conditions of location. However, in the Bakau fish landing spot which is endowed with an excellent marketing environment and is supported by the market oriented toward fresh fish, it will be fitting and proper to specialize in production of high-priced fish and to make efforts for higher productivity in terms of value to the extent the market conditions permit. Based on this standpoint, it is suitable to the large fishing canoes of the Bakau fish landing spot to adopt the multi-operation of catching both the demersal fish which has high-value productivity in addition to the characteristics of the fishing season, and bonga fish which has high quantitative productivity. In this sense, multi-operation of surrounding gill net fishing to be implemented under the project will contribute to improvement of artisanal fisheries at the Bakau fish landing spot, hence improvement and stabilization of the fishermen's management.

6-2 Conclusion and recommendations

(1) As discussed in "6-1 Effect of the Project", implementation of this project will make a significant contribution to artisanal fisheries development in the Republic of The Gambia, and maintenance and increase in the supply of animal protein supply to Gambian nationals. The necessity of this project is extremely high, and implementation of this project under the Japan's grant aid is very significant.

(2) The maintenance of the fish landing facilities does not require much fund, but it requires the minimum level of maintenance such as painting and fender repair. However, the artisanal fisheries at the project site have not yet broken from the artisanal fishermen's management form, and artisanal fisheries promotion is the basic policy of this project. When these two are taken into account, it is not appropriate to collect all the expenditures for the maintenance of these fish landing facilities from the artisanal fishing canoes in the form of mooring charges. Earnings and expenses based especially on the operation profit of the ice plants show excellent performance according to the balance of earnings and expenses for the operation of facilities at the project site. So share in expenses by the artisanal fishermen for use of the fish landing faculties should be kept to a minimum for the time being. It is considered to be preferable to check the conditions of use and improvement in the fishermen's management and to increase the share accordingly.

(3) As oceanographical conditions at the project site for construction of the fish landing facilities, strong winds and raging waves tend to occur in winter. To ensure complete use of the fish landing facilities, it is preferable to introduce the breakwater or similar device having water breaking function.

However, installation of such breakwaters at the position having a water depth of 2.0 m may cause siltation and similar problems, and is not technically preferred. The effective use of the planned fish landing facilities without breakwater is calculated at about 80% according to the data on the wind velocity and wind direction at the project site. This rate of use is considered to make a sufficient contribution to artisanal fisheries promotion which is the basic policy of the project. Furthermore, the scale of the facilities under this project has been calculated on the basis of the average use by the fishing canoes as of 1995. Depending on the future development of the Bakau fish landing spot, shortage in the capacity of facilities may be anticipated. To solve this problem, it is preferred that the Fisheries Department should take the lead in improvement of the fish landing efficiency and promotion of the extended landing time. Depending on the degree of insufficient capacity, it may become necessary to study the jetty extension or addition of the water breaking function at the extend end position. It should be noted that this fish landing facilities are designed to permit such extension work.

(4) This project relates to the construction of the fish landing facilities and supply of the fisheries equipment. Especially in the case of fisheries functional facilities such as fish landing facilities, the scale or facilities capacity is calculated based on the assumed conditions of use. However, the actual facilities capacity is realized in the operation and management process. The rate of facilities use will be improved by improvement in fish landing procedures, mooring form, mooring procedures and fish landing work form. Such improvement cannot be achieved in a day, a long-term policy and planning, daily trial and error and repeated strenuous efforts will lead to its success realization. The operation and management of the project facilities require continuous management and guidance efforts with careful consideration given to these points.

APPENDIX

Appendix I Members of Survey Team

1-1 Basis design survey

Team leader	Noboru TAZOE	Chief Fisheries Officer, Office of the Overseas Fisheries Cooperation, Fisheries Agency Ministry of Agriculture, Forestry of Fisheries
Grant Aid Planner	Yoshio ISHIYAMA	Associate Specialist on Fisheries, Second Basic Design Study Division, Grant Aid Study & Design Department, JICA
Port Facilities Planner	Munehiro SHIMADA	Overseas Agro-Fisheries Consultants Co., Ltd.
Fisheries Development Specialist	Yasumasa MATSUZAKA	Overseas Agro-Fisheries Consultants Co., Ltd.
Fishing Boats and Fishing Gear	Masashi SATO	Overseas Agro-Fisheries Consultants Co., Ltd.
Port Civil Engineer and Natural Conditions Surveyor	Masami TSUCHIYA	Overseas Agro-Fisheries Consultants Co., Ltd.

1-2 Draft report explanation phase

Team leader	Noboru TAZOE	Chief Fisheries Officer, Office of the Overseas Fisheries Cooperation, Fisheries Agency Ministry of Agriculture, Forestry of Fisheries
Port Facilities Planner	Munehiro SHIMADA	Overseas Agro-Fisheries Consultants Co., Ltd.
Fishing Boats and Fishing Gear	Masashi SATO	Overseas Agro-Fisheries Consultants Co., Ltd.

Appendix II Schedule of field study

II-1 Basic design study

A. Government staff

Order	Date	Place and activities
1	July 10 (Sats.)	Tokyo to Paris
2	11 (Sun.)	Paris to Dakar
3	12 (Mon.)	Courtesy call to the Embassy of Japan, discussion at JICA Office, Dakar to Banjul
4	13 (Tue.)	Courtesy call to the Ministry of Natural Resources and The Environment and Fisheries Department, discussion
5	14 (Wed.)	Courtesy call to the Ministry of Foreign Affairs, discussion with concerned bodies, site survey
6	15 (Thr.)	Site survey, discussion with concerned bodies
7	16 (Fri.)	Courtesy call to Port Authority, site survey
8	17 (Sat.)	Visit to EC project site
9	18 (Sun.)	Discussion among members
10	19 (Mon.)	Site survey, discussion on the Minutes
11	20 (Tue.)	Courtesy call to the President, discussion with concerned bodies, signing the Minutes of Discussion
12	21 (Wed.)	Banjul to Dakar
13	22 (Thr.)	Report to the Embassy of Japan and JICA, leaving Dakar
14	23 (Fri.)	Arrive at Paris, leave Paris
15	24 (Sat.)	Arrive at Tokyo

B. Consultants

Order	Date	Place and activities
1	July 10 (Sats.)	Tokyo to Paris
2	11 (Sun.)	Paris to Dakar
3	12 (Mon.)	Courtesy call to the Embassy of Japan, discussion at JICA Office, Dakar to Banjur
4	13 (Tue.)	Courtesy call to the Ministry of Natural Resources and The Environment and Fisheries Department, discussion
5	14 (Wed.)	Courtesy call to the Ministry of Foreign Affairs, discussion with concerned bodies, site survey
6	15 (Thr.)	Site survey, discussion with concerned bodies
7	16 (Fri.)	Courtesy call to Port Authority, site survey
8	17 (Sat.)	Visit to EC project site
9	18 (Sun.)	Discussion among members
10	19 (Mon.)	Site survey, discussion on the Minutes
11	20 (Tue.)	Courtesy call to the President, discussion with concerned bodies, signing the Minutes of Discussion
12	21 (Wed.)	Detailed survey on site situations (Fisheries Development Group members leave Banjul to arrive at Japan on July 24)

13	22 (Thr.)	Detailed survey on site situations, depth sounding
14	23 (Fri.)	Detailed discussion on the contents of facilities and equipment, depth sounding
15	24 (Sat.)	Detailed survey on site situations
16	25 (Sun.)	Discussion among members (fishing port civil engineering/natural conditions survey group members leave Banjul to arrive at Japan on July 27)
17	26 (Mon.)	Collection of data from Ministry of Tourism and Ministry of Local Government and Lands
18	27 (Tue.)	Survey of actual situation at the Bakau fish landing spot and supplementary survey
19	28 (Wed.)	Survey of actual situation at the Bakau fish landing spot and supplementary survey
20	29 (Thr.)	Final discussion on the equipment and facilities
21	30 (Fri.)	Major fish market survey
22	31 (Sat.)	Visit to Italian project site
23	Aug. 1 (Sun.)	Visit to Italian project site
24	2 (Mon.)	Final discussion with concerned bodies
25	3 (Tue.)	Leave Banjul and arrive at Dakar
26	4 (Wed.)	Report to the Embassy of Japan and JICA, leaving Dakar
27	5 (Thr.)	Arrive at Paris, leave Paris
28	6 (Fri.)	Arrive at Tokyo

II-2 Draft report explanation phase

Order	Date	Place and activities
1	Sept 19 (Sun.)	Tokyo to London
2	20 (Mon.)	London to Brussels, Brussels to Banjur
3	21 (Tue.)	Courtesy call to the related bodies, explanation of the draft contents
4	22 (Wed.)	Explanation of the draft contents
5	23 (Thr.)	Explanation of the draft contents, Discussion on the contents of the Minutes
6	24 (Fri.)	Signing the Minutes
7	25 (Sat.)	Supplementary survey
8	26 (Sun.)	Discussion among members
9	27 (Mon.)	Final discussion, Banjul to Dakar
10	28 (Tue.)	Report to the Embassy of Japan in Senegal and JICA, Dakar to Brussels
11	29 (Wed.)	Brussels to London, leave London
12	30 (Thr.)	Return

Appendix III List of Major Personnel Interviewed

1. President	
Mr. Dawda Kairaba Jawara	President
2. Ministry of Foreign Affairs	
Mr. Omar Yusupha N'jie	Deputy Permanent Secretary
Mr. William J. Joof	Chief of International Economic Cooperation Division
3. Ministry of Natural Resources and Environment	
Mr. Sarjo K. Touray	Minister
Mr. Mustapha Darboe	Permanent Secretary
4. Fisheries Department	
Mr. Ousman K. L. Drammeh	Director
Mr. Momodou Kota Cham	Assistant Director
Mr. Pete Ndow	Fisheries Officer
Mr. Momodou N'jie	Fisheries Officer
Mr. Ebou M. Mbye	Fisheries Officer
Mr. Omar Ali Sarr	Fisheries Assistant
Mr. Gibril Gabis	Fisheries Field Assistant
Mr. Sekouba Manjang	Forman
Mr. Moses J. Cardos	Forman Mechanic
Mr. Abdolie N'jie	Assistant Forman Mechanic
Mr. Harold Nicolls	Mechanic
Mr. Nobuyoshi FUNAHASHI	JICA expert
5. Ministry for Local Government and Lands	
Mr. Baboucar B. Barry	Director, Depertment of Lands and Surveys
6. Gambian Port Authority	
Mr. Cap. Abdou R. Bah	Harbour Master
Mr. Nicholas Alfred Blell	Technical Manager

7. Bakau Subcommittee (4) Italian project site

Mr. Ousman A. K. Bojang	Commitee member

8.

Mr. Buba Sanneh	Refrigeration Mechanic (Bintang)
Mr. Tumbul N. N. Sise	Village based Field Assistant (Kemoto)
Mr. Saja Touray	Village based Field Assistant (Tendaba)

9. Private fisheries distributors

Mr. Momodou Jammeh	Ref. Engineer, GAMCOOL

10. Embassy of Japan in Senegal

Mr. Morita Mizuho	Conseiller
Mr. Tsukahara Daini	Premier Secretary
Miyoshi Shu	Attache

11. Japan International Cooperation Agency (JICA) office at Senegal

Noriki ASAHI	Head
Toshimichu AOKI	Staff member

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY
ON
THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE REPUBLIC OF THE GAMBIA

In response to the request from the Government of the Republic of the Gambia, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Artisanal Coastal Fisheries (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to The Gambia a study team, which is headed by Mr. Noboru TAZOE, Chief Fisheries Officer, Office of the Overseas Fisheries Cooperation, Fisheries Agency, and is scheduled to stay in the country from 12 July to 3 August, 1993.

The study team held discussions with the officials concerned of the Government of the Republic of the Gambia and conducted a field survey in the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The study team will proceed with further works and prepare the basic design study report.

Banjul, 20 July, 1993

Mr. Noboru TAZOE
Leader
Basic Design Study Team
JICA

Mr. Ousman DRAMMEH
Director
Fisheries Department
Ministry of Natural Resources
and the Environment

ATTACHMENT

1. Objectives

The objectives of the Project are to establish appropriate fish landing facilities and to support activities of the land facilities in Bakau fish landing spot for further development of artisanal coastal fisheries in The Gambia

2. Project site

The project site is in Bakau, as shown in Annex I.

3. Executing agency and Responsible organization

Ministry of Natural Resources and the Environment
Department of Fisheries

4. Item requested by the Government of the Republic of the Gambia

After discussions with the basic design study team, the items listed in Annex II were finally requested by the Government of the Republic of the Gambia. However, the final components of the Project will be decided after further studies.

5. Japan's Grant Aid system

(1) The Government of The Gambia has understood the system of Japanese Grant Aid explained by the study team.

(2) The Government of The Gambia will take necessary measures, described in Annex III for smooth implementation of the Project, on condition that the Grant Aid Assistance by the Government of Japan is extended to the Project.

N. T.

JICA

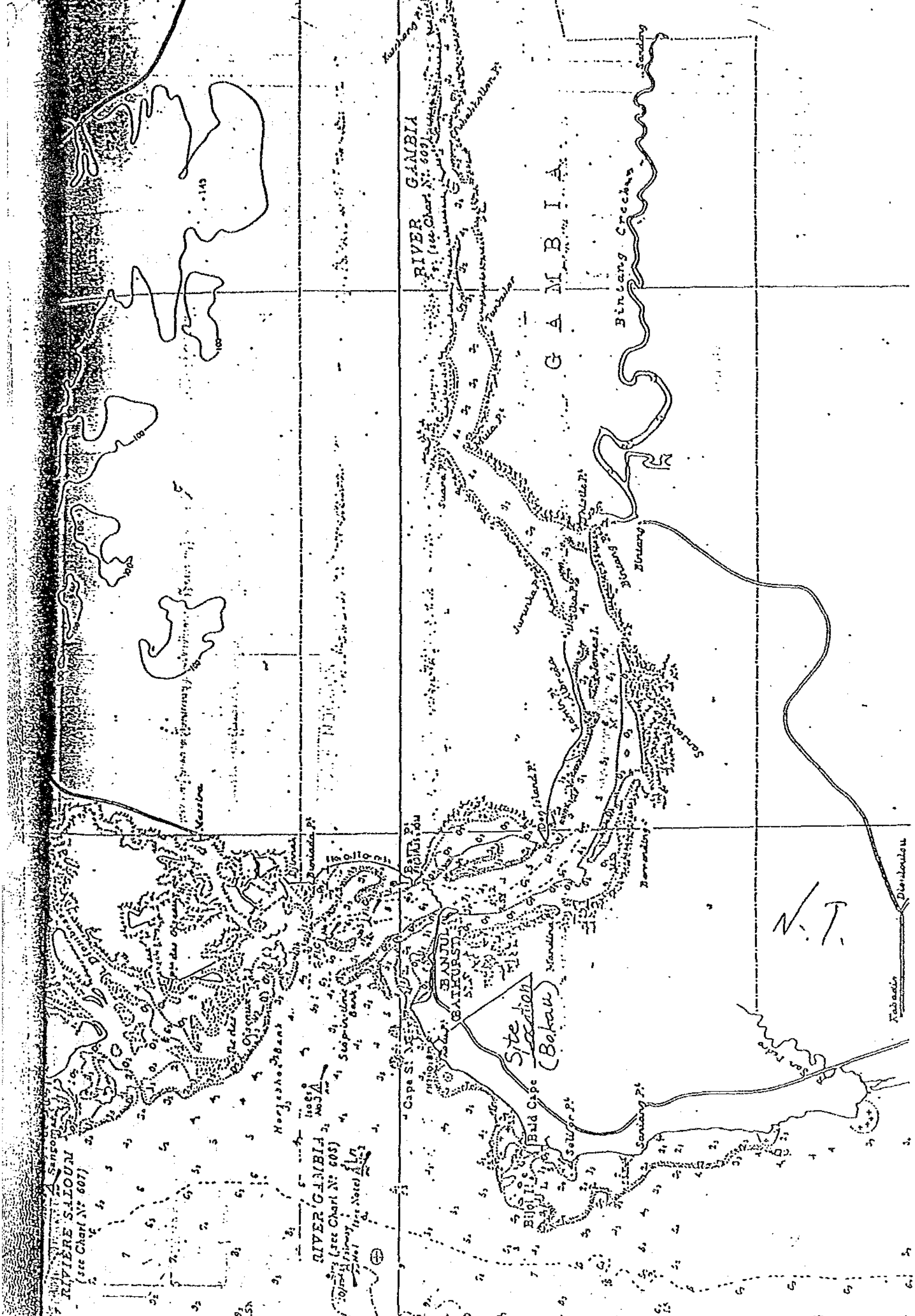
6. Schedule of the study

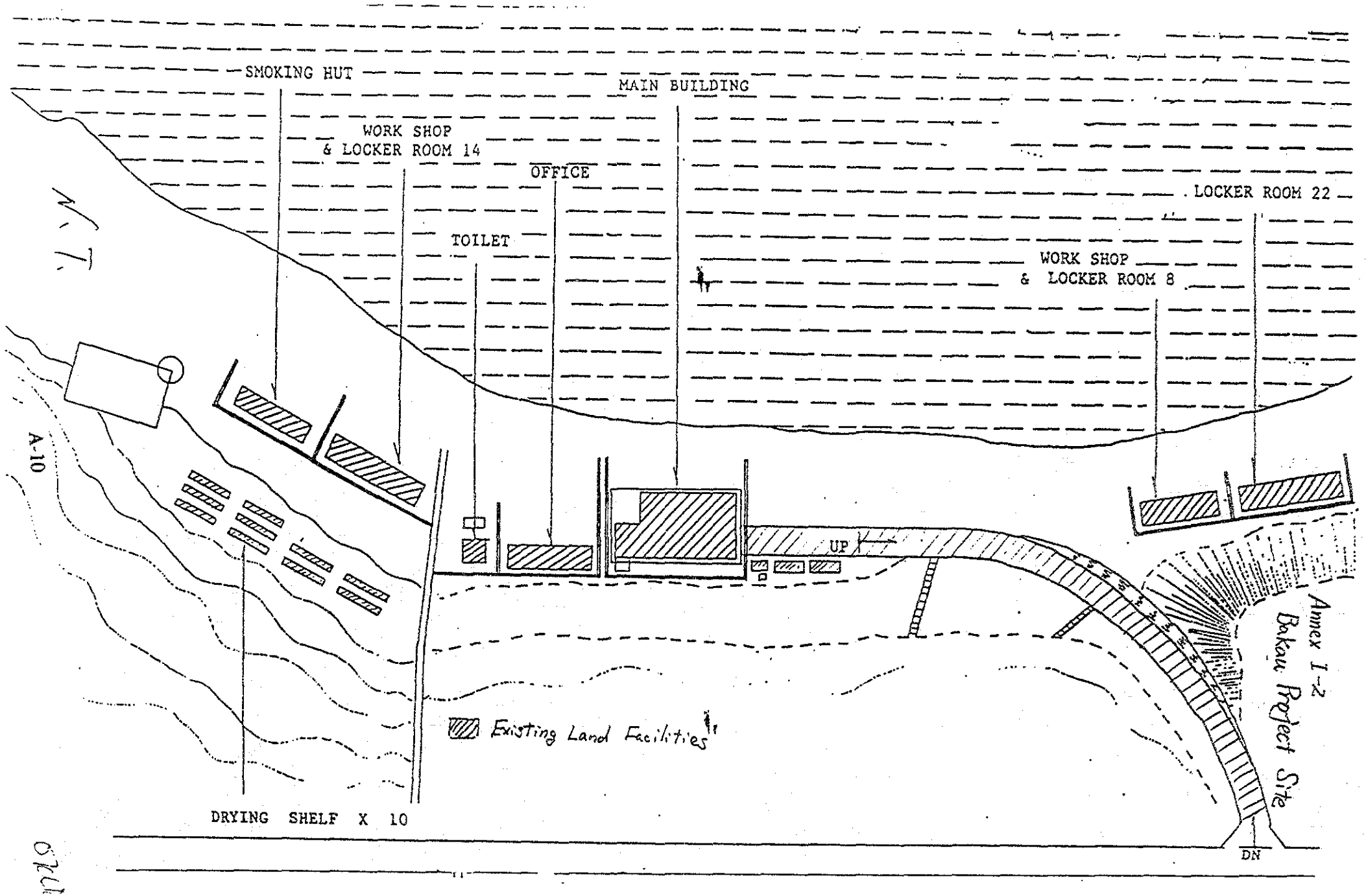
(1) The consultants will conduct further studies in The Gambia until 3 August, 1993.
(2) JICA will prepare the draft final report in English and dispatch a mission to explain its contents around September in 1993.
(3) When the contents of the draft final report is accepted in principle by the Gambia side, JICA will complete the final report and send it to the Government of The Gambia by December in 1993.

7. Proper use of equipment and the counterpart fund

When the products, purchased by the grant from Government of Japan, are sold or leased to fishermen, the Government of The Gambia shall take necessary measures to ensure the following :

(1) to deposit, in local currency, the amount to be obtained by such sale or lease in a suitable account of the Government of The Gambia as a counterpart fund,
(2) to utilize the above-mentioned counterpart fund for the purpose of fisheries development and maintenance of equipment purchased by the grant from the Government of Japan, and
(3) to report to the Government of Japan upon the use of the counterpart fund.


RIVER GAMBIA
G A M B I A
BANJUL
BATHURST
Site location
(Bakau)
N.T.
Cape St Mary
Bald Cape
Bintang Creek
RIVIERE SALOUM
(see Chart No 607)
RIVER GAMBIA
(see Chart No 608)
Dog Island Pt
Banta Pt
Kemada Pt


SMOKING HUT
MAIN BUILDING
WORK SHOP
& LOCKER ROOM 14
OFFICE
LOCKER ROOM 22
TOILET
WORK SHOP
& LOCKER ROOM 8
N.T.
A-10
UP
Existing Land Facilities
DRYING SHELF X 10
DN
Annex I-2
Bakau Project Site
1120

Annex II

Item Requested by The Government of the Republic of the Gambia. (in order of priority)

1. Fish landing facilities
2. 13m-long FRP canoe
3. Outboard engines (gasoline and diesel)
4. Spare parts for above outboard engines
5. 4WD pick-up truck
6. Fishing gears
7. Tools for FRP canoe repairing
8. Beach bins
9. VHF radio telephones (for insulated vans services)

N. T.

OKUDA

Annex III

Necessary measures to be taken by the Government of the Republic of the Gambia in case Japan's Grant Aid is executed.

1. To secure the ownership and/or right of site for the Project.
2. To clear and level the site prior to commencement of the Project.
3. To secure yard for stocking material and constructing temporary facilities at the Project site.
4. To obtain and maintain the license of the fish landing facilities from the concerning authority such as the Gambia Port Authority.
5. To provide necessary permissions, licenses and other authorizations for smooth implementation of the Project.
6. To provide facilities for distribution of electricity, water supply, drainage, telephone line and other incidental facilities.
7. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.
8. To exempt taxes and to take necessary measures for custom clearance of the materials and equipment brought for the project at the port of disembarkation.
9. To accord Japanese Nationals whose services may be required in connection with the supply of products and the services under the verified contract such facilities as may be necessary for their entry into the Republic of the Gambia and stay therein for the performance of their work.
10. To maintain and use properly and effectively the facilities constructed and equipment purchased under the Grant.
11. To bear all the expenses other than those to be borne by the Grant, necessary for construction of facilities as well as for the transportation and the installation of the equipment.
12. To coordinate and solve any matters which may arise with third party and inhabitants living in the Project area during implementation of the Project.

N. T.

OMD

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY
ON
THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES
IN THE REPUBLIC OF THE GAMBIA

(Consultation on Draft Report)

In July 1993, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study team on the Project for Improvement of Artisanal Coastal Fisheries (hereinafter referred to as "the Project") to the Republic of The Gambia, and through discussions, field survey, and technical examination of the results in Japan, has prepared the draft report of the study.

In order to explain and to consult The Gambia side on the components of the draft report, JICA sent to The Gambia a study team, which is headed by Mr. Noboru TAZOE, Chief Fisheries Officer, Office of the Overseas Fisheries Cooperation, Fisheries Agency, and is scheduled to stay in the country from September 20 to 26.

As a result of discussions, both parties confirmed the main items described on the attached sheet.

Banjul, 24 September, 1993

田添 伸

Mr. Noboru TAZOE
Leader
Basic Design Study Team
JICA

Mr. Ousman DRAMMEH
Director
Fisheries Department
Ministry of Natural Resources
and the Environment

ATTACHMENT

1. Components of Draft Report

The Government of The Gambia has agreed and accepted in principle the components of the Draft Report proposed by the team.

2. Japan's Grant Aid system

The Government of The Gambia has understood Japan's Grant Aid system, and reconfirmed the measures to be taken by the Gambia side for the realization of the project as agreed upon in the Minutes of Discussions dated 20 July 1993.

3. Further schedule

The team will make the final report in accordance with the confirmed items, and send it to the Government of The Gambia by December, 1993.

N. T.

Appendix V Trial Balance Sheet for Annual Operation of FRP Fishing Canoes

(1)	Annual earnings			162,500 Dalasis/year
	1) Bonga sales income	500 kg/day x 200 days/year x 0.5 Dalasis/kg	=	50,000 Dalasis/year
	2) Croaker and snapper sales income	200 kg/day x 75 days/year x 7.5 Dalasis/kg	=	112,500 Dalasis/year
(2)	Annual expenses			146,450 Dalasis/year
	1) Fuel cost	20 liters/day x 275 days/year x 3.9 Dalasis/liter	=	21,450 Dalasis/year
	2) Food expenses	20 Dalasis/day x 275 days/year	=	5,500 Dalasis/year
	3) Ice expenses (for croaker and snapper)	200 kg/day x 75 days/year x 1 Dalasis/kg	=	15,000 Dalasis/year
	4) Personnel expenses	500 Dalasis/month x 12 months x 8 persons	=	48,000 Dalasis/year
	5) FRP fishing canoe rental cost (including outboard engines)			30,000 Dalasis/year
	6) Maintenance cost			8,000 Dalasis/year
	① Outboard maintenance			(5,000 Dalasis/year)
	② Fishing gear repair			(3,000 Dalasis/year)
	7) Repayment for fishing gear purchase			11,000 Dalasis/year
	8) Bank interest	50,000 Dalasis/year x 15%	=	7,500 Dalasis/year

Appendix VI Estimated balance of operations

(1) Annual earnings	1,008,600 Dalasis/year		
1) Ice making sales earning	3,000 kg/day x 365 days/year x 0.8 x1 Dalasis/kg	=	876,000 Dalasis/year
2) Cold storage rent	10,000 Dalasis/month x 12 months x 0.8	=	96,000 Dalasis/year
3) Fishermen locker rent	1,600 Dalasis/month x 12 months	=	19,200 Dalasis/year
4) Fix box rent	600 Dalasis/month x 12 months x 0.8	=	5,760 Dalasis/year
5) Smoking oven rent	720 Dalasis/month x 12 months	=	8,640 Dalasis/year
6) Fuel oil pump rent	250 Dalasis/month x 12 months	=	3,000 Dalasis/year
(2) Annual expenses	746,970 Dalasis/year		
1) Personnel expenses	9,000 Dalasis x 12 months	=	108,000 Dalasis/year
2) Miscellaneous expenses	1,000 Dalasis/month x 12 months	=	12,000 Dalasis/year
3) Electric power and water supply	38,000 Dalasis/month x 12 months	=	456,000 Dalasis/year
4) Generator fuel expenses	3,500 Dalasis/month x 12 months	=	42,000 Dalasis/year
5) Support vehicle fuel expenses	2 units x 100 liters/month x 12 months x 3.9 Dalasis/liter	=	9,360 Dalasis/year
6) Activities equipment and office supplies expenses	1,500 Dalasis/month x 12 months	=	18,000 Dalasis/year
7) Maintenance expenses			101,610 Dalasis/year
① Land facilities maintenance expenses			(76,610 Dalasis/year)
② Fish landing facilities maintenance expenses			(25,000 Dalasis/year)

(3) Grounds for setting items of earnings and expenses

1) Earnings

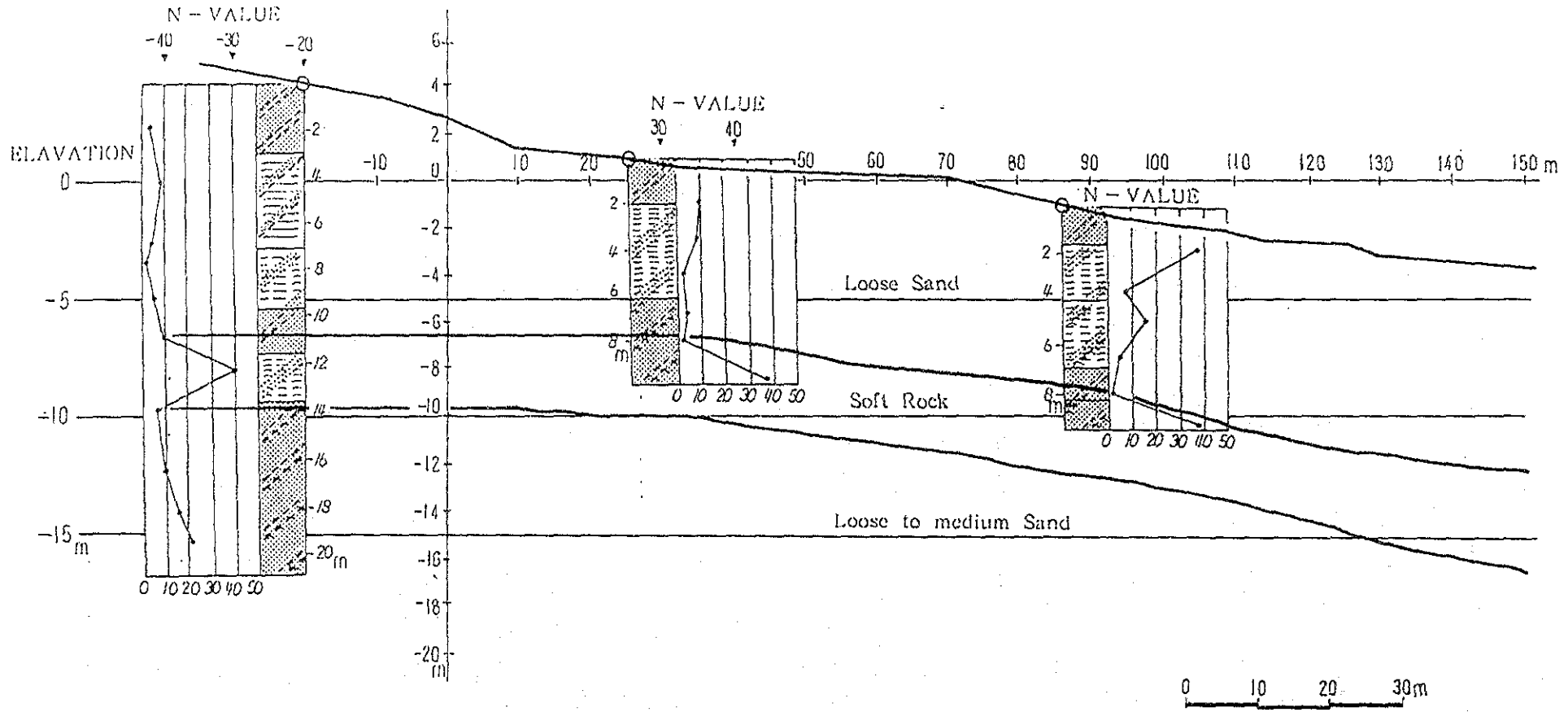
① Ice sales	:	Utilization rate of 80% was set up on the basis of the current 89%
② Refrigerator rent	:	Utilization rate of 80% was set up on the basis of the current usage, with consideration given to lean fishing seasons
③ Fishermen locker	:	Determined on the basis of current usage
④ Fish box	:	Utilization rate of 80% was set up for 10 boxes/day x 30 days/month x 2 Dalasis/day/box, with consideration given to lean fishing seasons
⑤ Smoking oven:	:	Determined on the basis of current usage
⑥ Fuel oil pump	:	Determined on the basis of current usage

⑦ Rents for fish drying shelves,insulated vans are not definite, and will not be included in the calculation.

2) Expenses

① Personnel expenses	:	According to the personnel plan
② Miscellaneous expenses	:	Determined on the basis of current usage
③ Electric power and water supply	:	Determined on the basis of current usage and 36,000 to 38,000 Dalasis/month estimated by the Fisheries Department
④ Generator fuel expenses	:	Determined on the basis of current usage
⑤ Support vehicle fuel expenses	:	Determined on the basis of travel distance of 800 km/month per vehicle
⑥ Activities equipment and office supplies expenses	:	Determined on the basis of current results
⑦ Land facilities maintenance expenses	:	Addition to 26,610 dalasis/year estimated at the time of basic design of land facilities
⑧ Fish landing facilities maintenance expenses	:	The fish landing facilities are maintenance-free for the initial 7 years, and all facilities are to be repaired by painting on the 8th year. The maintenance cost is estimated at about 120,000 Dalasis. So repair cost and repair expenses which may be required every year must be added.

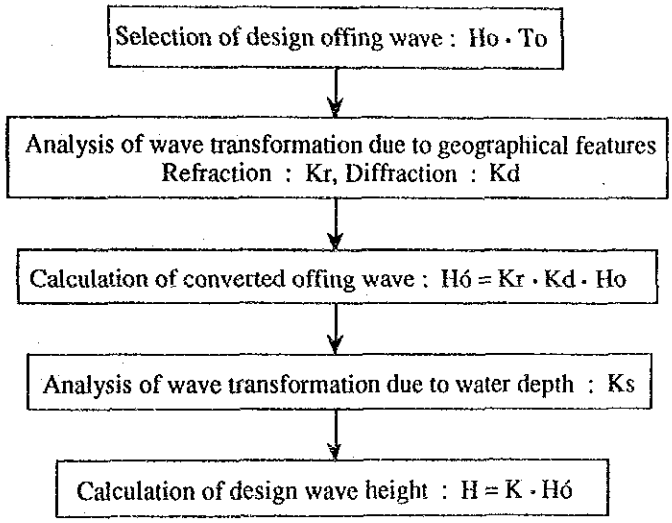
Appendix VII



Appendix VIII Calculating the design wave height

(1) General

As the project site faces the open sea, direct waves come up to the project site. As the jetty is located with facing the open sea in this project, the jetty should have firm structure with reasonable durability against direct waves. Then, it is necessary to determine the design wave height in the project site for stability calculation of the structure. The design wave height is generally determined in the following procedures, which is adopted in this calculation.



(2) Selection of design offing wave

When there are enough observation data, the design offing wave is generally determined by conversion to significant wave through analysis of those data. However, as those data are not available for this project, it is necessary to use other related data observed by foreign countries. There are Ocean Wave Statistics (U.K.) and Marine Climatic Atlas (USA) as reliable data. The design offing wave determined in comparison with those data.

1) Offing wave by Ocean Wave Statistics

Ocean Wave Statistics is published for navigation by U.K. Its data is categorized by 50 sea areas, 3 month terms and 36 directions. This project site is located in No. 18 sea area of the above category. As the offing wave is analyzed in north to west directions, four directions such as N, NNW, WNW, W are analyzed in this calculation. Generally, exceed probability of 0.05 corresponds to the significant

wave height (Ho) of 20 years term of appearance. The offing wave heights (Ho) in each direction are selected as follows.

Direction / Components	N	NNW	WNW	W
Ho	3.5m	3.0m	3.0m	3.0m
To	8 sec.	7 sec.	8 sec	10 sec.

2) Offing wave by Marine Climatic Atlas

Marine Climatic Atlas has been compiled by US. Navy since the Second World War for marine operations. Its data only show monthly average wave height ($\bar{H}$) except wave direction and cycle. Relation between significant wave heights and these data is determined statistically as follows.

$H_{1/3}$ (significant wave height) = 1.6 x $\bar{H}$ (average wave height)

Ho (20 years probability wave height) = $H_{1/3}$ + 2S

Therefore, the offing wave is selected as 3.5 m in maximum as following figures.

Components / Month	$\bar{X} = \bar{H}$	S	$H_{1/3} = 1.6\,\bar{H}$	Ho = $H_{1/3}$ + 2S
Jan.	1.0m	0.8	1.6m	3.2m
Feb.	1.2	0.8	1.9	3.5
Mar.	1.2	0.8	1.9	3.5
Apr.	1.2	0.8	1.9	3.5
May.	1.0	0.8	1.6	3.2
Jun.	1.0	0.8	1.6	3.2
Jul.	1.0	0.8	1.6	3.2
Aug.	1.0	0.8	1.6	3.2
Sep.	1.0	0.8	1.6	3.2
Oct.	1.0	0.8	1.6	3.2
Nov.	1.0	0.8	1.6	3.2
Dec.	1.0	0.8	1.6	3.2

3) Selection of the offing wave

The offing waves determined by available statistics of wave data are summarized as follows.

Results from OCEAN WAVE STATISTICS

	N	NNW	WNW	W
Ho	3.5m	3.0m	3.0m	3.0m
To	8 sec.	7 sec.	8 sec	10 sec.

Results form MARINE CLIMATIC ATLAS

3.5 wave direction and cycle are unknown

Though wave heights are similar in both cases, results by Ocean Wave Statistics are more reliable with presenting wave directions and cycles. Then, those results are used for further process.

(3) Wave transformation due to geographical features

① Refraction

As waves are influenced by geographical features of the sea bottom at the water depth as same as half height of wave, wave speed and direction will changes. There are drawing analysis and computer simulation for determining a refraction coefficient. With regards to this project, there is expection of change of geographical features of the sea bottom in a long term because the project site is located nearby the estuary of the River Gambia and the sea bottom is composed of sand. Then, a refraction coefficient is determined synthetically.

As procedures, sea area in front of the project site is demarcated into two sections such as area of –5 ~ –10 m water depth and area of lower –10 m water depth, then each refraction coefficient (kr) in calculated. As to assumed water lines are settled as 45 degrees against north for area of –5 ~ –10 m and 15 degrees against north for lower –10 m area.

Refraction coefficients and angles of irregular waves at the straight and parallelly depending shore though above procedures are determined as follows for four directions such as N, NNW, WNW and W.

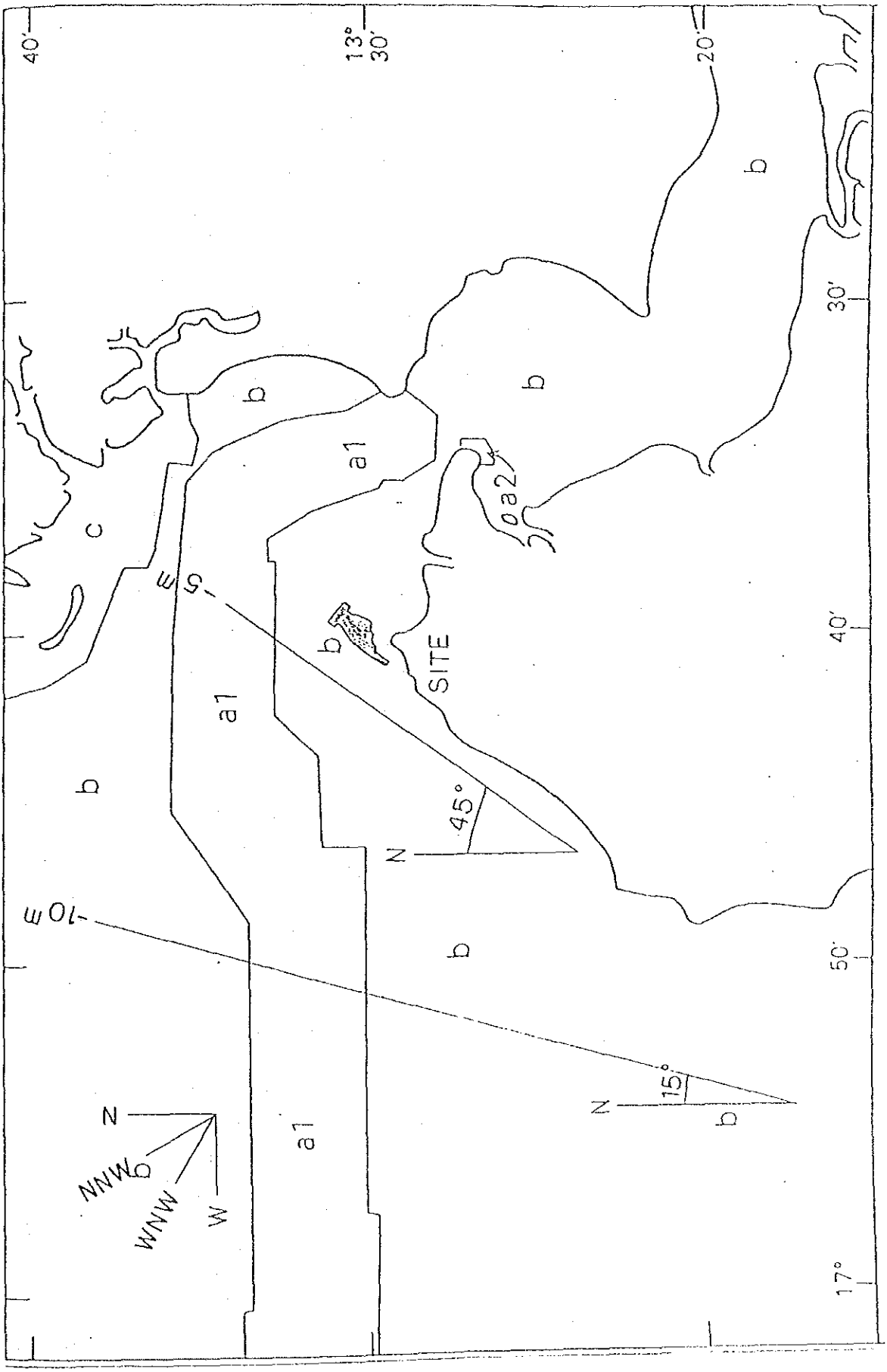
Refraction coefficients (K_{r1}) for area of lower –10m depth

	α_o	h_1	Lo	h/Lo	K_{r1}	α_1
N	75°	10m	99.8m	0.100	0.58	43°
NNW	45°	10m	76.4m	0.131	0.93	33°
WNW	15°	10m	99.8m	0.100	0.98	10°
W	–15°	10m	154.0m	0.064	0.98	8°

Refraction coefficients (K_{r2}) for area of lower –10m depth

	α_6	h_2	h/Lo	K_{r2}	$K_r = K_{r1} \times K_{r2}$
N	13°	5m	0.05	0.99	0.574
NNW	3°	5m	0.07	1.00	0.930
WNW	–20°	5m	0.05	0.97	0.951
W	–38°	5m	0.03	0.97	0.882

Fig. VIII-①



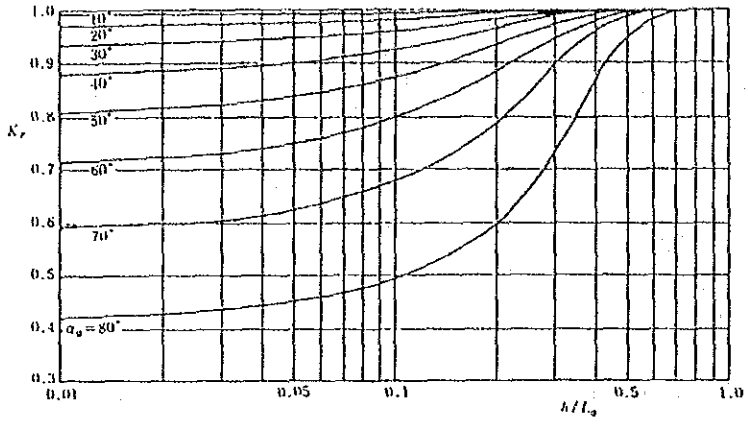


Fig. VIII-②

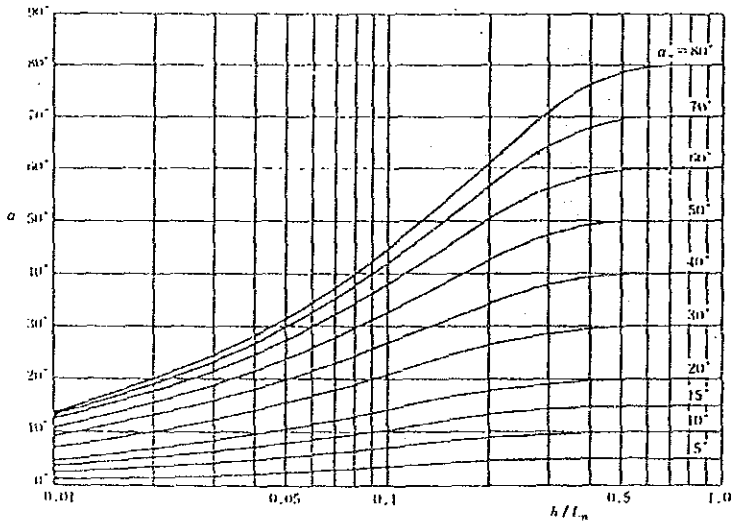


Fig. VIII-③

② Diffraction

As there does not exist structures such as cape and sandbank between off shore and the project site, diffraction coefficient is determined as Kd = 1.0.

(4) Calculation of converted offing wave

Converted offing waves are determined as follows considering the above mentioned refraction and diffraction.

	Ho	Kr	Kd	Hó = Kr • Kd • Ho
N	3.5m	0.574	1.0	2.01m
NNW	3.0m	0.930	1.0	2.79m
WNW	3.0m	0.951	1.0	2.85m
W	3.0m	0.882	1.0	2.65m

(5) Transformation due to water depth

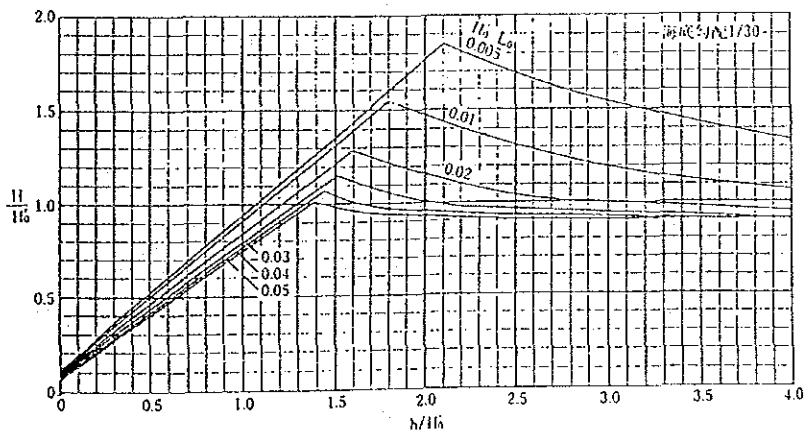
As water depth comes shallow, wave length, speed and height generally transform accordingly, transformation of wave height in accordance with water depth in determined as follows.

Wave height determination depth : h = 1.8 + 2.5 = 4.3m
(MHWS + design water depth)

Average slope do sea bottom : 1/30

Shallow coefficient : determined by the following figure

	h/Hó	Hó/Lo	H/Hó	Design wave height
N	2.19	0.020	1.10	2.21m
NNW	1.58	0.037	1.05	2.29m
WNW	1.54	0.029	1.14	3.25m
W	1.66	0.017	1.33	3.52m



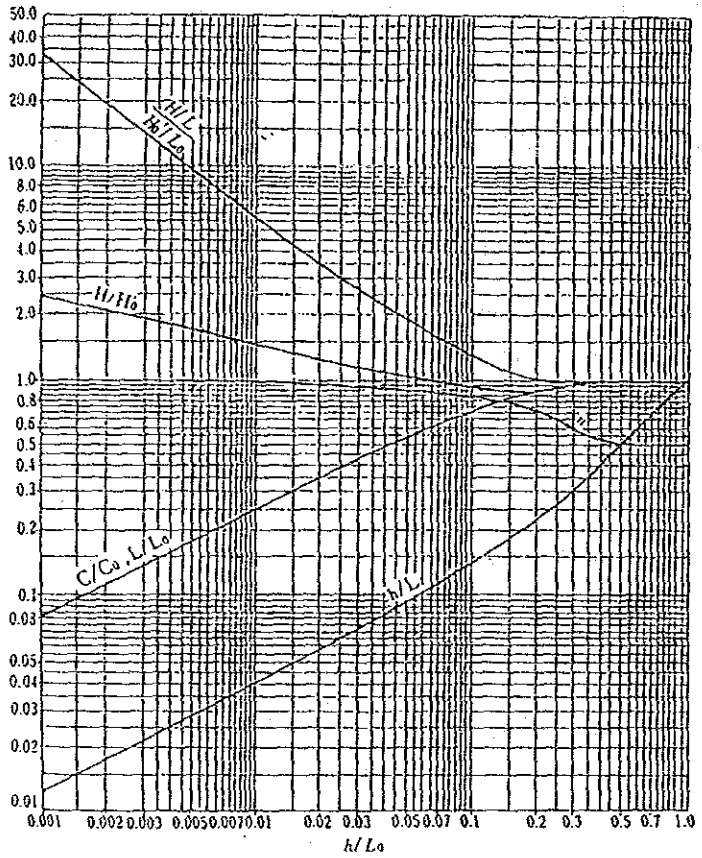
(6) Design wave height

As design wave height of west direction at the jetty shows maximum value, the followings are adopted for this project.

H = 3.5m, T = 10 sec. (at up tide)

Wave length is determined by the following drawing

L = 62.9 m by h/L = 0.07 and h/Lo = 0.028



Appendix IX Study of fish landing jetty availability

(1) Overview

The fish landing jetty is not provided with a wave breaking function such as a breakwater and thus berthing of the vessel may be extremely difficult depending on the oceanographic conditions. Then, it was determined to study the utilization rate (availability) of the fish landing jetty by analyzing the existing data related to oceanographic conditions. Factors which affect jetty availability are wind and waves coming from the outer ocean. The influence of the wind was studied according to the observation data recorded in the last five years. Since there was no observation record for waves, general theoretical formulae were used to draw inferences. As a result, annual availability of 90% or more was estimated when the impact of wind is considered, while annual availability of 60% or more was estimated when the influence of waves is assumed. Based on the above result, the availability of the fish landing jetty under this project is considered to be about 80%.

(2) Study of wind impact

① Wind data analysis

The Water Resources Department is collecting wind data in the neighborhood of the project site. The data is concerned with the maximum wind velocity, average wind velocity and prevailing wind direction. The data used in the present study is based on the average monthly wind speed in the west-to-north wind direction alone, since only the west-to-north direction has topical relevance.

② Determining the critical wave height

Wave height at which the jetty is available is determined at the place where the jetty is constructed. According to experience, the jetty is said to be available at the wave height of $\bar{H}$ = 30 cm to 50 cm; however, since the fishing vessels using the jetty are comparatively small fishing canoes, and the elevating staircase is provided for easire landing operation in the project, the critical wave height is determined to be $\bar{H}$ = 50 cm.

③ Calculation of wave height at the jetty position

The S-M-B method should be used to predict the wave which is caused by wind at the jetty position. The wind duration is not clear from the data of the Water Resources Department, and maximum value of the average maximum wind velocity is 8.7m/sec, which is not very high. Therefore, we have determined that the maximum wind direction of 12 hours is sufficient. As a result, the wind velocity at which significant wave height H1/3 is 50 cm, is 5m/sec, as shown in the following table.

④ Calculating the frequency in occurrence of critical wind velocities

The following table shows the frequency of occurrence of average wind velocities of 5m/sec or more, summarized based on the 1987~1991 data by the Water Resources Department.

Frequency in occurrence of wind velocity V = 5 m/sec (10 knots)

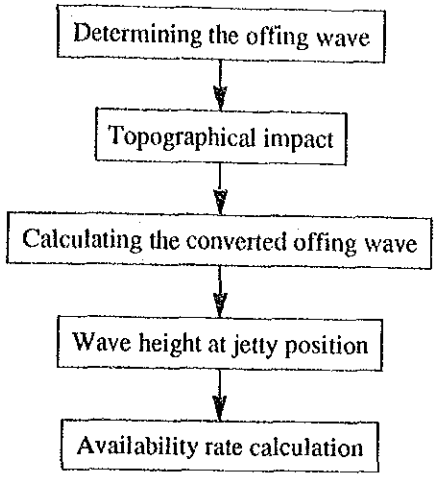
	1987	1988	1989	1990	1991	Total frequency	Frequency by month	Annual frequency
1	0	0	0	0	1	1	0.7	
2	1	0	0	0	0	1	0.7	
3	5	2	3	0	8	18	12.0	
4	6	7	14	0	9	37	24.7	
5	11	14	12	0	8	45	30.0	
6	4	8	5	0	0	24	16.0	
7	4	8	2	7	6	20	13.3	
8	0	0	1	0	0	1	0.7	
9	0	0	0	0	0	0	0	
10	0	0	0	0	0	0	0	
11	0	0	0	0	0	0	0	
12	0	0	0	0	0	0	0	
Σ	30	39	39	7	32	147		147 ÷ 5 ÷ 365 = 8.1%

⑤ Summary of availability rate throughout the year

Calculating the frequency in occurrence of critical wind velocities has revealed that days when the wave height exceeds 50 cm at the jetty position accounts for 8.1%. When wind impact is taken into account, the availability rate throughout the year is estimated at over 90%.

(3) Study of the wave impact from the open sea

The availability rate of the jetty is calculated by estimating the wave height when the wave from the open sea has reached the project site after undergoing topographical deformation. The following procedures are taken to calculate the availability rate.



① Setting the offing wave

The Gambia has not yet surveyed the particulars of the offing waves in the sea area in front of the project site, so we use the data surveyed at No. 18 sea areas according to the Ocean Wave Statistics (U.K.).

The direction of the wave incident upon the projected site can be classified into the following four components topographically:

Wave direction	North	North-northwest	West-northwest	West	Subtotal
No. of data	22,829	15,960	5,685	2,227	46,701

Thus, the percentage with respect to the number of all data, 60,570 points (in all directions), is 46,701/60,570 = 0.771 (77.1%), and the wave does not enter the project site at the remaining 0.229 (22.9%).

② Topographical impact

The project site faces the open sea and is immune to diffraction impact, so only the impact of refraction is considered. The incident wave direction can be classified into four components; north, north-northwest, west-northwest, and west, depending on the topographical characterstics.

Wave direction	North	North-northwest	West-northwest	West	Subtotal
Frequency	0.49	0.34	0.12	0.05	1.00

The refraction is not determined for each wave direction; it is calculated by using the average refraction rate in conformity to the frequency of occurrence in each direction. For the refraction rate for each wave direction, see the description in Appendix VIII "Calculating the design wave height."

The average refraction rate is 0.755 as shown below:

Wave direction	North	North-northwest	West-northwest	West
Frequency (Ai)	0.490	0.340	0.120	0.050
Refraction (Kr)	0.574	0.930	0.951	0.882
Ai.Kr	0.281	0.316	0.114	0.044
Di.Dr	0.755			

③ Setting the converted offing wave

The wave height of the wave code according to the Ocean Wave Statistics is converted into significant wave height according to the Wave Codes. The following shows the offing wave in from of the project site calculated from the refraction rate gained in the previous paragraph:

Wave code	Offing wave (Ho)	Converted offing wave (Hó) (Ho × $\bar{K}r$)
02	1.0	0.76m
03	1.5	1.13m

④ Wave height at jetty position

Wave depth at the jetty position is considered with reference to the average tide level. Accordingly, water depth at the jetty position is:

h = M.S.L. + depth at jetty position = 0.95 + 2.5 = 3.45

We get the waver height discussed in the previous paragraph by the Wave Code, as given below. For Ho'/Lo" and other symbols, see the description in the "Calculating the Design Wave Height."

Wave code	Ho (m)	Hó (m)	To (sec)	Lo (m)	h/Hó	Hó/Lo	H/Hó	H (m)
0.2	1.0	0.76	5	39.0	4.5	0.019	0.95	0.72
0.3	1.5	1.13	6	56.2	3.1	0.020	1.00	1.13

⑤ Conversion from significant wave height to average wave height

The wave height obtained from the Wave Code is given in the significant wave height (H1/3), which must be converted into average wave height.

The following relationship holds between the significant wave height (H1/3) and average wave height (H), according to Rayleigh distribution:

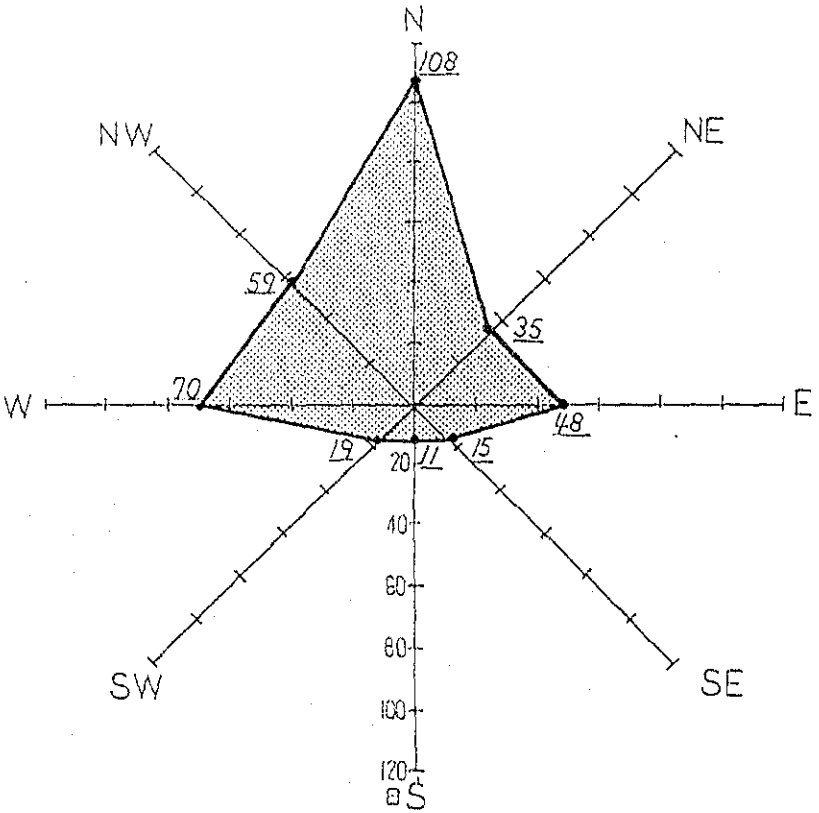
$$H1/3 = 1.60\bar{H}$$

The following table shows the average wave height converted from the significant wave height:

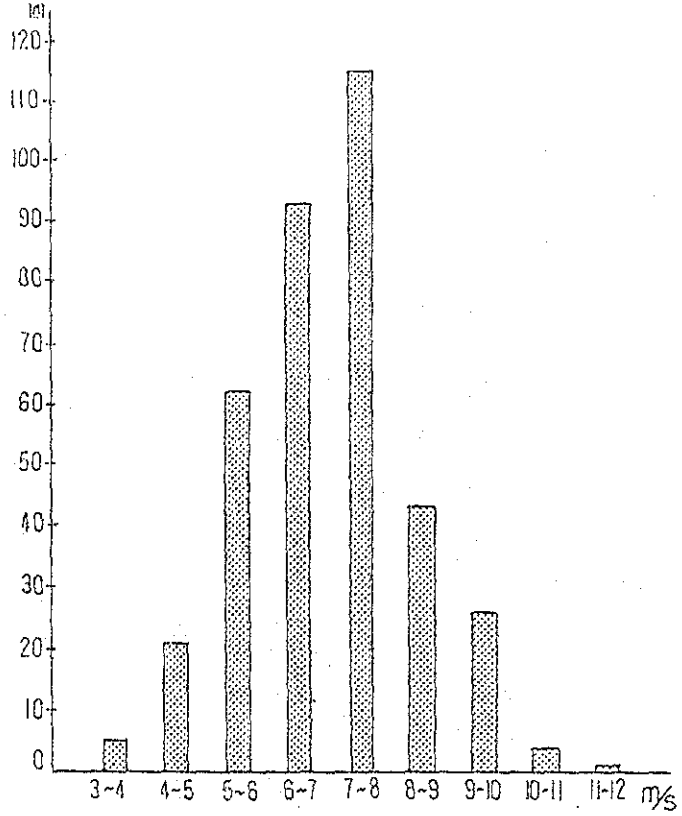
Wave code	$H_{1/3}$ (m)	$\overline{H}$ (m)	Frequency of occurrence
02	0.72	0.45	58.4
03	1.13	0.71	80.0

Therefore, when critical wave height is set to 50 cm, utilization rate on the top end of the jetty at the deepest position is estimated at over 60%.

Appendix X



Frequency of daily maximum wind directions

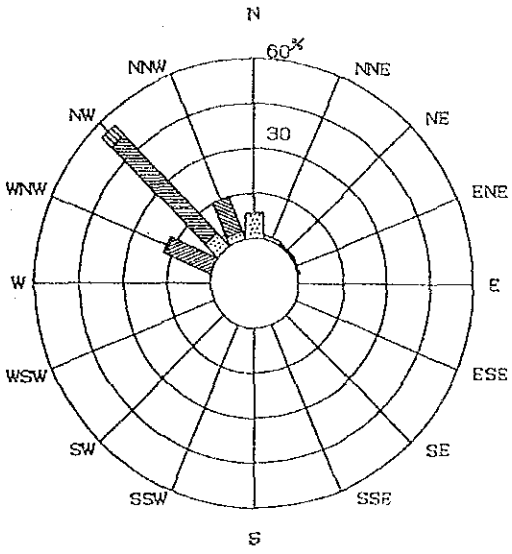


Frequency of daily maximum wind speed (1991)

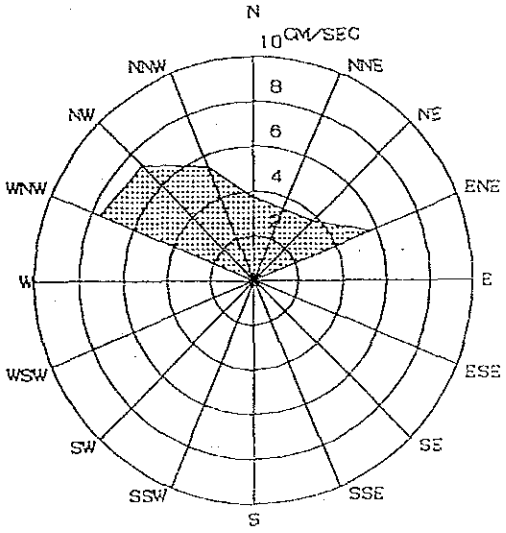
Appendix XI

ST. A

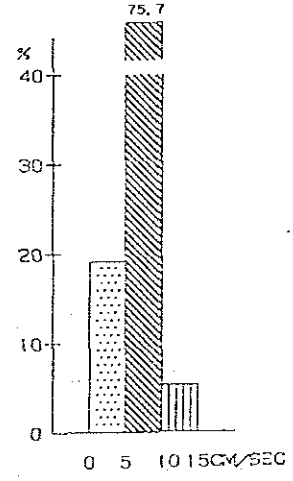
1993年7月20日～7月21日



Frequency of current directions



Frequency of average current speed



Frequency by current speed

Appendix XII Table

Table 2-1 Economic Index of The Gambia

Item/Fiscal year	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	Remarks
1. GDP market price (million Dalasis)	1,486.0	1,635.5	1,942.3	2,367.0	2,629.6	2,947.6	
Increase over the previous year (%)	–	10.1	18.8	21.9	11.1	12.1	
2. Per Capita GDP market price (Dalasis)	1,909.0	2,031.9	2,333.7	2,750.4	2,954.9	3,203.2	
Increase over the previous year (%)	–	6.4	14.9	17.8	7.4	8.4	
3. Per Capita GDP market price (US dollars)	237.8	269.8	319.6	333.5	364.9	342.9	
Assimilation over the previous year (%)	–	13.5	18.5	5.9	7.8	–6.0	
4. Mid-year population (1,000)	778.4	804.9	832.3	860.6	888.9	920.2	
Increase over the previous year (%)	–	3.4	3.4	3.4	3.3	3.5	
5. Consumer price index (against 100 in the base year of 1976/77)	440.9	496.3	550.2	607.8	663.1	742.9	
Increase over the previous year (%)	–	12.6	10.9	10.5	9.1	12.0	
6. Trade balance (million Dalasis)	–616.6	–643.1	–738.0	–1,193.1	–1,487.5	–	
Import amount (million Dalasis)	839.1	861.6	1,054.2	1,447.3	1,759.4	–	
Export amount (million Dalasis)	222.5	318.5	316.2	254.2	271.9	–	

(Source: Central Statistic Department)

Table 2-2 Population distribution in The Gambia in 1983

(unit: number of population)

Name of administrative district	Population	Men/women		Distribution ratio (%)
Banjul	44,188	22,705	21,483	6.4
K. U. D. C.	101,504	52,153	49,351	114.8
Brikama				
Kombo	103,649	51,984	51,665	15.1
Foni	33,596	16,724	16,872	4.9
Mansa Konko	55,263	26,967	28,296	8.0
Kuntaur	57,594	28,871	28,723	8.4
Georgetown	68,410	34,255	34,155	9.9
Kerewan	112,225	54,930	57,295	16.3
Basse	111,388	53,545	57,843	16.2
Total	687,817	342,134	345,683	

Note: K. U. D. C. stands for Kanifing Urban District Council, which includes Bakau and Sere Kunda, and constitutes the Banjul metropolitan area with Banjul.

(Source: Central Statistic Department)

Table 2-3 Percentage of GDP market price by industries

(unit: 1,000 Dalasis)

Industry	Fiscal year 1986/87	Percentage (%)	Fiscal year 1991/92	Percentage (%)
Primary industry	(467,441)	(31.5)	(675,520)	(22.8)
1. Agriculture	317,407	21.4	387,003	13.1
2. Live stock	94,427	6.4	176,955	6.0
3. Forestry	13,491	0.9	30,485	1.0
4. Fishing	41,805	2.8	80,477	2.7
5. Mining	311	0.0	600	0.0
Secondary industry	(32,531)	(2.2)	(175,273)	(5.9)
1. Manufacturing	32,531	2.2	175,273	5.9
Tertiary industry	(986,013)	(66.3)	(2,096,839)	(71.3)
1. Construction	70,294	4.7	148,300	5.0
2. Electric power and water supply	12,494	0.8	25,638	0.9
3. Foreign trade	438,974	29.5	1,014,403	34.4
4. Tourism	76,276	5.1	113,551	3.9
5. Transport	114,997	7.7	226,038	7.7
6. Others	177,828	12.1	371,996	12.7
7. Public services	95,150	6.4	196,913	6.7
Total	1,485,985		2,947,632	

(Source: Central Statistic Department)

Table 2-4 Transition of fisheries production

(unit: ton)

Fiscal year	1985	1986	1987	1988	1989	1990	1991
Artisanal fisheries	7,426	9,909	5,138	7,224	10,941	11,573	20,204
Industrial fisheries	23,976	22,225	22,421	11,864	11,534	26,401	23,175
Total	31,402	32,134	27,559	19,088	22,475	37,974	43,379

(Source: Fisheries Department)

Table 2-5 Major fish prices

(unit: Dalasis/kg)

Fish	Market retail price	Hotel wholesale price
Bonga	1.0	–
Sea catfish	–	–
Croaker	15.0	18
Barracuda	12.0	18
Grouper	10.0	14
Mackerel	7.0	11
Sole	13.0	18
Shrimp	20.0	15 – 45
Lobster	100.0	90 – 150

(Source: Fisheries Department)

Table 2-6 Transition of marine product exports

(unit: ton)

Product item	Fiscal year							
	1984	1985	1986	1987	1988	1989	1990	1991
Fish (fresh fish, frozen)	4,392.1	3,585.09	4,731.6	4,352.67	72.8	34.2	50.45	124.51
Shell	3.9	194.58	475.9	561.06	388.3	326.1	837.1	886.14
Fish (dried, smoked)	357.9	520.85	33.3	479.52	493.7	503.09	514.09	492.15
Stock fish	6.6	48.37	18.5	57.51	108.2	121.9	46.6	35.46
Lobster	0.2	3.8	3.8	1.89	0.2	0.4	1.14	6.59
Total	4,774.7	4,352.09	5,562.8	5,452.35	1,068.2	1,035.69	1,449.31	1,544.35

(Source: Fisheries Department)

Table 2-7 Canoe motorization rate at major fish landing spots (fiscal 1991)

Fish landing spot	Total number of canoes	Number of motorized canoes	Motorization rate
Bara	35	9	26
Banjul	58	39	67
Old Jeshwan	11	11	100
Bakau	40	8	20
Brufut	85	63	74
Tanji	32	31	97
Total	261	161	62

Note: Fish landing spots other than above are not documented.

(Source: Fisheries Department)

Table 2-8 Fish production of artisanal fisheries by major fish species

(unit: ton)

Fish name	Fiscal year											Reference
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	991	
Bonga	4,177.9	3,604.6	5,699.5	45,714.2	5,022.9	7,818.2	3,195.2	5,317.3	9,362.3	8,038.65	17,669.24	
Cassava fish	956.6	271.0	296.1	294.1	253.8	216.1	201.7	234.0	123.2	379.04	125.20	
Lady fish	740.2	297.3	312.0	396.2	352.9	254.3	240.6	296.7	197.5	518.83	353.80	
Sea catfish	1,982.9	672.9	765.5	1,119.0	650.5	427.4	371.6	319.6	248.6	318.63	198.19	
Rubber grunt	114.8	27.2	54.6	45.6	35.6	30.2	60.2	52.2	47.5	35.95	48.78	
Barracuda	717.4	146.1	99.1	227.0	113.0	195.6	164.3	55.1	39.8	162.94	220.22	
G. African Threadfin	696.4	105.1	76.0	134.3	80.0	47.1	43.9	44.7	21.8	105.5	69.48	
Mackerel	106.3	48.1	50.7	92.7	102.1	109.5	45.0	122.1	69.9	173.50	117.46	
Grouper	104.1	48.2	18.5	70.4	25.6	6.3	4.2	13.3	3.8	85.92	36.54	
Croaker	119.1	8.9	14.3	4.8	16.2	8.3	5.2	8.7	15.3	10.54	41.69	
L. African Threadfin	134.7	44.1	26.1	44.6	19.5	14.8	11.1	10.0	14.0	143.01	55.06	
Jack, crevalles	95.7	40.0	66.3	106.6	67.4	42.6	58.6	125.4	106.5	96.22	42.00	
Sardines	21.8	4.3	38.3	0	0	0.6	0	0	2.3	23.0	0.13	
Sole fish	168.2	20.0	77.8	40.3	6.9	25.9	14.9	84.5	20.3	211.15	131.03	
Mullet	238.4	94.9	119.2	183.9	66.4	52.6	151.8	2.3	37.8	21.80	13.32	
African sickle fish	86.4	30.1	31.1	27.3	20.6	34.2	43.6	41.9	24.8	97.33	128.39	
Bobo croaker	367.9	127.0	84.0	144.8	98.6	79.9	58.2	21.8	16.8	56.32	33.08	
Sompat grunt	244.5	134.5	13.0	109.8	86.7	92.0	98.0	100.8	63.4	228.42	262.59	
Sharks and rays	858.1	335.3	376.9	373.4	298.5	301.7	263.1	250.0	386.8	600.50	404.54	
Lobster	12.0	0.8	0.9	4.4	5.4	20.5	5.9	13.1	12.1	94.47	51.43	
Snapper spp.	0	6.4	7.6	4.8	5.9	3.9	12.1	25.9	32.7	93.35	54.00	
Tilapia spp.	136.6	27.6	22.5	51.0	6.1	3.2	5.2	2.1	21.6	13.52	10.02	
Others	410.8	114.9	83.4	123.3	91.4	124.1	84.2	82.8	72.9	65.06	137.84	
Total	14,579.2	6,209.3	8,333.4	49,312.5	7,426.0	9,909.0	5,138.6	7,224.3	10,941.7	11,573.15	20,204.03	Average of the last 4 years
Percentage of Bonga	28.7	58.1	68.4	92.7	67.6	78.9	62.2	73.6	85.6	69.5	87.5	79.1
Fish catch except for bonga	10,401.3	2,604.7	2,633.9	3,598.3	2,403.1	2,090.8	1,943.4	11,907.0	1,579.4	3,534.50	2,534.79	

(Source: Fisheries Department)

Table 2-9 Fish landing in marine artisanal fisheries by major fish landing spot (1992)

(unit: ton)

Name of fish landing spot	Annual fish landing	Percentage (%)
Banjul	163.19	1.2
Old Jeshwan	2,989.58	21.3
Bakau	521.52	3.7
Kololi	22.67	0.2
Brufut	840.40	6.0
Tanji	4,897.61	34.5
Tuju Bata	21.85	0.2
Sanyang	9.81	0.1
Gunjul	4,366.13	31.2
Karlong	221.16	1.6
Total	14,053.92	100.0

(Source: Fisheries Department)

Table 2-10 Distribution of fishing canoes by major fish landing spots and fishing methods (1991)

(unit: number of vessels)

Fish landing spots	Number of canoes	Fishing method and number of canoes						Number of fishermen
		Bottom gill net fishing	Surrounding gill net fishing	Hand line fishing	Stow net fishing	Drift gill net	Others	
Bara	35	2	2	24	7	0	0	161
Banjul	58	2	0	3	50	0	3	202
Old Jeshwan	11	0	11	0	0	0	0	116
Bakau	40	5	1	34	0	0	2	91
Kololi	11	7	0	3	0	0	1	20
Brufut	85	34	3	4	13	8	23	278
Tanji	32	6	20	0	0	6	0	251
Tuju Bata	11	11	0	0	0	0	0	51
Sanyang	32	15	1	15	1	0	0	102
Gunjul	85	49	33	1	0	0	1	588
Karlong	8	3	0	5	0	0	0	15
Total	417	144	71	87	71	14	30	1,943
Percentage		35	17	11	17	3	7	

(Source: Fisheries Department)

Table 2-11 Fish market around project site

Market	Sales point size	Estimated handling per day			Equipment	Collection site	User bracket
		Inside	Outside				
		Fresh fish	Fresh fish	Dried and smoked fish			
Banjul	1 m by 1 m, 40 tables	2,000 kg, 50 kg by 40 persons	100 kg, 10 kg by 19 persons	200 kg, 10 kg by 20 persons	Ice not used,No water supply	Banjul	Inhabitants of Banjul
Bakau	1.5 m by 1 m, 24 tables	3,600 kg, 150 kg by 24 persons	0 kg	100 kg, 10 kg by 10 persons	Ice used,No water supply	Bakau	Inhabitants of Bakau, restaurants, hotels
Sere Kunda	1.5 m by 1 m, 34 tables	3,400 kg, 100 kg by 34 persons	300 kg, 10 kg by 30 persons	300 kg, 10 kg by 30 persons	Ice used, No water supply	Brufut Sanyang Tanji Gunjul	Inhabitants of Sere Kunda

(Source: Field Survey)

Table 2-12 Balance of the operation at Bakau land facilities (June 15 to July 28)

1. Earnings		(Dalasis)
1) Ice sales		85,327.00
2) Cold storage rent		14,492.25
3) Fishermen locker rent		1,600.00
4) Fish box rent		131.00
5) Smoking oven rent	(not collected, to be included in mid-August)	
6) Fish drying shelf rent	(not collected, to be included in mid-August)	
7) Fuel oil pump rent	(not collected, to be included in mid-August)	
8) Insulated van rent		(not yet working)
	Subtotal	101,550.25
2. Expenses		
1) Generator fuel expenses		5,000.00
2) Miscellaneous expenses		1,500.00
3) Materials expenses		700.00
4) Electric power and water supply		23,271.30
5) Wages		6,500.00
6) Maintenance expenses		300.00
7) Refrigerator insurance premium		34,465.20
3. Profit	101,500.25 – 71,736.50	29,813.75

(Source: Fisheries Department)

Table 2-13 Ice sales earnings (June 15 to July 9)

Date	Jun. 15	Jun. 16	Jun. 17	Jun. 18	Jun. 19	Jun. 20	Jun. 21	Jun. 22	Jun. 23	Jun. 24	Jun. 25
Sales (Dalasis)	140	170	520	402	2,105	2,782	3,010	931	2,140	2,972	3,215
Date	Jun. 26	Jun. 27	Jun. 28	Jun. 29	Jun. 30	Jul. 1	Jul. 2	Jul. 3	Jul. 4	Jul. 5	Jul. 6
Sales (Dalasis)	2,650	2,837	2,582	1,680	1,995	2,185	2,525	3,482	2,415	4,257	1,482
Date	Jul. 7	Jul. 8	Jul. 9								
Sales (Dalasis)	4,489	3,525	2,605								

Note: 1) Ice price is one Dalasis per kg, so sales profit is almost equivalent to the sales volume (kg).
2) The average sales volume from June 19 to July 9 is about 2,660 kg (55,864 kg / 21 days).

(Source: Fisheries Department)

Table 3-1 Number of hotels around the project site and their accommodation capacity

(as of 1992)

District	Number of hotels	Number of beds	Distance from projected site (km)
Banjul	6	1,486	11
Kotu	5	1,046	5
Bakau	5	985	0
Fajara	2	548	2
Kololi	4	1,058	6
Total	22	5,123	

(Source: Ministry of Tourism)

Table 3-2 Number of foreign visitors to The Gambia

(unit: person)

	Fiscal year											
Means	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Chartered flight	20,833	15,431	29,188	42,448	48,373	49,607	46,894	48,653	55,099	47,455	58,428	63,131
Airliner	14,879	15,686	19,695	20,864	24,525	27,432	29,085	46,584	44,065	37,932	41,281	–
Ship	1,558	1,721	758	796	955	1,229	1,654	1,276	2,440	473	1,710	–
Total	37,270	32,838	49,641	64,108	73,853	78,268	77,633	96,513	101,604	85,860	101,419	–

(Source: Central Statistic Department)

Table 3-3 Number of foreign visitors by chartered flight according to major countries (as of 1991)

(unit: person)

U.K.	Germany	Sweden	Switzer-land	Denmark	Finland	Norway	Belgium	France	Africa	Others	Total
32,247	8,061	7,709	2,546	2,499	1,976	1,900	1,443	871	222	3,657	63,131

(Source: Ministry of Tourism)

Table 3-4 Number of foreign visitors by chartered flight according to months (as of 1991)

(unit: person)

1991						1992						
Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jun.	Feb.	Mar.	Apr.	May	Jun.	Jul.
1,160	1,166	1,412	2,766	8,071	10,945	9,968	8,667	9,223	6,505	1,810	1,438	63,131

(Source: Ministry of Tourism)

Table 3-5 Meteorological observations around the project site (as of 1990)

Place of observation	Banjul				Yundum			
Item	Min. temperature	Max. temperature	Relative humidity	Precipita-tion	Min. temperature	Max. temperature	Relative humidity	Precipita-tion
January	17.7°C	31.4°C	0.0%	0.0mm	16.3°C	31.1°C	50.0%	0.0mm
February	18.0	35.2	0.0	0.0	17.7	35.9	52.0	0.0
March	21.1	32.9	0.0	0.0	19.6	35.6	63.0	0.0
April	20.4	30.4	0.0	0.0	19.7	34.0	63.0	0.0
May	20.9	30.7	0.0	0.0	20.4	32.0	70.0	0.0
June	23.5	31.4	44.4	3.7	22.4	32.1	72.0	14.0
July	25.1	31.2	156.6	110.1	24.1	31.4	78.0	136.2
August	25.1	31.5	140.1	381.7	23.5	31.1	81.0	297.4
September	25.5	32.8	158.0	178.8	23.3	32.5	80.0	77.7
October	25.7	32.6	39.0	40.6	23.2	32.8	80.0	32.0
November	24.2	33.5	0.0	0.0	20.0	33.7	67.0	0.0
December	21.2	31.7	0.0	0.0	16.3	32.6	57.0	0.0

Note: The Yundum observation site is adjacent to the Banjul airport

(Source: Central Statistic Department)

Table 3-6 Monthly record of fish landing at the Bakau fish landing spot

(unit: ton/month)

Year	Jun.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual total
1989	0	5.53	7.47	50.13	85.74	15.44	0	0	293.39	56.30	19.27	33.96	567.23
1990	96.12	56.00	53.50	41.30	59.21	59.10	52.10	31.62	26.93	24.73	29.32	0	529.93
1991	234.7	150.25	37.47	36.86	37.90	12.88	45.11	46.18	24.41	38.51	32.86	37.00	735.13
1992	51.79	36.96	46.59	40.20	74.00	60.97	47.01	32.72	35.30	31.83	32.53	31.62	521.52 (*1)
Monthly total	382.61	248.74	146.03	168.49	256.85	148.39	144.22	110.52	380.03	151.37	113.98	102.58	2,353.81
Seasonal index for this landing (*2)	195	127	74	86	131	76	74	56	194	77	48	52	

Note (*1) Construction of the land facilities was carried out at the fish landing spot from October 1992 to April 1993, and use of the fish landing spot was partly prohibited.
(*2) This is obtained by dividing the monthly average (196.5 tons) by the cumulative value according to months calculated from the cumulative value of the annual total.

(Source: Fisheries Department)

Tale 3-7 Fish catch at the Bakau fish landing spot by major fish species

(unit: ton)

Fish name	1989	1990	1991	1992	
Bonga	381.52	301.70	538.50	284.16	
Cassava fish	9.40	21.12	14.13	15.10	
Lady fish	6.40	29.21	25.86	32.09	
Rubber grunt	0.38	0.21	1.32	0	
Sea catfish	43.32	20.00	27.15	35.81	
Barracuda	11.08	20.34	31.09	28.25	
G. African Threadfin	2.50	1.90	3.62	2.90	
Mackerel	0.03	6.06	2.01	2.99	
Grouper	1.83	14.57	13.43	14.13	
Croaker	3.29	2.05	3.39	3.82	
L. African Threadfin	5.04	6.39	6.66	8.11	
Jack, trevallys	1.70	0	0.28	0	
Sardines	0.30	0	0	0	
Sole fish	0.78	0.14	3.62	0.25	
Mullet	0	0	0	0	
African sickle fish	3.52	1.74	4.23	2.75	
Bobo croaker	2.73	7.52	9.65	13.42	
Sompat grunt	3.34	15.54	13.14	13.78	
Sharks and rays	66.30	63.90	17.82	7.95	
Lobster	5.00	1.74	0	6.32	
Snapper spp.	16.67	15.20	14.42	48.66	
Tilapia spp.	1.70	0	0	0	
Others	0.40	0.60	4.81	1.03	
Total	567.23	529.93	735.13	521.52	Average
Percentage of Bonga	67.30	56.90	73.30	54.50	63

(Source: Fisheries Department)

Table 3-8 Results of fish landing activities sampling survey at the Bakau fish landing spot

Date	Fishing method	Overall length (m)	Landing volume (kg)	Landing start time	Means of landing	Labor (number of persons)
July 10	Large hand line fishing	11.5	135	11:55	Plastic bucket	4
	Hand line fishing	6.5	4	13:45	By hand	1
	Hand line fishing	4.6	3	13:54	—	1
	Hand line fishing	6.3	0.5	13:56	—	1
	Hand line fishing	5.6	6.7	13:56	—	1
	Hand line fishing	6.5	15.8	14:02	—	1
	Surrounding gill net fishing	10.5	900.0	14:10	Fish box	5
	Hand line fishing	6.0	1.8	14:07	By hand	1
	Hand line fishing	5.6	7.0	14:15	By hand	1
	Hand line fishing	6.7	21.3	14:58	By hand	2
	Surrounding gill net fishing	12.0	405.0	14:20	Fish box	4
	Surrounding gill net fishing	12.5	240.0	15:16	Fish box	3
	Hand line fishing	7.4	2.4	14:31	By hand	1
	Hand line fishing	5.8	8.6	14:34	Fish box	1
	Surrounding gill net fishing	13.5	350.0	15:20	By hand	4
	Hand line fishing	5.5	1.3	14:39	—	1
	Hand line fishing	7.8	3.8	14:52	—	1
July 11	Hand line fishing	6.5	4.0	12:15	By hand	1
	Surrounding gill net fishing	10.5	600.0	13:02	Fish box	5
	Hand line fishing	6.0	15.0	13:12	By hand	1
	Hand line fishing	4.5	13.2	13:21	—	2
	Hand line fishing	5.6	—	13:22	—	1
	Hand line fishing	5.6	3.0	14:05	By hand	1
	Bottom gill net fishing	11.7	10.5	12:14	By hand	2
	Hand line fishing	6.0	2.3	14:10	By hand	1
	Hand line fishing	6.7	17.4	14:26	—	2
	Hand line fishing	7.0	—	14:48	—	—
	Large hand line fishing	12.1	56.6	12:15	Fish box	—
	Surrounding gill net fishing	13.5	840.0	16:21	Fish box	4
	Surrounding gill net fishing	12.5	270.0	15:08	Fish box	6
	Surrounding gill net fishing	12.0	550.0	14:05	Fish box	6
	Hand line fishing	7.4	13.2	13:50	By hand	1

(Source: Field Survey)

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