4-2 Priority

The Ghanaian side gave priority to the items at the following order in answer to the Study Team.

a) First priority

i) Equipments and materials for artisanal fishery

ii) Equipments and materials for deep bottom fishery

iii) Machinery and equipments for "Kakadiama"

iv) Pick-up vehicles for Fisheries Department

b) Second priority

i) Equipment and materials for inshore fishery

ii) Machinery and equipments for new patrol and training vessel

c) Third priority

i) Equipments and materials for the Aquaculture Project

4-3 Selection of Equipments and Materials to be granted.

Based on the above priority, the Study Team had discussions with the officials of Fisheries Department in order to select equipments and materials to be granted.

4-3-1 Equipments and materials for artisanal fishery

Artisanal fishery is the nucleus of fishing industry in Ghana. It is, especially, playing a very important role in supplying fish protein such as sardine to the nation. On the other hand, the lack of equipments and materials is serious in artisanal fishery, causing a paralysis of operation. It is understandable that the Fisheries Department give the first priority to the item.

The requested equipments and materials are given as follows:

i) Outboard motors

Outboard motors given the first priority are worn out for only 2 years due to excessive use in Ghana. Even if a repair and service system developed locally, these outboard motors will not last more than 3 years. The Team was not sure that artisanal fishery using outboard motors, which are practically expandable used for two years only, will be promoted much more, unless foreign aid continues. Although the Team recognized that the grant of outboard motors is an interim step, decided to make this item the subject for the grant aid, regarding these as indispensable for artisanal fishery.

ii) Spare parts for outboard motors

Spare parts for 40 HP and 25 HP outboard motors are requested. The Team, understanding the necessity of procurement of spare parts for outboard motors in order to raise the working ratio and make the life longer decided to make this item the subject for the grant aid.

iii) Tools for outboard motors

This item shall be included in the item of spare parts for outboard motors.

iv) Fishing gears and materials

The Study Team has recognized the necessity of supply of fishing gears and materials to increase productivity of artisanal fishery.

For instance, Photograph (C), (E) and (F), showing the current using fishing nets mended in various ways, indicate a short supply of materials necessary for a repair. Under this condition, it is impossible to develop artisanal fishery even if outboard motors are supplied. The Fisheries Department, understanding the necessity of procurement of fishing nets, mending twines, netting materials and multi-purpose ropes, requested the Team to decide the items and quantities of the necessary gears and materials.

4-3-2 Equipments and materials for deep sea bottom fishery

Though deep sea bottom fishery has potential marine resources for fisheries in Ghana, powerful fishing vessels, fishing machinery and fishing gears and huge investment and also high technique are required. In general, deep sea bottom fishery utilizes trawling and handlining. However, the trawlers operating trawl fishing in the coastal area are in Ghana not able to operate trawl fishing on the deep sea fishing ground due to having no power in all aspects. There are few trawlers for experimental fishing on the deep sea bottom beyond 70 m of water. It will take a long time to construct any new trawler under the present condition of economy in Ghana. Accordingly, the Team concludes that trawl fishing for deep sea bottom marine resources has much difficulties in Ghana at present.

However, handline fishing is practicable. In fact there are some villages specializing in handline fishing such as Osu village in Accra, and fishermen in Osu have the highest handlining skill for circumstances in which Ghana is placed now. In order to catch more, however, it is necessary to improve fishing gears such as lines,

ropes and hooks and others, introduce hand-worked winches for fishing on the fishing ground beyond 50 m of water, equip new echo-sounders. Also a fish hold with insulation cooled by ice and water should be installed on board a canoe since such fancy fishes as snappers, hakes and groupers and others, are likely to be caught. The Study Team considered that the deep sea bottom fishery utilizing handlining technique in Ghana is promising if only such improvement is carried out.

4-3-3 Fishing gears and materials for the survey vessel "Kakadiama"

Fishing gears and materials for the survey vessel "Kakadiama" requested by the Fisheries Department are as follows:

i) Echo sounder recording paper for 2 years
ii) Spare parts for auxiliary and main engines
iii) Spare parts for refrigerating machinery

Although the Team wanted to discuss with engineers of the "Kakadiama" to specify the requested items, the Team had no chance because the vessel was under sailing.

4-3-4 Pick-up vehicles

Three gasoline cars, pick-up type with double cabins, are requested. Judging from a traffic condition in Ghana, the Team recognized the necessity of vehicles and decided to make this item the subject for the grant aid.

4-3-5 Equipments and materials for inshore fishery

The followings are requested for the development of inshore fishery.

i) Main engines with winches for trawling and purse-sening for 10-20 m type fishing vessels

ii) Purse-seining in inshore fishery, purse-seining in canoe fishery and beach-seining have sardine resources for common utilization.

iii) Catches in trawling is only 3.9%, 8,400 tons, of the total catches in Ghana.

Furthermore, the narrow Ghana's continental shelf, extending for only 30 miles from the shore, has little potential for development.

Finally, the Study Team recommended the Fisheries Department to give canoe fishery preference over others, aiming at an immediate effect of the Improvement Project for Artisanal Fishery. The Fisheries Development accepted.

4-3-6 New patrol and training vessel

This item was presented at the final meeting. Although the hull of the vessel was completed, this vessel cannot be launched because engines, fishing machinery, nautical instruments, fittings and others are not available. The Fisheries Department is desirous of completion of the vessel as soon as possible through the grant aid of Japan in order to put the vessel to practical use for fisheries development.

The Study Team, saying that no comment can be issued without plans and specifications necessary for fitting-out, requested to offer such materials. The Fisheries Department is to prepare them.

4-3-7 Aquaculture Project

The Study Team concluded that the Project was unreasonable. Although the Project is seemingly completed under apportionment of a budget necessary for construction of the ponds and reservoirs, the Team considered after

careful study that it is too early to grant for the Project.

As one of reasons, it is impossible to provide such huge quantity of feed, vegetable or animal, as to meet the target of production, 50,000 tons yearly, under the existing circumstances of no self-sufficiency in food.

4-3-8 Recommendations

The Study Team pointed out that the request for the grant aid is inclined to emphasize rehabilitation of the existing fisheries without any positive measure, and recommended the following two basic trials essential for fishing development in future.

The Fisheries Department accepted the Team's recommendations and requested equipments and materials necessary for trials.

i) Trial for stationary net

Some 40% of the total catches in Ghana is sardines caught by beach-seining and artisanal purse-seining close by shore. This indicates that large schools of such mass-catchable fishes are migrating with the sea currents.

In Japan, people set stationary nets of various sizes to catch such migrating fishes with good success.

The following advantages are expected when stationary nets are introduced in Ghana.

a) On a characteristic of stationary net, quantities and freshness of catches are controlled and people employed in the fishery are able to work longer.

b) Fishes trapped in a bunt remain alive and are landed with freshness. When too much quantities of fishes are trapped to process catches in all, the remainings can be stored living in a bunt.

c) Since stationary nets are set close by shore, fishing boats employed in the fishing need not spend much fuel.

These advantages will make up for the disadvantages of the canoe fishery.

ii) Trial for loading a diesel marine engine on board a canoe.

Outboard motors used in Ghana at present have some disadvantages as follows:

a) 40 HP outboard motors are too heavy for a flat-bottom canoe and results in low propulsive efficiency.

b) High fuel consumption of 40 HP outboard motors for sardines of very low price is unprofitable.

c) Since outboard motors cannot be utilized for mechanical power and electric power except driving power, mechanization of fishing works, increase of catches in its turn, is impossible.

Juding from the fact that fishery in Ghana is aiming at economy in expenditures and increase of catches in order to strengthen its constitution, it is necessary to save fuel costs of outboard motors and to increase catches using fishing machinery and electronic machines. To be concrete, the Team considers that it is the time when

outboard motors should be replaced by inboard diesel marine engines. The existing canoe seems to have enough space to install an inboard engine, but several points such as canoe's stability at sea, strength of a canoe's hull for loading an inboard engine and driving methods of fishing machinery and a generator and others should be cleared.

To do so trial operation of two or three canoes with inboard engines should be performed for some period, and modifications should be taken in accordance with the results of trial.

CHAPTER V BASIC DESIGN

CHAPTER V BASIC DESIGN

5-1 Basic Design Policy

The project is basically designed standing on the understanding to the present Ghanaian fisheries and based on the Ghanaian Government's policy to their Fisheries Development Program and the minutes agreed upon between official repreentatives of Ghana and Japan.

5-2 Basic Design

5-2-1 Equipment and material for canoes fishery

(1) Outboard Engine

In Ghanaian canoes fishery, nearly all of the canoes except for the very few belonging to petty fishermen, are equipped with the outboard engine. According to the survey conducted in 1981, total number of canoes were 7,000 of which 4,000 canoes, or about 60%, were powered by outboard engine (see Table-7). Supposing that the engine is durable for two years, it becomes necessary to supply 2,000 units of engines every year. Most of the outboard engine now in operation are the ones with capacity of 40HP and this tendency will continue in the future. Taking the matter of spare parts into consideration, it is recommendable to select only 40HP engine as the type of engine that will be granted. The transom more than 49cm is necessary.

In order to decide the number of engine, the following formula is applied. The following numbers of canoe shall be required yearly.

$$\frac{\text{Total powered canoes}}{\text{Durable years}} = \frac{4.052}{2}$$

Since about 400 motors are imported by Ghanaian Account, numbers of canoe through foreign aid shall be

4.052/2-400. 50% of this figure shall be granted for the Project.

(4.052/2 - 400) x 50% = 813, that is, 820 units

(2) Replacement Parts

In consideration of local conditions, the amounts of replacement parts were decided with reference to the reports of members of the Japan Overseas Cooperation Volunteers who have actually repaired in Ghana and the Basic Design Study Report on Fisheries Development Project in Ghana (1980).

It is assumed that the present working outboard motors consist of 4,000 of 40HP motors and 1,000 of 25HP motors. Since Ghana's fishermen are skillful in handling outboard motors no trouble will occur in the first year. Assuming durable years to be two years, required motors for repairing are

40HP	4,000 x 1/2 =	2,000
25HP	1,000 x 1/2 =	500

Replacement parts of 50% of these motors shall be granted for the Project.

40HP	2,000 x 1/2 =	1,000
25HP	500 x 1/2 =	250

1) Replacement parts for 40HP outboard motors

Replacements parts for 250 motors, a quarter of 1,000, shall be one unit and each unit shall be distributed to 4 regions.

2) Replacement parts for 25HP outboard motors

One unit is for 250 motors in the same way of 40HP motors.

Particulars are given in Table-

(3) Tools

One set of tools shall be for one unit for 40HP outboard motors.

Table 10. Parts List - Outboard Engine

(1) Outboard Engine 40HP 820 Sets

(2) Parts List for Outboard Engine

1) Outboard Engine 40HP:

Components		Number required for 1 unit	Number required for 4 units
Crank Case & Cylinder:	Crank Cylinder Assy.	3	12
	Crank Cylinder Assy.	6	24
	Pin (for Dowel Crank Case)	10	40
	Bolt (with Washer)	10	40
	Anode (Positive)	20	80
	Screws (Flat headed for Anode)	10	40
	Anode	40	160
	Bolt	10	40
	Cylinder Head	10	40
	Gasket for Cylinder Head	60	240
	Bolt (with Washer for Cylinder Head Cover)	10	40
	Cylinder Head Cover	4	16
	Gasket for Head Cover	40	160
	Thermostat	6	24
	Cover for Thermostat	4	16
	Gasket for Thermostat Cover	10	40
	Bolt (for Thermostat Cover)	10	40
	Washer (for Thermostat Cover)	10	40
	Exhaust Inner Cover	6	24
	Gasket for Exhaust Inner Cover	40	160

	Exhaust Outer Cover	4	16
	Gasket for Exhaust Outer Cover	40	160
	Pipe (Joint 3)	4	16
	Bolt (for Outer Cover)	10	40
	Washer (for Outer Cover)	10	40
	Ignition Plug	2,000	8,000
	Oil Seal Housing	10	40
	Oil Seal	40	160
	Oil Seal	80	320
	O-Ring	20	80
	O-Ring	20	80
	Snap Ring	10	40
	Pin (Spring)	4	16
	Hose	4	16
	Clip	10	40
	Bolt	10	40
	Grommet	10	40
	Pressure Control Valve	10	40
	Spring (Compression)	10	40
	Plug (Straight Screw)	10	40
	Gasket	10	40
	Gasket Kit for Power Head	40	160
Crank & Piston	Crank Assy.	6	24
	Crank 1	10	40
	Crank 2	6	24
	Crank 3	6	24

Crank & Piston (contd.)	Crank 4	10	40
	Ball Bearing for Crank (Upper)	40	160
	Roller Bearing for Crank	40	160
	Ball Bearing for Crank (Lower)	40	160
	Labyrinth Seal	20	80
	Snap Ring	10	40
	Connecting Rod	60	240
	Crank Pin	80	320
	Plain Washer	100	400
	Bearing for Connecting Rod Large End	60	320
	Piston (S. T. D.)	80	320
	Piston (1st O. S.)	20	80
	Piston Ring Set (S.T.D.)	200	800
	Piston Ring Set (1st O.S.)	40	160
	Piston Pin	40	160
	Clip for Piston Pin	60	240
	Bearing for Connecting Rod Small End	400	1,600
	Plain Washer	60	240
Air Suction	Lead Valve Assy.	10	40
	Lead Set	40	160
	Suction Manifold	4	16
	Check Valve Assy.	10	40
	Hose	6	24
	Clip	20	80

Air Suction (contd.)	Gasket (for Suction Manifold)	20	80
	Screw (with Washer)	10	40
	Packing (Valve Set)	20	80
	Stud Bolt	10	40
	Bolt	10	40
	Bolt	10	40
	Washer	10	40
	Cover for Suction Manifold	6	24
	Gasket (for Suction Manifold)	20	80
	Pipe (Joint)	10	40
	Gasket	20	80
	Washer	10	40
	Nut	10	40
	Cover (1)	10	40
	Pipe (Joint)	10	40
	Cover (2)	10	40
	Screw (with Washer)	10	40
	Screw	10	40
	Seal	10	40
	Gasket	20	80
	Hose	4	16
	Choke Lever	10	40
	Choke Knob	10	40
	Grommet	10	40
	Choke Lever Joint	20	80
	Pin (Spring)	10	40

Air Suction (contd.)	Check Valve Assy.	10	40
	Hose	4	16
	Hose	4	16
Carbureter	Carbureter Assy.	10	40
	Gasket (for Float Chamber)	20	80
	Body (for Float Chamber)	4	16
	Main Nozzle	10	40
	Gasket	40	160
	Main Jet	20	80
	Float Assy.	20	80
	Screw	10	40
	Pin for Float	20	80
	Valve Seat Assy.	40	160
	Gasket	40	160
	Pilot Jet	20	80
	Cover Plate	6	24
	Gasket for Cover	20	80
	Screw	10	40
	Washer	10	40
	Washer	10	40
	Screw (with Washer)	10	40
	Screw (Throttle)	10	40
	Spring	10	40
	Screw (with Washer)	10	40
	Screw (for Drain)	10	40
	Gasket	40	160

Carbureter (contd.)	Screw (for Air Adjustment)	10	40
	Spring (for Air Adjustment)	10	40
	O-Ring	10	40
	Carbureter Repair Set	20	80
Starter	Starter Assy.	6	24
	Case (for Starter)	4	16
	Drum (Sheave)	6	24
	Drive Pawl	10	40
	Spring (for Starter)	20	80
	Spring (for Return)	20	80
	Drive Plate	10	40
	Bushing	40	160
	Bolt	10	40
	Washer (Flat 1)	10	40
	Nut	10	40
	Starter Rope (1.9m. 50m/Roll)	1	40
	Starter Handle	10	40
	Collar Plate	20	80
	Roller for Rope	10	40
	Bushing 1	10	40
	Lock Washer	10	40
	Bolt	10	40
	Washer	10	40
	Thrust Washer	20	80

Starter (contd.)	Pulley for Starter	6	24
	Bolt	10	40
	Bolt (with Washer)	10	40
	Bushing	10	40
	Collar	10	40
	Rope Guide	6	24
	Bolt	10	40
	Washer	10	40
	Seal 2	10	40
	Dumper	6	24
	Stay 1	6	24
	Stay 2	6	24
	Bolt	10	40
	Washer	10	40
Fuel System	Fuel Tank Assy.	20	80
	Cap. Assy.	10	40
	Strainer	10	40
	Fuel Pipe Assy.	10	40
	Fuel Pipe with Joint	20	80
	Fuel Pipe with Joint	20	80
	Primary Pump Assy.	20	80
	Band (for Fuel Pipe)	10	40
	Fuel Pipe with Joint	6	24
	Bolt	10	40
	Washer	10	40
	Hose	4	16
	Clip	20	80

Fuel System (contd.)	Filter Assy.	10	40
	Filter Element	40	160
	O-Ring	40	160
	Filter Cap	10	40
	Fuel Pmp Assy.	20	80
	Diaphragm	40	160
	Plate for Spring Guide	10	40
	Spring for Diaphragm	10	40
	Gasket for Fuel Pump Body	40	160
	Check Valve	80	320
	Screw for Pan Head	10	40
	Nut	10	40
	Gasket for Body (2)	40	160
	Diaphragm for Pump	40	160
	Cover for Pump	6	24
	Screw for Pan Head	10	40
	Washer	10	40
	Gasket for Fuel Pump	20	80
	Bolt	10	40
	Washer	10	40
	Plug (Water Check)	20	80
	Tool Kit (Set)	10	40
	Fuel Hose 30m/Roll	1	4
	Bracket for Filter	4	16
	Bolt for Filter	10	40
	Washer for Filter	10	40

Fuel System (contd.)	Nut for Filter	10	40
	Hose (Filter Outlet)	4	16
Cowling (Top)	Top Cowling Assy.	6	24
	Seal (for Cowling Body)	10	40
Cowling (Bottom)	Bottom Cowling	4	16
	Lever (for Cramp (1))	4	16
	Bushing	20	80
	Lever for Cramp	4	16
	Washer for Lever	10	40
	Bolt for Lever	10	40
	Plate (Fitting)	4	16
	Bolt	10	40
	Washer	10	40
	Seal 1	10	40
	Grommet (1)	10	40
	Grommet (4)	10	40
	Grommet	10	40
	Grommet	20	80
	Collar (for Grommet)	10	40
	Washer	10	40
	Washer	10	40
	Bolt	10	40
	Nut	10	40
	Stop Switch Assy.	20	80
	Overheat Warning Lamp	10	40

Cowling (Bottom) (contd.)	Holder (for Warning Lamp)	10	40
	Washer	10	40
	Apron	10	40
	Bolt (for Fixing Apron)	10	40
	W-sher (for Fixing Apron)	10	40
	Bolt (for Fixing Apron)	10	40
	Corrugated Washer	20	80
Bracket (1)	Bracket (Clamp 1)	4	16
	Bracket (Clamp 2)	4	16
	Pad (for Transom Clamp)	40	160
	Screw (for Transom Clamp)	20	80
	Handle (for Transom Clamp)	20	80
	Bolt (1)	20	80
	Pin	20	80
	Stud Bolt	10	40
	Collar	10	40
	Nut	10	40
	Washer	10	40
	Bracket (Swivel)	4	16
	Grease Nipple	20	80
	Cap (for Grease Nipple)	20	80
	Friction Piece	10	40
	Spring (Compression)	10	40
	Dumper	10	40
	Bolt	10	40
	Washer	10	40

Bracket (1) (contd.)	Bolt (for Clamp Bracket)	6	24
	Washer	20	80
	Nut (Self Locking)	10	40
	Cap (for Clamp Bracket)	10	40
	Bracket (Steering)	6	24
	Pin (Dowel 1. B)	10	40
	Bolt (for Steering Bracket)	10	40
	Bolt (for Steering Bracket)	10	40
	Washer (for Steering Bracket)	10	40
	Shaft (Steering Pivot)	6	24
	Washer	10	40
	Bushing (Upper Bracket)	10	40
	Bushing (Lower Bracket)	10	40
	Oil Seal (Lower Bracket)	10	40
	Washer (Lower Bracket)	10	40
	Housing (1)	4	16
	Housing (2)	4	16
	Cover (Lower Mount)	4	16
	Mount Dumper	10	40
	Bolt (for Mount Cover)	10	40
	Bolt (for Housing)	10	40
	Washer	10	40
	Bolt	10	40
	Washer	10	40
	Washer	10	40
	Washer	10	40
	Nut (Crown)	10	40

Bracket (1) (contd.)	Dumper	10	40
	Dumper	10	40
	Bracket (1)	10	40
	Bolt	10	40
	Nut	10	40
	Mount Dump (1)	10	40
	Bolt	10	40
	Washer	10	40
	Washer	10	40
	Nut (Self Locking)	10	40
	Cover (for Upper Mount (1))	6	24
	Cover (for Upper Mount (2))	6	24
	Bolt (for Upper Mount Cover)	10	40
	Nut (for Upper Mount Cover)	10	40
	Seal (1) (for Upper Mount Cover)	10	40
	Seal (2) (for Upper Mount Cover)	10	40
	Hose Clamp	10	40
	Bolt	10	40
	Washer	20	80
	Washer	20	80
	Nut	10	40
Bracket (2)	Pin	10	40
	Spring (Lever Return)	10	40
	Washer (Friction 1)	10	40
	Washer	20	80

Bracket (2) (contd.)	Corrugated Washer	20	80
	Stopper (1)	4	16
	Stopper (2)	4	16
	Pin	10	40
	Shaft (Stopper)	10	40
	Snap Ring	20	80
	Washer	20	80
	Spring (Compression)	20	80
	Tilting Lever Assy.	6	24
	Cover	4	16
	Lever (Tilt 1)	10	40
	Bolt (for Lever)	10	40
	Spring (Torsion)	10	40
	Rod (Tilt Lock 1)	10	40
	Plate (Tilt Lock 1)	4	16
	Plate (Tilt Lock 2)	4	16
	Tilting Lock Arm	6	24
	Pin	6	24
	Pin	6	24
	Collar	6	24
	Cotter Pin (Check Pin)	20	80
	Spring (for Tension)	10	40
	Tilting Rod Assy.	20	80
	Spring	10	40
	Rivet	10	40

Steering	Handle Steering Assy.	4	16
	Steering Handle	6	24
	Grip (for Steering Handle)	6	24
	Handle	6	24
	Indicator (Throttle)	4	16
	Rivet	4	16
	Screw (Oval Head)	10	40
	Washer	10	40
	Spring (Compression)	10	40
	Bushing	20	80
	Shaft (for Steering Handle)	10	40
	Stay	10	40
	Bolt	10	40
	Washer	10	40
	Gear	20	80
	Pin (Spring)	10	40
	Pinion	20	80
	Bushing	10	40
	Washer	10	40
	Nut	10	40
	Throttle with Wire (1)	40	160
	Clip (for Wire (1))	10	40
	Clip (for Wire (2))	10	40
	Screw (Plain Headed)	10	40
	Bushing	10	40
	Bolt	10	40
	Washer	40	160

Steering (contd.)	Washer	40	160
	Washer	40	160
	Corrugated Washer	40	160
	Nut (Self Locking)	10	40
Control Equipment	Stay for Throttle Wire	6	24
	Pulley	6	24
	Axle Lever (Pulley Axle)	6	24
	Collar	10	40
	Bolt	10	40
	Bolt	10	40
	Washer	10	40
	Link for Axle	10	40
	Joint (for Link 2)	20	80
	Handle for Gear Shifting	6	24
	Lever for Shifting Rod	6	24
	Pin (with Spring)	10	40
	Bracket (2)	4	16
	Bolt (for Bracket)	10	40
	Washer (for Bracket)	10	40
	Lever for Shifting Rod (1)	10	40
	Pin (with Hole)	10	40
	Cotter Pin	20	80
	Screw	10	40
	Bushing	10	40
	Plunger (Shifting Cam)	10	40
	Spring (Compression)	10	40

Control Equipment (contd.)	Rod (1) for Shifting	4	16
	Connector (for Shifting Rod (2))	10	40
	Nut (for Shifting Rod (2))	10	40
	Spring (Compression)	10	40
Upper Casing	Upper Casing (for Short Size)	2	8
	Pin (Dowel B)	10	40
	Bolt (for Casing)	10	40
	Washer (for Casing)	10	40
	Gasket (for Upper Casing (1))	60	240
	Guide (for Exhaust)	4	16
	Gasket (for Upper Casing (2))	20	80
	Bolt	10	40
	Washer	10	40
	Exhaust Manifold (1)	6	24
	Gasket (for Exhaust Manifold)	20	80
	Bolt	10	40
	Washer	10	40
	Protector	6	24
	Bolt	10	40
	Elbow (for Water Mixing)	6	24
	Seal (1) (Elliptic Cylinder (1) (Long Size)	4	16

Lower Casing & Transmission (1)	Lower Unit Assy. (Long Size)	10	40
	Lower Casing 1	10	40
	Lower Casing 2	10	40
	Seal (for Lower Casing)	60	240
	Pin (Dowel B)	10	40
	Bolt	20	80
	Cover for Cooling Water Inlet (2)	20	80
	Cap (for Cover for Cooling Water Inlet)	20	80
	Plug (Straight Screw)	20	80
	Plug (Straight Screw)	40	160
	Gasket (for Plug)	100	400
	Screw	10	40
	Gasket	20	80
	Plate (for Shifting Rod Boots)	10	40
	Bolt	10	40
	Boots (for Shifting Rod)	20	80
	Shifting Cam Assy. (for Long Size)	6	24
	Housing (for Cooling Water Pump)	10	40
	Water Seal	10	40
	Insert (Cartridge)	20	80
	Impeller	60	240
	Gasket (for Cooling Water Pump 1)	60	240

Lower Casing & Transmission (1) (contd.)	Outer Plate (Cartridge)	20	80
	Gasket (for Outer Plate Cartridge)	40	160
	Housing (for Cooling Water Pump 2)	10	40
	Housing (for Cooling Water Pump 2)	40	160
	Pin (Dowel B)	10	40
	Bolt (for Pump 1 Housing)	10	40
	Bolt (for Pump 1 Housing)	10	40
	Washer (for Pump 1 Housing)	10	40
	Oil Seal	60	240
	Drive Shaft Complete (for Long)	30	120
	Key (Woodruff)	20	80
	Thrust Washer (for Drive Shaft 1)	30	120
	Needle Bearing (Upper)	20	80
	Sleeve (for Drive Shaft)	10	40
	Needle Bearing (Lower)	20	80
	Thrust Bearing	40	160
	Roller Bearing	20	80
	Shim (3)	10	40
	Pinion	80	320
	Snap Ring	40	160
	Taper Roller Bearing	40	160
	Shim (1)	10	40
	Gear Assy. (for Propeller Shaft)	50	200

Lower Casing & Transmission (1) (contd.)	Cross Pin Ring	10	40
	Straight Pin	10	40
	Clutch (Dog)	40	160
	Plunger (Shift)	10	40
	Slide (Shift)	10	40
	Propeller Shaft	40	160
	Washer (for Propeller Shaft)	100	400
	Gear Assy. 2 (for Propeller Shaft)	50	200
	Shim (2)	10	40
	Bearing (for Propeller Shaft)	60	240
	Oil Seal	80	320
	Cap for Lower Casing	30	120
	O-Ring	40	160
	Screw (for Cooling Water Inlet)	20	80
	Gasket Kit for Lower Unit	60	240
	Repair Kit for Cooling Water Pump	50	200
	Cover for Cooling Water Inlet	20	80
	Screw (for Cover)	10	40
	Anode (Positive)	40	160
	Bolt (for Anode)	10	40
	Washer (for Water Tube)	60	240
	Water Tube (for Long Size)	6	24
	Gasket (for Water Tube) B	20	80

Lower Casing & Transmission (1) (contd.)	Pin (Dowel B)	10	40
	Bolt	10	40
	Washer	10	40
	Pin (for Propeller Shaft)	400	1,600
	Corrugated Washer	40	160
	Propeller Nut	20	80
	Cotter Pin	100	400
	Seat	10	40
	Propeller Assy. (3-Blade P=11")	40	160
C.D.I. Magnet Generator	C.D.I. Magnet Generator Assy.	6	24
	Rotor Assy.	4	16
	Base Assy. complete with:		
	Generator Base	6	24
	Charger Coil Assy.	40	160
	Screw (with Washer)	20	80
	Lighting Coil Assy.	20	80
	Screw (with Washer) for Coil	20	80
	Pulser Coil Assy.	40	160
	Screw (with Washer) for Coil	20	80
	Screw (with Washer) for Coil	20	80
	Oil Seal	20	80
	Key	40	160
	Nut (for Crank 1 Top)	20	80
	Washer (for Crank 1 Top)	20	80
	O-Ring	20	80
	Bolt	10	40
	Washer	10	40

Electric Installation	Terminal Cover	10	40
	Screw (for Terminal Cover)	20	80
	Bracket (for Terminal)	6	24
	Dumper	20	80
	Collar	10	40
	Bolt (for Dumper)	10	40
	Washer (for Dumper)	20	80
	Nut	10	40
	C.D.I. Unit Assy.	40	160
	Screw (for C.D.I. Unit)	10	40
	Ignition Coil Assy.	40	160
	Bolt (for Coil)	10	40
	Washer (for Coil)	10	40
	Plug Cap Assy.	40	160
	Control Unit Assy.	20	80
	Band	10	40
	Thermo-Switch Assy.	10	40
	Wire for Earth Line	10	40
	Bolt	10	40
	Washer	10	40
	Plate	10	40
	Grommet (1)	10	40
	Tube	10	40
Combustion Apparatus	Bracket (for Filter)	4	16
	Bolt (for Filter)	10	40
	Washer (for Filter)	10	40

Combustion Apparatus (contd.)	Nut (for Filter)	10	40
	Hose (Filter Outlet)	4	16

2) Outboard Engine 25HP:

Crank Case and Cylinder	Crank Cylinder Assy.	10	40
	Crank Case Assy.	20	80
	Anode (Positive)	100	400
	Screw (Special Screw)	50	200
	Cylinder Head	20	80
	Gasket (for Cylinder Head)	100	400
	Housing (Oil Seal)	20	80
	Oil Seal	50	200
	Gasket (for Oil Seal Housing)	50	200
	Outer Cover (Exhaust)	10	40
	Gasket (for Exhaust Outer Cover)	200	800
	Inner Cover (Exhaust)	20	80
	Oil Seal (Lower Crank 4)	100	400
	Oil Seal (Lower Crank 4)	200	800
	Rolling	20	80
	Housing (Oil Seal 2)	10	40
	Spark Plug	1,000	4,000
	Gasket Kit for Power Head	30	120
Crank and Piston	Crank Assy.	10	40
	Crank 1	20	80
	Crank 2	10	40
	Crank 3	10	40

Crank and Piston (contd.)	Crank 4	20	80
	Connecting Rod	50	200
	Bearing (Connecting Rod Large End)	50	200
	Washer	100	400
	Crank Pin	30	120
	Labyrinth Seal	20	80
	Roller Bearing	30	120
	Snap Ring	10	40
	Bearing	30	120
	Piston (S.T.D.)	50	200
	Piston Ring Set (S.T.D.)	200	800
	Piston Pin	50	200
	Clip (for Piston Pin)	100	400
	Bearing (Connecting Rod Small End)	-	-
	Washer	100	400
	Pin (Dowel B)	3,000	12,000
Air Suction	Gasket (for Fixing Carbureter)	50	200
	Gasket (for Suction Manifold)	50	200
	Lead Valve Assy.	10	40
	Lead Set	30	120
	Packing (Valve Seat)	50	200
Carbureter	Carbureter Assy.	10	40
	Gasket (for Floor Chamber)	50	200

Carbureter (contd.)	Float	20	80
	Pin for Float	20	80
	Main Nozzle	20	80
	Main Jet	50	200
	Valve Seat Assy.	100	400
	Pilot Jet	20	80
	Screw (for Throttle)	10	40
	Screw (for Air Adjustment)	10	40
	Carbureter Repair Kit	20	80
Starter	Starter Assy.	10	40
	Starter Case	10	40
	Drum (Sheave)	10	40
	Spring (Spiral, for Starter)	20	80
	Shaft	20	80
	Driving Pole	50	200
	Snap Ring	20	80
	Spring for Driving Pole	30	120
	Bushing (for Shaft)	30	120
Fuel System	Fuel Tank Assy.	10	40
	Fuel Pipe Assy.	10	40
	Fuel Pipe with Joint (2)	20	80
	Primary Pump Assy.	20	80
	Fuel Pipe with Joint (2)	20	80
	Fuel Pipe with Joint (1)	10	40
	Filter Assy.	10	40

Fuel System (contd.)	Filter Element	50	200
	O-Ring	50	200
	Filter Cap	10	40
	Fuel Pump Assy.	20	80
	Diaphragm (for Pump)	50	200
	Plate (for Spring Guide for Pump)	20	80
	Spring (for Diaphragm)	20	80
	Gasket (for Pump Body 1)	50	200
	Check Valve	100	400
Screw for Pan	Screw for Pan Head	20	80
	Nut (for Pump)	20	80
	Gasket (for Body 2)	100	400
	Diaphragm (for Pump)	50	200
	Gasket (for Fuel Pump)	50	200
Cowling (Top)	Top Cowling Assy.	10	40
	Seal (for Cowling Body)	20	80
Cowling (Bottom)	Grommet	50	200
	Collar (for Grommet)	50	200
	Bolt (for Grommet)	50	200
	Washer (for Grommet)	50	200
	Corrugated Washer (for Crank Lever)	50	200
	Bushing (for Crank Lever)	50	200
	Stop Switch Assy.	20	80
	Grommet	50	200

Cowling (Bottom) (contd.)	Collar (for Grommet)	50	200
	Bolt (for Grommet)	50	200
	Washer (for Grommet)	50	200
	Corrugated Washer (for Crank Lever)	50	200
	Bushing (for Crank Lever)	50	200
	Stop Switch Assy.	20	80
Bracket	Steering Bracket	2	8
	Mount Dumper for Bottom Side	20	80
	Washer	20	80
	Bushing (for Shaft)	20	80
	Bushing (for Shaft)	20	80
	O-Ring (for Shaft)	20	80
	Handle (for Transom Clamp)	20	80
	Bolt	20	80
	Pin (for Handle)	20	80
	Screw (for Transom Clamp)	20	80
	Pad (for Transom Clamp)	30	120
	Tilting Rod Assy.	10	40
	Bracket (Complete)	5	20
	Bushing (Solid)	20	80
	Mount Dumper (for Upper Front)	10	40
	Mount Dumper (for Upper Side)	20	80
Steering	Steering Handle Assy.	5	20
	Spacer	10	40

Steering (contd.)	Spacer (for Handle 2)	50	200
	Plain Washer	50	200
	Corrugated Washer	50	200
	Handle (for Steering 2)	10	40
	Bolt (for Handle)	20	80
	Bolt (for Handle)	20	80
	Throttle Lever	20	80
	Washer	20	80
	Spring (for Compression)	10	40
	Bushing	30	120
	Throttle Wire (Complete)	50	200
Control Equipment	Retainer (for Generator Base 1)	10	40
	Retainer (for Generator Base 2)	5	20
	Plate (for Base Friction)	10	40
	Handle for Gear Shift	10	40
	Cam Plate (for Handle)	10	40
	Washer (for Handle)	20	80
	Lever for Shifting Rod 1	10	40
	Lever for Shifting Rod 2	10	40
	Pin (Spring)	10	40
	Plain Washer (for Lever)	10	40
Upper Casing	Gasket (for Upper Casing)	100	400
	Gasket (for Pipe)	50	200

Lower Casing and Transmission (1)	Lower Unit Assy. (for Long Size)	10	40
	Lower Casing 1 (Complete)	10	40
	Lower Casing 2	10	40
	Seal (for Lower Casing 2)	50	200
	Cooling Water Inlet Cover	10	40
	Screw (Oval Head)	20	80
	Plug (Straight)	30	120
	Gasket	50	200
	Anode (Positive)	50	200
	Housing for Cooling Water Pump	20	80
	Insert Cartridge (Complete)	20	80
	Impeller	50	200
	Gasket (for Cartridge)	50	200
	Outer Plate (for Cartridge)	20	80
	Drive Shaft 1 (for Long Size)	20	80
	Pin for Impeller	20	80
	Oil Seal (for Drive Shaft)	50	200
	Collar (for Drive Shaft)	10	40
	Washer (for Thrust)	20	80
	Bearing (Thrust Needle)	20	80
	Ball Bearing	20	80
	Shim (for Adjusting Gear)	10	40
	Gear Assy. 1	30	120
	Washer	20	80
	Clutch (Dog)	50	200

Lower Casing and Transmission (1) (contd.)	Spring (Compression)	50	200
	Propeller Shaft	20	80
	Washer	50	200
	Gear Assy. 2	30	120
	Shim 2	20	80
	Bearing	50	200
	Oil Seal	100	400
	Cap for Lower Casing	10	40
	Gasket Kit for Lower Unit	50	200
	Repair Kit for Pump Repair Kit	20	80
	Pinion Gear Assy.	20	80
Lower Casing and Transmission (2)	Anode (Positive)	50	200
	Water Seal 1	50	200
	Pin (Straight)	100	400
	Propeller Unit	20	80
	Cotten Pin (for Propeller Nut)	50	200
	Propeller Assy. (3-Blade P=8")	50	200
Flywheel and Magnet Generator	Flywheel and Magnet Generator Assy.	3	12
	Generator Base	5	20
	Ignition Coil	30	120
	Contact Breaker Assy.	100	400
	Condenser	50	200
	Lead Wire Assy.	10	40

Flywheel and Magnet Generator (contd.)	Lighting Coil Assy.	10	40
	Key	50	200
Electric Installation	Ignition Coil Assy. 1	20	80
	Ignition Coil Assy. 2	20	80
	Plug Cap Assy.	50	200

Table 11. Tool List (No. 1)

Item No.	Description	Remarks
1.	Hydraulic Press	for Crank Assembly
2.	Electric Drill	for Drilling Holes
3.	Parts Cleaning Table	for Cleaning Parts
4.	Vice	
5.	Air Compressor	for Cleaning
6.	Plain Surface Plate	for Plane off and Working Table
7.	V-Shaped Block	for Moulding and Working Table
8.	Crank Adjuster	for Assembling Crank
9.	General Tool Kit	for Service Engineer
10.	Special Tool Kit (A)	for Installation in Work-shop
11.	Special Tool Kit (B)	for Field Work
12.	Gear Oil Injector	
13.	Air Gun	for Cleaning
14.	Air Hose	for Cleaning
15.	Rubber Hose	for Cleaning
16.	Hose Band	for Cleaning
17.	Chick Chuck	for Cleaning
18.	Air Pressure Controller	for Declining Pressure
19.	Grinder	
20.	Magnet Base	for Dial Gauge
21.	Torque Wrench (920)	
22.	Torque Wrench (1300)	

23.	Torque Wrench (1900)	
24.	Copper	Special Hammer for Adjusting Crank
25.	Electric Drill	
26.	Bearing Separator	
27.	Tap and Dice Set	
28.	Grease Gun (Large)	
29.	Grease Gun (Small)	
30.	Terminal Kit	for Connecting Terminals
31.	Soldering Iron with Code	
32.	Sawing Frame	
33.	Sawing Blade	
34.	Test Propeller (Large)	
35.	Test Propeller (Medium)	
36.	Test Propeller (Small)	
37.	Pocket Tester	
38.	Point Tester	for Adjusting Point Interval
39.	Ignition Coil Tester	for Testing Ignition Coil
40.	Engine Tachometer	Engine Revolution Gauge
41.	Timing Light	for Measuring Ignition Timing
42.	Dial Gauge Set	for Measuring Piston Top Dead Center
43.	Slide Calipers (150)	
44.	Slide Calipers (300)	
45.	Bond No. 4	
46.	Grease (12)	

47. Gear Oil (24)

48. Oil for 2-Cycle Engine

49. Spray Paint

50. Burner

(4) Fishing Materials

Net

The purse seining net and gill net shall be provided. Since the yar-pound system is applied in Ghana, conversion is given at Table-12.

Table-12 Conversion

Purse Seining Net	Inch	3/8	1/2	3/4	1	1.1/4	1.1/2	1.3/4	2	5
	mm	10	13	20	25	32	38	44	50	125
Gill Net	Inch	2.1/2	3	3.1/2	4	5	6	7	8	10
	mm	63	76	88	100	125	150	175	200	250

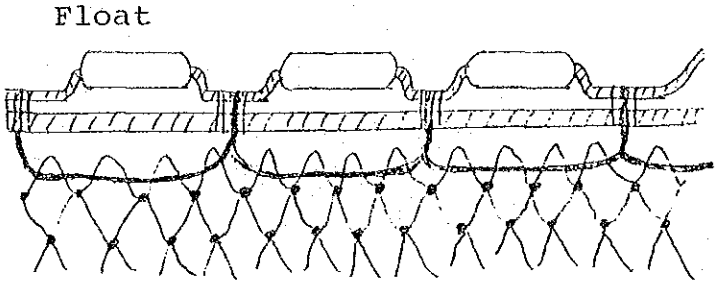
Table-13 shows standards on the purse seining net.

Table-13 Gill Net

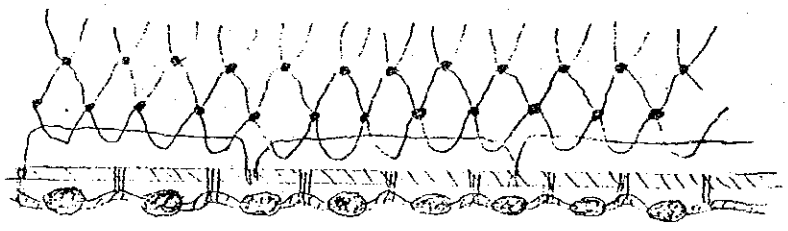
Mark	Thickness of Twine	Mesh Size (mm)	Mesh Deep	Length (m)	Selvage Top & Bottom	Mending Twine (kg)	Hanging Twine (kg)
A	#(2) 2/4	63	100	83	3/4x1 mesh each	1	Cremona #5 x 2 kg
B	#(4) 3/6	76	100	83	3/12x1 mesh each	2	#5 x 2 kg
C	#(6) 3/6	88	75	83	3/15x1 mesh each	2	#6 x 3 kg
D	#(9) 3/9	125	60	83	3/18x1 mesh each	2	#6 x 3 kg
E	#(12)3/12	150	50	83	3/24x1 mesh each	3	#8 x 4 kg

(per 10 pcs.)

Figure-6 Gill Net for Ghana

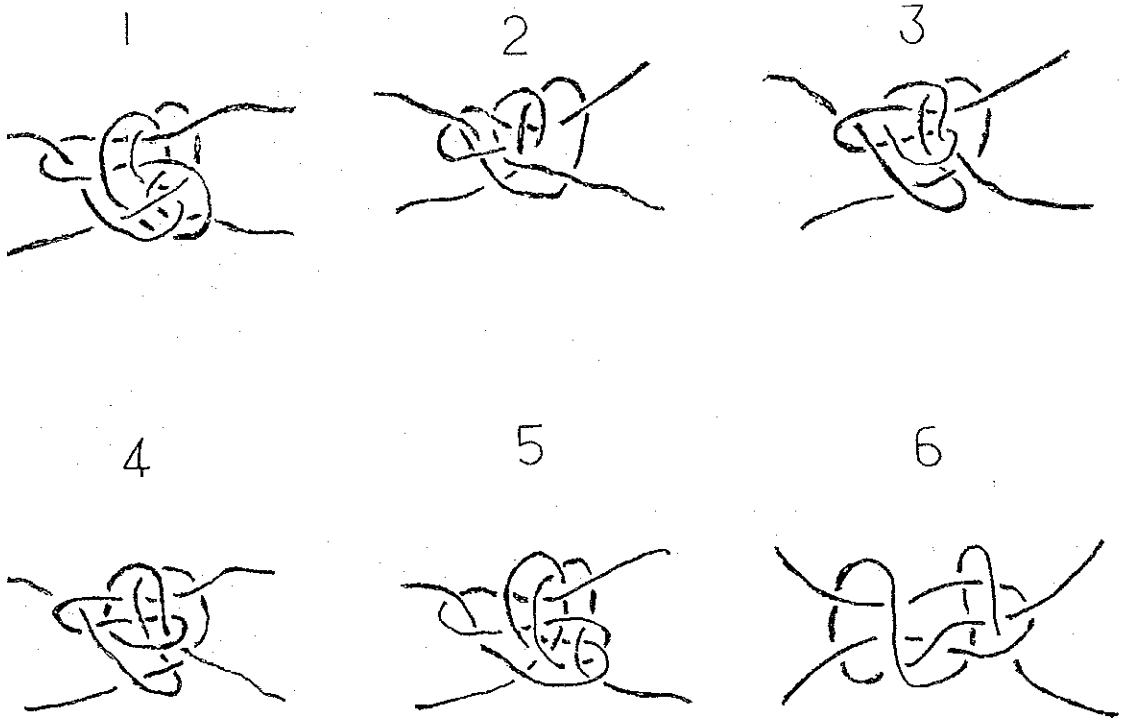


Design of Gill Net



Float line	PP Cross x 15 g/m x (50 + 1 x 2) m
Float attaching line	PP Cross x 10 g/m x 60 m
Net connecting twine	Cremona (blue) x #10 x 80 m
Sink line	PP Cross x 15 g/m x (50 + 1 x 2) m
Sink attaching twine	PP Cross x 10 g/m x 60 m
Float	Floatage 100 $\pm$ 20 g Depth 50 m Cylinder type 50 PS/TAN
Sink	Weight 75 g Lead egg type 50 PS/TAN

The monofilament for the gill net shall be applied, and in order to prevent knots of the net from loosening knots of the net shall be of special knots shown in the following Figure-7. Ghana's fishermen will have an opportunity to compare fishing performance of the monofilament net with one of multi net.



(5) Purse Seining Net

The completed net was designed firstly and selection of standards of accessory materials such as netting, floats and sinks and others.

Table-14, 15 and Figure-8, 9 and 10 show specifications of the purse seining net.

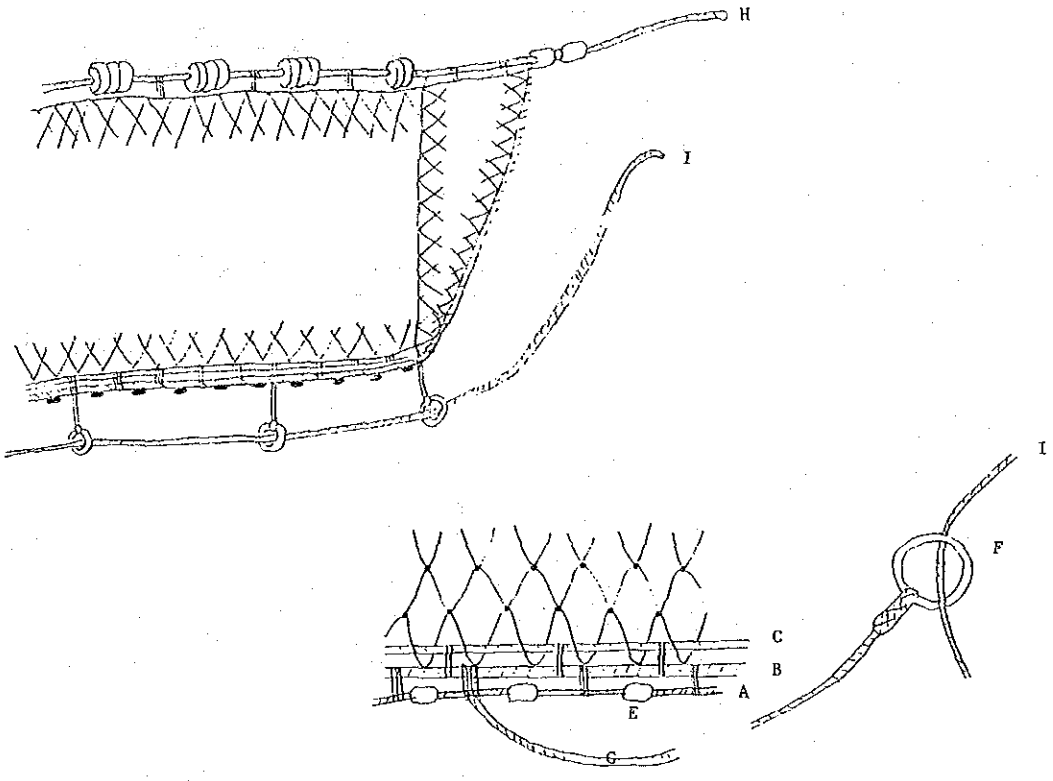
Table-14 Standards of mending twine for purse sening net

	Nylon 210d (blue)				
No. of twine	3/6	3/9	3/12	3/30	3/60
Weight (kg)	20	10	20	10	10

Table-15 Specifications of hanging twine (blue)

	Purpose	Part applied	Standard	Amount
Sewing twine (A)	To sew nettings of 100m length and make panels.	Same twine as netting	210d 3/6 or 3/9	50
Sewing twine (B)	To sew panels.	All panels	210d 3/15	50
Attaching twine for floats and sinks	To attach floats and sinks with the float and sink lines.	Float & sink	Cremona 3/24	30
Connecting twine (Top)	To make shrinkage on the top.	Only the top	Cremona 3/30	30
Connecting twine (Bottom)	To make shrinkage on the bottom.	Only the bottom	Cremona 3/45	30
General hanging twine	To use generally.	General	Cremona 3/120	50

Figure-8 Design of purse seining net



Accessary materials (including spares)

	Mark	Material	Processing	Size	Unit	Amount	Space
Float line	A	P.P.	Cross	10m/m dia.	200m/coil	6	2
Sink line	B	P.P.	Cross	12m/m dia.	200m/coil	6	2
	C	P.P.	Cross	5m/m dia.	200m/coil	6	2
Float	D	Vinyl	Doughnut	Floatage 280g	1,000 p/s		200
Sink	E	Lead	Egg shape	Weight in water 75g	1,000 p/s		200
Ring	F	Iron	10m/m	80m/m dia.	40 p/s		20
Bridle line	G	P.P.	Cross	10m/m dia.	200m	0.5	0.5
Towing line	H	P.P.	Cross	18m/m dia.	200m	1	1
Purse line	I	P.P.	Cross	16m/m dia.	200m	4	2

Netting Arrangement of Purse Seine for Ghana

Fig.-8 Netting Arrangement - Two Boat Type

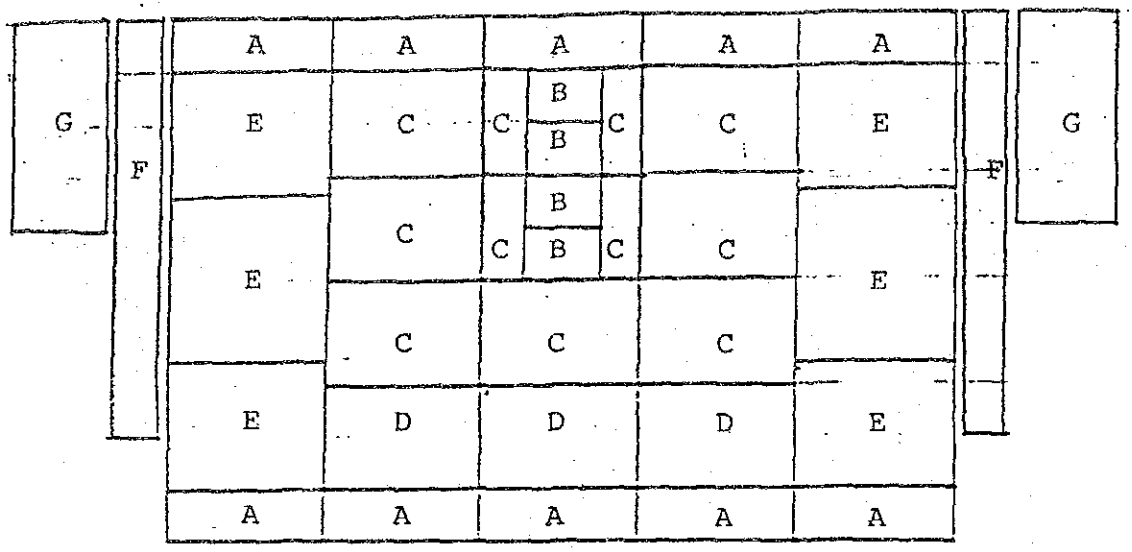
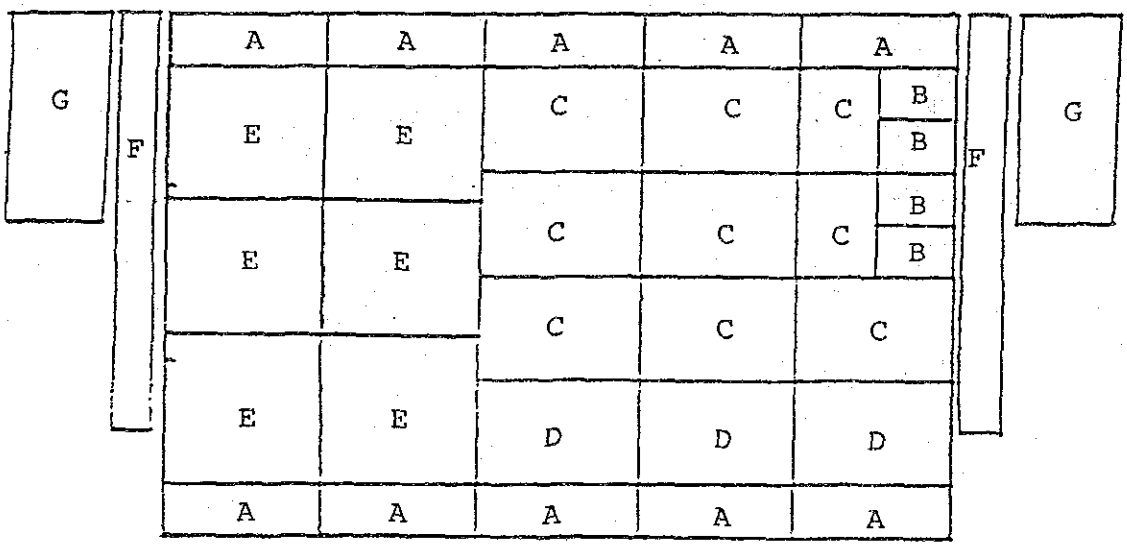


Fig.-10 Netting Arrangement - One Boat Type

第１２図：一叟旋型網地配置図



Required amonut (blue)

	Thickness of Twine	Mesh Size	Mesh Deep	Length	TAN	Spare
A	210d x 3/30	50m/m	10	100m	10	5
B	210d x 3/9	10m/m	500	50m	4	4
C	210d x 3/6	25m/m	400	100m	8	4
D	210d x 3/12	32m/m	400	100m	3	2
E	210d x 3/15	38m/m	400	100m	6	3
F	210d x 3/45	50m/m	10	20m	2	2
G	210d x 3/90	125m/m	100	4m	2	2

5-2-2 Deep Sea Line Fishing at Deep Sea Fishing Bank of more than 70m deep.

The following three kinds of fishing method will be adopted within Ghanaian waters and for the development new fishing ground at the outer edge of the land shelf.

A) Hand Line

B) Vertical Line

C) Bottom Long Line

(A) Hand Line (see Fig. 13 - (1))

There is special villages in Ghana where Line Fishings are their occupation. Their fishing method is hand line fishing and catches are Snapper, Grouper, Hake, etc.

The lead line they are using now is nylon gut, which was not treated to kill its elasticity. This type of lead line abosrbs the shock under the load and it was difficult to accurately meet to a bite. This resulted in small catches.

Because of the hand line fishing, an overload caused by a big catch at the deep sea gives heavy friction to a fisherman's hand, which sometimes caused a chaps like lacerated wound to his palm. In order to solve such problem, and to expect a higher catch rate, it was decided to use a particular lead line shown in the Fig. 11 , which was made by polyester core covered by woven nylon multi-filament and coated by special plastic coatings.

Fig. 11 - Specialized Lead Line for Bottom Line Fishing

(Features)

1) Extremely small elasticity and and capable to be strongly knotted.
2) Twist-proof and kink-proof
3) Properly weighted
4) Enable to transfer a bite

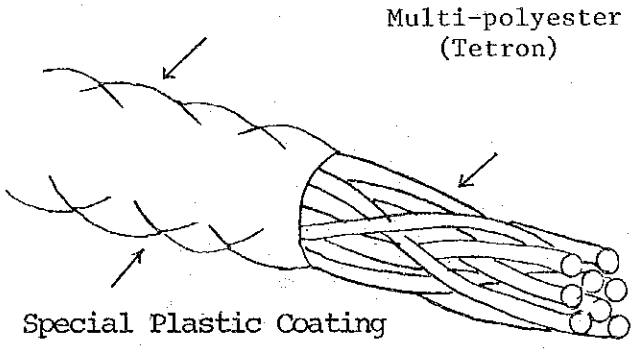
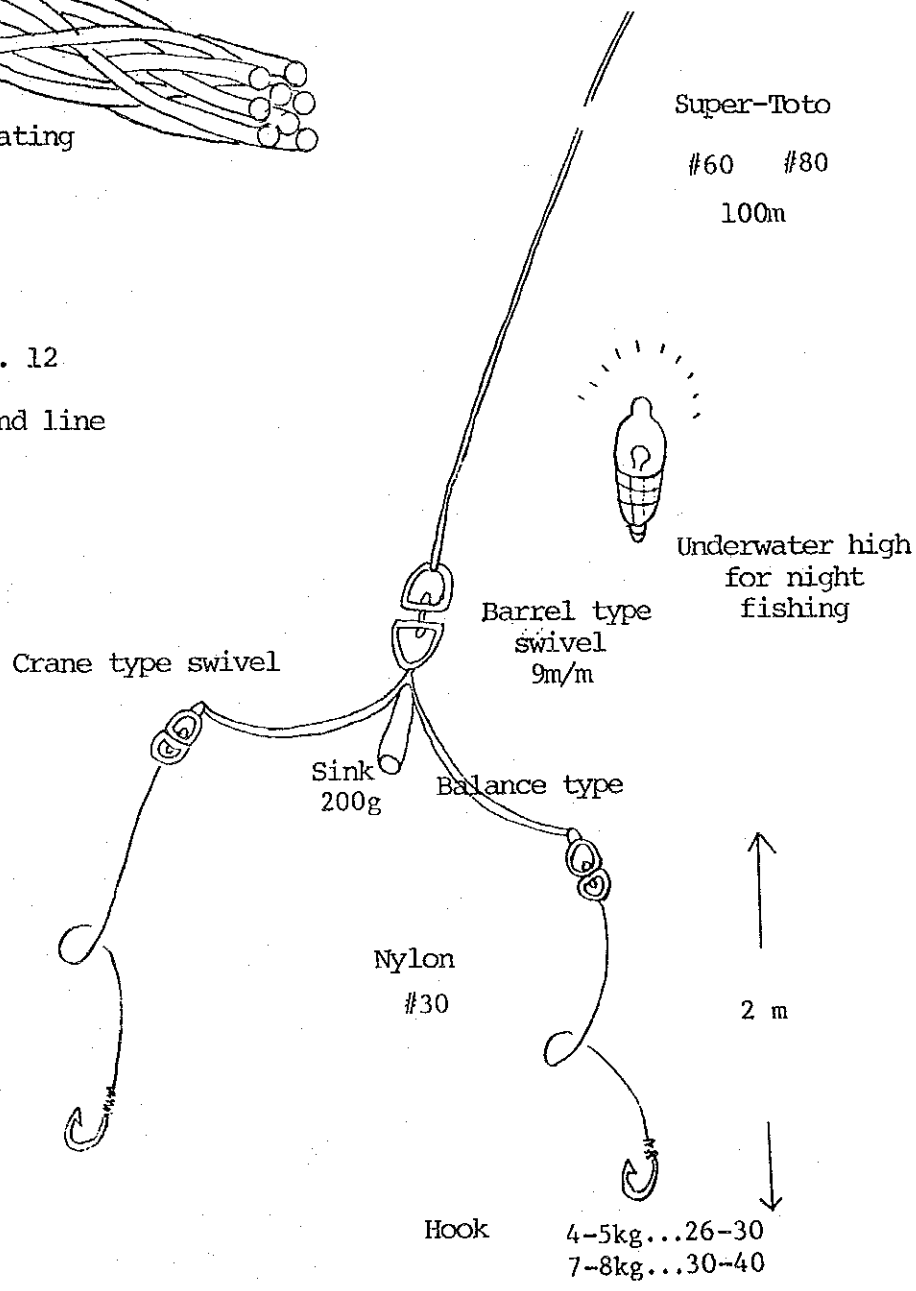


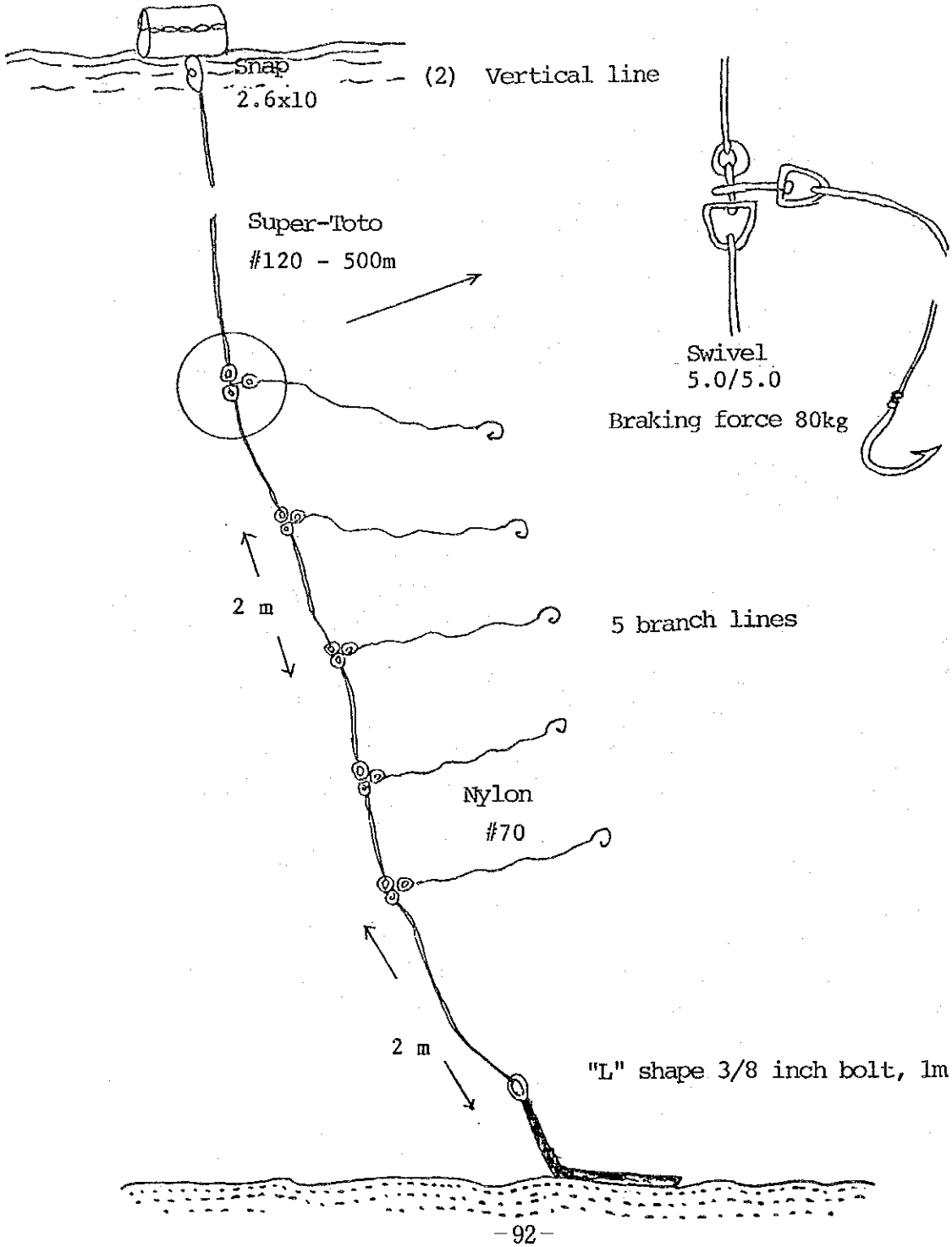
Fig. 12

(1) Hand line



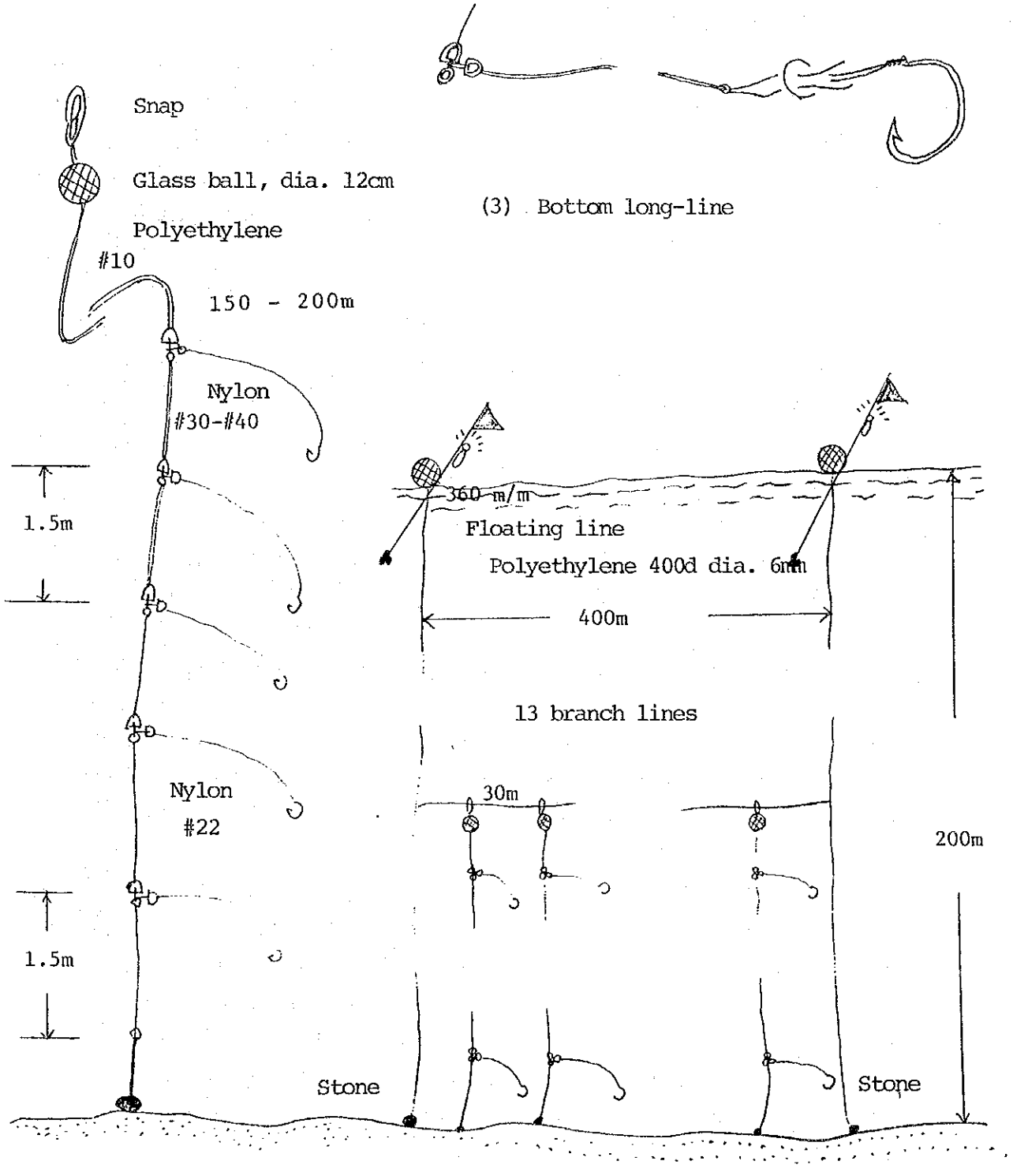
(B) Vertical Line (Fig. 12-(2))

As shown in the Fig. 12-(2), vertical line is a fishing tool of which line is hanged from the barrel floated on the surface and has branch lines with baits at the end of them. These lines are left in the sea. This method is applicable to the fishing of up to 500m deep. Each vertical line is laid independently. Thus, this method is suitable for rough bottom fishing, because the independently laid vertical line is unable to be caught by projected sea bottom.



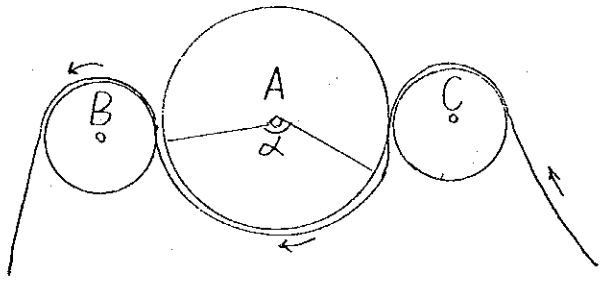
(C) Bottom Long-Line (Fig. 12-(3))

As shown in the Fig. 12-(3), main lines are set between fixed buoy line parallel to the sea bottom. Branch lines with hooks are also set vertically to the main lines by snap with interval of 20m-30m. This method is suitable for fishing of thick shoal and an effective work is expected.



(3) Bottom long-line

Fig. 13 Line-hauler

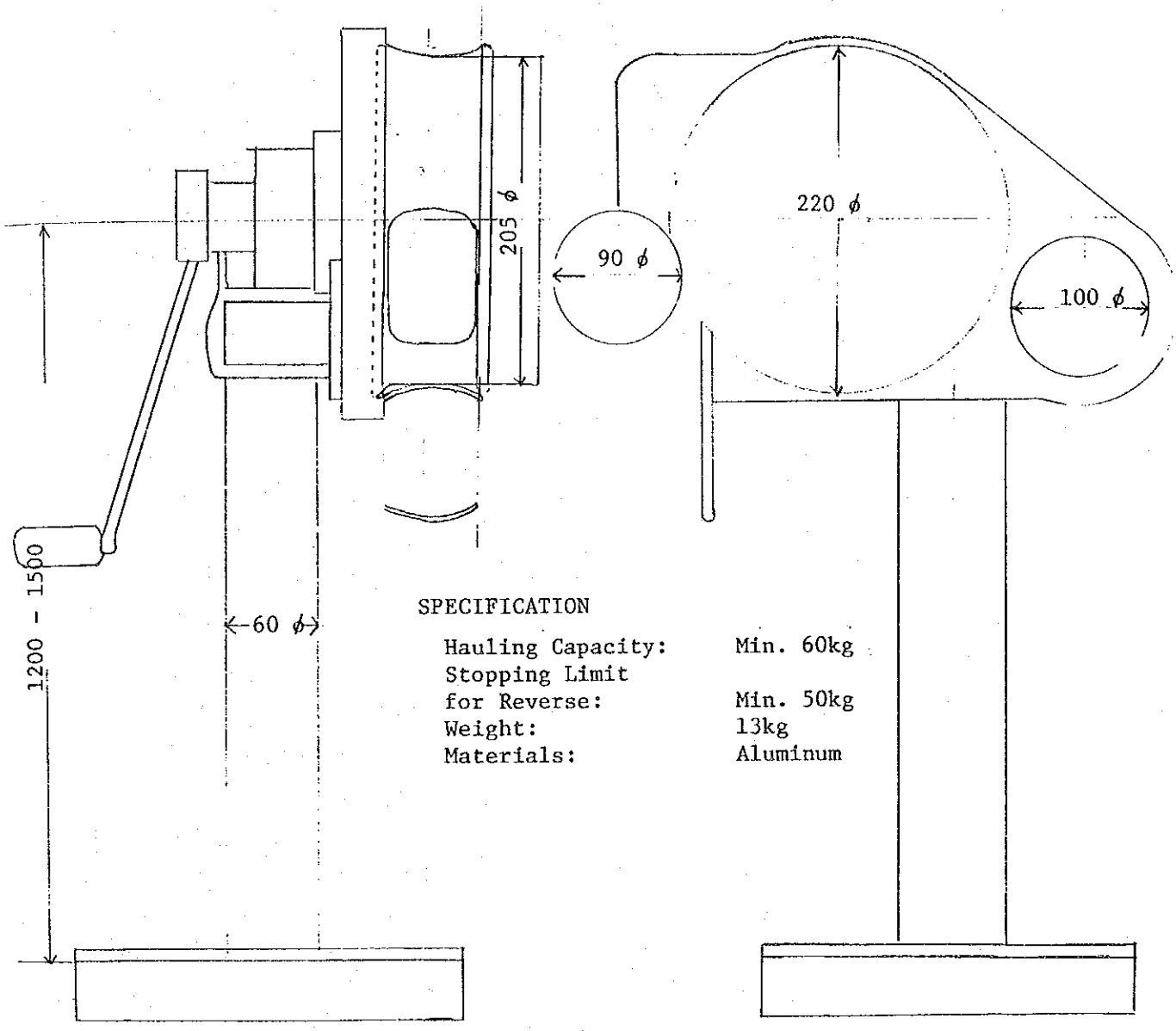


Note: Line Hauler

A line-hauler is absolute necessity for the deep sea fishing at the depth around 100m, because hand lifting of the line is impossible in any case. The line-hauler shown in the Fig. 13 is made of three rollers; main roller (A) which is rotated by hand, tension roller (B) which is pushed strongly against main roller (A) by spring and rope guide roller (C) which is provided for keeping friction distance of a rope lifted up from the sea. The rope is guided through the rollers as shown in the Fig. 13. When the roller (A) is rotated, the roller (B), which is pushed against (A) by spring, rotates synchronized with (A). Thus the rope put between (A) and (B) is lifted up by rotating the roller (A). The rollers (A), (B) and (C) are set in a manner to have wide angle so that a friction distance along the circumference of (A) may become longer. Lifting capacity of this line-lauler is 60 kg (min.) mergency stop mechanism works at the load of 50 kg, which prevents the rope from pulled back under the overload caused by a big catch or by rolling of the boat. On the contrary, when a load becomes lighter by sudden float of fishes or by lurch of the hauler side by rolling, a load to the roller (A) becomes smaller. In such case, by increasing rotation of the roller, it is possible to speed up the rope lifting speed. Each roller is mounted with special rubber ring at its outer edge, which provides larger friction to the rope and prevent slip motion.

Figure-14

HAND-DRIVED LINE-HAULER



SPECIFICATION

Hauling Capacity:	Min. 60kg
Stopping Limit for Reverse:	Min. 50kg
Weight:	13kg
Materials:	Aluminum

5-2-3 Equipment and Material for Survey Vessel "KKADIAMA"

Since the delivery in 1979, any replacement parts and materials were not suplied to the survey vessel "KAKADIAMA". The material supply lists are prepared as per attached sheet covering spare parts for main engine, auxiliary engine, refrigerator, and recording sheet for for echo sounding machine for two years' operation. Those parts were selected on the assumption that the vessel has been normally operated for the last five years. However, it should be considered that KAKADIAMA's own operation conditions have resulted in some peculiar conditions to the hull, engines, gauges, gears and facilities. In order to keep an effective operation of the vessel, it is recommendable that the Fisheries Department as well as the engineer in charge of engines of "KAKADIAMA" will take into consideration the matters of engine condition, measures to be taken at the mergencies, etc.

5-2-4 Small Trap Net

The main catches in Ghanaian fisheries is sardine species which generated at the Ghanaian coast and make a littoral migration from west to east on the coastal tide. The Ghanaian fishermen have catched them by a seine fishing and purse seine chasing after the shoal. The most suitable fishing method for the sardine species, which has the characteristics such as littoral migration, and good catch seems to be a drift net fishing, however, such fishing methods have not yet been developed in Ghana. Several factors are considered as the reason of such situation; those are strong tide, lack of material such as fishing net, lack of technology and information, etc. The main reason, however, may be that the Ghanaian fishermen have never seen the drift net.

As the objectives of the grant of this time, small bottom set net shown in Fig. 15 and Fig. 16 were decided

taking the present Ghanaian situation into consideration. This type of net has the following features:

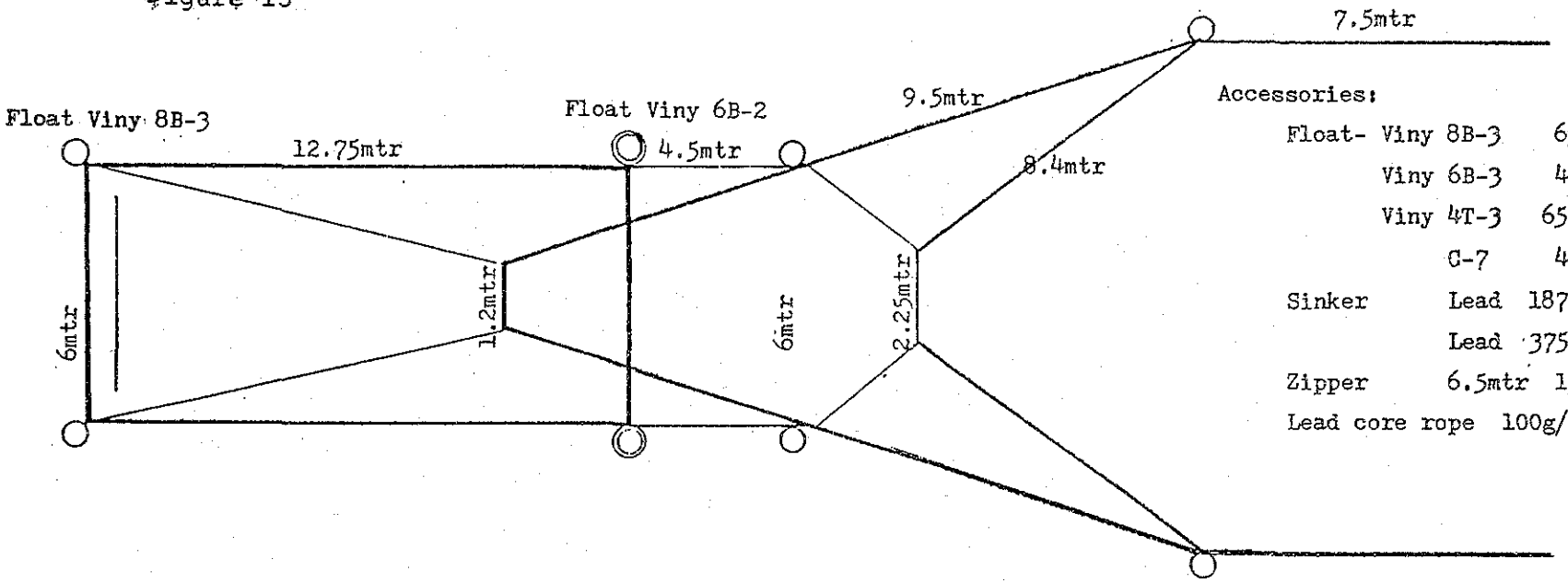
1) Because of its laying arrangement, the net formation is not destroyed by strong tide. In case if it should be destroyed, the formation is recovered soon after tide calms down, and can keep its catching capacity.

2) An importance was put on its design so as to meet the Ghanaian request to learn new technics. It is small sized for easy handling and is equipped with an anchor system for fixing which enables the vessel to follow the movement of shoal very quickly.

3) It has large box net and is able to keep the fish alive for about five days. This particular feature solves the problems when it is impossible to lift the net because of strong tide or bad weather, or in case the capacity of drying or smoking facilities cannot follow the catches.

Three sets of type of fishing net will be granted. Two sets will be applied to the actual operation for testing, surveying and introduction. Another set will be left for spare in case of agglutination of sea weed to the other two sets. At the initial operation of the net, it should be necessary to extend an assistance from the manufacturer of the net. Therefore it must be better to ask the manufacturer to send a supervisor to Ghana for about one month.

Figure-15



Accessories:

Float- Viny 8B-3		6pcs	
Viny 6B-3		4pcs	
Viny 4T-3		65pcs	
C-7		4pcs	
Sinker	Lead	187grm	432pcs
	Lead	375grm	120pcs
Zipper	6.5mtr	1pce	
Lead core rope	100g/mtr		31mtr

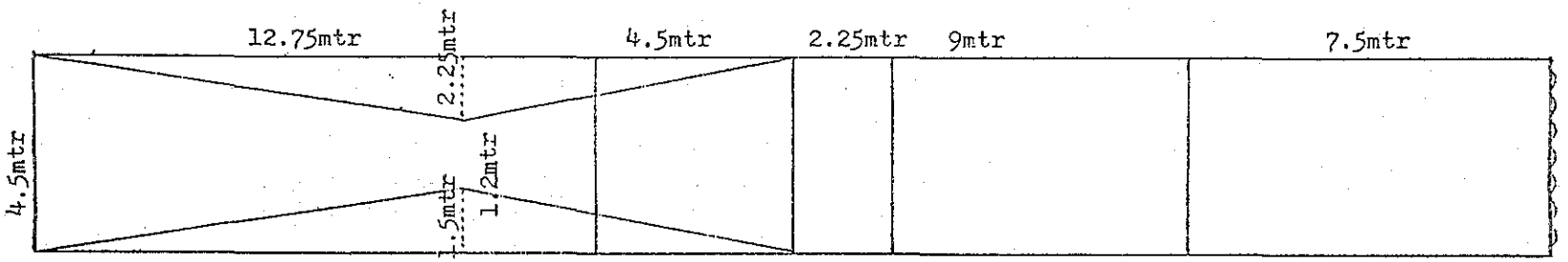
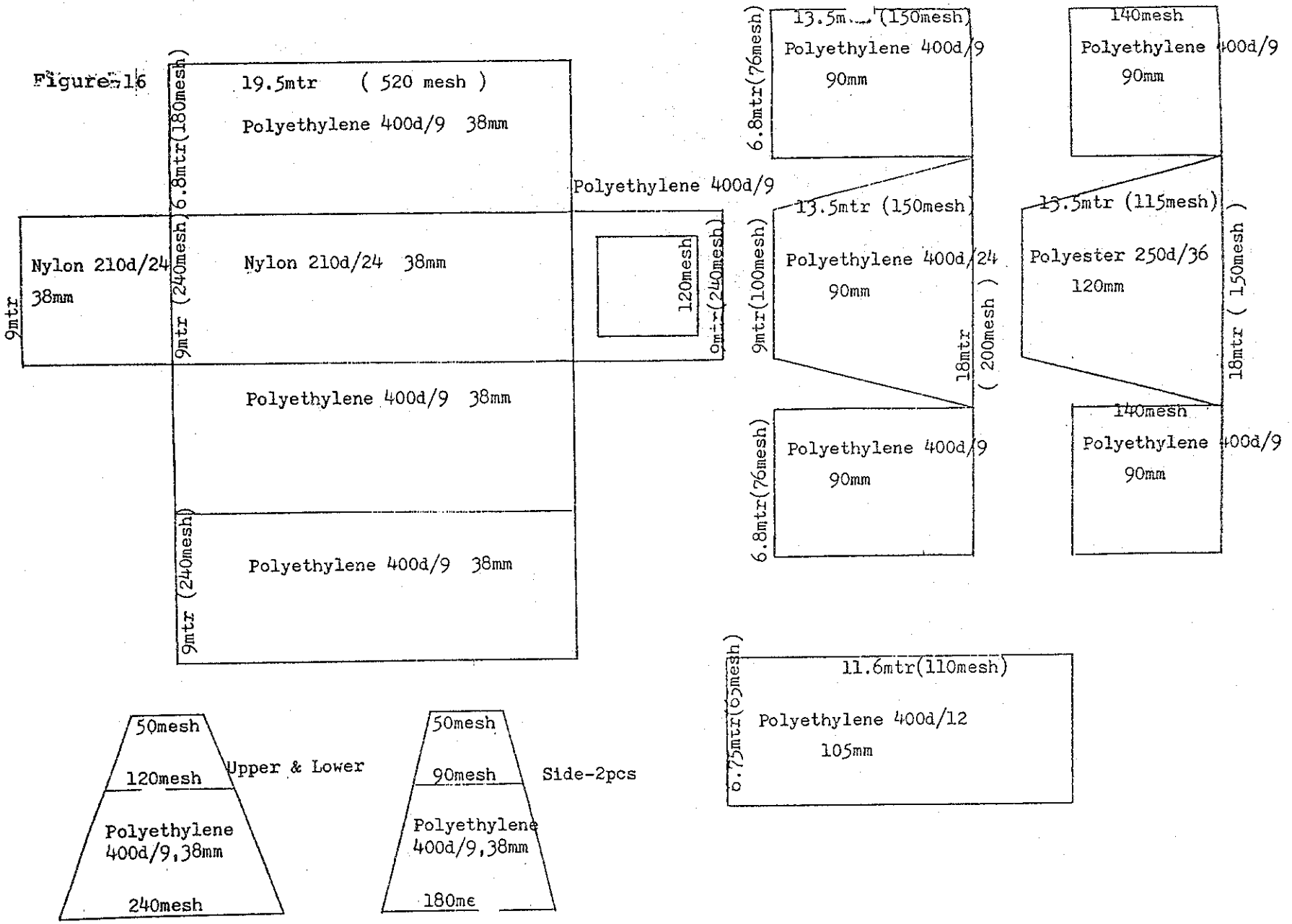


Figure 16


19.5mtr (520 mesh)
Polyethylene 400d/9 38mm
6.8mtr(180mesh)
Polyethylene 400d/9
Nylon 210d/24
38mm
9mtr
Nylon 210d/24 38mm
9mtr (240mesh)
120mesh
9mtr(240mesh)
Polyethylene 400d/9 38mm
Polyethylene 400d/9 38mm
9mtr (240mesh)
6.8mtr(76mesh)
13.5m... (150mesh)
Polyethylene 400d/9
90mm
9mtr(100mesh)
13.5mtr (150mesh)
Polyethylene 400d/24
90mm
18mtr (200mesh)
6.8mtr(76mesh)
Polyethylene 400d/9
90mm
140mesh
Polyethylene 400d/9
90mm
13.5mtr (115mesh)
Polyester 250d/36
120mm
18mtr (150mesh)
140mesh
Polyethylene 400d/9
90mm
50mesh
120mesh
Upper & Lower
Polyethylene
400d/9,38mm
240mesh
50mesh
90mesh
Side-2pcs
Polyethylene
400d/9,38mm
180me
6.75mtr(65mesh)
11.6mtr(110mesh)
Polyethylene 400d/12
105mm

5-2-5 Mounting Test of Inboard Engine

In order to check the possibility of mounting the inboard engine to the general canoes, the following procedures are planned to be taken.

First, mounting the inboard diesel engine on canoe type vessel and on small vessel with the length of less than 30 feet, try to solve the problems arisen from such modification. Second, the modernization of the fishing works will be conducted by mounting generators, gears, etc. on the vessel. After it becomes clear through the field operation, that the problem arisen during the test period were solved, the inboard engine will be mounted on the general canoes successively.

However, it must be considered whether the present canoes are stout enogh to mount the inboard engine. This has direct relation with the durable years of the vessel, therefore, it is necessary to carry out an mple test. However unsuccessful results must also be taken into consideration. Table No. 16, attached in next page, shows a program which is considered adequate.

Table-16 Schedule of the Test

Test No.	Type of Canoe	Material	Construction Place (Hull)	Installing Place (Engine)	Granted Materials	Figure
1	Round bottom local canoe	Timber	Ghana	Ghana	Diesel engine	17
2	Square bottom Japanese canoe	Timber	Japan	Ghana	Hull and engine	18
3	Reformed square bottom canoe	Ferro-cement	Japan	Ghana	Hull and engine	19
4	Round bottom local canoe	FRP				

The followings are specifications of the inboard diesel engine.

1) Type

Diesel engine, electric starting, sea water cooling type, gas oil (A heavy oil)

2) Horse power

12 - 20HP

3) Stern part

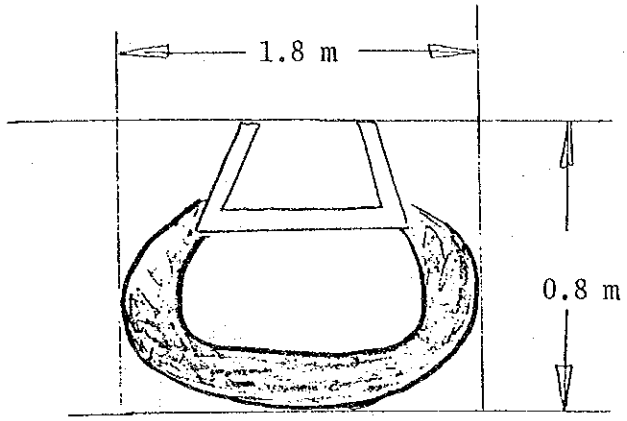
The stern part shall be designed so as to enable fishermen to lift the screw and the rudder when when the canoe is pulled up on shore. Or the keel shall be attached to protect the screw and the rudder.

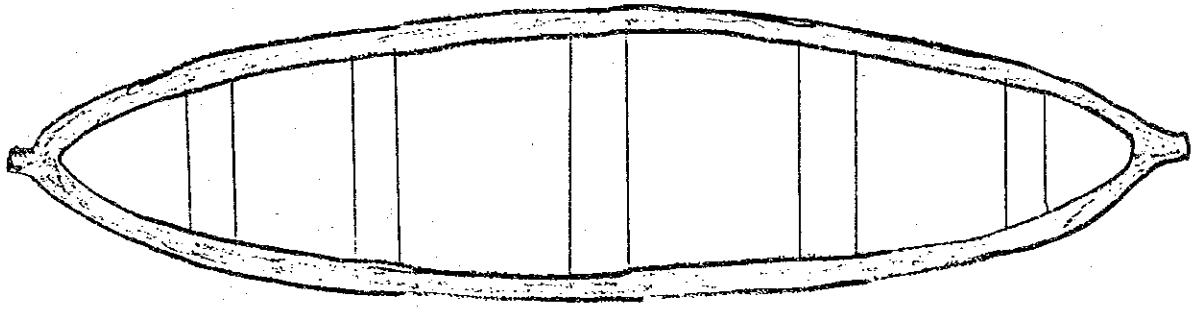
Table-17 shows consumption of fuel oil.

Table-17 Consumption of fuel oil

	40HP Outboard Motor	22HP Diesel Engine
Consumption of fuel oil per hour	18.7 l/hr	5.6 l/hr
Unit price of fuel oil	$0.375/l	$0.287/l
Consumption of fuel oil yearly (4 hr x 20 days/month x 12 months) = 960 hr/year	17,952 l	5,376 l
Expenses	$6,732	$1,543

Fig. 17 Round bottom local canoe





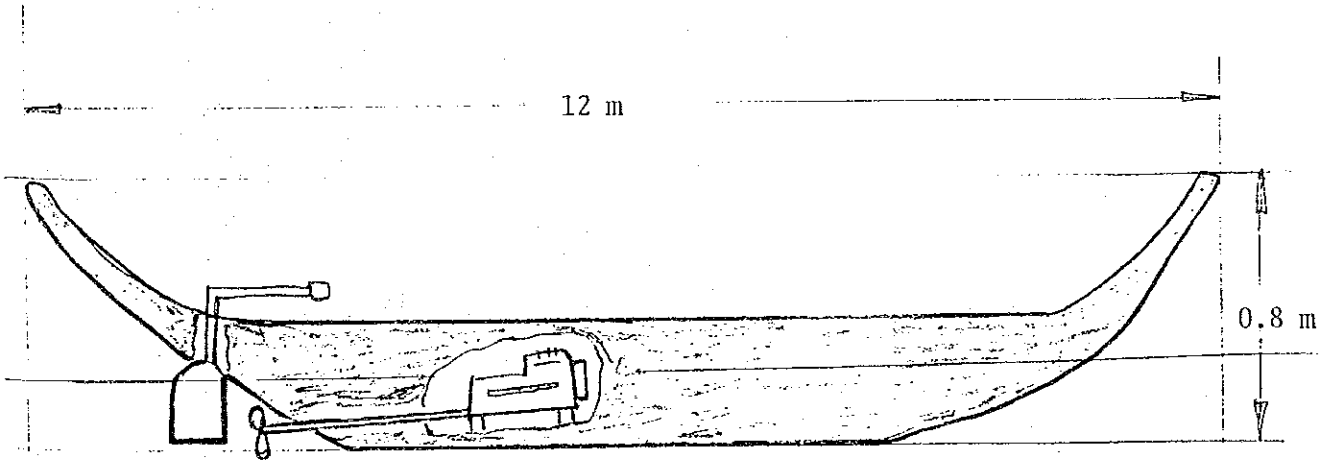


Fig. 18 Japanese type canoe

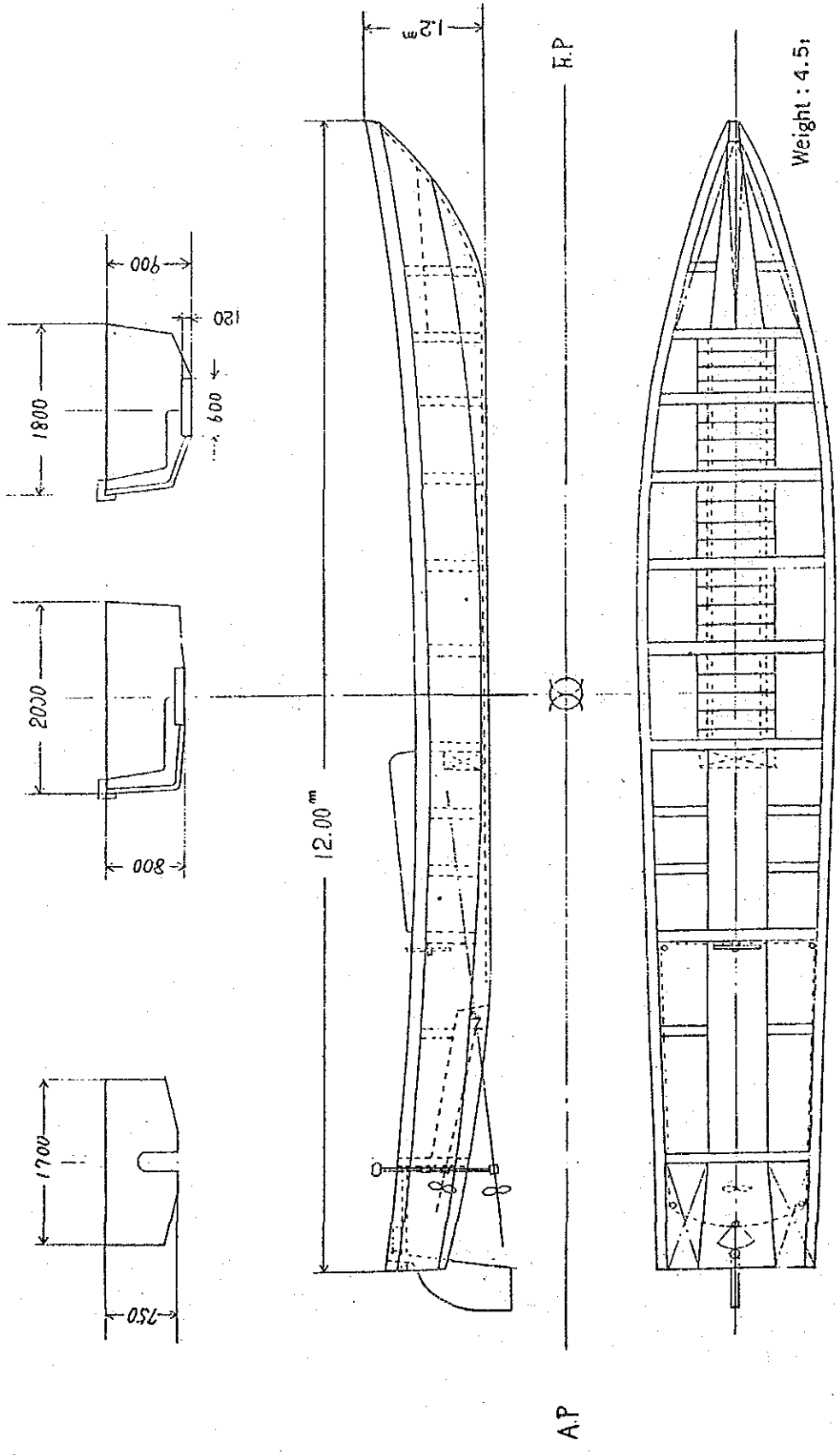
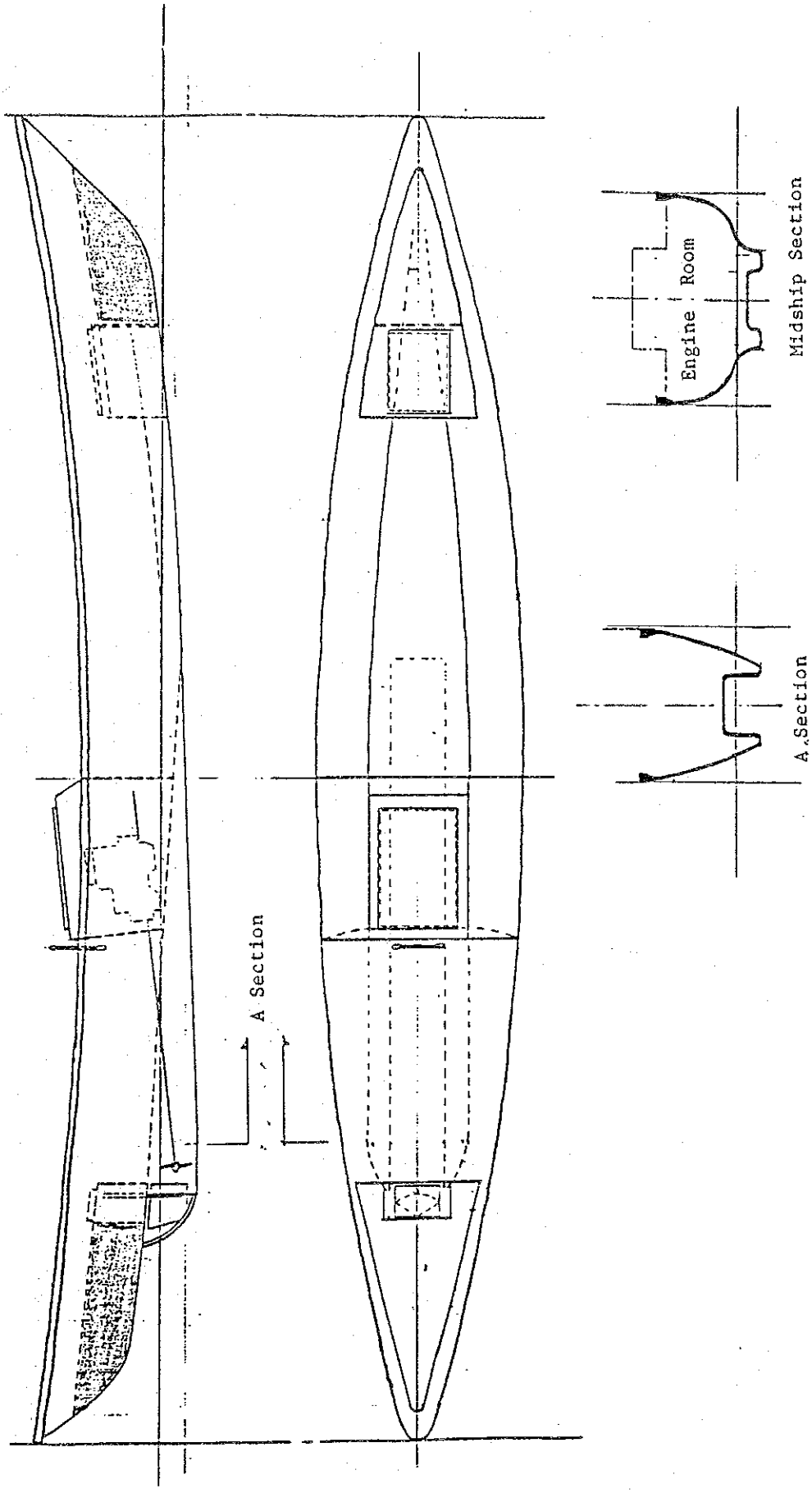


Fig. 19 Square bottom local canoe



CHAPTER VI IMPLEMENTATION OF THE PROJECT

CHAPTER VI IMPLEMENTION OF THE PROJECT

6-1 Organization

6-1-1 Ghana

This Project shall be supply of equipments and materials for fishermen in Ghana. The Fisheries Department is responsible for the Project. The granted equipments and materials shall be received by the Fisheries Department, and the Fisheries Department shall distribute these equipments and materials to four regions through the branch offices in proportion to the number of canoes. Table 19, 20, 21 and 22 show the equipments and materials distributed to each region. The Fisheries Department shall control and instruct fishermen so that the granted equipments and materials shall be used efficiently to promote Ghana's fishery.

6-1-2 Consultant

After the Exchange of Notes has been concluded, CONSULTANT of Japan shall conclude a consulting agreement with the Government of the Republic of Ghana in conformity of the procedure of the Japanese Grant Aid. The followings are the duties of CONSULTANT.

1) Preparation of Tender Documents consisted of Detail Design Drawings, Specifications and Technical Informations and others.

2) Selection of the CONTRACTOR through Tender and, Assistance to the Government of the Republic of Ghana in conclusion of the Supply Contract.

3) Supervision of Manufacturing Work.

6-1-3 Contractor

CONTRACTOR shall select the Maker in Japan and

complete making of materials in accordance with Detail Design Drawing, Specification and others and deliver them within the period of the CONTRACT.

6-2 Execution Plan

Execution Plan shall be given at Table-18.

6-3 Granted Equipments and Materials

All equipments and materials shall be prepared in Japan. It is estimated that implementation of the Project will take about 12 months.

1)	Outboard motors 40HP		820
2)	Replacement parts for outboard motors		
	1 unit for 250 motors	40HP	4 units
		25HP	1 unit
3)	Tools		
	1 unit for 1,000 motors		4 units
4)	Fishing materials		
	Purse seining net		60 sets
	Gill net		4,000 TAN
	Hook		for 300 canoes
5)	Fishing materials for "Kakadiama"		1 set
6)	Stationary net		3 sets
7)	Outboard diesel engine		4
8)	Truck (Pick-up type)		3

Table-18 Execution Plan

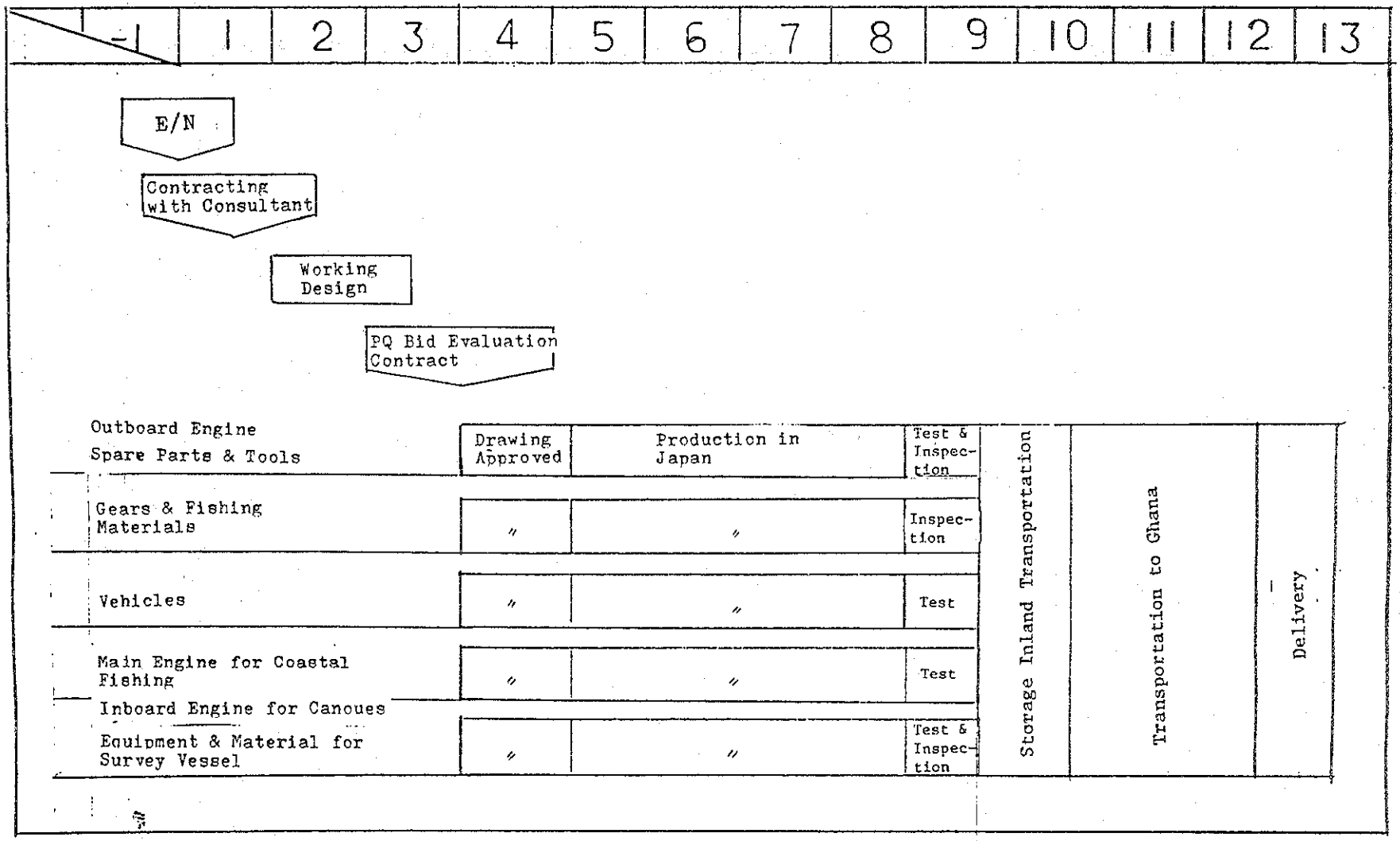


Table-19 Equipment & Material List for Volta & East Great Accra

Data of District		Fishing Method	Name of Canoue	Population of Fishermen	Name of Designated Village	No. of Canoue	No. of Outboard Engine Granted	No. of Fishing Tools Granted
Name of District	Volta & East Great Accra	Line Fishing	About 200	About 1,000	Ahwin	92	20	Bottom Long Line 10
					Pramkram	47	10	Vertical Line 27
								Hand Line 55
Centre Name	Tema	Small Purse Seine & Beach Seine	About 400	About 7,000	Atrko	17	6	A - 36
					Lolonyah	28	9	B - 28
								C - 36
								D - 18
Total Number of Canoue	About 1,300	Purse Seine	About 700	About 7,300	Lolonyah, Goi & Anyamam	163	80	E - 28
								F - 6
					Akplabanya & Tema(Canoe - Beach)	157	70	G - 6
Population of Fishermen	About 16,000	Gill Net	About 100	About 700	Totop & Goi	16	2	
					Tema(Canoe - Beach)	19	3	
Total			About 1,400	About 16,000		539	200	

Each one set of Replacement Parts and Special Tools are granted to the Fisheries Department and its Tema Branch.

Table-20 Equipment & Material List for West Great Accra

Data of District		Fishing Method	Name of Canoue	Population of Fishermen	Name of Designated Village	No. of Canoue	No. of Outboard Engine Granted	No. of Fishing Tools Granted
Name of District	West Great Accra	Line Fishing	About 300	About 2,000	Mingo	61	20	Bottom Long Line 10
					Osu	90	30	Vertical Line 40
								Hand Line 80
Centre Name	Accra	Small Purse Seine & Beach Seine	About 200	About 3,000	Prampram	38	12	A - 56
					Labadi	24	8	B - 45
								C - 56
								D - 28
Total Number of Canoue	About 1,600	Purse Seine	About 900	About 1,500	Teshie	242	90	E - 45
					Accra(Light House)	221	80	F - 12
								G - 12
Population of Fishermen	About 21,000	Gill Net	About 200	About 3,000	Accra(Light House)	20	3	(七寸 30
					Kpone & Tema	29	7	Multi 400
								Mono 400
Total			About 1,600	About 21,000		725	250	

Replacement Parts and Tools are granted to the Accra Service Centre, Fisheries Department

Table-21. Equipment and Material List for Central District

Data of District		Fishing Method	Name of Canoue	Population of Fishermen	Name of Designated Village	No. of Canoue	No. of Outboard Engine Granted	No. of Fishing Tools Granted
Name of District	Central	Line Fishing	201	1206	Winneba (Eyipe)	70	25	Bottom Long Line 10
					Apam	76	25	Vertical Line 27
								Hand Line 55
Centre Name	Elmina & Wineba	Small Purse Seine & Beach Seine	85	3315	Cape-Coast (High Court)	12	3	A - 40
								B -32
					Elmina (Banluma)	9	2	C - 40
								D - 20
Total Number of Canoue	2,535	Purse Seine	1,424	21,360	Elmina (Main Elmina)	127	60	E - 32
								F - 8
					Winneba (Eyipe)	194	90	G - 8
Population of Fishermen	31,656	Gill Net	825	5,775	Moree	39	8	(t2 150
					(Abokomano)	32	7	Multi 1300
								Mono 1300
Total			2,535	31,656		559	220	

Replacement Parts and Special Tools are granted to Winneba Technical Service Center.

Table-22 Equipment and Material List for Wester Districts

Data of District		Fishing Method	Name of Canoue	Population of Fishermen	Name of Designated Village	No. of Canoue	No. of Outboard Engine Granted	No. of Fishing Tools Granted	
Name of District	Western	Line Fishing	41	246	Secondi & New Takoradi	21	16	Bottom Long Line	4
								Vertical Line	6
					Lower Axim	18	14	Hand Line	10
Centre Name	Aakoradi		117	3,417	Awuna Krom	30	7		A - 68
					Anlomatwpe	11	3		B - 55
									C - 68
									D - 34
Total Number of Canoue	1,497	Purse Seine	351	4,914	Abuesi, Aboadze & Myiresia	500	120		E - 55
									F - 14
					Axim (All Axim Zone)	52	30		G - 14
Population of Fishermen	16,002	Gill Net	988	7,425	Shama (Apo & Bentsir)	80	30		200
								Multi	1,700
					Lower Axim	79	30	Mono	1,700
Total			1,497	16,002		791	250		

A lot of Replacement P arts and Special Tools are granted to Takoradi Training Center, Fisheries Department.

CHAPTER VII EVALUATION OF THE PROJECT

CHAPTER VII PROJECT EVALUATION

It is expected that the Project will produce the following development effects if implemented as scheduled.

7-1 Recovery of Catches

Outboard motors, fishing equipment and materials to be supplied under the Project will contribute greatly to restoring the catches by canoe fishing which is the mainstay of Ghana's fishery but has been on the decline in recent years.

7-2 Development of New Fishing Grounds

When existing canoes are equipped with a manual line hauler and gear for three kinds of angling fishery (hand line fishing, vertical line fishing and bottom long line fishing), it will become possible to develop new, 400 - 500 m deep fishing grounds outside the continental shelf. This will make it possible to add catches of deep sea shark and other new species to snapper, hake and grouper currently caught by canoes.

7-3 Fishing Efficiency Improvement and Fuel Cost Reduction

All engines mounted on existing canoes are outboard engines for propelling the boat. This means that power equipment effective in increasing the fishing efficiency such as generator cannot be installed. For this reason, if skipjack clippers catching sardines for pole and line fishing bait are in the same fishing ground where canoes are engaged in fishing, the catching rate is far greater for the former because they use fish lamps effectively and also employ an efficient fishing method.

This poses a serious problem for canoe fishermen who, having no powered line hauler, are forced to engage in hand

line fishing which can be operated only in shallow areas with a depth of 50 - 60 m.

If a practical diesel inboard engine for canoes is developed on the basis of its mounting and running test at the sea, the catching capacity of canoes will be phenomenally increased. The diesel inboard engines will also exhibit great fuel economy, cutting down the fuel cost to about one-fourth the amount required for conventional gasoline outboard engines (Table 19).

7-4 Promotion of Survey Activities of Research Vessel "KAKADIAMA"

"KAKADIAMA," supplied to Ghana by the 1978 Japanese Grant Aid, is given high evaluation for its fisheries research activities conducted since August 1979. The new equipment and parts to be supplied for "KAKADIAMA" under the Project will enhance its research activities, enabling it to make continued contributions to the development of Ghana's fisheries.

CHAPTER VIII CONCLUSION AND RECOMMENDATIONS

CHAPTER VIII CONCLUSIONS AND RECOMMENDATIONS

8-1 Conclusions

The Ghanaian fishery has been on the decline in recent years owing to the shortage of the country's foreign currency reserves, with the total fish catch either levelling off or going slightly below the average level.

After completing the field survey and a series of discussions with the competent Ghanaian authorities, the Team reached the conclusion that in order for Ghana's fishery to be able to recover from the prevailing downward tendency and regain the previous level of catch, highest development priority should be given to canoe fishing which accounts for 60% of total catch.

To be more specific, the Team considered it necessary to supply 510 units of 40 HP outboard engines for revitalising canoe fishery as well as repair parts and tools for ensuring longeval, fault-free operation of such outboard engines. The field survey disclosed that canoe fishery is now faced with an extreme deterioration of fishing gear including, in particular, fishing nets which have been repetitively repaired by fishermen to the extent that they can barely meet the purpose of net fishing operation, with their performance reduced to half the original level. The fishing equipment and materials to be supplied under the Project will therefore be designed to produce an immediate stimulating effect on canoe fishery by incorporating Japan's advanced, unique fishing techniques.

Regarding angling fishery which is established as an independent fishing method, the Team took into consideration the necessity for introducing line haulers and advanced fishing gear to meet the technical requirements for developing new, deep sea fishing grounds at depths of more than 70 m.

When canoe fishery is mechanised by the introduction of inboard diesel engines, it will become similar to small-scale inshore fishery in terms of fishing method, and the difference in fishing efficiency now observed between the two types of fishery will eventually disappear. For small fishing boats engaged in inshore fishery, which are just about the same as canoes in length (10 - 12 m) and use canoes for transportation between the beach and the offing where they cast anchor, the Team considered it necessary to supply 10 units of small-type diesel engines. It is foreseen that these engines, which serve the dual purpose of propelling the boat and supplying power for operating fishing machines, will enable Ghanaian fishermen to improve the inshore fishing efficiency by their stimulated self-help efforts.

Besides the assistance in equipment and materials mentioned above, which more or less has the character of a symptomatic treatment, or an emergency measure, for restoring the production of Ghanaian fishing industry in a short time, two other positive plans for strengthening Ghana's fishery were formulated for execution under the Project. One of them is the introduction of small stationary net fishing aimed at catching the great masses of sardines migrating periodically with sea currents, and the other is the onboard test of diesel inboard engines intended to mitigate two drawbacks of canoe fishery mechanisation by outboard engine introduction, i.e., the high fuel cost and the inability to supply power to generator and fishing machines.

The scope of equipment and materials supply for the Project, as considered necessary by Team, also covers the following. Spare parts of the main and auxiliary engines, echo sounder recording paper for two years, and refrigerating machine repair parts will be supplied for ensuring the smooth

operation of "KAKADIAMA" which has been engaged in important research activities since its delivery to Ghana in August 1979, and three units of double-cab pickups will also be supplied for the field service staff of the Fisheries Department to facilitate fishing village patrol service.

8-2 Recommendations

The following recommendations are made to assure that Ghana's Fisheries Development Plan will be implemented smoothly and Japan's Grant Aid will be utilised most efficiently to attain the Plan's objectives.

(1) Efficient Utilisation of Equipment and Materials

The Fisheries Department is urged to provide adequate guidance in efficient utilisation of the equipment and materials to be supplied under the Project in order to ensure a fast recovery of fish catches, and to special note of the fact that small stationary nets and inboard engines for canoes were included in the scope of supply to promote the research and development activities essential for quick modernisation of Ghana's fishery. The stationary nets and inboard engines may not be very effective in meeting the immediate need of recovering the fish catch, but they will play an important role in promoting the long-range development of the country's fishing industry.

Specifically, the stationary nets will greatly improve the productivity of inshore fishery because of its unique, high fish catching performance that cannot be expected from purse seines or beach seines. Furthermore, in the course of trial operation of stationary net fishing, the Ghanaian fishermen will gain deeper knowledge about the foreshore geography, oceanographic conditions and fish species and will eventually be

inspired to evaluate the advantages of inshore fishery with a renewed recognition.

On the other hand, the canoe mechanisation by inboard engine introduction will invigorate canoe fishery and upgrade it to the level of inshore fishery by eliminating Ghanaian fishery's dual structure which is due to the coexistence of artisanal fishery based on traditional fishing techniques and modern fishery based on imported fishing techniques.

Introduction of inboard engines will expedite the structural improvement of canoe fishery by cutting down the fuel cost and by permitting the use of fish lamps and powered fishing machines which are conductive to higher fishing efficiency.

It is hoped that the Fisheries Department will conduct the trial stationary net fishing and the inboard engine test continuously as both are important and effective means of accelerating the development of Ghana's fishery. It is also hoped that the Department will keep collecting all necessary data essential for the Ghanaian fishing industry to take an enormous leap forward in the future.

(2) Long-term Fisheries Development Project

Ghana's fishery is now beginning to show signs of recovery, presenting an animated state resulting from the uptrend of national economy. However, this is to be construed not as an indication of structural improvement of the Ghanaian fishery, but as a reflection of integrated effects of emergency measures frequently enforced in the past for catch recovery.

For further development of the country's fishery,

it is necessary to formulate a long-term development project aimed at realisation of the following goals.

1) Construction of an exclusive fishing port fully equipped with all necessary facilities.

2) Construction of a manufacturing plant of important fishing gear and materials, such as fishing machines and fishing nets.

3) Extension of frozen/fresh fish supply areas by the use of refrigerated trucks.

4) Research and development of new fish processing methods that can take the place of conventional smoking and drying methods for extended process fish supply in inland areas.

(3) Relationship between Equipment Supply and Expert Dispatch Service

There are many countries offering fishery development assistance to Ghana. In many cases, however, the effect of such foreign aid is reduced markedly because the assistance in equipment and materials is not associated with technical cooperation. As cooperation in fishery development must inevitably cover the entire expanse of the fishing industry, it is very important to secure the services of able, experienced fisheries experts who are capable of comprehensive, unbiased judgement required in evaluating the effects of foreign aid, in formulating fishery development policies and measures from a long-range point of view, in providing the Ghanaian Government with advice and recommendations, and in maintaining the development effects of foreign aid.

A N N E X

Annex 1 NATIONAL FISHERIES POLICY AND ACTION PLAN 1984 - 1986

FISH PRODUCTION

INTRODUCTION:

Ghana has a fair sized fishing industry comprising marine fishing and inland fishing. Marine fishing has been the most important sector contributing about 80% of the total domestic fish supply and inland fish principally from the Volta Lake contributing the rest.

Statistics in fish production from 1970 to 1982 indicate that marine fish production has shown a declining trend from a peak of 249.1 thousand metric tons in 1972 to about 200 thousand metric tons in 1981, in overall decline of 20 per cent. The decline is more pronounced in the production of the deep sea fleet where 70% decline was evident. This was due to loss of fishing grounds in foreign waters.

Although the canoe sector production maintained its relative high productivity during the decade its net production also declined.

The industry as a whole duffered adversely from the general economic depression in the country, due to the fact that its effective performance depends on importedinputs the supllies of which had not been adequate or maintained at a reasonable level to allow for continous operation.

There is therefore the need to evolve policies, strategies and programmes to minimise or completely eliminate these problems of the fishing industry.

POLICY:

During the short term plan period, the Government policy on fish production will be:-

1. To promote increased fish production from both marine and inland water bodies for human consumption and the provision of raw materials for industries.
2. To promote the exploitation of specific fish species for export.

TARGET:

The Government in the plan period, will ensure an increase in the production of fish to meet about 50% of the national requirement for fish. This will be done as follows:-

..../2.

1984 - 1986 FISH PRODUCTION TARGETS

YEAR	POPULATION (MILLIONS)	FISH REQUIREMENT (000m/t)			PROJECTED DOMESTIC	DEFICIT (000m/t)
		HUMAN	ANIMAL	TOTAL		
1984	12.6	550.6	50.0	600.6	300	300.6
1985	13.0	568.0	58.3	626.3	330	296.3
1986	13.4	585.5	70.00	655.5	363	292.5

NB:- Projection of Annual Fish requirement for Human and Animals. Assuming 3% population growth rate and fish contributing 60% of National protein requirement in relation to projectd Annual Production and Deficits.

STRATEGY:

i. For rapid increase in fish production during the plan period, emphasis will be placed on canoe fishery. The entire traditional canoe fleet of some 7,000 will be increasingly mechanised by equipping them with appropriate motors.

ii. Landing beaches and other infrastructural facilities, including repair and maintenance, cold storage, ice making plants processing facilities, fish handling etc. will be improved and developed in potential areas.

iii. Large scale fish farms will be simultaneously developed in association with appropriate irrigation projects. A reasonable percentage of the area should be devoted to fish farming if the areas are suitable for the purpose. Construction and running of private, commercial and household fish ponds will be encourage through extension education.

iv. Government will promote and encourage the production of fingerlings as foundation stock from hatcheries and pilot fish farms which would be established in all regions. The public will be educated and encouraged to use all available water bodies for fish production.

v. Formulation of appropriate fish feed would be developed simultaneously as fish farming activities increase.

iv. The development of tuna fishing will be promoted by encouraging Ghanaian to go into tuna fishing either alone or through joint ventures with foreign partners.

vii. The percentage of tuna exports by each tuna fishing vessel will be reviewed after payment for the vessel has been completed.

viii. Broken down vessels and machinery will be rehabilitated wherever possible.

ix. The fish catching efficiency of all production units namely the canoe fleet, the inshore fleet and the deep sea fleet will be improved by providing them with their basic inputs such as fishing gear, marine engines, navigation and communication equipment, deck machinery as

...3/

well as requisite spare parts.

x. Scientific research by the Department of Fisheries and other research institutions as well as international agencies will be encouraged to support all sectors of the fishing industry with emphasis on quaculture and the development of coastal lagoons.

xi. Fishermen Service Centres will be established as foci for development.

xii. Training courses normally organised by the Department of Fisheries would be intensifed.

xiii. Naval patrols of Ghana's territorial waters would be intensified and existing fisheries regulations should be vigorously enforced to minimise poaching and diversion of catches on the high seas.

ACTION PLAN

Average fish production statistics from 1978-82 indicate the following productive efficiencies in the various production units.

AVERAGE % CATCHES	CANOE FLEET	INSHORE FLEET	DEEP SEA FLEET	TUNA FLEET	INLAND FISHERY
1978 - 1982	61.5	7.4	7.6	5.3	18.1

For details see table 7

From the above statistics, it is clear that for immediate expansion in fish production, emphasis must be placed on canoe fishery. The fishing industry and its supporting industries such as boat building, drydocking, cold storage, canneries, net manufacturing etc. depend almost entirely on imported inputs. Government will provide the needed foreign exchange to procure these inputs on adequate, sustained and timely basis to meet the industry's needs. The programme envisages a total import expenditure of ¢85.12m for 1984, 85 and 86 and total local cost (constructional works) ¢54.90m for 1984, 85 and 86.

S U M M A R Y

FISH INPUT REQUIREMENT

	Foreign Exchange in US $			Local Currency in Cedis		
	1984	1985	1986	1984	1985	1986
(a) Canoe Fishing						
Outboard Motors						
2500 units per annum	8.20m	8.20m	8.20m			
Spares	2.05m	2.70m	3.30m			
	10.25m	10.90m	17.50m			
(b) Beach improvement Works	-	-	-	1.5m	1.5m	1.5m
(c) Inshore Fishing						
Marine engines						
+ 20% spares						
(100 units total)	12.1m	12.1m	12.1m			
Supporting Industry						
(Cold Store, ice plant,						
smoking facilities)	1.80m	1.80m	1.80m	2.0m	2.0m	2.0m
(d) Fish Farm Construction						
(110 ha total)	-	-	-	6.0m	6.0m	3.0m
(d) Fishing gear						
Nets, 30,000 bales	2.95m	3.0m	2.50m			
Cordage (twines, ropes etc)	1.06m	0.45m	.35m			
Floats (10 million pieces total)	0.09m	0.09m	.14m			
Lead (10,000 boxes)	0.05m	0.05m	.10m			
	4.09m	3.59m	3.09m	9.50m	11.90m	6.50m
Grand Total	28.24m	28.39	28.49m	9.50m	11.90m	6.5m

ANNEX-2

Members of the Study Team

1. Mr. Saburo Masai (Leader of the Team)
   Overseas Fisheries Cooperation Foundation

2. Mr. Kenji Ishiwata (Project Coordinator)
   Kanagawa International Fisheries
   Training Center, JICA

3. Mr. Tamio Akaoka (Fisheries Development Engineer)
   D & A Engineering

4. Mr. Makoto Yamazaki (Fisheries Engineer)
   C & A Engineering

ANNEX-3

Day No.	Date & Day of Week	Schedule	Contents of Survey	
9	Nov. 4 Sun.	12:00 lv. Accra	09:00	Meeting Hearing from Mr. Furuta about fisheries situation over there
		13:30 ar. Winneba		
		15:30 lv. Winneba	19:30	Meeting with an officer of Branch Office of Fisheries Department
		18:30 ar. Takoradi (stay in Takoradi)		
10	Nov. 5 Mon.		05:00	Inspection - Purse Seine operation.
			08:00	visit Takoradi Branch Office, Fisheries Dept. and hearing about fisheries situation over there.
			09:00	Inspection - Takoradi Port
		15:00 lv. Takoradi	09:30	visit Director of Western District
		20:00 ar. Accra (stay in Accra)	09:50	Inspection - Shipbuilding Cold Store, Work Shop, Fishing Service Center.
11	6 Tue.	stay in Accra	09:00	Preparing for Minutes at Fisheries Dept.
			11:00	visit Minister of Agriculture
12	7 Wed.		09:00	Exchange signature on Minutes at the Embassy
		11:50 lv. Accra by WT-915		
		11:20 ar. Lome (stay in Lome)	15:00	visit Ministry of Foreign Cooperation at Togo and meeting for itinerary
13.	8 Thu.	(stay in Lome)	08:00	visit Ministry of Regional Development and meeting
			14:00	hearing at Fishing Production Dept., Livestock Bureau, Ministry of Regional Development

Day No.	Date and Day of Week	Schedule	Contents of Survey	
14.	Nov.9 Fri.		08:00	Inspection - National Sales Corporation of Fishing Tools and Materials and Engine Repair Shop
			09:30	visit Fisheries Protection Bureau
			10:00	Inspection - Lome Port, Fish Market and fisherman's village
			14:00	meeting at Fisheries Production Dept. for specifications of gears and materials.
		stay in Lome	19:30	Dinner Party sponsored by Ministry of Regional Development
15.	10 Sat.		05:00	Inspection - Purse Seine operation
			08:00	Inspection - Togo Lake & raising facilities
			14:00	re-visit National Sales Corporation of Fishing Tools and Materials and make drawings of trawl net
		stay in Lome	19:00	meeting
16.	11 Sun.	08:00 lv. Lome		Survey - Fish consumer in farming villages
		09:30 ar. Kpalime		
		16:30 ar. Lome (stay in Lome)		
17.	12 Mon.		08:00	Making minutes at Fisheries Dept for all day through.
			19:30	Dinner Party sponsored by Survey Team .
18.	13 Tue.		09:00	visit Minister of Regional Development
			14:00	meeting and arrangement of data and information
		(stay in Lome)	16:00	Exchanging signatures on minutes at Fisheries Dept.

Day No.	Date & Day of Week	Schedule	Contents of Survey
19.	Nov.14 Wed.	11:20 lv. Lome by RK-105 12:20 ar. Abidjan (stay in Abidjan)	15:00 meeting and arrangement of data and information
20	15 Thu.		10:00 Report the result of survey at Japanese Embassy at Ivory Coast 12:00 Lunch Party sponsored by the Embassy 15:00 preparation for return trip 21:00 lv. Abidjan by UT-846 (stay on plane) via Nouakchott
21	16 Fri.	08:00 ar. Paris (stay in Paris)	
22.	17 Sat.	12:00 lv. Paris by AF-270 (stay on plane)	via Moscow
23.	18 Sun.	10:30 ar. Tokyo	

ANNEX-4

Agreed Minutes of Discussion of Fishery Development Project in Ghana

In response to the request of the Government of Ghana for the fisheries development project, the Government of Japan sent, through Japan International Cooperation Agency (JICA) a study team headed by Mr. Saburo Masai, Counsellor, Cooperational Promotion Department, Oveaseas Fishery Cooperation Foundation to conduct a preliminary study for 8 days from 30th October to 6th November, 1984.

The team has conducted the field survey and had a series of discussions and exchanged views with the authorities concerned. As a result of the study and the discussions, both parties have reconfirmed the items of request for Japanese Aid with the order of priority made by the Government of the Republic of Ghana as listed in the Annex attached hereto.

Upon request of the Ghanaian side, the Japanese side agreed to convey the desire of the Government of the Republic of Ghana to the Government of Japan.

Mr. ~~Victor H.~~ Dowuona
Director of Fisheries
Fisheries Department
Accra - Ghana

正井三郎
Mr. Saburo Masai
Team Leader
Japanese Preliminary
Study Team

Accra, 7th November 1984

(1) Background of the Project

Republic of Ghana, independent from U.K. in 1957 is a typical agricultural country with the monoculture's economic structure and its economy depending on cocoaproduction as its main export crop. In order to get out of this economy that depends upon chiefly cocoa, Ghana has positively attracted foreign investment and asked for loans from abroad for the purpose of promotion of the industrialization policy. However before obtaining the fruits of these efforts, Ghana's economy has been severely affected by heavy decline of international price level of cocoa and so-called "oil crisis" and Ghana's foreign exchange reserve grew worse.

Ghana is a agricultural country, but on the other hand fishing activities such as purse-seine fishery pole and line fishery and trawl fishery as well as artisanal fishery supported by abundant marine resources are extensively carried out. Reflecting these fishing activities, the dezand for fish is increasing more and more in Ghana. Under the above economic situation, self-sufficiency in foods is of high priority for Ghana and the government is placing their hope on fisheries. However under the present severe shortage of foreign exchange reserve, they cannot import fishing gears machinery and other fishing equipment as they desire and that fishing inputs are becoming obsolete rapidly. Thus Ghana's fishing activities aiming at self-sufficiency in foods do not function well. In order to solve these problems the Government of Ghana has requested the Government of Japan to grant fishing gears, equipment and materials which are indispensable for fishing activities.

(2) Description of the project

In order to secure fish protein for the nation and increase in production of foods, the government of Ghana has requested to Japan to grant fishing gears and materials necessary for the three projects to develop the fishery as follows:-

(1) Research project for fishing development

Fishing gears and materials for:

(1) More effective practical use of the survey vessel "Kakadiana" granted from Japan in 1979.

(2) Development of expertise for harvesting deep bottom marine resources, especially beyond 70 metres of water on Ghana's continental shelf.

(2) Aquaculture project

Fishing gears and materials necessary for fresh water fish production averaging about 50,000 tons per year by means of spawning and culture in the ponds and reservioirs in various places in Ghana.

(3) Improvement project for artisanal and inshore fisheries:

Ghana is at present unable to import of fishing gears and other equipment such as outboard motors, inboard engines, fishing nets etc. in adequate quantities because of extreme shortage of foreign exchange. Consequently about 40% of coastal fishing boats are not operational. Under the circumstances, procurement of these fishing gears equipment and materials is planned under the Japanese grant aid so that Ghana could aim at improvement of operational rate of coastal fishing boats to increase food production.

Objectives of the study

In response to the request of the Government of Ghana, the Government of Japan has decided to conduct preliminary study on Fisheries Development Project through the Japan International Cooperation Agency (JICA) and have decided to send a team headed by Mr. Saburo Masai. The objectives of the preliminary study are as follows:

(1) To confirm the background of the three projects which were requested by the government of Ghana.

(2) To carry out a necessary study and evaluate the effects of the previous grant aid of Japan.

(3) To assess the urgency of each item and an appropriate scale of these items in the projects and to set up the priority and scope of the projects so that the most effective grant aid from Japan could be implemented.

Discussions

After discussing the requests made by Ghana it was agreed that the order of priority should be as follows:

(I) Improvement project for artisanal and inshore fisheries.

(II) Research project for fishing development.

(III) Aquaculture project.

Items I & II were accepted for implementation, whilst item III was to be taken in the future. The detailed requests are attached in the Annex.

ITEMS OF REQUEST

Project 1

Sub-item 1 - Artisanal Fisheries

(a) 40 hp outboard motors

(b) Spare parts for 40 hp and 25 hp outboard motors

(c) Fishing gear
- (i) Fishing nets
- (ii) Netting material for seining
- (iii) Mending Twines
- (iv) Hanging Twines
- (v) Lead and float lines
- (vi) Multi-purpose ropes

(d) Hooks and lines

- (i) Hand lines
- (ii) Long lines
- (iii) Hand winch for lines
- (iv) Portable compass

Sub-item 2 - Inshore Fishing

- (i) Marine engines with combination winches for trawling and purse-seining for 30'-60' vessels
- (ii) Trawling and purse-seine nets
- (iii) Synthetic purse-seine ropes.
- (iv) Galvanised wire ropes.

Project 2

Research Project for Fishing Development

(1) Machinery and equipment for new patrol and training vessel.

- (i) Main auxiliary engine
- (ii) Echo sounder and navigational equipment. safety equipment.
- (iii) Winch
- (iv) Anchors

(2) Machinery and equipment for "KAKADIAMA"

- (i) Echo sounder recording paper for 2 years.
- (ii) Spare parts for auxiliary and main engines for research vessel.
- (iii) Spares for refrigeration machinery

(3) Trap Nets

(4) Inboard engine installation trials and demonstration for canoes (2 units).

(5) 3 Pick-up vehicles regular (double cabin)

ANNEX-5

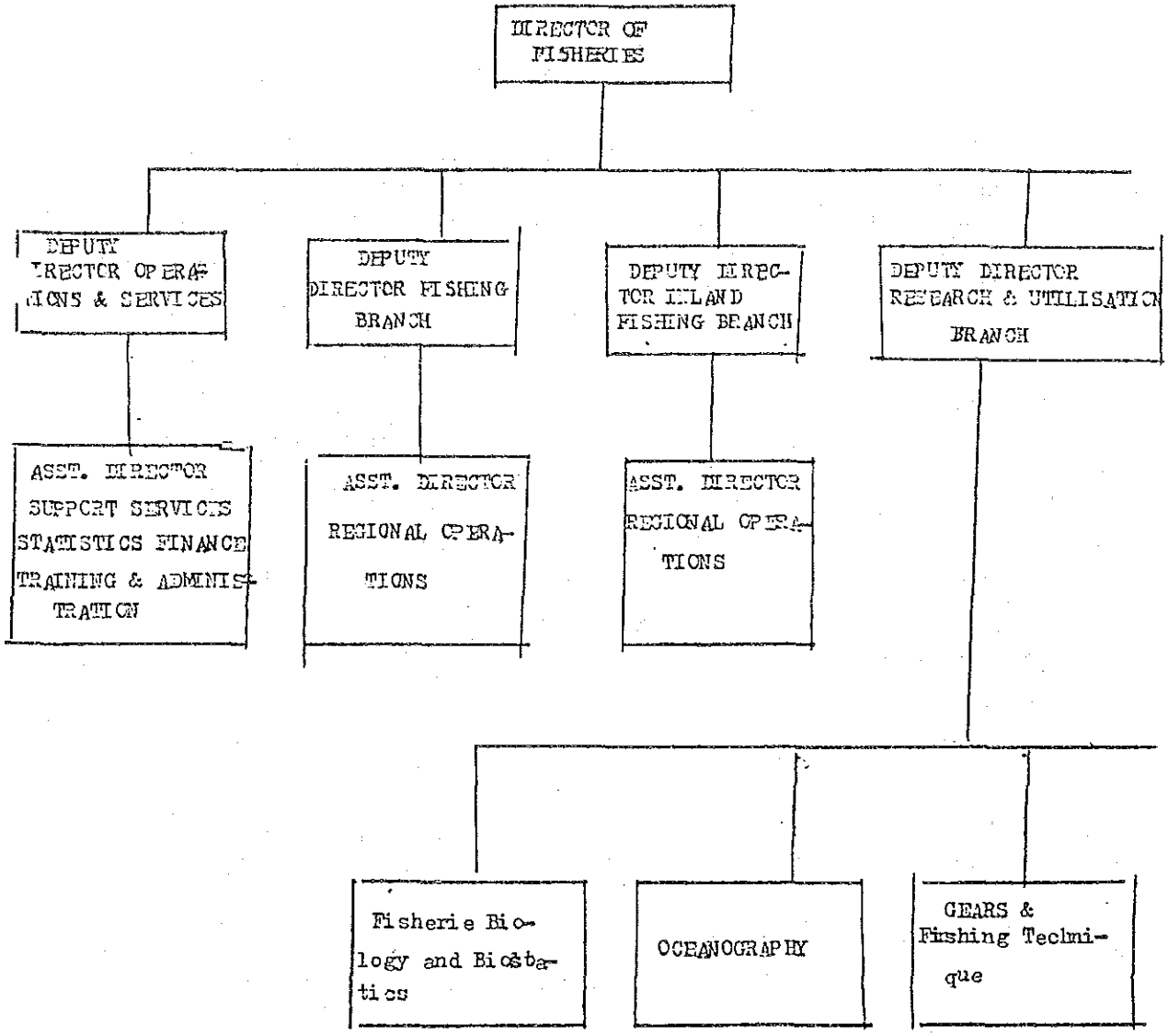
List of the Persons Concerned in Ghana

Fisheries Department	
Director	Victor N. Dowuona
Vice President	Marquaye Armah
Chief of Technical Section	Polix Johnson
Assistant Engineer	Gabriel Baddoo
Manager of Tema Regional Office	Adjei Lomo
Assistant Manager of Takorade Regional Office	George Hutchfine
Manager of Sekondi Regional Office	I. Barton Odro
Assistant Manager of Sekondi Regional Office	J. S. D-Hayfron
Governer of Western State	Don Arthur
Manager of National Fisheries Service Center in Western District	Joe A. Manlen

ANNEX-6

ORGANISATIONAL CHART

FISHERIES DEPARTMENT



ANNEX-7

GENERAL ADMINISTRATION
(GREATER ACCRA REGION)

1 Director
2 Deputy Directors
1 Assistant Direct
1 Assistant Fisheries Officer
1 Chief Technical Officer
1 Senior Technical Officer
1 Technical Officer
1 Senior Executive Officer
3 Clerical Officer
3 Artisan
8 Technical Assistant
4 Fitters
1 Demonstrator
2 Fishermen

Osu

CENTRAL REGION

1 Regional Fisheries Officer
1 Fisheries Officer
1 Principal Technical Officer
2 Senior Technical Officer
6 Technical Officer
1 Chargeman Mechanic
5 Artisans
2 Instructors
1 Coxswain
1 Clerical Officer
4 Fitters
11 Technical Assistants
4 Bosuns
6 Deckhands
2 Fitter Apprentice

GREATER ACCRA REGION (TEMA)

1 Regional Fisheries Officer
1 Senior Technical Officer
2 Technical Officers
6 Instructors
1 Gear Technician
2 Artisans
1 Storekeeper
1 Clerical Officer
1 Learner Technical Officer
14 Technical Assistants
2 Demonstrator
3 Bosun
3 Fishermen
4 Fitter

WESTERN REGION

1 Regional Fisheries Officer
1 Assistant Fisheries Officer
1 Principal Technical Officer
3 Technical Officer
1 Chargeman Mechanic
1 Junior Chargeman Mechanic
2 Instructors
2 Secondhands
4 Artisans
2 Gear Technicians
1 Coxswain
6 Fitters
1 Electrician
6 Bosums
14 Technical Assistants
4 Fitter Apprentice

VOLTA Region

1 Regional Fisheries Officer
1 Senior Technical Officer
2 Recorders
6 Demonstrators
9 Fishermen
2 Technical Officers
2 Instructors

RESEARCH & UTILIZATION

1 Assistant Director
2 Senior Fisheries Officers
2 Assistant Fisheries Officers
1 Principal Technical Officer
3 Senior Technical Officer
1 Senior Executive Officer
1 Higher Executive Officer
23 Technical Officers
6 Learner Technical Officers
1 Junior Foreman
2 Secondhands
6 Artisans
2 Gear Technicians
2 Coxswains
1 Clerical Officer
13 Bosums
8 Fitters
11 Technical Assistant
2 Electricians
4 Deckhands

ANNEX-8

I N F O R M A T I O N R E P O R T

C A N O E F R A M E S U R V E Y,
G H A N A - O C T O B E R
1 9 8 1

B Y:

W. O D Ō I-A K E R S I E

A P R I L, 1982

F I S H E R I E S D E P A R T M E N T

A C C R A - G H A N A

PRELIMINARY ANALYSIS OF THE CANOE FRAME SURVEY - 1981

BY - W. ODOI-AKERSIE

Introduction:

In March, 1977, the Department of Fisheries conducted Canoe Frame Survey, the results of which have been used as basis for estimation of catch and effort of the artisanal fisheries sector. Since the last survey a lot of changes in terms of structure and size of the canoe fleet, fishermen population have taken place. Other economic parameters of the artisanal fisheries have changed over time. It is therefore, essential to up-date these data periodically, preferably on annual basis. However, because of the financial, transportation costs and time constraints, the surveys are carried out once every four years. The current survey was undertaken in October, 1981 with the following objectives:

(a) To establish the current number and structure of the canoe fleet as the basis for selection of sample landing sites for catch assessment of the artisanal sector.

(b) The information collected include the number of fishing villages, landing beaches, canoes by size category and activity or operation, level of motorization, migration patterns and different types of gears used.

(c) On the basis of the above information, to estimate the number of artisanal fishermen and their other economic activities.

(d) To identify and plan for provision of required fishing inputs for the industry.

The timing of the exercise is very crucial. It should be conducted either before or after the main herring season (June - September) when there is less migration of canoe and fishermen between landing centres. Accordingly the current survey was conducted in latter part of October, 1981. It took approximately two weeks to complete. Post census checks, which took additional five weeks to complete, were carried out at randomly selected fishing centres in the Volta and Greater Accra Regions and later in the Central and Western Regions Most of the data were obtained from the Chief Fishermen at their respective fishing villages. Some fishermen also assisted ourenumerators in identifying and physically counting the canoes. While majority of them co-operated with the field enumerators, there were few who refused to co-operate; the non- co-operation may tend to affect the quality of the data collected.

... /2

However, the response, on the whole, has been encouraging. The analysis which follows is based on the available data collected by the field enumerators.

Canoe Fleet

The 1981 Canoe Frame Survey reveals that the overall canoe fleet dropped from 8472 units to 6938 units in 1981 (Table 2). There is a reduction in fleet by 1534 units, representing 18 per cent. With exception of the Greater Accra Region where there is an increased of 12 per cent all other Regions experience a drop in the fleet, the highest drop of 33 per cent coming from the Central Region. There is also a fall of 25 per cent and 9 per cent respectively in the Western and Volta Regions. The increase in the canoe fleet in the Greater Accra Region is due mainly to addition of about 400 newly built Ali Canoes which have slightly bigger sizes than the normal. Of the total canoe fleet of 6938 recorded in 1981, Ali canoes account for 48 per cent, sdnet 30 per cent, beach seine 12 per cent and line canoe 10 per cent.

With regard to fall of 18 per cent of the ovbrall canoe fleet from 1977 to 1981, two main factors have been identified as the reason. The first factor is that of late canoe owners have been purchasing larger and newer canoe while abandoning the old small ones. This trend is clearly shown in the canoe composition for the two periods. The number of Ali canoes has increased in absolute terms, from 3005 in 1977 to 3359 in 1981 while there are corresponding decreases in setnet and line canoes. Beach seine canoes appear to have increase slightly. In relative terms, Ali canoes account for 48 per cent of the overall canbe fleet in 1981 as compared with 35 per cent in 1977 while setnet canoes account for 30 per cent in 1981 as against 41 per cent in 1982. The same is true for line canoes. IT follows that the smaller canoes which have shorter lifespan are being replaced with bigger canoes which take a longer period to manufacture. The rate of replacement is thus slower. The trend for bigger canoes is also supported by the fact that even though the canoe fleet have declined, the estimated fishermen have increased slightly from about 81,000 to around 84,000 (Table 4) over the period. This means that ratio of fishermen per canoe has gone up.

The second factor is that because of the problems of procuring fishing inputs and high operational costs, some fishermen who originally own . two or more canoes are prepared to sell off one. There is information to the effect that Ivorians and Togolese offer good prices for such canoes which are then taken out of the country by sea.

Level of Motorization:

The overall level of motorization of canoes is put at 58 per cent (Table 1). On regional basis the Greater Accra Region has the highest motorized canoes of 65 per cent, the Central Region 61 per cent, Western Region 55 per cent and Volta Region 20 per cent. In terms of Canoe classification, drift gillnet canoes are 80 per cent motorized, ali canoes, 77 per cent, line canoes 69 per cent, setnet canoes, 34 per cent and beach seine canoes 15 per cent.

Fishing Villages and Landing Beaches:

A total of 180 fishing villages comprising 222 landing beaches are covered in the canoe survey for 1981 as compared with 200 fishing villages and 238 landing beaches recorded in 1977. (Table 2). There is thus a decline in both number of fishing villages and landing beaches, over the four years. There appears to be a greater concentration of fishing villages and landing beaches as against wide dispersion especially of landing beaches in the past.

Estimated Canoe Fishermen:

Approximately 84,000 canoe fishermen are estimated tobe operating in the artisanal sector in 1981 as (Table 4) compared with 81,000 fishermen in 1977. Ali fishermen account for 55 per cent of the number, beach seine fishermen 20 per cent and the remainder going to setnet, drift net and line. On regional basis the x 38 per cent of the fishermen operate at the Central Region, 33 per cent at Greater Accra Region, 19 per cent in the Western Region and 10 per cent in the Volta Region. About 90 per cent of the fishermen are fulltime while the part time fishermen operate mainly with the beach seine, the latter are engaged on daily basis as net haulers.

Estimated Gear Unit:

The estimated fishing gear units are presented at Table 5. The set net gear unit appear to be more numerous (4,275 units) with over 50 per cent coming from the Western Region. The Ali gear follows closely (3,359 units with Greater Accra Region predominating. We are unable to estimate line gear units because of wide variations in sizes.

Migration and Fishing Holidays:

Usually a day or two in a week set aside for maintenance of fishing gear and canoes is known as 'fishing holidays'. Tuesday are observed as fishing holidays in the Greater Accra and the Central Regions. However there are some variations in the observance of fishing holidays in the Volta and Western Regions.

In the Western Region some beaches observe Sundays, other take either Tuesdays or Thursdays. In the Volta Region, Wednesdays, Tuesdays and Sundays are observed at different landing beaches. Eleven landing beaches from Border beach to Amutinu do not observe any fishing holiday as such. Except for few landing beaches, fishing operations are carried out throughout the year in almost all the regions. Generally migratory pattern of fishermen follows the seasonal imigration of herrings. At the start of the season around June the school of herring appear from the Western Region and move eastwards. Thus some fishermen from the Western Region migrate to Central and Greater Accra Regions for few weeks and return to base. Some fishermen from Ningo in Greater Accra Region migrate to Axim in the Western Region as well as to landing beaches of Denu, Abutiakope in the Volta Region. External l migration is also noted. Some fishermen based in Tema, Ningo, Ada and Prampram migrate to Togo, Benin and Ivory Coast.

~~Share System~~:

The shares of the proceeds of the catch vary from Region to Region and between various types of fishing (Table 9). After deducting all expenses for a fishing period, the proceeds are shared between crew, owners of canoe, net and outboard motors. For operation of Ali fishery crew receive on the average 45 per cent, motors and net 20 per cent each 15 per cent for canoe. Beach seine crew receive about 50 per cent, while canoes and net take approximately 25 per cent each. Crew for setnet and line receive higher percentage of 65% and 61% respectively.

Table 1

CANOE FRAME SURVEY 1981 (SUMMARY)

Region	Fishing Village	Landing Beaches	Beach Seine Canoe	Ali/Watsa Canoe	Setnet Canoe	Drift/ Gillnet	Line Canoe	Total
Volta	35	35	348(0)	92(80)	37(10)	1 (1)	6(4)	484(95)
Greater Accra	42	45	2[illegible](113)	1492(1075)	161(26)	73(56)	413(312)	2422(1582)
Central	37	65	85(8)	1424(1176)	773(242)	52(18)	201(104)	2535(1548)
Western	66	77	117(0)	351(263)	763(318)	225(207)	41(39)	1497(827)
Total	180	222	833(121)	3359(2594)	1734(596)	351(282)	661(459)	6938(4052)

No. of motorized in parenthesis.

COMPARISON OF CANOE FRAME SURVEYS
OF 1977 AND 1981

Table 2

Region	Fishing Village		Landing Beaches		Beach Seine Canoe		Ali/Watsa Canoe		Setnet Canoe		Line Canoe		Total	
	1977	1981	1977	1981	1977	1981	1977	1981	1977	1981	1977	1981	1977	1981
Volta	30	35	35	35	391	348	62	92	70	38	6	6	529	484
Greater Accra	53	42	53	45	142	283	1099	1492	430	234	484	413	2155	2422
Central	44	37	69	65	124	85	1615	1424	1624	825	422	201	3803	2535
Western	73	66	81	77	124	117	229	351	1370	988	262	41	1985	1497
Total	200	180	238	222	781	833	3005	3359	3512	2085	1174	661	8472	6938

*Includes drift/gillnet

Table 3

CHANGES IN 1977 AND 1981 CANOE FRAME SURVEY

Region	No. of Canoes	1977 % of Total	No. of Canoes	1981 % of Total	Change	% of Change
Volta	529	6	484	7	- 45	- 9
Greater Accra	2155	25	2422	35	+ 267	+ 12
Central	3803	45	2535	37	- 1268	- 33
Western	1985	24	1497	21	- 488	- 25
Total	8472	100%	6938	100%	- 1534	- 18%

Table 4

CANOE FRAME SURVEY - 1981
ESTIMATES OF CANOE FISHERMEN

Region	Beach Seine Fishermen	Ali/Watsa	Setnet	Drift/Gillnet	Line	Total Fishermen
Volta	5220	1196	259	7	36	6,718
Greater Accra	4528	20,888	966	438	2891	29,711
Central	3315	21,360	5411	364	1206	31,656
Western	4914	4,914	4578	1350	246	16,002
Total	17,977	48,358	11,214	2159	4379	84,087

Table 5

CA.CE FRAME SURVEY - 1981
ESTIMATED GEAR UNITS

Region	Beach Seine	Ali/Watsa	Setnet	Drift/Gillnet
Volta	348	92	37	1
Greater Accra	189	1492	403	73
Central	85	1424	1546	52
Western	117	351	2289	225
Total	739	3359	4275	351

*Line units are difficult to estimate because of wide variation in sizes.

*Other local names for setnet are: pataku, boso tenga, kroba tenga, mpataku.

Table 6

COMPARISON OF SURVEY STATISTICS

	1969	1973	1977	1981
No. of fishing villages	198	191	200	180
No. of landing beaches	269	257	238	222
No. of outboard motors	-	-	-	3698
Total No. of Canoes	8728	8238	8472	6938
No. of Ali canoes	2315	2244	3005	3359
No. of beach seine canoes	1587	1081	761	833
No. of setnet canoes	3347	2973	3532	1734
No. of line canoes	734	676	1174	661
No. of drift/gillnet canoes	-	-	-	357

Drfit/gillnets were separated from setnets only in 1981 survey

ANNEX-9

MARINE FISH LANDINGS - 1977/78

	1977		1978	
1) Canoe Fishery	m/t	₵	m/t	₵
i) Round sardine	9,581.6	10,127,809	40,257.3	65,976,237
ii) Flat sardine	14,696.0	16,560,254	11,069.5	25,983,735
iii) Chub mackerel	93.3	84,820	304.3	634,969
iv) Anchovy	35,042.9	15,323,548	51,424.1	21,140,144
v) Frigate macherel	13,913.7	7,155,822	1,047.3	3,441,002
vi) Seabreams	9,137.4	8,914,691	10,993.2	25,324,535
vii) Burrito	8,485.2	6,260,499	11,593.8	20,499,500
viii) Others	60,440.4	47,031.405	49,320.7	91,435.211
Total	151,390.5	111,456,858	176,010.1	254,435,333
2) Inshore Vessels				
a) Purse Seine				
i) Round sardine	2,342,100	2,944,951	6,126.092	8,763,639
ii) Flat sardine	1,697.342	2,367,379	1,920.996	2,289,745
iii) Frigate mackerel	671.725	1,016,963	250.810	742,794
iv) Scad mackerel	479.734	519,035	56.609	100,835
v) Others	1,554.466	2,070,801	516.828	1,081,938
Total	6,745.367	8,919,219	8,241.537	12,978,951
b) Trawlers				
i) Seabreams	1,972.594	2,750,409	1,340.646	4,150.685
ii) Cassava	530.837	675,585	496.168	825,206
iii) Burrito	993.034	992,214	892.808	1,448,819
iv) Trigger fish	5,895.951	1,729,290	5,561.256	3,684,102
v) Others	2,907.339	3,092,137	2,358.435	4,518.199
Total	13,299.765	9,159,635	10,647.303	14,627,011
c) Line	11.920	15,378	28.104	50,074
d) Set net	11,713	22,229	5,887	11,840
Total inshore Vessel	20,068.765	18,116,461	18,924.831	27,667,876
3) Distant water vessels				
i) Seabreams	3,435.79	2,303,121	3,505.38	3,154,842
ii) Trachurus	20,433.90	17,078,165	2,169.62	1,598,423
iii) Hake	33.34	27,116	116.62	85,133
iv) Herrings	19,921.24	4,317,706	13,112.10	10,227,438
v) Others	5,438.43	3,256.617	4,579.94	3,757,992
Total	49,322.70	25,983.4.6	23,603.66	18,823,828

.../2.

4) Tuna Ghana Flag	m/t	¢	m/t	¢	
i) Yellowfin	615.686	,502,708	250.431	Not Availab.	
ii) Big eye	230.066	187,849	181.447	– do	–
iii) Black skipjack	53.742	37,700	68.240	– do	–
iv) Skipjack	3,492.483	2,449,977	2,635.792	– do	–
v) Others	1,037.263	727,640	414.336	– do	–
Total	5,429.240	3,905,874	3,550.246	– do	–
5) Tuna Foreign Flag					
i) Yellowfin	4,351.302	3,552,838	2,872.657	– do	–
ii) Big eye	2,086.996	1,704,032	4,104.037	– do	–
iii) Black skipjack	468.391	328,575	491.198	– do	–
iv) Skipjack	22,840.906	16,022,896	29,506.698	– do	–
v) Albacore	0.075	61	–	– do	–
vi) Others	258.265	181, 173	457.773	– do	–
Total	30,005.935	21,789,576	37,432.363	– do	–
Total tuna	35,435.175	25,685,450	40,982.609	– do	–
5) Total domestic catch	226,211.21	160,462,639	222,088.637	– do	–
6) Tuna fish transhipped	34,609.839	–	36,802.915	– do	–
7) Tuna sold locally	2,705.698	–	1,557.144	– do	–
8) Fish imports	1,388.00	–	17,830.724	– do	–
9) Marine fish consumption	224,875.866	–	237,926.459	– do	–

104 204

156 626

MARINE FISH LANDINGS

(IN METRIC TONS)

CANOE FISHERY	1979		1980	
	M/T	₵	M/T	₵
Round Sardine	9,247.4	21,377,262	19,126.1	147,469,995
Flat Sardine	14,249.1	50,250,546	11,310.1	89,593,804
Chub Mackerel	51.8	115,153	43.4	991,036
Anchovy	36,675.9	53,489,160	37,908.1	93,502,871
Frigate Mackerel	4,286.2	15,287,245	7,565.8	127,390,555
Sea Breams	12,365.8	57,213,980	9,060.0	63,713,613
Burrito	13,329.8	44,092,204	8,057.4	97,799,515
Others	49,753.8	220,357.009	48,741.4	328,966,085
T O T A L	139,959.8	419,223,395	141,822.3	909,426,474
2. INSHORE VESSELS				
a. PURSE SEINE				
Round Sardine	3,580.733	10,133,990	2,706.235	18,321,530
Flat Sardine	1,603.961	8,084,785	610.605	5,272,573
Chub Mackerel	0.428	2,934	14.235	160,220
Frigate Mackerel	32.674	203,116	82.617	806,299
Others	1,224.242	6,188,089	1,411.844	11,952,713
T O T A L	6,442.038	24,612,914	4,825.536	36,513,335
b. TRAWLERS				
Seabreams	1,005.937	6,109,263	1,052.246	11,393,887
Cassava	356.137	1,584,259	336.267	3,291,180
Burrito	1,000.669	3,638,792	962.467	6,413,467
Trigger Fish	10,159.419	10,386,490	5,667.536	12,652,365
Others	2,606.974	8,192,100	2,749.325	19,595,021
T O T A L	15,129.136	29,910,904	10,767.841	53,345,920
c. LINE	6.113	22,267	9.629	84,646
d. SET NET	-	-	-	-
Total Inshore Vessels	21,577.287	54,546,085	15,603.006	89,943,901
3. DISTANT WATER VESSELS				
Seabreams	2,282.73	2,568,071	3,034.600	12,290,130
Trachurus Trachurus	2,047.78	1,646,415	3,766.520	15,106,080
Hake	59.40	47,758	981.520	3,926,080
Herrings	10,254.894	8,244,935	2,632.800	10,531,200
Others	6,200.801	5,980,673	8,671.625	33,819,337
T O T A L	20,845,605	18,487,852	19,087.065	41,853,490

2/....

4a. TUNA – GHANA FLAG				
Yellowfin	288.1	706,519	713.279	2,379,981
Big Eye	115.4	247,143	49.638	122,605
Skip Jack	3,908.1	7,593,897	4,804.693	11,893.866
Black Skipjack	131.2	132,250	17.029	21,482
Others	1, 139.9	1,616,353	2,024.007	2,627,353
T O T A L	5, 576.7	10,276,162	7,608.646	17,045,287
6. TUNA-FOREIGN FLAG				
Yellowfin	2,475.0	6,069,542	2,280.904	7,156,574
Big Eye	3,451.7	7,392,230	1,659.230	4,098,299
Skipjack	31,695.6	61,635.581	22,126.784	53.949,497
Black Skipjack	129.3	130,334	57.787	106,733
Others	1,410.4	2,005,194	2,122.593	2,571,344
T O T A L	39,162.0	77,232,881	28,247.298	67,882,447
TOTAL TUNA	44 ,738.7	87,509,043	35,855.944	84,927,734
TOTAL DOMESTIC CATCH	187, 959.392	502 533,494	184,121.017	1,058,269,152
Tuna Fish Transhipped	38,146.373		28,256.021	
Tuna SOLD Locally	2,095.216		4,219.905	5,215,752
Fish Imports(FROZEN)	1,127.95		494.910	
Marine Fish Consumpr	191,182.558		188,835.83	

113 385
111 597

Corrected

MARINE FISH LANDINGS
(IN METRIC TONS)

	1981		1982	
(1) Canoe Fishery	M/T	¢	M/T	¢
i. Round Sardine	10,066.5	149,750,759	14,186.7	84,423,629
ii. Flat Sardine	12,445.3	108,705,495	12,799.7	69,922,175
iii. Chub Mackerel	327.4	3,017,909	47.6	553,095
iv. Anchovy	67,535.5	483,565,181	37,292.1	73,496,016
v. Frigate Mackerel	4,095.7	79,612,816	5,926.0	71,338,900
vi. Sea Breams	13,353.4	187,047,847	10,713.1	58,963,796
vii. Burrito	4,351.0	51,384,447	10,693.5	50,945,860
viii. Others	37,648.4	455,816,587	49,251.7	254,681,463
Total	149,823.2	1,518,901,041	140,890.4	664,324,935
(2) Inshore Vessels				
(a) Purse Seine				
i. Round Sardine	4,982.19	30,365,787	5,778.850	34,673,100
ii. Flat Sardine	567.80	7,285,449	682.511	4,776,877
iii. Chub Mackerel	44.11	664,949	19.826	158,608
iv. Scad Mackerel	82.53	1,142,663	97,430	876,870
v. Others	1,019.31	11,372,833	1,343.942	10,751,536
	6,695.94	50,831,687	7,922.559	51,236,991
(b) Trawlers				
i. Sea Breams	1,093.21	5,261,419	989.366	7,904,294
ii. Cassava Fish	165.62	3,733,186	254.067	3,048,804
iii. Burrito	850.88	8,883,484	632.405	4,426,835
iv. Trigger Fish	5,371.50	22,246,234	4,045.601	20,228,005
v. Others	-	-	2,513.165	22,618,485
Total	10,039.16	84,360,842	8,434.604	58,226,423
(c) Line	1.97	26,349		-
(d) Set Net	0.88	4,800	-	-
	16,857.20	137,077,249	16,357.163	109,463,414

	1981		1982	
(3) Distant Water Vessels	M/T	¢	M/T	¢
i. Sea Breams	1,816.14	27,424,100	2,703.90	4,326,240
ii. Trigger Fish	485.79	1,943,160	230.24	899,317
iii. Cuttle Fish	113.32	453,280	908.25	1,271,550
iv. Herrings	800.31	9,603,720	5,449.45	76,292,300
v. Others	12,164.98	150,772,640	3,693.80	41,747,327
Total	15,380.54	190,196,900	12,985.64	124,536,734
(4a) Tuna - Ghana Flag				
i. Yellowfin	3,116,780	10,279,055	4,157.78	11,342,573
ii. Bigeye	167.238	403,730	529.33	1,117,831
iii. Skipjack	10,833,504	29,108,512	17,494.39	35,307,942
iv. Black Skipjack	396.977	240,569	617.65	374,288
v. Others	3,850,530	2,331,416	6,087.23	3,687,648
	18,365,029	42,363,282	28,886.38	51,830,282
(4b) Tuna Foreign Flag				
i. Yellowfin	941,771	3,134,742	1,110.40	2,832,869
ii. Bigeye	189.509	489,691	17.66	30,096
iii. Skipjack	21,653.480	58,091,600	11,041.59	30,869,308
iv. Black Skipjack	134.284	81,379	-	-
v. Others	3,888.611	2,356,500	5,190.99	3,145,742
Total	~~26,807,656~~ ~~18,365.029~~	~~64,153,912~~ ~~42,363,282~~	17,360.64	36,878,015
Total Tuna	45,172.684	106,517,194	46,247.02	88,708,297
(5) Total Domestic Catch	200,425.97	1,888,538,472	199,119.58	950,155,365
(6) Tuna Fish Transhipped	32,498.45		31,031.22	
(7) Tuna Sold Locally	9,011.674		10,500.0	
(8) Fish Imports (Frozen)	1,455.6		847.16	
(9) Marine Fish Consumption	192,528.21		181,530.36	

143680
120681