezon Province from April to November 1988. Fishing data and catch composition were noted.

The fishing operations yielded a total catch of 1,212.8 kg or an average catch of 36.3 kg per fishing operation of three hours immersion in water. The catch was composed of snappers (32.9%), cavalla (16.5%), groupers (14.1%), Spanish mackerel (6.5%), barracuda (6.5%), dolfin fish (5.4%), shark (5.4%), eel (5.3%), lizard fish (2.9%), cownosed ray (1.8%), and soldier fish (18%).

The study shows that bottom vertical longline is effective in catching demersal fishes. It can be operated in muddy, sandy, and rocky or reefy bottoms.

**Keywords:** bottom vertical longline, demersal fishes, catch efficiency

### INTRODUCTION

Line fishing has certain advantages and disadvantages. On the advantage side, line fishing is less likely to be limited by environmental factors in the fishing grounds. It is possible in very deep sea waters, in shallow waters, in areas with strong currents and/or rough bottoms. Less damage is done to fish caught by line fishing; hence, freshness is maintained.

The disadvantage of this type of fishing gear is its small amount of catch because of its peculiar mechanism: one hook to one fish. Also, in most cases, a particular kind of bait is required for each species of the larger fish.

In 1975 the Japan Marine Fishery Resources Research Center (JAMARC) conducted experimental fishing by vertical longline fishing at Vanguard Bank, Thailand Gulf, and in the waters off Sabah. It concluded that bottom vertical

longline is effective in catching demersal fishes. It was observed that snappers were caught by the upper hooks of the branchline, while groupers were generally caught by the lower hooks.

In 1982, the same fishing gear was tested by SEAFDEC in the same area with a good catch. The major fishes were snapper emperor (scavengers) and sea basses, with individual weights ranging from 4-5 kg/fish. SEAFDEC recommended that larger hooks be used in the fishing operation.

In 1983, SEAFDEC conducted a Training Course in Marine Fishing Technology and Bottom Vertical Longline to which the author was a participant. The experience gained from that course prompted this study.

## OBJECTIVES

This study is conducted in line with the objectives of the Fishery Technology Division and the Research Division of the Bureau of Fisheries and Aquatic Resources to contribute to the improvement of basic fishing methods in the Philippines. Specifically, it aims to:

- a) determine the feasibility and suitability of bottom vertical longline under Philippine fishing conditions;
- b) identify the composition of catch by the vertical bottom longline; and
- c) determine the catching efficiency of the bottom vertical longline.

## MATERIALS AND METHODS

### Description of the study area

Lamon Bay was selected as research area for the experimental fishing operation of bottom vertical longline. It is situated in the eastern part of the country, facing the Pacific Ocean (Fig. 1). Studies show that the Lamon Bay is one of the best fishing grounds in the country; it produced 82,321 mt of fish in 1988 (Fisheries Statistics). This volume is equivalent to 7.76% of the total production of the Philippines for that year. The catch composition included pelagic and demersal fishes.

The rough and reefy areas in the Bay are the reason behind the abundance of demersal fishes therein. This was the basis for the study, verification and adoption of the bottom vertical longline technology.

### Description of the gear

The primary mainline is suspended horizontally 20 meters above the sea bottom (see Fig. 2a). It is held in place by two buoylines at both ends. The buoylines each is tied to a float at one end and to a weight at the other. The secondary mainline hangs vertically from the primary mainline and is attached at every 50-m distance along the primary mainline. It is held vertically in place with a float at the upper end and a weight which touches the seabed. Each secondary mainline holds a series of seven hooks, distributed equidistantly along it. The hooks are attached to the secondary mainline with a branchline, which consists of a 0.3 m cord, attached to a 0.9 m stainless steel wire, which in turn is attached to the hook.

The bottom vertical longline can be used both in moderately deep and in shallow and rough fishing grounds where other fishing gears cannot be operated. The bottom vertical longline can be operated in any type of bottom because it has a lesser chance of getting caught under the seabed. This is its advantage over the traditional bottom set longline.

The traditional bottom set longline is more liable to be damaged when the fishing gear touches the bottom and the set hook-up is entangled with rocks and other obstacles at the bottom. This may cause the loss of the entire fishing gear. On the other hand, the primary mainline of the bottom vertical longline is suspended at a distance of 20 meters from the bottom. Only the weights touch the bottom, thus reducing the chance of having the hooks entangled in the seabed.

But it also has the same limitations as those of other line fishing gears, such as: the catch is limited by the number of hooks; suitable baits for target species must be obtained; and the boat has to be kept above the shoal or edges of the island slope or ocean banks during fishing operations.

### Parts of a bottom vertical longline

- A. **Buoylines** - 2 pieces of polyamide (PA), 6 mm in diameter, 200 m long, which are used to keep the primary mainline horizontally in place. Its upper ends are tied to marker buoys and its lower ends are held down by weights. It is provided with a foot-long eye splice at both ends to make tying and untying of parts easy. (See Figures 2b and 2c for illustration of gear and Table 1 for gear specifications).
- B. **Primary mainline** - a 2,250 m long polyamide (PA) 5 mm in diameter, provided with a 30-cm eye splice at both ends, which are tied to the buoylines. The secondary mainlines are attached to this line.

- C. **Secondary mainline** - 43 pcs of 20-meter nylon (PA), 4 mm in diameter, with 30 cm eye splice at both ends; one end is connected to the primary mainline and the other to a sinker/weight.
- D. **Branchlines** - 300 pcs of 1 m long monofilament nylon (PA), 1.5 mm in diameter which serve to hold the hooks.
- E. **Stainless steel wire** - 300 pcs of No. 14 stainless steel wire (SS) measuring 30 cm long which are used to connect the branch line and the hooks, and to protect the branchline from fish bites.
- F. **Hooks** - 300 pcs of a Mustard brand long type, Nos. 12, 13, and 14. These hooks are intended for catching big fishes.
- G. **Floats (G1)** - 6 pcs of T132 Vinyl floats, each with a buoyancy of 3,000 g tied to the buoylines to serve as markers.
- Floats (G2)** - 43 pcs of T 3 Vynicon floats, cylindrical type, with 650 grams buoyancy. These are tied to the upper ends of the secondary mainline to prevent the primary mainline from touching the sea bottom.
- H. **Sinkers (H1)** - 2 pcs of 8-kg lead which are tied to the buoylines to prevent the gear from being drifted by the water current.
- Sinkers (H2)** - 43 pcs of 700 g lead which are attached at the bottom ends of the secondary mainlines, the upper ends of which are held up by 650-g floats to keep them in vertical position.
- I. **Swivels** - 300 pcs of brass, box type, SB No. 0/4 and 50 pcs. of No. 0/6 copper. These are used to minimize kinks of the branchline due to the movement of fish caught.

#### Accessories

**Improved line hauler** - an assembled wheel, drumlike, framed with lumber, iron bar, soil pipe, and fixed by iron bolt and weld. This is rigged on board the banca to facilitate setting/shooting and hauling the line during fishing operation (Figure 3).

**Baiting platform** - This is made of marine plywood which is installed at the astern part of the banca.

#### Fishing Banca

The M/B Luzviminda, owned by the cooperator, was used for the fishing operations. The motorized banca is a dug-net type boat with outrigger. It is 9.5 m long, 1.3 m wide and 1.2 m high. It is propelled by 16-hp (Briggs Stratton) gasoline engine. It is made of wood with marine plywood planking.

#### Bait used (fish bait)

The fish baits used were frigate mackerel, round scad, big-eyed scad and other similar species. The sizes of the baits ranged from 15 to 20 pcs per kg. About 20 kg of fish baits were needed to complete one setting operation of a longline with 300 hooks.

#### Fishing Operation

The bottom vertical longline was set once or twice a day, either before sunset or at sunrise (Table 2). The fishing gear was baited and prepared by the crew upon reaching the fishing ground. The location, depth, nature of bottom, current and wind direction were noted to determine the length of float line to be used. The boat's speed was about 2-3 knots during the shooting of the gear. The boat stopped whenever there were snags while the line was being released.

The shooting of the gear starts with the release of the marker buoy with a flag and the laying out of the buoyline, weights, and primary mainline. This was followed by attaching the secondary mainline at an equidistance of 50, until the last of the 43 pieces of secondary mainline has been released with a marker buoy at the end. The gear was left in the water for three hours before the hauling operation started. An improvised line hauler was used in lifting the gear. While the primary mainline was being rolled, the secondary mainline, are detached and coiled separately. The fish caught were removed from the hooks and placed in the baskets.

#### Catch Analysis

To establish the composition of the catch, the fish were sorted into groups, identified and weighed.

The volume of catch for the 33 fishing operations was 1,212.8 kg with an average of 36.3 kg per fishing operation. The catch was composed of 11 different species (See Table 3). Test fishing was done in an eight fishing-month period. The 170 fish caught had an average weight of 7.1 kg.

### Data analysis

#### A. Computation of percentage of volume by species

$$\text{Percentage} = \frac{\text{Total weight (kg) of species}}{\text{Total weight (kg) of whole catch}} \times 100$$

#### B. Computation of hooking rate (HR)

$$\text{H.R.} = \frac{\text{Total no. of fish}}{\text{Total no. of hooks}} \times 100$$

#### C. Computation of catch per unit effort (CPUE)

$$\text{CPUE} = \frac{\text{Total wt. of fish (kg)}}{\text{Total no. of fishing hours}}$$

## RESULTS AND DISCUSSION

Thirty-three fishing operations were conducted in Lamon Bay and its vicinity from April to November 1988. They yielded a total catch of 170 pieces of fish, weighing a total of 1,212.8 kg, or an average of 7.1 kg per fish. Some 8,790 hooks were used. The catch was composed of 11 species, namely: snappers (32.9%), cavalla (16.5%), groupers (14.1%), Spanish mackerel (6.5%), barracuda (6.5%), dolfin fish (5.4%), shark (5.4%), eel (5.3%), lizard fish (2.9%), cownosed ray (1.8%), and soldier fish (1.8%) (Table 3).

Most of these are demersal dwellers. The first five dominant species are considered Class A fishes that demand a good price in the market.

It was observed that the hooking rate in the evening was higher (2.55 pcs/100 hooks) than in the morning (1.6 pcs/100 hooks). This justifies the belief that most demersal fishes feed during the night time. However, bigger fishes are caught in the morning (with an average weight of 8.5 kg) than in the evening (with an average weight of 5.3 kg) (Table 4).

Another observation made was on the volume of catch by nature of habitat, which is classified into three: (a) muddy bottom, (b) sandy/muddy bottom, and (c) rocky/reefy bottom. It was observed that the catch per unit effort (CPUE) in rocky/reefy bottom is higher (13.9) than in muddy (12.0) and sandy/muddy (11.5) (Table 5). This proves that food is more abundant in reefy or rocky areas.

### Cost and returns

The capital investment of the outfit, including banca, accessories and fishing gear, is P57,699.00. At the average fish catch of 36.3 kg per fishing operation of 15 days a month, and a 35% share to the investor, he gets a net income of P206.00 per fishing operation. The return of investment was estimated at 10 months to one year operation (see Appendix).

### Comments

1. Care must be taken in laying down the branchline with hooks and bait in the bait compartment prior to the setting of the fishing gear to avoid entangling of the lines.
2. Care must be taken in hauling the fishing gear and to maintain the lines' vertical position, the gear must be hauled toward the wind and current.

## SUMMARY AND RECOMMENDATION

The exploratory fishing experiment using bottom vertical longline is recommended for adoption by our local fishermen. Based on the data collected (catch composition), the bottom vertical longline is a selective fishing gear that is suited to the needs of the BFAR Fish Conservation and Management program. A healthy return on investment can be obtained in one year's time.

The bottom vertical longline is effective and efficient in catching demersal fishes. It could be operated in rough fishing grounds.

Any future study of bottom vertical longline might consider finding the most suitable kinds of fish baits. The baits should be cheap and obtainable.

## ACKNOWLEDGEMENT

Heartfelt gratitude is extended to BFAR Director Juanito B. Malig, Assistant Director Natividad M. Laguna, Arsenio S. de Jesus (Chief, Fishing Technology Division) and Staff, Florida Arce ( of the Fisheries Resources Research Division) who helped and gave moral support in the implementation of this reasearch project.

Special thanks are also extended to Deogracias Tapan (cooperator) and the local fishermen of Alabat Island who rendered their services in the construction of the bottom vertical longline and its actual fishing demonstration.

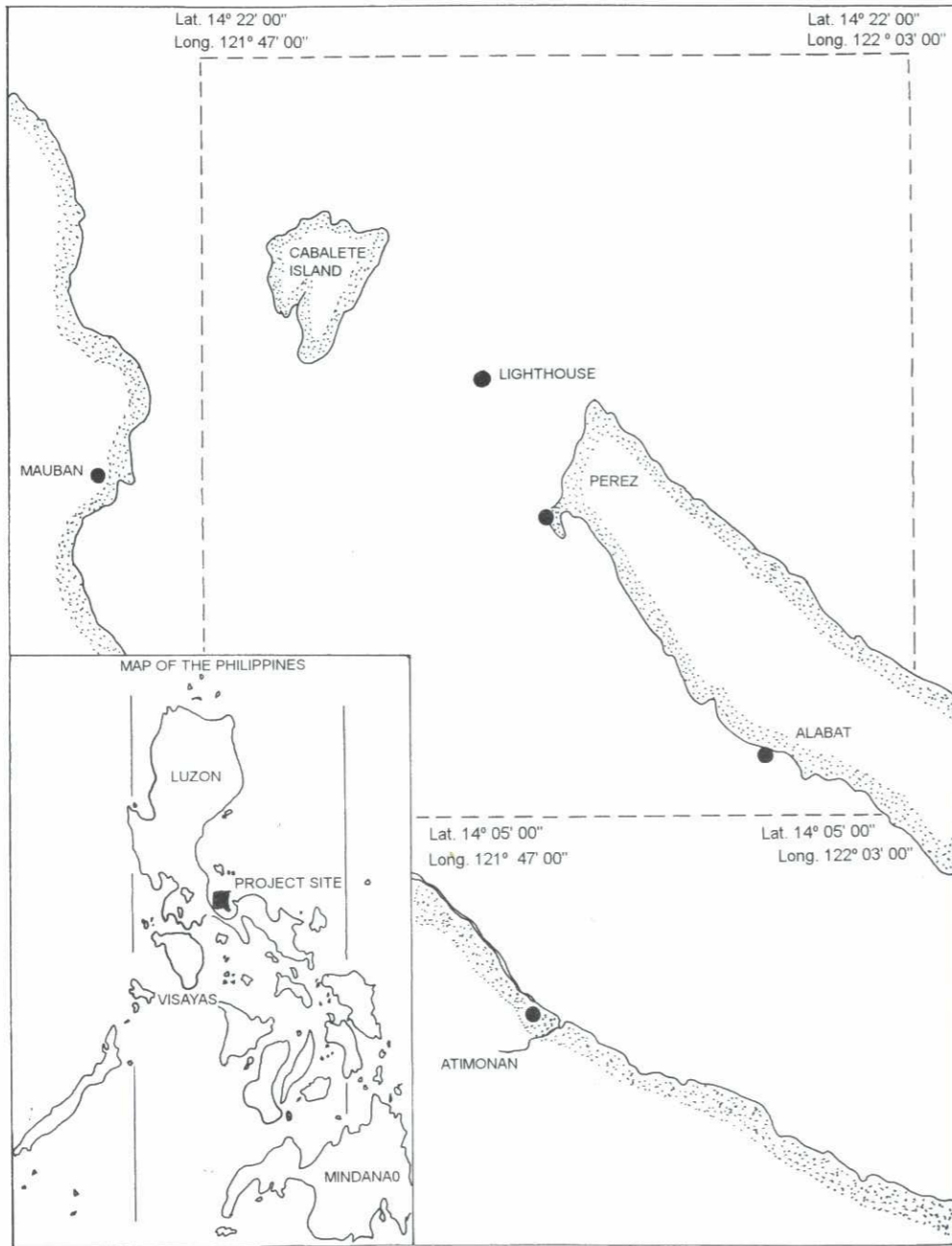


Figure 1. Project site of the Research Study on Fishing with Bottom Vertical Longline in Lamón Bay, Alabat Quezon

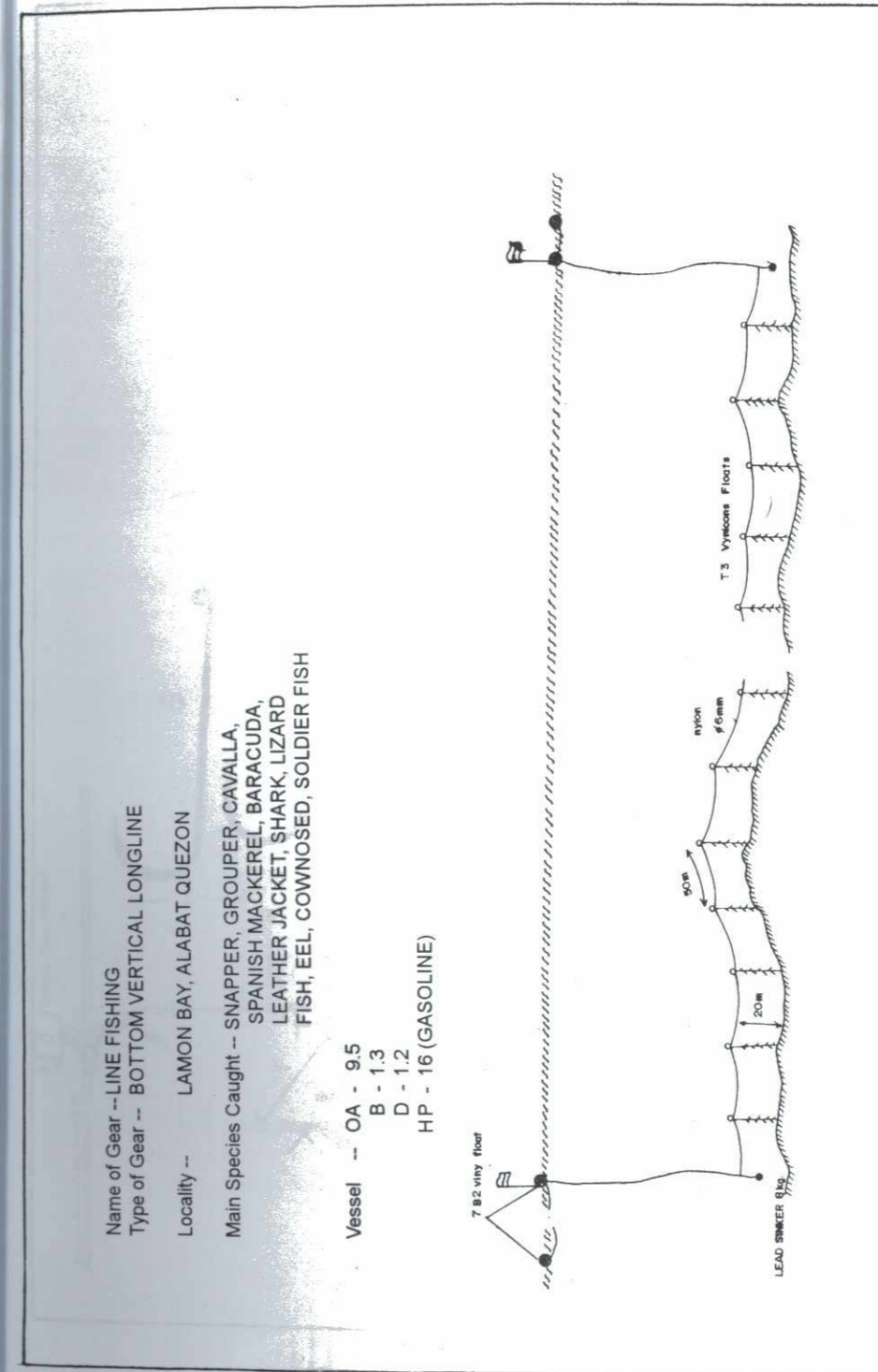


Figure 2a. Bottom vertical longline gear

NAME OF GEAR:	Bottom Vertical Longline	BOAT:	Wood
TYPE:	Line Fishing	TYPE:	Pumpboat
SPECIES CAUGHT:	Snapper, Cavalla, Spanish Mackerel, Barracuda, Dolphin Fish, Rays, Grouper, Shark, Lizard Fish, Eel, Soldier Fish	L.O.A.:	= 9.5 m
		Breadth:	= 1.3 m
		Width:	= 1.2 m

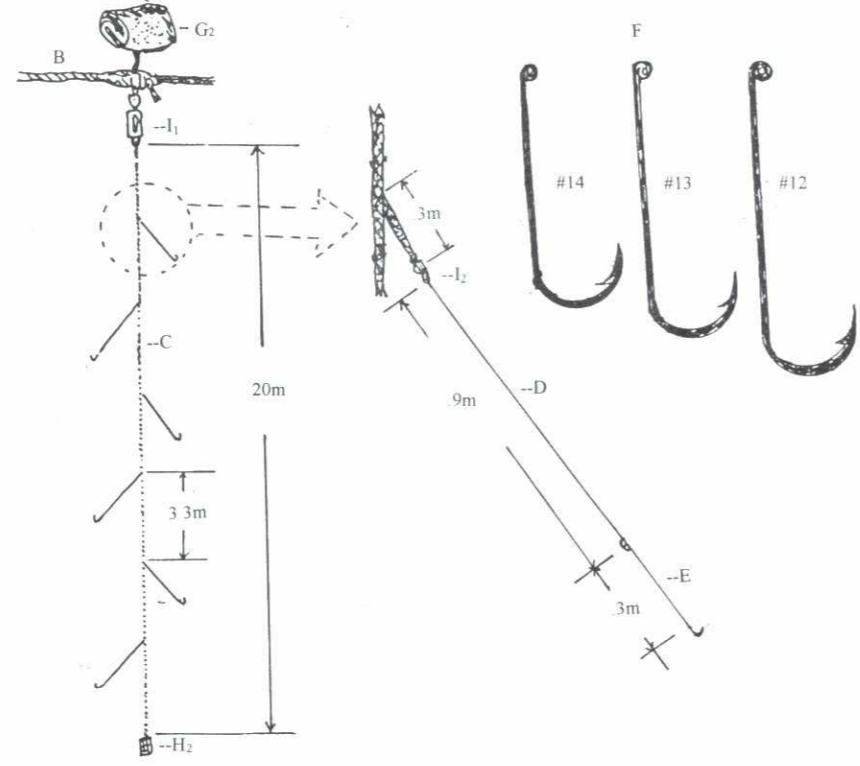
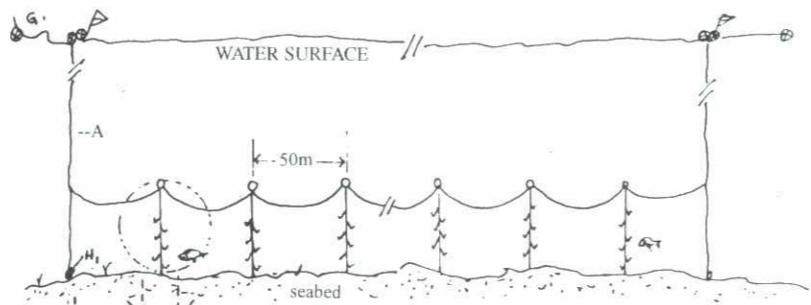


Figure 2b. A typical bottom vertical longline

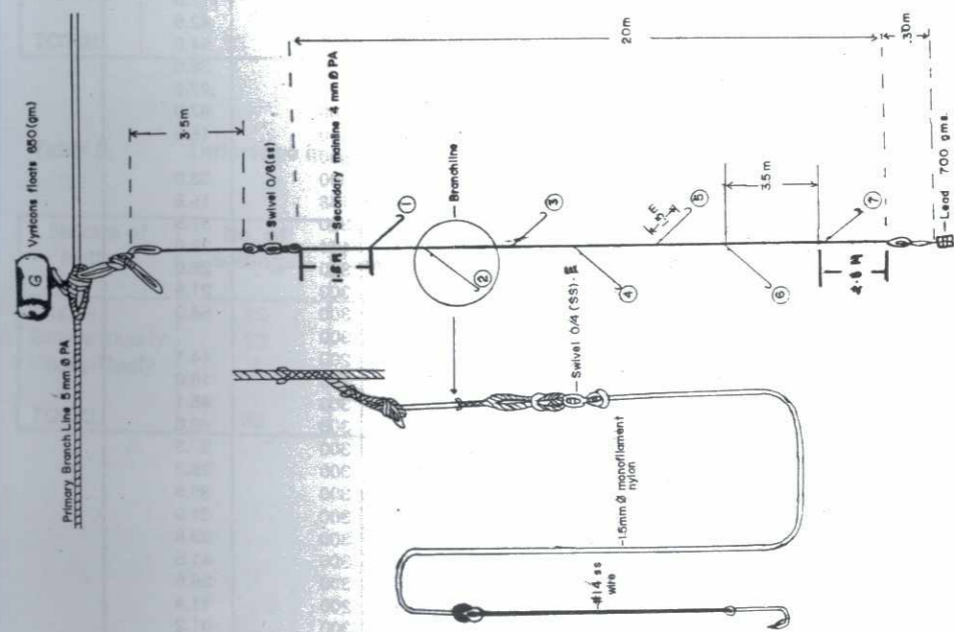


Figure 2c. Outline of Secondary Mainline and No. of Branchline Position

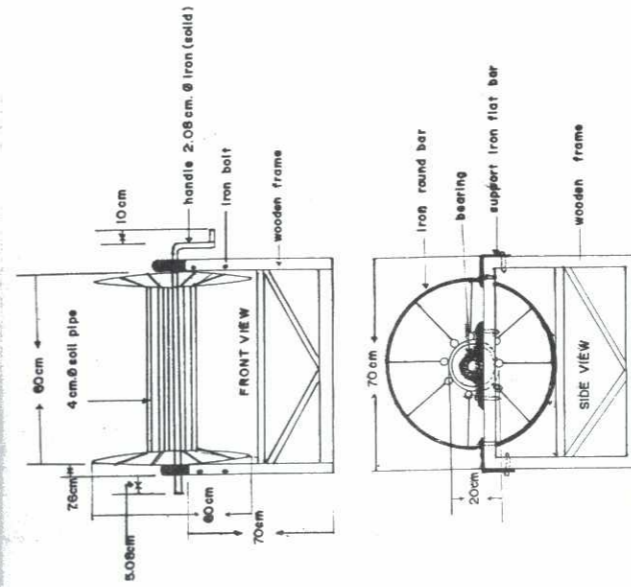


Figure 3. Improvised line hauler for bottom vertical longline



Table 1. Fishing gear specification (Bottom Vertical Longline)

No.	Gear Parts	Material	Sizes	Length	Quantity Pcs.
A	Buoy Line	Polyamide PA	6 mm 0	200m.	2
B	Primary mainline	- do -	5 mm 0	50 m.	50
C	Secondary mainline	- do -	4 mm 0	20 m.	50
D	Branch line.	Monofilament	1.5	1	300
E	Stainless wire	Steel	14	20 cm	300
F	Hooks	- do -	12, 13, 14	-	300
G 1	Float	Synthetic	3,000 gms.	-	6
G 2	Float	- do -	650	-	50
H 1	Sinker	Lead	8 kgs.	-	2
H 2	- do -	- do -	700 kgs	-	50
I 1	Swivel	Brass	0/6	-	50
I 2	- do -	- do -	0/4	-	300

Table 2. Data on fishing operations

Fishing Station	Date 1988	Number of hours	Depth bottom ave. (m)	Nature bottom	Number of hooks	Total catch (kg)
1	04-10	3'00"	70	sm	300	135.0
2	12	3'05"	88	m	330	112.0
3	12	3'05"	115	m	138	42.5
4	14	2'04"	85	m	210	54.0
5	15	3'10"	110	sm	150	38.0
6	05-13	3'02"	93	m	300	27.5
7	14	2'43"	97	r	300	87.0
8	15	3'00"	135	sm	210	15.0
9	19	3'02"	83	sm	300	-
10	19	3'02"	80	co	300	33.0
11	20	3'00"	65	co	138	15.5
12	24	3'00"	70	m	300	37.5
13	26	3'00"	97	m	144	28.0
14	28	2'40"	55	m	300	25.0
15	07-08	3'00"	60	co	300	21.5
16	09	3'00"	60	r	300	54.0
17	11	3'00"	120	m	300	-
18	12	3'00"	94	m	200	14.1
19	14	3'00"	63	sm	300	18.0
20	15	3'00"	77	sm	300	46.1
21	09-11	3'00"	30	r	300	42.0
22	12	3'00"	80	sm	300	37.3
23	15	3'00"	82	sm	300	28.2
24	16	3'80"	88	sm	300	39.6
25	23	3'00"	118	m	300	31.9
26	24	2'30"	87	m	300	23.8
27	27	3'00"	65	r	300	41.5
28	11-14	3'00"	45	sm	300	26.8
29	15	3'00"	65	sm	200	11.4
30	18	3'00"	53	m	300	31.2
31	19	3'00"	85	sm	300	35.0
32	23	3'00"	80	m	300	43.4
33	28	2'00"	73	sm	300	21.6

Table 3. Catch composition by species in average weight and percentage

Common Name (English)	Local Name (Tagalog)	Weight (kg)	No. of fish caught	Average wt. (kg)	%
Snapper	Biluan	261.2	56	4.7	32.9
Cavalla	Talakitok	186.6	28	6.6	16.5
Grouper	Lapu-Lapu	89.1	24	3.7	14.1
Spanish mackerel	Tangingi	75.0	11	6.8	6.5
Barracuda	Baracuda	42.2	11	3.8	6.5
Dolphin fish	Dorado	78.3	10	7.8	5.4
Shark	Pating	216.7	10	21.6	5.4
Eel	Pendanga	40.3	9	4.4	5.3
Lizard fish	Kalaso	2.1	5	0.4	2.9
Cownosed ray	Pagi	202.8	3	67.6	1.8
Soldier fish	Baga-baga	18.5	3	6.2	1.8
<b>TOTAL</b>		<b>1,212.8</b>	<b>170</b>	<b>7.1</b>	<b>100%</b>

Table 4. Difference in the volume of catch by time of fishing operation

TIME	No. of settings	No. of fish	Weight fish	Ave. wt (kg)	No. of hooks	H.R.
Evening	13	70	365.8	5.3	2,740	2.55
Morning	20	100	847.0	8.5	6,050	1.6
<b>TOTAL</b>	<b>33</b>	<b>170</b>	<b>1,212</b>	<b>7.1</b>	<b>8,790</b>	<b>1.93</b>

Table 5. Difference in the volume of catch by nature of sea bottom

Nature of bottom	No. of settings	Immersion time (hours)	No. of fish	Weight (kg)	Ave. wt (kg)	CPUE (kg per hour)
Muddy	13	39	61	470.9	7.7	12.0
Sandy/muddy	13	39	68	452.3	6.6	11.5
Rocky/Reefy	7	21	41	289.6	7.1	13.8
<b>TOTAL</b>	<b>33</b>	<b>99</b>	<b>170</b>	<b>1,212.8</b>	<b>7.1</b>	<b>12.2</b>

**APPENDIX: Estimated cost of investment, fish production, expenses and income, bottom vertical longline fishing**

Estimated Cost of Investment P57,699.00

A. One unit of bottom vertical longline

2	rolls 6 mm 0 x 200 nylon (PA)	-----	P1,900.00
15	rolls 5 mm 0 x 200 nylon (PA)	-----	13,162.00
6	rolls 4 mm 0 x 200 nylon (PA)	-----	4,680.00
2	kilos 1.5 mm 0 mono nylon	-----	234.00
2	boxes SB swivels no. 4/0	-----	704.00
50	pcs T3 vynicon floats	-----	5,500.00
6	pcs 7 B 2 viny floats	-----	1,650.00
1	box (50 kgs) lead sinker No.8	-----	900.00
3	boxes No. 12 tuna circle hook	-----	1,755.00
4	rolls 210/12 nylon twine	-----	64.00
		-----	
	TOTAL		P30,599.50

B. One unit banca/complete

	One unit banca/complete	-----	P10,000.00
	One unit 16 hp engine	-----	16,000.00
	One unit line hauler	-----	2,500.00
	One unit pressure lamp	-----	600.00
		-----	
	TOTAL		P27,100.00

Estimated production, expenses and income

1. Fish production

33	fishing operations	1,212.8	kg
	Average catch per fishing operation	36.2	kg
	Average price per kilo	P 30.00	
	Average income per fishing operation	P1,086.00	

2. Operating expenses for one (1) fishing operation

	Gasoline, 10 ltr. at P5.40/ltr	P 54.00
	Lub. Oil, 10% gasoline consumption	5.40
	Kerosene (Gas), 4 liters at P4.95/ltr	19.80
	Provision for 3 fishermen at P10.00/person	30.00
	Fish baits, 20 kg at P18.00/kg	360.00
	Maintenance	57.00

TOTAL P496.20

C. Estimated Income (one setting operation)

	Gross income (36.2 kg of fish at P30.00/kg)	P1,086.00
	Less: Expenses	P 496.00
	Net Income	P 589.80

D. Sharing basis (one setting operation)

	35% for the investor	P206.43
	65% for the fishermen	P383.37
	One (1) share	P127.79