

**BASIC DESIGN STUDY REPORT
ON
FISHERIES PROMOTION PROJECT
IN
THE REPUBLIC OF GHANA**

MARCH, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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ON
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PREFACE

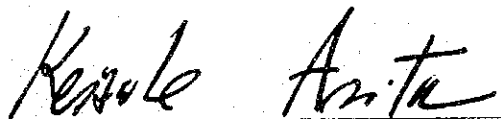
In response to the request of the Government of the Republic of Ghana, the Government of Japan decided to conduct a Basic Design Study on the Fisheries Promotion Project in Ghana, and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Ghana a survey team headed by Mr. Saburo MASAI, Counselor, Overseas Fisheries Cooperation Foundation, from October 27 to November 7, 1984.

The team had discussions with the officials concerned of Government of the Republic of Ghana and conducted a field survey. After the team returned to Japan, further studies were made and the present Report has been prepared.

I hope that this Report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Ghana for their close cooperation extended to the team.

March, 1985

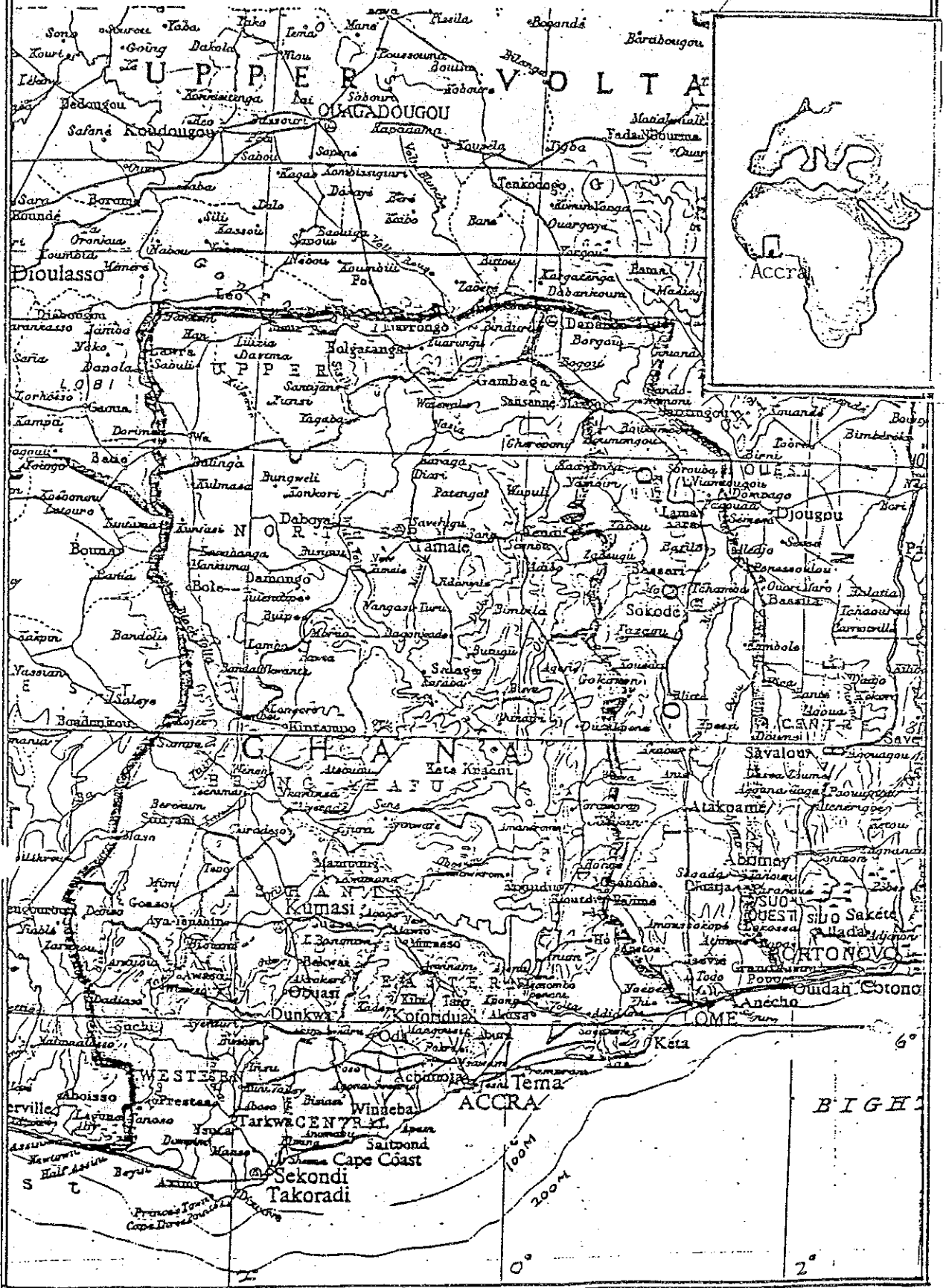


Keisuke Arita

President

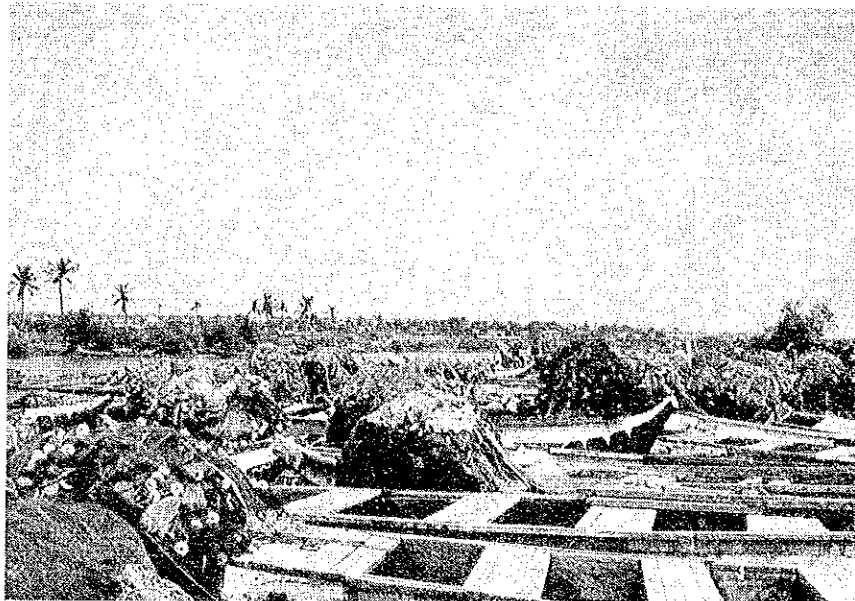
Japan International Cooperation Agency

GHANA

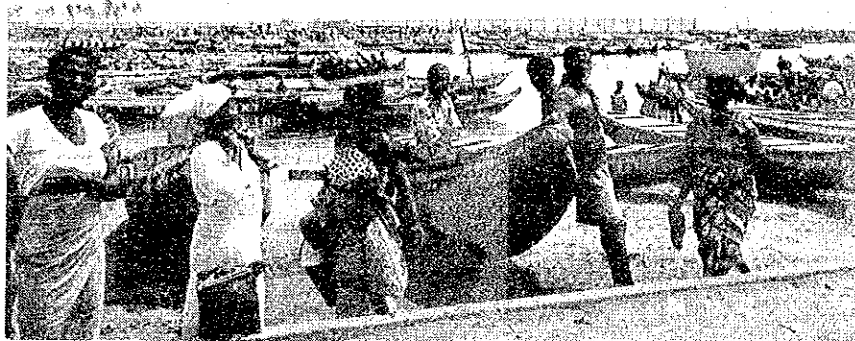


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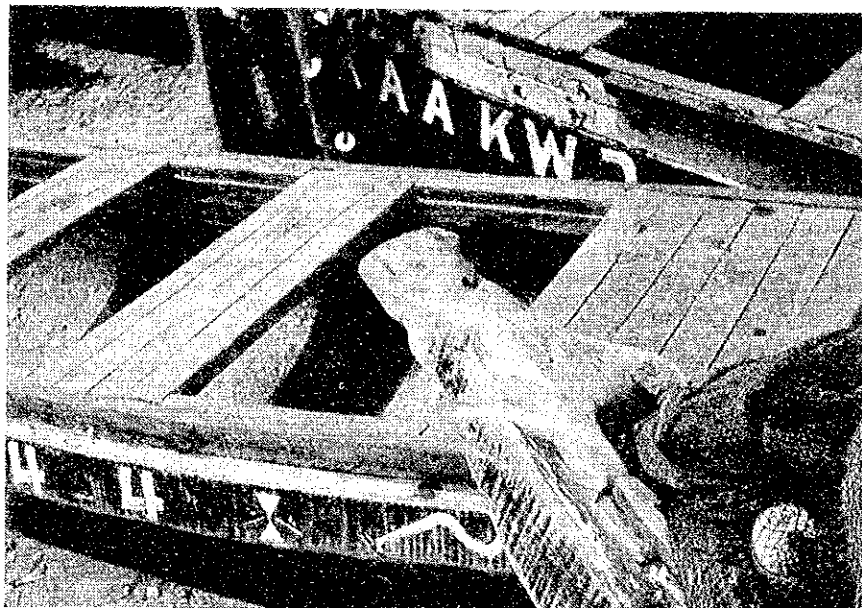
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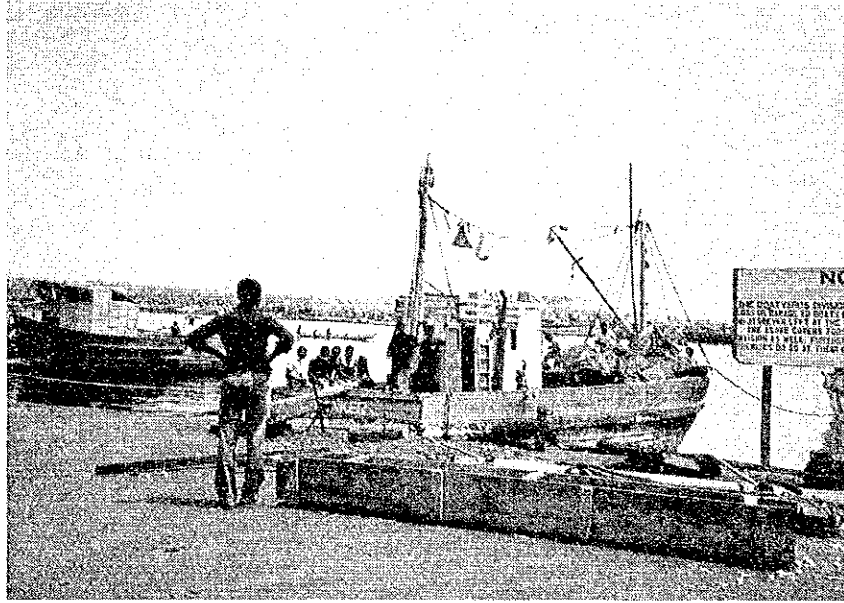
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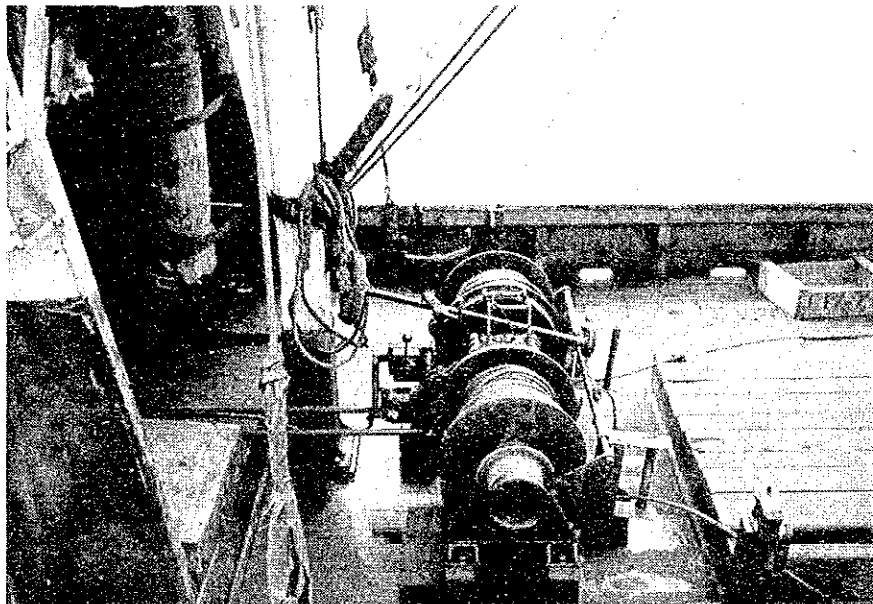
E. Repaired purse seining net



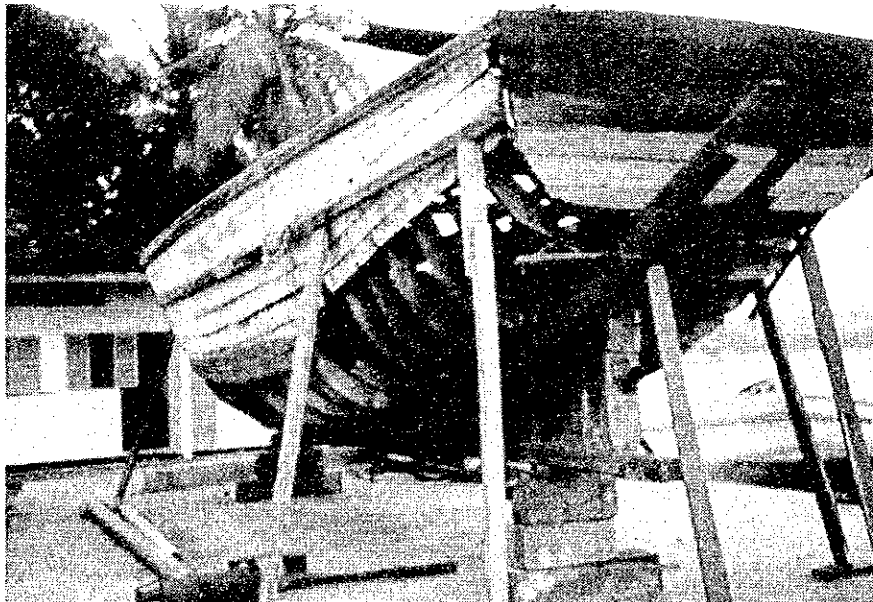
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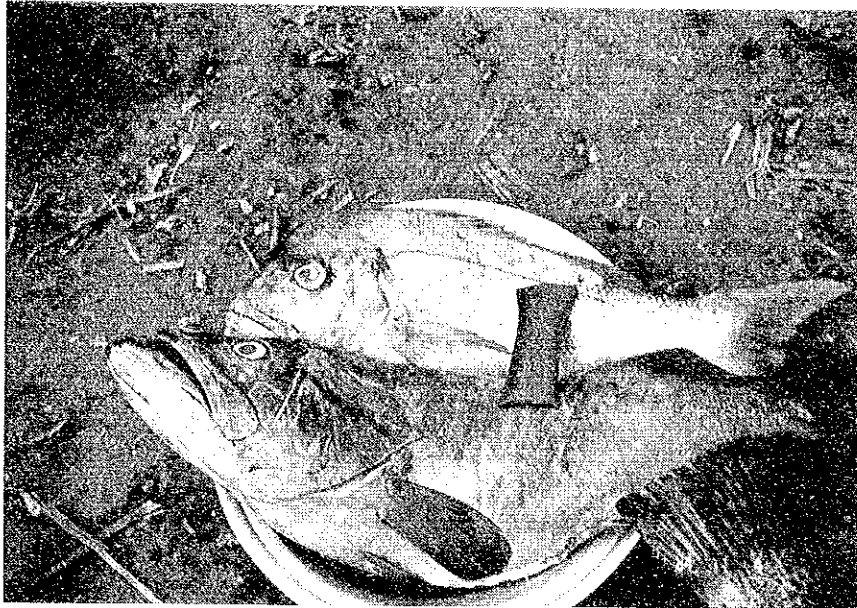
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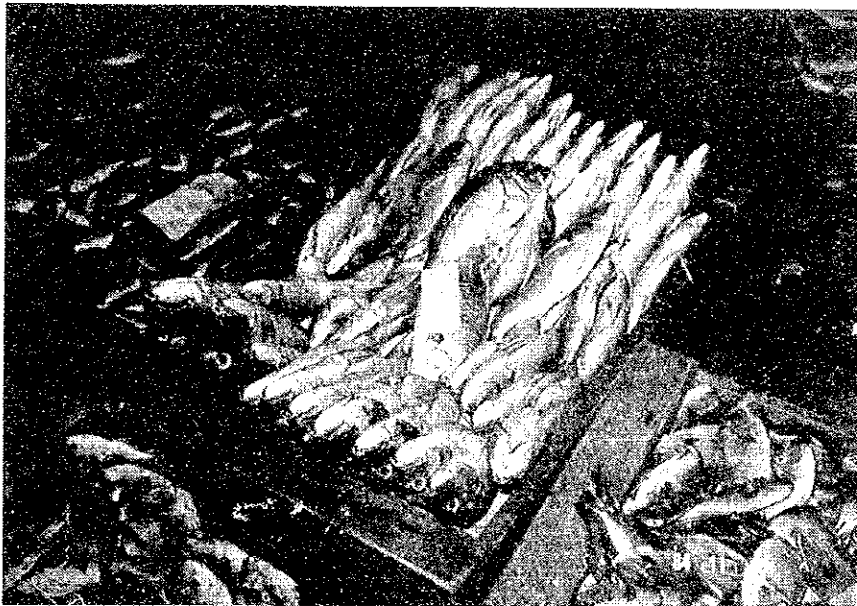
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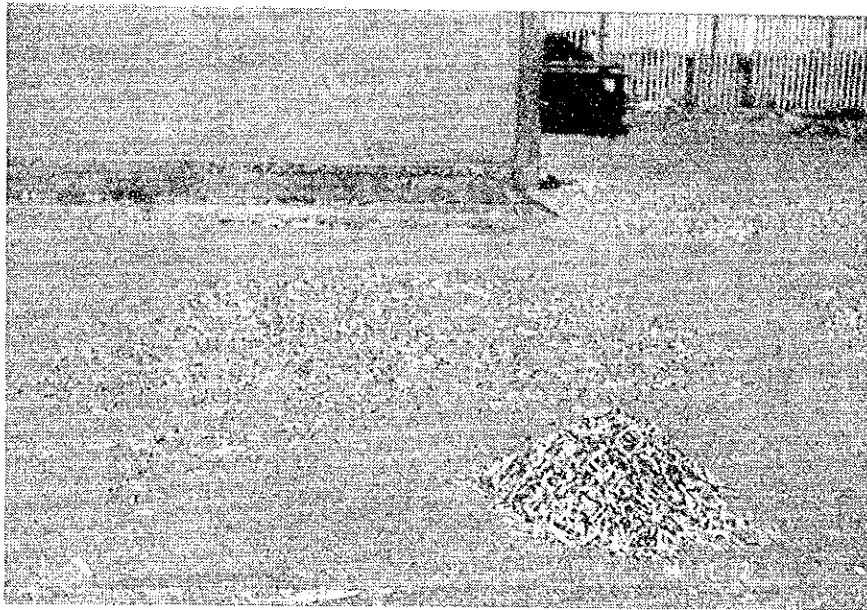
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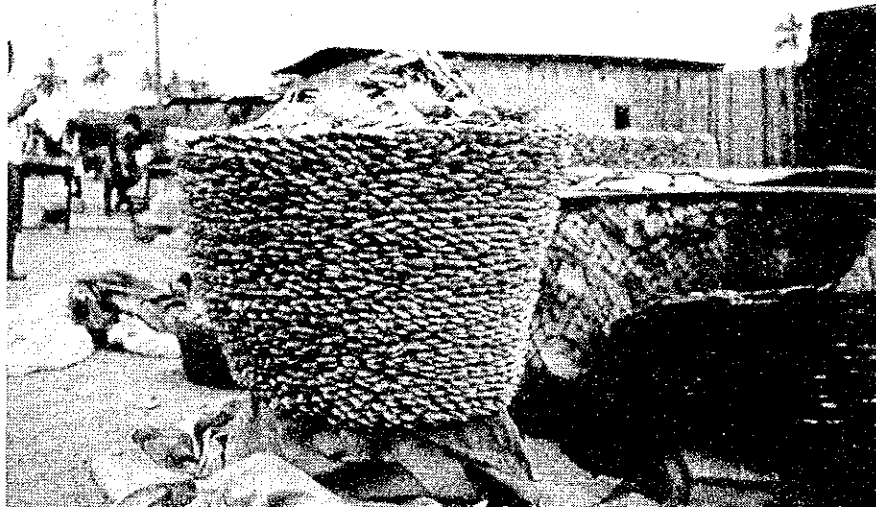
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S U M M A R Y

S U M M A R Y

The Republic of Ghana has consistently pursued its industrialisation policy since the country gained its independence in an effort to break out of its monocultural economy that depends heavily on cacao production and exports. However, owing to a number of drawbacks such as the sharp escalation of crude price, the decline of cacao price in the international market and the stagnant production of minerals, the country has not been quite successful in materialising the industrialisation policy and is still faced with a shortage in foreign currency reserves.

As a consequence, a serious shortage is observed in the supply of imported equipment and materials in many industrial areas. In the fishing industry, the deficient supply of fishing gear, fishing nets and replacement parts has caused an increasing number of fishing boats to be left idle (now accounting for 40% of all boats), with an eminent reduction also noted in the life span of outboard motors. The fish catches which are an important source of protein supply for the Ghanaian people have therefore been on the decline in recent years.

In order to recover and augment the fish catches, the Ghanaian Government formulated its "National Fisheries Development Policy and Action Plan (1984 - 1986)." The Action Plan was formulated and put into execution in 1984. It is considered, however, that the success of the Plan will depend on the possibility of appropriating a foreign exchange budget necessary for its continued implementation (approximately US\$28 million a year).

In view of the severity of the situation, the Ghanaian Government requested Japan to cooperate in the Plan by

providing a grant aid necessary for financing a project comprising three programs that constitute part of the Plan, i.e., (1) Research Program for Fisheries Development, (2) Aquaculture Development Program, and (3) Artisanal and In-shore Fishery Improvement Program.

Acceding to this request, the Japanese Government undertook to send a study team to Ghana to ascertain the contents of the Ghanaian request, study the background and justifiability of the project, and determine the propriety of providing the financial aid as requested, and entrusted the Japan International Cooperation Agency with the dispatch of the study team.

The study team headed by Mr. Saburo Masai (Overseas Fisheries Cooperation Fund) stayed in Ghana for a period of 12 days from October 27 to November 7, 1984, during which it visited fishing ports and fish processing plants, collected necessary information and data through interviews with individuals and organisations concerned with fisheries, and had a series of discussions with the officials of the Ghanaian Fisheries Department. The particulars of the agreement reached between the team and the Fisheries Department were laid down in the Minutes of Discussions signed by both parties on November 7, 1984.

The findings of field survey are introduced below in outline.

1. The Ghanaian fishery is classified into four types, i.e., artisanal fishery using canoes, inshore fishery, skipjack and tuna fishery, and offshore fishery. The former two are small in scale, and the catches from their operations are available as protein resources for domestic consumption. The latter two, which are relatively large in scale, are operated mainly for skipjack and tuna fishing and contribute to the country's foreign currency earnings as the catches of both fishes are

supplied only to export market. The artisanal fishery, employing the great majority of Ghanaian fishermen, accounts for about 60% of the country's total fish catch, or 75% of domestic fish consumption.

2. The catch by species, though varying by year, is the largest for sardines including anchovy (40%), then come tuna and skipjack (20%) and other species including snapper. 90% of sardines are caught by canoes.
3. As can be seen from the types of fishery and the catch by species mentioned above, artisanal fishery plays the most important role in supplying protein resources to the Ghanaian people. Although 70% of all canoes are now equipped with engines, these are all outboard engines which are short in life span, high in fuel consumption, and not usable with other fuels. To secure the required amount of catch, however, installation of outboard engines needs to be promoted for accelerated mechanisation of fishing operation, although it is certainly desirable to introduce inboard diesel engines to promote the fishery development from a long-range point of view. Introduction of stationary net fishing in addition to the currently employed purse seine and beach seine fishing methods will also be effective in increasing the efficiency of artisanal fishery.
4. Inshore fishery operated by purse seiners and trawlers has little prospect of future development. This is because purse seine net fishing is competing with artisanal fishing and trawling operations are limited owing to the small continental shelf area.
5. For the development deep sea fishery (water depth - more than 70 m), angling is more recommendable than trawling because it incurs less financial risk, produces an immediate catch increasing effect, and is also realistic.

6. The aquaculture development in inland waters should be preceded by basic research for solving a number of pending problems including bait acquisition, although it has future growth potentials.
7. The fisheries research vessel "KAKADIAMA" supplied from Japan in 1978 under its grant aid plan is now engaged in important survey activities necessary for the development of the Ghanaian fisheries.

The following are the quantities and specifications of major equipment and materials selected for the project implementation on the basis of survey results outlined above.

- 1) Equipment and materials for artisanal fishery

Outboard engines, 40 HP	510 units
Spare parts	4 "
Tools	4 "
Fishing gear and materials	1 set
- 2) Equipment and materials for fisheries research

Fishing gear and materials for "KAKADIAMA"	1 set
Small-type stationary nets	3 sets
Inboard diesel engines for canoes	4 units
- 3) Others

Trucks	3 units
--------	---------

The period required for the project completion is estimated at 12 months after conclusion of an official aid agreement between the Governments of Japan and Ghana. Specifically, three months will be required for completion of the detailed design, five months for the manufacture of equipment and materials, and four months for transportation of such equipment and materials.

It is expected that the supply of artisanal fishing equipment and materials to all fishing villages will enable Ghanaian fishermen to increase their fish catches and raise their living standard, and will also produce an immediate revitalisation effect on Ghana's stagnant fishery, thus contributing to the realisation of self-sufficient in food which is one of the country's high priority policies.

It is also foreseen that the supply of stationary nets and diesel inboard engines will promote the development of Ghana's fishery, and fishing gear and materials for "KAKADIAMA" and patrol service trucks will strengthen the basis of the Fisheries Department's activities including research and development, dissemination of advanced fishing techniques, etc.

For efficient implementation of the project, it is recommended that the following measures be taken.

First, a long-term development project aimed at the construction of a new, exclusive fishing port and a new fishing gear and materials manufacturing plant, utilisation of refrigerated trucks, and development of new fish processing methods should be formulated to ensure further fishery development after the catch rehabilitation is realised under the present project.

Second, efforts should be directed to "human resources development" aimed primarily at technology transfer by making a shift from all former fishery development schemes which were focused on "equipment development." Specifically, fishery education and training should be reinforced to secure the services of highly capable experts and specialists who can accelerate the long-term development of Ghana's fishery by maintaining and enhancing the promotional effects produced by the project.

Preface

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CHAPTER I INTRODUCTION

CHAPTER I INTRODUCTION

Due to heavy decline in international price level of cocoa and stagnation of mineral products, the present foreign exchange reserve is severely strained.

As a result, import of equipments and materials is being adversely affected. In fishery industry, the trend is toward increasing numbers of idle vessels and graduate decrease in fish catches.

Thus, a restoration of fishery to require level, which is a major source of protein supply for the nation, constitutes most vital policy of the Government of Ghana.

The Government of Ghana has formulated "National Fisheries Policy and Action Plan (1984 - 1986)", and has requested the Japanese Government to provide grant aid in order to accelerate the implementation of the following parts of this plan:

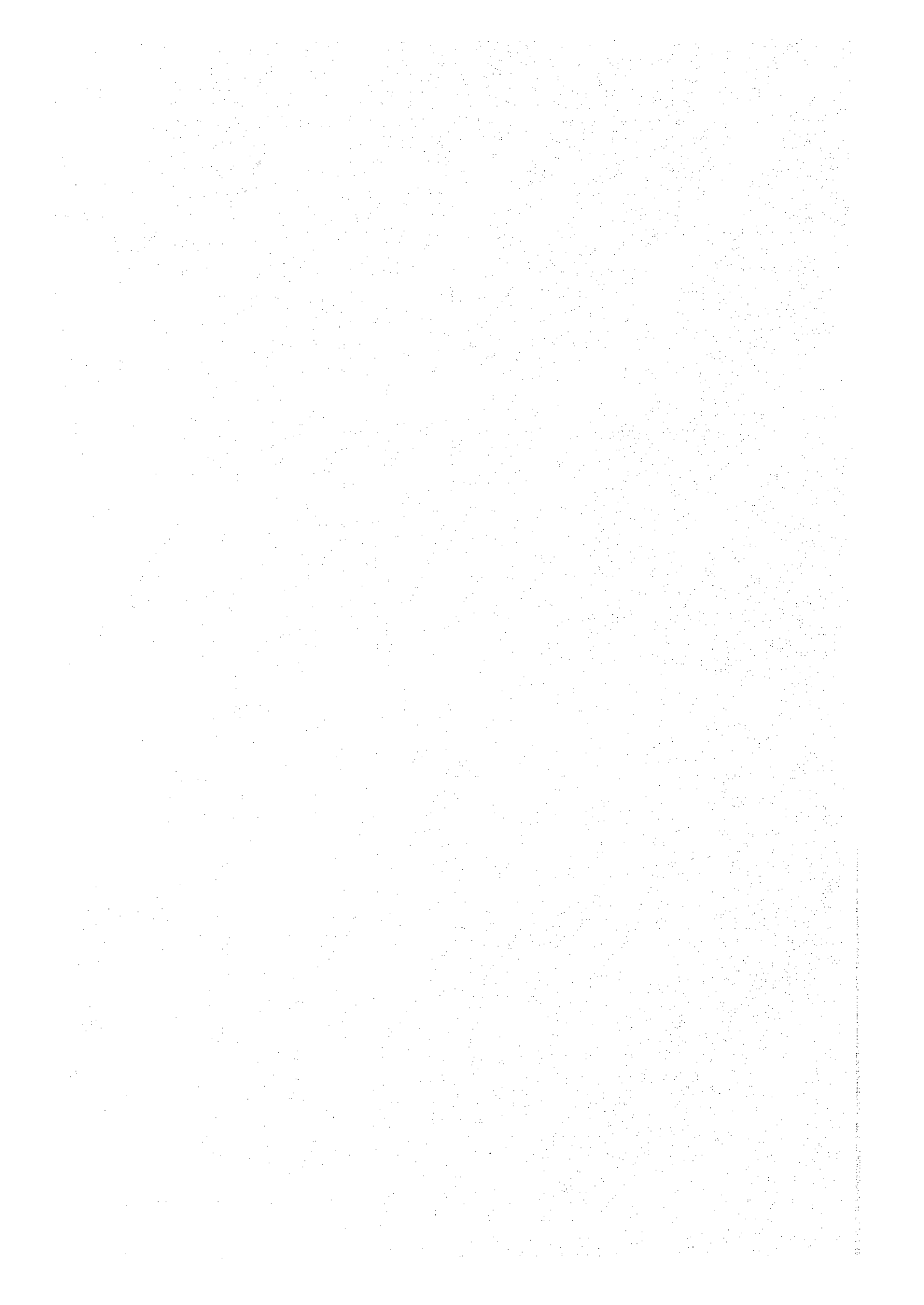
- 1) Research project for fishing development
- 2) Acquaculture project
- 3) Improvement project for artisanal and inshore fishery

In response to the above request of the Government of Ghana, Government of Japan through the Japan International Cooperation Agency, decided to send a study team to Ghana to confirm the background of the request by Government of Ghana and to study the viability of the project.

The team conducted field survey from 27 October to 7 November, 1984 and had frequent discussions with the Government officials of Ghanaian Ministry of Agriculture and Fishery on the basis of the result of the study.

Following the discussions, Minutes of Discussion setting out the order of pr-ority was prepared and signed by both the parties. (See Annex 2 Members of the Study Team, Annex 3 Study Itinerary, Annex 4 Minutes of Discussions and Annex 5 List of the Persons Concerned in Ghana).

CHAPTER II BACKGROUND OF THE PROJECT



CHAPTER II BACKGROUND OF THE PROJECT

2-1 Economic Situation in Ghana

Owing to a decline in Ghanaian main industries, cocoa production and mining (gold, manganese, bauxite and diamond), Ghanaian economic situation has worsened, year by year, since 1980.

A further aggravating factor is the depressed price of cocoa in the international market. Ghana is totally dependent on import for its oil need and has a huge foreign debt.

After making payments for the oil imports and on foreign loans as they become due, there is barely foreign exchange reserve remained.

Therefore, the policy of the Government of Ghana regulating foreign products permits the import of only such goods as are absolutely necessary for ensuring the barest minima of life in the nation.

As issuance of licences to factories for importing materials and mechanical parts has stopped and the former stock of parts and supplies has depleted, many factories are being forced to shut down their operation.

The fishery industry is in a similar plight. There, too, the stock of imported machinery, spare parts and other materials has hit the rock bottom with the result that 40% of the whole fishing fleet is out of action.

As for agriculture, 50% of the total population being engaged in farming activities, it is a most vital industry

of the country. Yet, vast tracts of arable land lie uncultivated and are in a state of neglect, the yield from land having decreased to the point that domestic needs simply cannot be met. Consequently, Ghana has become a nation perpetually dependent on import of food supplies to meet the basic needs of her people.

The problem of supplying foodstuffs to cities and urban centers is particularly serious because of inadequate transport facilities aggravated by shortage of trucks and poor condition of roads.

Fortunately, this year, timely rainfalls in rural districts helped to bring in a rich harvest of corn, a staple food for the people.

Also, aids of various kinds from foreign countries have begun to show favourable results. Basic necessities of life have appeared on the market. It seems that the worst period may have come to an end.

2-2 Fishery Industry and its Administration in Ghana

Ghana is a fish producing country, as is the Republic of Senegal in Western Africa.

In artisanal fishery, some of the local fishermen using canoes, go out fishing not only within the territorial waters of Ghana but also as far north as Liberia and to Gabon in the south.

Note: In Ghana, 95% of artisanal fishing is done by canoe fishery. Therefore, this term "canoe fishery" is widely used instead of artisanal fishery.

Approximately 85,000 fishermen live along the 550 km sea-coast and are engaged in canoe fishery, inshore

fishery, distant water fishery and skipjack/tuna fishery.

Tema Fishing Port is the only port equipped with proper infrastructure. Takoradi, which is a commercial port, is used as an alternative fishing port; and in other districts canoes are unloaded on the sand beaches of the fishing villages which are located near by.

According to the statistics of Government of Ghana on the basis of the survey conducted in 1981, 200 fishermen's villages and 220 landing beaches lie scattered. Approximately 84,000 fishermen operating some 7,000 canoes catch and unload 140,000 to 150,000 tons of fish catches which represents 75% of the 200,000 tons, being the entire fish catches of Ghana.

After simple processing such as smoke-drying and sun-drying, fish is forwarded for domestic use.

30,000 tons of fish, i.e., approx. 15% of the entire catch, are caught by approx. 250 inshore vessels plus some 10 distant water vessels.

Tema is the main landing port, very little use being made of Takoradi.

Sometimes, expensive fish are temporarily kept in cold storage, but ultimately they too are shipped to urban areas through normal channels of sale.

The Fisheries Department of the Government of Ghana has divided the whole coastal line into 4 regions, and set a government office in each region from which fishery is being administered (see Figure-1).

The main research center, located at the Tema Port, is seeking to achieve better comprehension and management of

resources, improvement in fishing and processing techniques and aquaculturing.

The "Kakadiama" which had been provided through Japan grant aid is being well utilized as a survey vessel by Central Research Center.

On the average, she makes 50 trips each year. Each trip is of 3 to 10 days' duration and average out to 5 days per trip.

Thus the ship is on the sea a total of 250 days each year. This performance is deemed highly satisfactory.

Administrative System of Fisheries Department is shown "Organizational Chart Fisheries Department" (Annex-6) and personnel allocation at each division is given in "General Administration" (Annex-7). Fisheries Department partly bears the responsibility for the project of self sufficiency in food supported by the Government of Ghana.

It set up "National Fisheries Policy and Action Plan 1984-1986", the implementation of which has already begun (Annex-1)

Table-1 National Fisheries Policy and its Production Target

(Unit: 1,000 M/T)

Year	Item	Population (in Million)	Demand for Fish			Domestic Production Target	Deficit
			Feed for People	Feed for Livestock	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	70.0	655.5	363	292.5

The above table shows the Production Target for coming 3 years.

The above table shows the Production Target for coming 3 years, assuming 3% population on growth rate and fish contributing 60% of national protein requirement and the following Table-2 shows required supplies and equipments necessary for accomplishment of the Target.

Table-2 Required Supplies and Equipments for Fisheries Promotion Project

	Foreign Currency (US\$) (in million)			Ghanaian Funds (¢) (in million)		
	1984	1985	1986	1984	1985	1986
Canoe Fishery						
Outboard engine	8.20	8.20	8.20			
Outboard engine parts	2.05	2.05	3.30			
T o t a l	10.25	10.25	11.50			
Improvement of Beaches	-	-	-	1.5	1.5	1.5
100% outboard motors with spare parts of 20%	1.21	1.21	1.21			
Facilities (ice making machine etc.)	1.80	1.80	1.80	2.0	2.0	2.0
Acquaculturing Pond (100 ha)	-	-	-	6.0	6.0	6.0
Fishing Gear						
Net 30,000	2.95	3.00	2.50			
Thread (twine/rope)	1.00	0.45	0.35			
Float	0.09	0.09	0.14			
Sink	0.05	0.05	0.10			
T o t a l	4.09	3.59	3.09			
Grand Total	28.24	28.39	28.49	9.50	9.50	6.50

Figure-1

Four Regions of the coastal
coastal area in Ghana and
main fishing ports

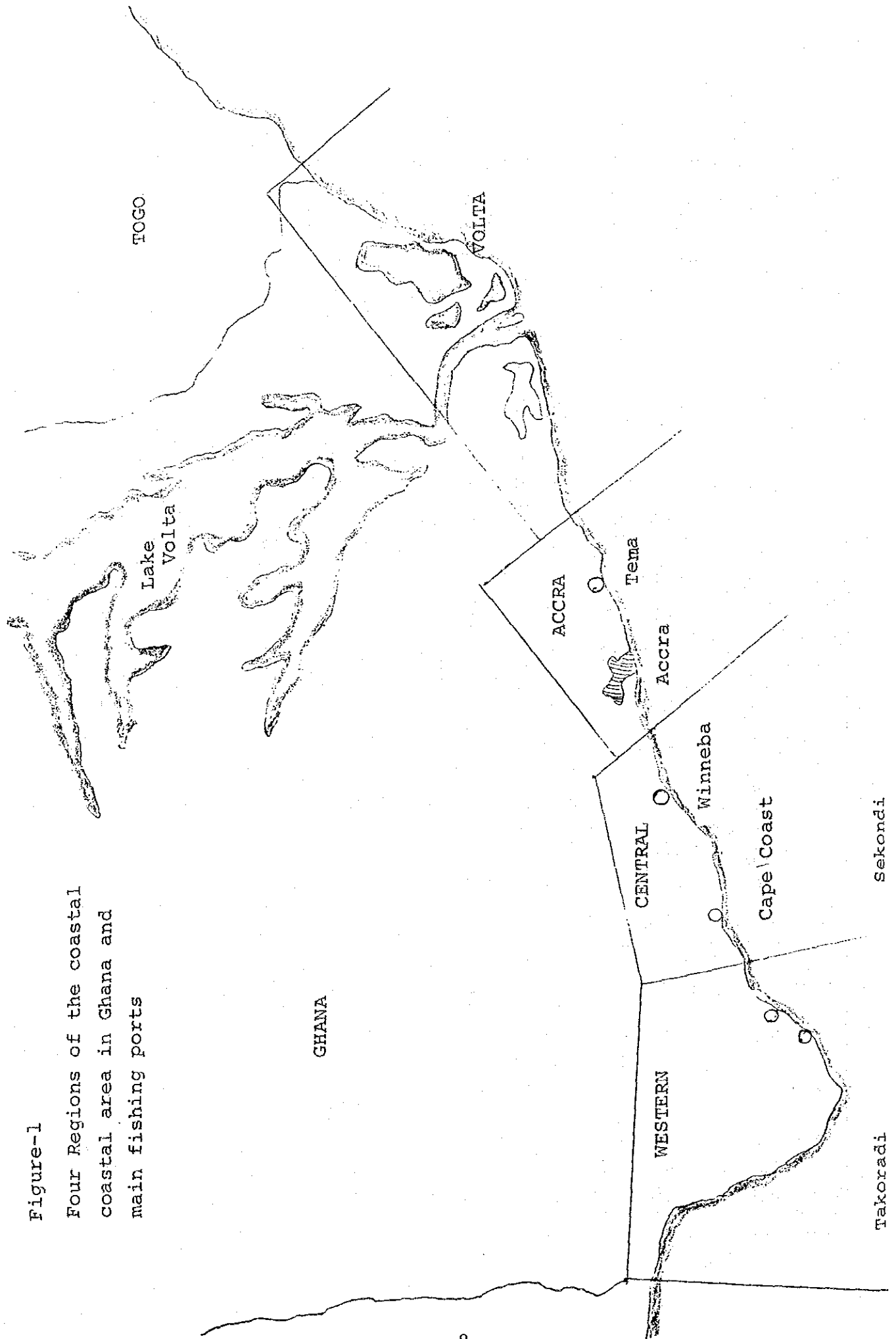


Table-3 Fluctuation in the Number of Ghanaian Fishing Vessels
(1970-1983)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Number of Fishing Vessels in operation														
Motorized Fishing Vessels less than 9.9 m in length	201	200	168	204	144	130	107	126	109	122	115	120	123	126
Inshore Fishing more than 10.0 m - less than 18.3 m	131	119	95	128	100	95	100	98	94	90	85	93	90	94
Deep Water Fishery more than 30.5 m	25	27	21	29	35	24	26	18	17	23	33	27	30	25
Tuna Fishery Vessels registered in Ghana	-	-	-	-	-	4	4	4	6	8	12	22	31	33
Total Number of Fishing Vessels in operation (A)	389	360	311	383	314	278	265	262	238	253	255	276	286	290
Total Number of Fishing Vessels (B)	472	452	503	438	434	440	434	434	442	455	435	437	441	431
Rate of Operation (A/B x 100)%	82.4	79.6	61.8	87.4	72.4	63.2	61.1	60.4	53.8	55.6	58.6	63.2	64.9	67.3
Number of Non-Motorized Canoes (C)	1,825	1,194	1,194	1,130	1,070	-	-	-	-	-	-	2,886	-	-
Number of Motorized Canoes (D)	6,903	7,534	7,598	7,168	-	-	-	-	-	-	-	4,052	-	-
Total Number of Canoes	8,728	8,727	8,238	-	-	-	-	8,472	-	-	-	6,938	-	-
Rate of Motorization (C/D x 100)%	79.1	86.3	92.2	87.0	-	-	-	-	-	-	-	58.4	-	-
Number of Foreign Tuna Fishery Vessels	79	52	55	34	33	35	33	26	36	33	28	17	10	8

2-3 Present Condition of Surface Fishery

Present condition of surface fishery in Ghana is stagnant, owing mainly to shortage of foreign currency which makes it impossible to import machinery, equipments, repair parts and fishing gears which are indispensable for the operation of the fishing industry.

Given below is an analysis of Table-4 "Fluctuation in the Number of Fishing Vessels."

- i) Total number of fishing vessels slightly decreased.
- ii) Number of skipjack/tuna fishing vessels registered in Ghana increased, because some of the foreign vessels were transferred to Ghana. However, total number of Ghanaian and foreign vessels is decreasing.
- iii) Number of canoes is also decreasing. Number of non-motorized canoes is increasing and number of motorized canoes is decreasing. It is clear that shortage of foreign currency prevented the import of outboard engine.
- iv) Number of the fishing vessels in operation in 1978 was 238 whose rate of operation was 53.8%. It was the worst. This was the year when there was a most crucial shortage of imported materials. Although situation has improved gradually since then, the present situation is only 75% of its full capacity.

Chart-1 shows how the decrease in operational vessels has adversely affected the fish catches.

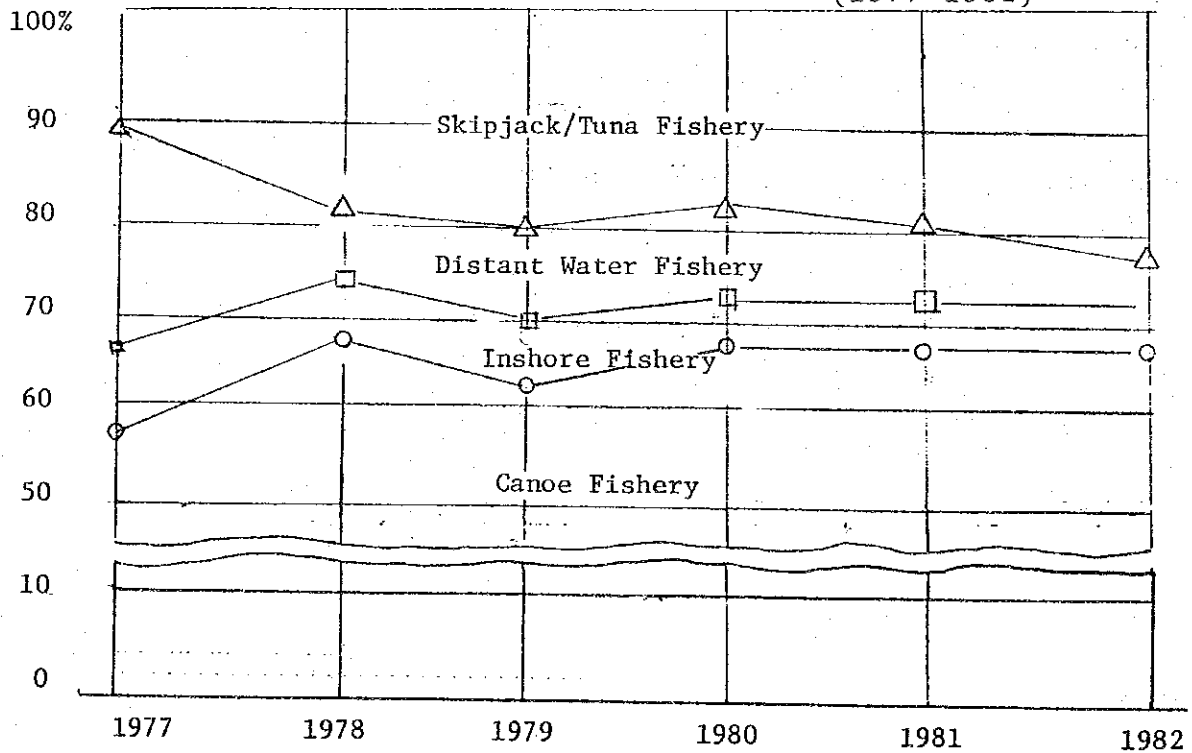
- i) Tonnage of the catches by canoe fishery is stable.
- ii) Catches by skipjack/tuna fishery is increasing.
- iii) Catches by inshore fishery is slightly decreasing. Catches by distant water fishery is remarkably decreasing, as a result of the loss of fishing ground in the territorial waters of foreign countries.
- iv) On the whole, in the past six years, the total catches have decreased by 10% compared with the catches prior to 1977.

Considering the large number of vessels which have been sitting idle, it may reasonably be said that actual tonnage of the catches of Ghanaian fishing industry have not decreased. However, the production target of fishery promotion project, which is a link in the chain of "self sufficiency in food policy" of the Government of Ghana, is 1.5 times larger than the total of current catches. It is necessary to make greater efforts in order to achieve this target.

Table-4 Fluctuation of Tonnage of the Fish Catches (1977-1982)

Year	1977	1978	1979	1980	1981	1982
Fishery						
Canoe Fishery	151,391 59.1%	176,010 67.8%	139,960 61.6%	141,822 66.8%	149,822 65.9%	140,890 65.1%
Inshore Fishery	20,069 7.8%	18,925 7.3%	21,577 9.5%	15,603 7.3%	16,857 7.4%	16,357 7.6%
Distant Water Fishery	49,323 19.3%	23,604 9.1%	20,846 9.2%	19,087 9.0%	15,381 6.8%	12,986 6.0%
Skipjack/Tuna Fishery	35,435 13.8%	40,983 15.8%	44,739 19.7%	35,856 16.9%	45,173 19.9%	46,247 21.4%
T o t a l	256,218 100.0%	259,522 100.0%	227,122 100.0%	212,368 100.0%	227,233 100.0%	216,480 100.0%

Figure 1 Fluctuation of Tonnage of the Fish Catches (1977-1982)



2-4 Classification of Ghanaian Fishery

According to the statistics of Fisheries Department, classification of Ghanaian Fishery is as follows:

- i) Canoe Fishery
- ii) Inshore Fishery
- iii) Distant Water Fishery
- iv) Skipjack/Tuna Fishery

The above-mentioned four classes of fisheries are broadly divided into two categories:

The canoe, inshore and distant water fisheries, being vital protein sources for the nation, are for domestic consumption only.

The skipjack/tuna fishery is exclusively for export and a source of earning foreign exchange.

The skipjack/tuna fishery was started as a joint project with Japan. Korea and Taiwan joined the project later on. Catches consist of skipjack and yellowfin tuna. Pole-and-line fishing using sardine as live bait within the territorial waters of Ghana used to be the chief method of skipjack/tuna fishery. However, this method demands a large scale-pursing fishery free from above-mentioned problems, is now being introduced. As each of the two methods has its advantages and disadvantages, it is expected that both the methods will continue to be used simultaneously.

In any event, skipjack/tuna fishery, a joint international project for exporting fish to foreign market (mainly U.S.A.), has been operating jointly with foreign capital, and contributing significantly to the earning of foreign exchange.

It has not been affected by the depressed state of Ghanaian economy.

Besides having the privilege of exemption from duties, it has been possible for the skipjack/tuna fishery to continue to operate independently.

According to the statistics of the Government of Ghana, skipjack/tuna fishery is not classified as distant water fishery. At present, distant water fishery of Ghana is trawler fishery within the territorial waters of foreign countries. Its catches account for 5 percent of the total fish catches. However, the international circumstances affecting Ghanaian distant water fishery are troublesome and, therefore, the future prospect of trawling is not expected to be too bright.

Canoe fishery is regarded as one of the methods of artisanal fishery in Ghana. The term "artisanal" is the opposite of industrial in as much as artisanal fishing is the method using traditional techniques and equipment without any motorized or mechanical aid.

Since catches have to be restricted to small areas and limited to consumption in immediate neighbourhood. In most cases, it is impossible to depend upon it as a principal means of livelihood. However, in recent years, artisanal fishery in Ghana has increased its efficiency in fish catches. Now processing method is being developed whereby large hauls of fish catches can be transported to more remote area. Thus artisanal fishery is becoming a partial means of livelihood. The term "canoe" is likely to be misunderstood as a small boat with an outrigger capable of holding no more than 2 or 3 people, rowed manually, something similar to the canoes seen in the South Pacific

slands, the Ghanaian canoes are totally different. They are fairly large vessels from the points of view of size, facilities and capacity. In fact, they form the core of fishing industry in Ghana.

The Government of Ghana fully acknowledges the importance of canoe fishery. The Fisheries Department carries out "Canoe Frame Survey" (Annex-i) every 4 years with concentrated efforts. Most recent canoe frame survey was conducted in October, 1984.

Table-5 Canoe Fishery

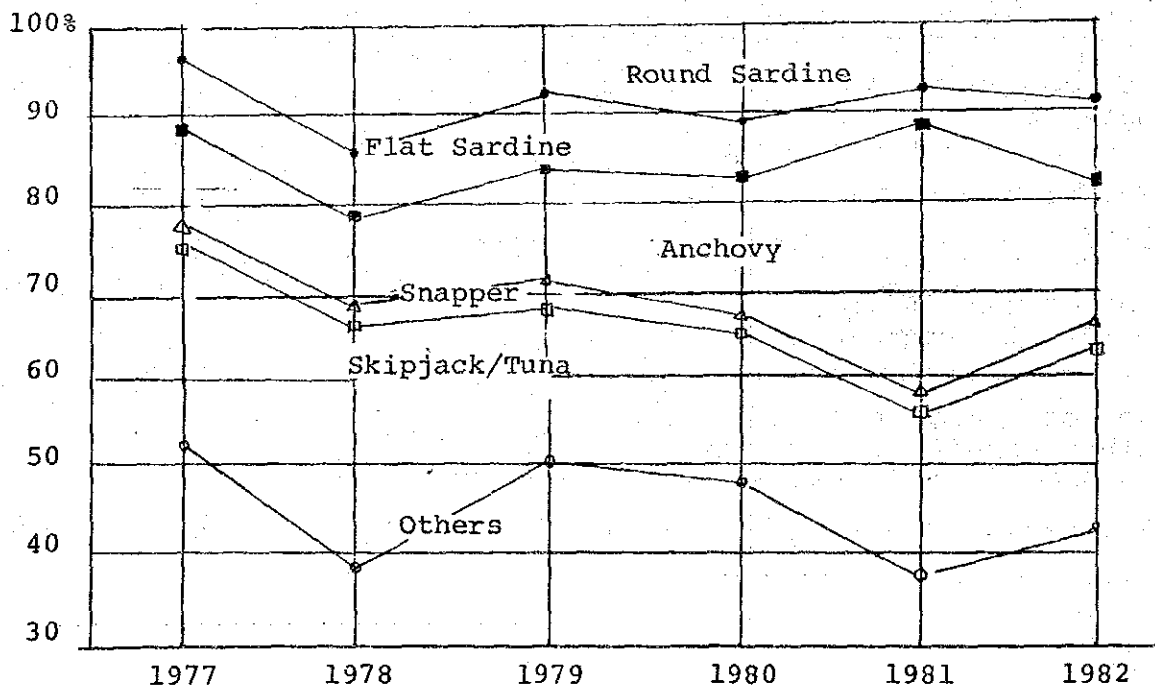
Year I t e m	1969	1973	1977	1981
Fishing Villages	198	191	200	180
Landing Beaches	269	257	238	221
Outboard	-	-	-	3,698
Total No. of Canoes	8,728	8,238	8,472	6,938
No. of Canoes for Ali-fishing	2,315	2,244	3,005	3,359
No. of Canoes for Seine Net	1,587	1,081	761	833
No. of Canoes for Set-net	3,347	2,973	3,332	1,734
No. of Canoes for Lines	734	676	1,174	661
No. of Canoes for Drift Gill-net	-	-	-	351
No. of Canoes for Other Fisheries	745	1,264	200	0
T o t a l	8,728	8,238	8,427	6,938

Fluctuation of the fish catches from 1977 to 1982 is shown in Table-6 and Figure-3

Table-6 Fluctuation of the Fish Catches (Tonnage)

Year	1977	1978	1979	1980	1981	1982
Species						
Round Sardine	11,924 4.7%	46,383 17.9%	12,828 5.6%	21,832 10.3%	15,049 6.6%	19,966 9.2%
Flat Sardine	16,393 6.4%	12,991 5.0%	15,853 7.0%	11,921 5.6%	13,013 5.7%	13,483 6.2%
Anchovy	35,043 13.7%	51,424 19.8%	36,676 16.1%	37,901 17.8%	67,536 29.7%	37,292 17.2%
Snapper	5,409 2.1%	4,846 1.9%	3,289 1.4%	4,087 1.9%	2,909 1.3%	3,693 1.7%
Skipjack/Tuna	35,435 13.8%	40,982 15.8%	44,739 19.7%	35,856 16.9%	45,173 19.9%	46,247 21.4%
Others	152,014 59.3%	102,896 39.6%	113,737 50.1%	100,771 47.5%	83,553 36.8%	95,799 44.3%
Total	256,218 100.0%	259,522 100.0%	227,122 100.0%	212,368 100.0%	227,233 100.0%	216,480 100.0%

Figure-3 Fluctuation of Main Fish Catches



This is estimated on the basis of a survey known as "Marine Fish Landing" (Annex-9) published biennially by the Fisheries Department.

According to this survey, 5 species, namely, anchovy, flat sardine, round sardine, snapper, skipjack and tuna, on the average, account for 60% of the total fish catches of Ghanaian fishery.

The annual snapper catches in Ghana are caught amounts to 13,000 tons of which 10,000 tons (i.e. 80%) by canoe fishery and the remaining 3,000 tons (i.e. 20%) by distant water fishery.

Because there is a line fishing of snapper in canoe fishery, snapper catches by this method is some five times as large as by trawling in distant water fishery.

Round sardine and flat sardine are caught by a method known as purse-seine fishery in inland waters.

Fish catches by this method over a six year period average out to only 6,000 tons per year and account for only 3% of the total fish catches while total sardine catches by purse-seine fishery method represent only 9%.

Canoe fishery, on the other hand, is stable compared with purse-seine fishery in inland waters.

Total fish catches of anchovy, round sardine and flat sardine are approximately 65,000 tons per year and represent 40% of the total fish catches, more than 90% of which are caught by canoe fishery.

Fish catches of anchovy, the main species in Ghanaian fishery, is approximately 40,000 tons per year which accounts for some 20% of the total Ghanaian fish catches.

They are caught entirely by canoe fishery.

The following is a table showing the number of canoes operated to various districts in 1981.

Table-7 Number of Canoes in Ghana (1981)

District	Fishery	Seine-net	Purse-seine	Set-net	Drift Gill-net	Lines	Total
Volta	No. of Canoes	348	92	37	1	6	484
	Motorized	0	80	10	1	4	95
	Ratio of Motorized	0	87.0	27.0	100.0	66.7	19.6
Great Accra	No. of Canoes	283	1,492	161	73	413	2,422
	Motorized	113	1,075	26	56	312	1,582
	Ratio of Motorized	39.9	72.1	13.0	76.7	75.5	65.3
Central	No. of Canoes	85	1,424	773	52	201	2,535
	Motorized	8	1,176	242	18	104	1,548
	Ratio of Motorized	0.94	82.6	31.3	34.6	51.7	61.1
Western	No. of Canoes	117	351	763	225	41	1,497
	Motorized	0	263	318	207	39	827
	Ratio of Motorized	0	74.9	41.7	92.0	95.1	55.2
Total	No. of Canoes	833	3,359	1,734	351	661	6,938
	Motorized	121	2,594	596	282	459	4,052
	Ratio of Motorized	14.5	77.2	34.4	80.3	69.4	58.4

As stated in the above table, canoe fishery in the Volta district is not well developed.

In other districts, purse-seine fishing by means of fairly advanced motorization of vessels is followed by line fishing.

Drift gill-nets are widely used except in Volta district.

Since there is little demand for motorized power in seine-net and set-net fisheries, motorization of these fisheries remain underdeveloped in the all districts.

"The Fluctuation in Numbers of Canoes Used in Different Kinds of Fishery" is shown below:

Table-8 The Fluctuation in Numbers of Canoes Used in Different Kinds of Fishery

Year		1969	1973	1977	1981	Total
Fishery						
Purse-seine Net	No. of Canoes	2,315	2,244	3,005	3,359	
	Change		-71	+761	+354	+1,044
Seine Net	No. of Canoes	1,587	1,081	761	833	
	Change		-501	-320	+72	-754
Set-net	No. of Canoes	3,347	2,973	3,532	1,734	
	Change		-374	+559	-1,798	-1,613
Lines	No. of Canoes	734	676	1,174	661	
	Change		-58	+498	-513	-73
T o t a l	No. of Canoes	8,728	8,238	8,472	6,938	-1,790
	Change		-490	+234	-1,534	-1,790

The table shows immense growth in purse-seine fishery, lines fishery at a stable level while set-net fishery has declined.

While the field survey was in progress, purse-seine and lines fishery were in active operation.

The sea-water temperature in tropical Ghanaian fishing grounds rises up to 30°C. This marine environment damages the fish harvest to such an extent that large quantities of good grade fish are rendered useless for distribution to distant centers and can be used only locally for domestic consumption. Therefore, the prospect for the development of set-net fishery is deemed highly unlikely.

2-5 Processing and Distribution

2-5-1 Processing

The processing method consists of the artisanal processing method and the industrial processing method.

A) Artisanal processing method

It is very hard to maintain freshness of fish in Ghana because of its hot and humidity, and the distribution circles of fish are limited around the landing places. Extension of circles has been tried for long time with simple processing methods. Three methods are given as follows:

i) Smoking

Arrayed fishes on a wire net putting on a kiln made of soil are smoked by firewood.

ii) Sun-drying

Arrayed fishes on a sand beach near a landing place are dried in the sun (photograph M and N).

iii) Salt-drying

Fishes are dried in the sun after soaked in salt water.

Table-9 Utilization of Fish

Condition at Sale	Condition at Consumption		Preservable Period	Consuming Place	%
Raw fish	Raw fish		Nil	Around landing place	25
	Fried fish		About a half day	Near landing place	5
Preserved fish	Smoked fish		Long period	Remote area	65
	Dried fish	Sun-dried	Long period	Remote area	5
Salt-dried					

As shown on Table-9 , smoked fish predominate at utilization of fish and processed fish including smoked fish and dried fish accounts for of all consumed fish.

B) Industrial processing method

The artisanal processing method, which has been developed along with artisanal fishery, is not suitable for short-period mass processing of mass catchable fish like sardine. Accordingly, fancy fishes such as snapper, hake and grouper and so on are stored in cold-storage facilities in order to sell it a high price, staggering the time for sale. Some cold stores at Tema and Takoradi are utilized for this purpose. Photograph (K) shows stored snappers in a cold store at Takoradi.

In addition, unless fish processing industry such as canning and pasting which utilize frozen fish as raw materials or fancy fish (eel, yellowtail and snapper and so on) culture which needs frozen fish as feed are developed, the cold-storages facilities are unprofitable in Ghana. It is more practicable to process fish with the artisanal processing method in fishing villages until fish processing industry is established in the country.

2-5-2 Distribution

Although there is no fish-store in Ghana due to difficulties of maintaining freshness of fish for long time and few commercial cold stores, fish is circulating in a spontaneous distribution system peculiar to Ghana.

So-called "Market Mammy", employing in processing and distributing business (processing fishes and carrying them to sell in the remote areas) is playing an important role in Ghana. Photograph (A) shows working Mammies buying raw fishes at a landing beach. Fishes are smoked or sun-dried in their fishing villages (Photograph (M) and (N)). Fish soaked in salt water before sun-dried become salt-dried fish.

Photograph (O) shows a heap of salt-dried fishes for shipment. These are put in baskets and carried to remote areas.

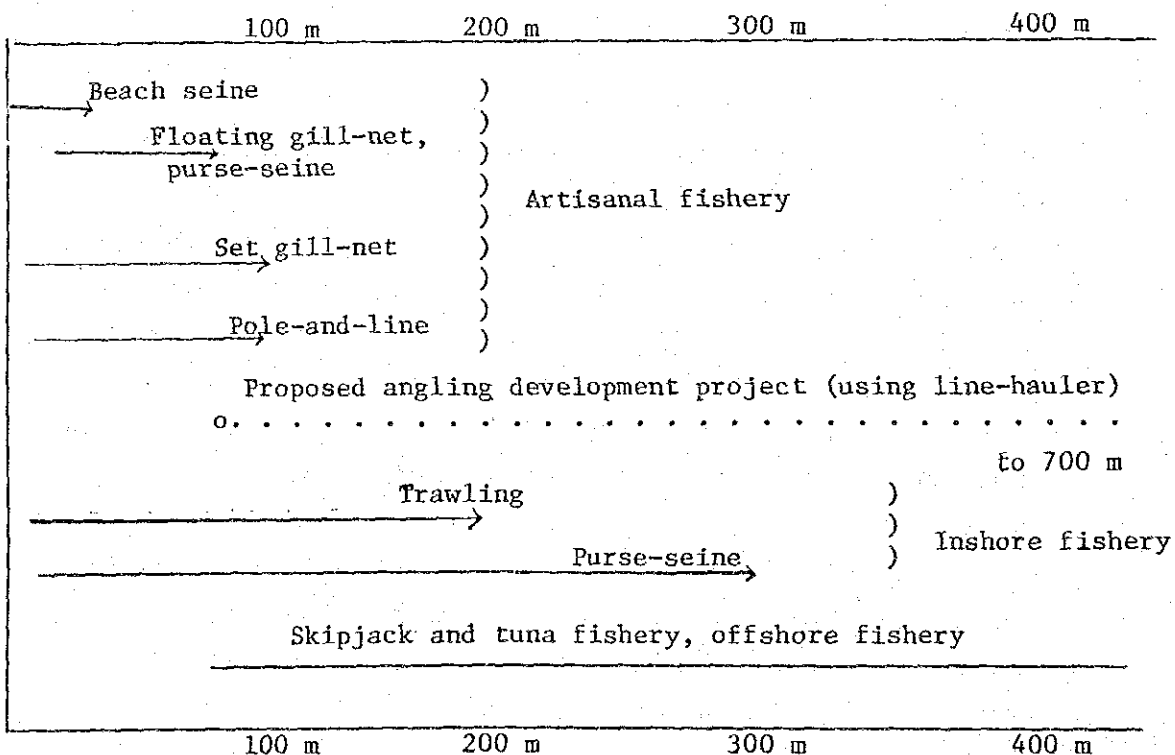
Mass catchable, perishable fish like sardine is unlikely to be stored in cold-storage facilities, and, to make the situation worse, huge quantity of fish and poor equipment on board fishing vessel make maintenance of freshness of fish between landing places and cold-storage facilities difficult. On the other hand, for consumers raw fish and cold-storage fish sold after fishing season, expecting a high price, are under the same condition. The problem is which fish is bought by consumers, processed fish which is consigned to consuming places directly from fishing villages after processed there or another processed fish stored in the cold-storage facilities and processed with the same method. Since the fishes seem to be same in quality, a margin in price originated in storage period will become a problem for consumers.

The Study Team concluded that the cold-storage facilities in Ghana will not play increasing role in processing and distribution of mass catchable fish such as sardine; it is impossible to expect an additional value of cheap fish like sardine so long as it is sold frozen because frozen sardine will be under the same condition as raw sardine once melt.

2-6 Fishing Ground

The continental shelf in Ghana is very narrow. The breadth of it is most wide off Takoradi, about 120 km from the shoreline, and the narrowest is off Volta, only 15 m. Flat sandy beach extends eastward from Takoradi and makes access to the fishing ports difficult. Figure 4 shows fishing grounds and fisheries by the depth of water in Ghana.

Figure-4 Fishing Ground and Fisheries in Ghana



From horizontal point of view, artisanal fishery is operating on the coast, skipjack and tuna fishery offshore.

2-7 Fishing Vessel

Fishing vessels in Ghana are classified into three classes as follows;

- i) Handmade canoe made of wood produced locally.
- ii) Coastal fishing boat installed foreign engine, made of wood produced locally, built in a shipyard.
- iii) Modern steel fishing boat introduced through joint-ventures, mainly for skipjack and tuna fishery.

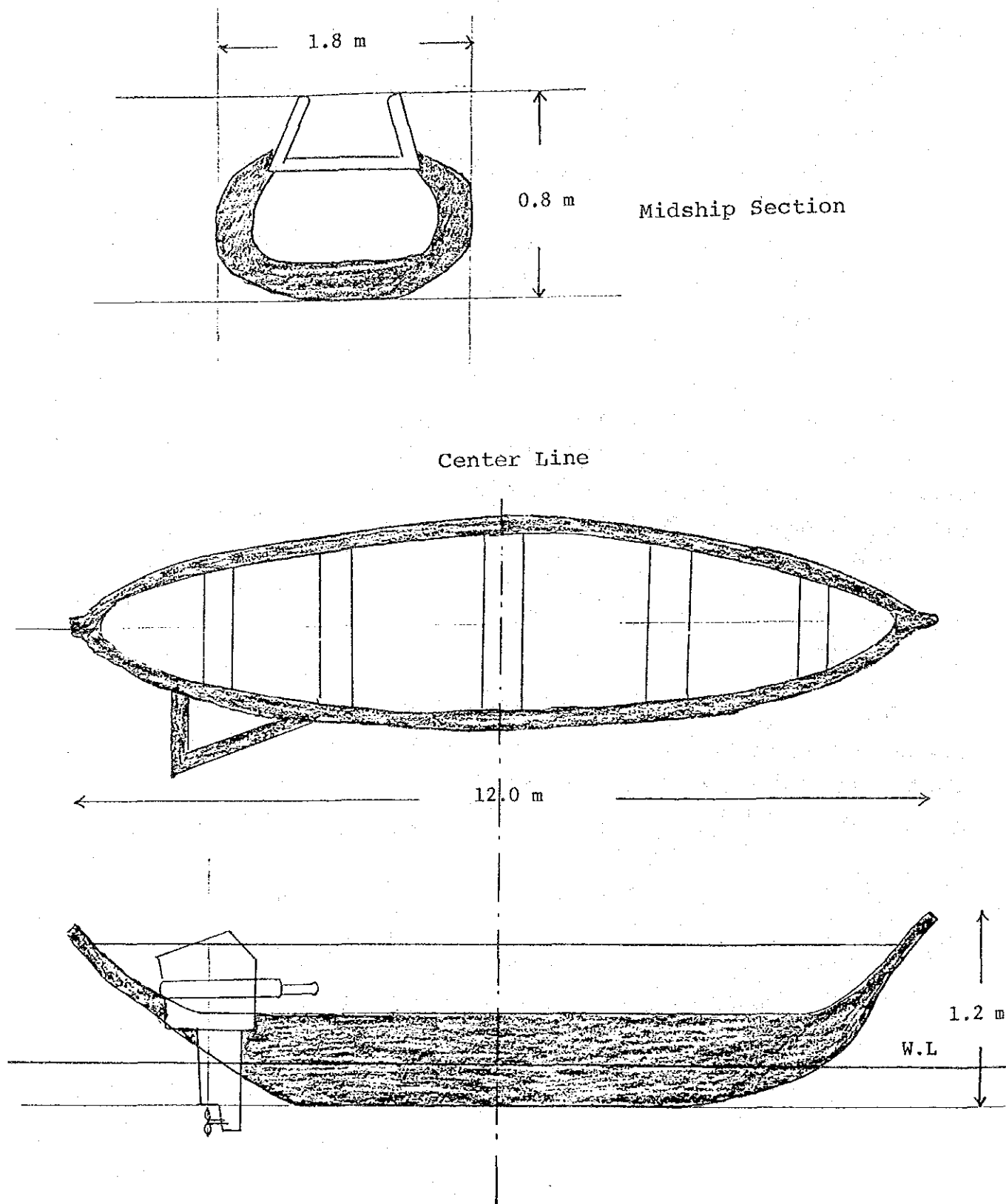
o Canoe

It is made of hollowed single trunk of kapok grown wild in the country. The shape is given in Figure-5 "Standard Type of Ghanaian Canoe." Also Photograph (C) shows its well and Photograph (D) bow structure.

The size of canoe varies on areas and purposes as describing in Annex 10 "Actual State of Canoe in Canoe Frame Survey, 1981."

The problem is how to mechanize canoe. According to "Canoe Frame Survey, 1981" (Annex 8), more than 70% of canoes operating purse-seine, floating gill-net and angling fisheries to which mechanization is indispensable have already equipped outboard engines.

Figure-5 Standard Type of Canoe in Ghana



Outboard engines granted from foreign countries and international agencies are given in "Importation of Outboard Engine" (Annex 12). 14,268 outboard engines are granted for 13 years from 1971 to 1983. Formerly, the majority of them were European-made, but Japanese made ones are increasing recently.

Some 2,000 outboard engines (40 HP) imported through the Agriculture Development Bank in Ghana began to operate when the Team visited there.

Although 800 outboard engines (25 HP) have been granted from the Government of Japan in 1982, none of them was found. Fisheries officers said that all of them were worn-out to scrap.

CHAPTER III CONTENTS OF THE REQUEST

CHAPER III CONTENTS OF THE REQUEST

As stated above in Chapter II "Background of the Project", Republic of Ghana has requested the Government of Japan to assist the following three Projects:

(1) Research Project for Fishing Development

- A) Fishing gears and materials for the survey vessel "Kakadiama".
- B) Development for harvesting deep bottom marine resources, especially beyond 70 meters 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 reservoirs 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 in adequate quantities, and 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.

3-1 Research Project for Fishing Development

3-1-1 Fishing gears and materials for the survey vessel "Kakadiama"

The survey vessel "Kakadiama" was granted from the Government of Japan in 1982. The vessel, belonging

to the Research and Utilization Center, based on Tema, has been operating some 50 survey trips for the year since August 1979. The scientific information and data necessary for the fishing development have been collected by the successive surveys and trials for marine resources using the "Kakadiama". Although the vessel will play an important role in the fishing development in Ghana, the time has come when the vessel has to be inspected both the hull and engines in dock. Since procurement of exchange parts and materials necessary for the inspection is difficult due to tight economic situation the Fisheries Department has requested to be granted the following materials.

- a) Echo sounder recording paper for 2 years
Type FE-W824B (2 frequency)
FG-11 (Portable)
- b) Spare parts for auxiliary and main engines
Main engine: 6 MG 20A Diesel
700 PS x 840 rpm
Auxiliary engine: 3 KDL Diesel
70 PS x 1,200 rpm x 56 KVA
- c) Spare parts for refrigeration machinery
Type: 4C752-E 15 KW, R22 Direct refrigerating system

Unfortunately, the Study Team were not able to confirm details of requested materials because the "Kakadiama" was out of port for a survey trip during the field survey.

- 3-1-2 Development for harvesting deep bottom marine resources, especially beyond 70 meters of water on Ghana's continental shelf.

Ghana's continental shelf is narrow and steep at its edge. Since high fishing technique is required to harvest marine resources beyond 70 m of water, these resources are not utilized now, while only resources in rather shallow water are harvested by handline and trawling.

The Fisheries Department has understood that the only marine resources for fishery development are deep bottom marine resources and they have a plan to harvest them.

Two fishing methods, handline and trawling, will be applied to exploit deep bottom marine resources. Regarding trawling it is necessary that power of engine on board the trawler is increased to get towing power, towing line is lengthened to make the net reach the bottom, and capacity of trawling winch is increased. For these purposes the fishing boat itself, the engine and fishing equipments and materials must be built newly or modified. In addition electrical apparatuses such as echo sounder, net-sonde and so on shall be required.

On the other hand, handline fishing can meet the purpose by prolongation of the fishing line. In this case a line-hauler must be installed on board a fishing vessel because the operational depth of water by the handline is limited. At the same time since it is likely that fishes caught by this method will be fancy fishes such as snapper, hake, grouper and others, the cooling equipments on board should be required in order to maintain freshness of fishes. The Fisheries Department has requested the Government of Japan to grant equipments and materials necessary for the development of deep bottom fishery.

3-1-3 Machinery and equipment for new patrol and training vessel

Although the Fisheries Department is building a new patrol and training vessel at a shipyard in Tema, construction work after completion of the hull is suspended because a main engine, machinery and equipment and others are no available.

The followings are the actual specifications of the vessel.

(1) Length overall	84 ft 4 inch
(2) Length (Between perpendiculars)	76 0
(3) Length (Water line)	77 0
(4) Maximum width	19 6
(5) Width at Water line	18 6
(6) Depth (Molded)	10 4
(7) Draft aft	9 0
(8) Propeller aperture	44
(9) Stern tube length	8 0
(10) Shaft length	22 0
(11) Required horse power	Approx. 450 HP (440-450 HP)
(12) Required winch capacity	5 - 8 tons

Other general characteristics of the vessel are as follows:

- (1) The vessel is of wooden construction with steel reinforcement.
- (2) The economic cruising speed will be 10 knots with a full power speed of approximately 11.5 knots.

- (3) The deck layout and rigging is to suit both trawling and purse seining to facilitate training in both types of fishing.
- (4) Sleeping and messing accommodation is for 8-10 trainees and a crew of 7.
- (5) The fishing deck is to be equipped for trawling and purse seining.

3-2 Aquaculture Project

According to the "National Fisheries Policy and Action Plan 1984-86", a fresh-water fisheries output on inland waters amounts to 18.1% of total fisheries output. Table-12 shows the production target and investment plan of the Government in the Aquaculture Project.

Table-12 Production Target and Investment Plan

	1984	1985	1986
Total fisheries output	ton 300,000	ton 330,000	ton 363,000
Production target of Aquaculture Project	54,300	59,730	65,700
Investment in Aquaculture Project	₪ 9,500,000	₪ 11,900,000	₪ 6,500,000

However, the proposed investment in construction of the ponds and reservoirs is insufficient for the Project, and the Fisheries Department is desirous of materials for study and equipments and apparatuses for the ponds and reservoirs such as pumps and others.

3-3 Improvement Project for Artisanal and Inshore Fisheries

The Fisheries Department, aiming at rehabilitation of fishery productivity in Ghana, understands that the first step for this purpose is to supply equipments and materials necessary for the stable operation of the existing fisheries (artisanal and inshore fisheries).

The followings are the requested equipments and materials by artisanal fishery and inshore fishery.

3-3-1 Artisanal fishery

- a) 40 HP outboard motors
- b) Spare parts for 40 HP and 25 HP outboard motors
- c) Fishing gear
 - i) Fishing nets (gill-nets)
 - ii) Netting material for purse and beach seining
 - iii) Mending twines
 - iv) Hanging twines
 - v) Lead and float lines
 - vi) Multi-purpose ropes
- d) Hooks and lines
 - i) Handlines
 - ii) Vertical lines
 - iii) Long lines
 - iv) Hand winch for lines
 - v) Portable compass

3-3-2 Inshore fishery

- i) Marine engines with combination winches for trawling and purse-seining for 10-20 m vessel

- ii) Trawling and purse-seine nets
- iii) Synthetic purse-seine ropes
- iv) Galvanized wire ropes

CHAPTER IV DISCUSSIONS

CHAPTER IV DISCUSSIONS

After understanding of the actual fishery situation in Ghana through observations of fishing ports, shipyards and processing plants and conversations with the persons concerned, the Study Team discussed with the officials of Fisheries Department in order to examine the contents of the request, decide their priorities and select equipments and materials to be granted.

Particulars of agreement resulted from discussions was confirmed on the Minutes of Discussions signed mutually by Victor N. Dawnona, Director of Fisheries Department, and Saburo Masai, Leader of Study Team, on 7 November 1984.

4-1 Items of Discussions

The following three items are discussed.

4-1-1 Research Project for Fishing Development

- i) Machinery and equipments for "Kakadiama"
- ii) Equipments and materials for development for harvesting deep bottom marine resources beyond 70 m of water.
- iii) Machinery and equipment for new patrol and training vessel.

4-1-2 Equipments and materials for the Aquaculture Project utilizing the ponds and reservoirs.

4-1-3 Equipments and materials for the Project for Artisanal and Inshore Fisheries

- i) Artisanal fishery
Outboard motors, spare parts and fishing gears and materials and others.
- ii) Inshore fishery
Main engines, winches for trawling and/or purse seining and fishing gears and materials and others.