BASIC DESIGN STUDY REPORT

ON

LAUTOKA FISHING PORT IMPROVEMENT PROJECT
IN
FIJI

SEPTEMBER, 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

P R E F A C E

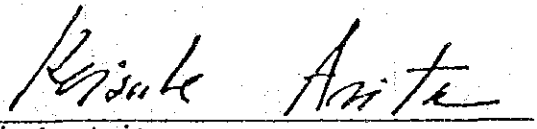
In response to the request of the Government of Fiji, the Government of Japan has decided to conduct a basic design study on the Lautoka Fishing Port Improvement Project and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Fiji a study team headed by Mr. Kunihiro SHINODA, Deputy Director, Fishing Port Planning Division, Fishing Port Department, Fisheries Agency from 7 to 30 April, 1986.

The team had discussions on the Project with the officials concerned of the Government of Fiji and conducted a field survey in Lautoka area. After the team returned to Japan, further studies were made, a draft report was prepared and a mission to explain and discuss it was dispatched to Fiji. As a result, the present report has been prepared.

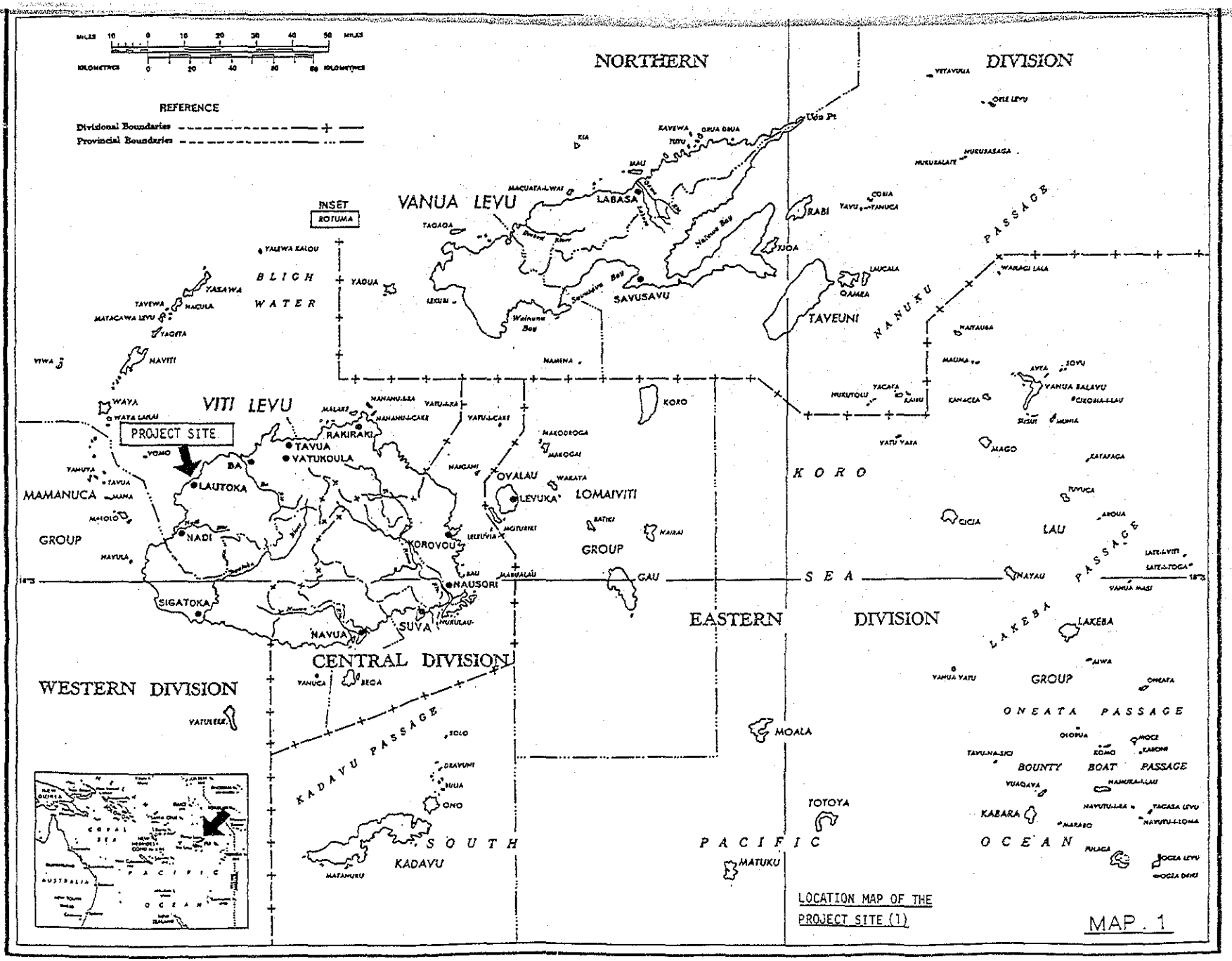
I hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between our two countries.

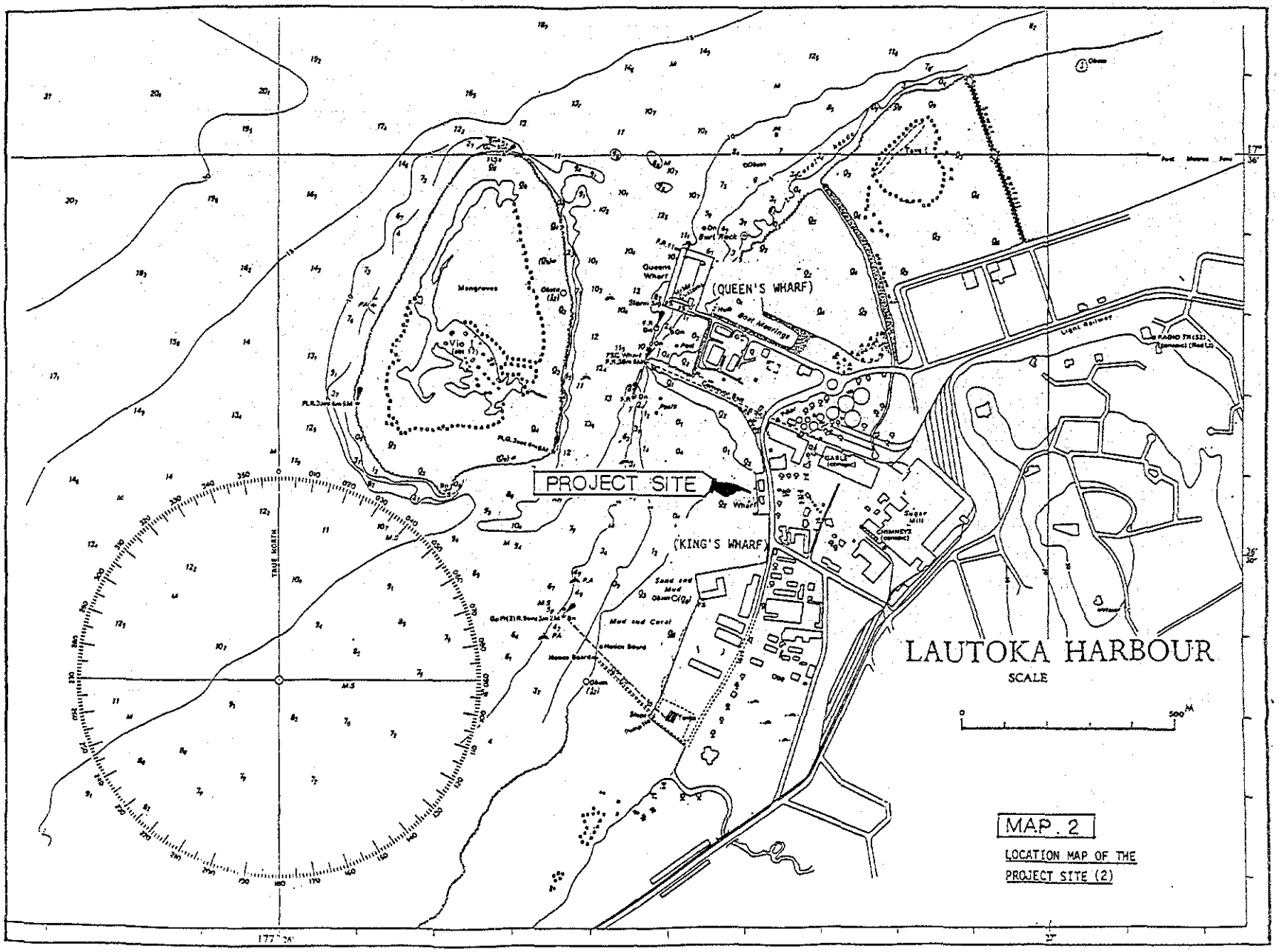
I wish to express my deep appreciation to the officials concerned of the Government of Fiji for their close cooperation extended to the team.

September, 1986



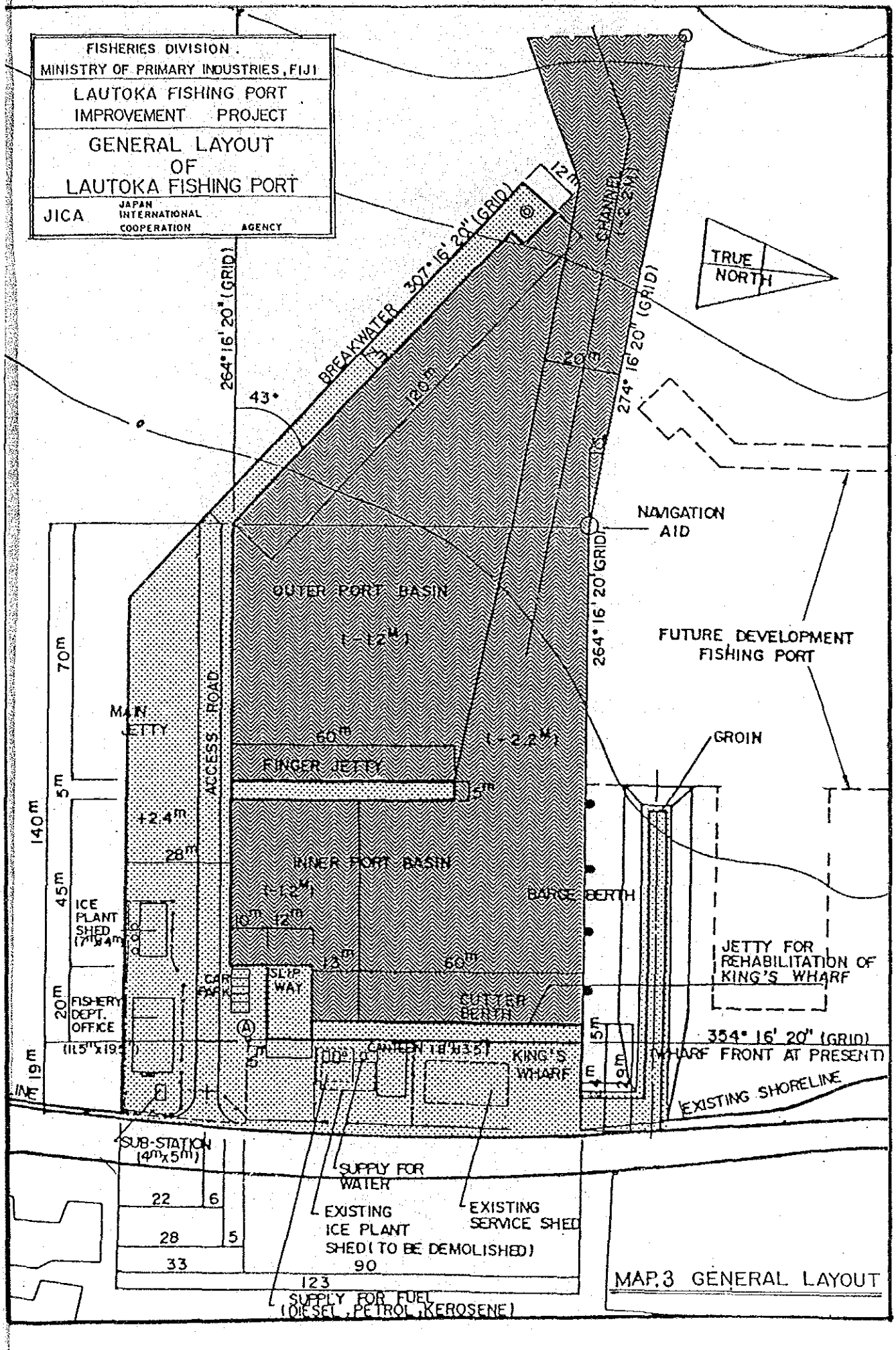
Keisuke Arita
President
Japan International Coopration Agency


NORTHERN DIVISION
REFERENCE
Divisional Boundaries
Provincial Boundaries
INSET
ROTUMA
VANUA LEVU
LABASA
SAVUSASU
TAVEUNI
RABI
QAMEA
KORO
VITI LEVU
PROJECT SITE
LAUTOKA
NADI
RAKIRAKI
TAVUA
VATUKOULA
BA
MAMANUCA GROUP
YASAWA
NAVITI
BLIGH WATER
OVALAU
LEVUKA
LOMAIVITI GROUP
KOROVOU
NAUSORI
SUVA
NAVUA
SIGATOKA
CENTRAL DIVISION
WESTERN DIVISION
EASTERN DIVISION
GAU
SEA
NANUKU PASSAGE
KADAVU PASSAGE
ONEATA PASSAGE
BOUNTY BOAT PASSAGE
LAU GROUP
LAKEBA
MOALA
TOTOYA
MATUKU
KADAVU
SOUTH PACIFIC OCEAN
LOCATION MAP OF THE PROJECT SITE (1)
MAP. 1



MAP. 2

LOCATION MAP OF THE PROJECT SITE (2)



MAP.3 GENERAL LAYOUT

PROJECT SITE: LAUTOKA FISHING PORT

KING'S WHARF

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SUMMARY

Fishing industry in Fiji is one of the major sources of protein supply and is generating a large amount of employment opportunities for the citizens. Contrary to the offshore fishing, the coastal fishing inside the reef is practiced in conventional ways in Fiji. The coastal fishing has variety of means such as seizing by hand, hand-line fishing, gillnets etc.
Following figures illustrate the scale of the coastal fighing industry.

- Number of fishing villages approx.850
- Licensed Fishermen (1984) 1,538
- Registered Fishing Crew (1984) 3,816
- Registered Fishing Boats (1984) 1,580

Other than figures shown above, there are many non-registered fishermen who play actually great roles in the industry and there are many villagers who are making subsistence fishing of fish and crustaceans for daily consumption by their own families and relatives.

In the Fifth National Development Programme, DP5 (1965～1970) the Government of Fiji set up a national policy to develop the coastal fishing industry as well as the offshore fishing industry and to undertake an administrative and financial reform on the industry.
The Government has been promoting with the development on the local fisheries project by means of provision of financial and administrative assistance.

The Government of Japan has played a great role to assist the Fiji government's intention to modernize the fishing industry by means of the grant aid programme as follows;

- Fishing Boats
- Research and Laboratories on Fish Resources
- Distribution Facilities
- Transportation Instrument
- Fishing Tools

The improvement of the Lautoka fishing port was initially proposed in the fishing ports study by FAO of 1977, and the recommendation was taken into consideration as a national project in DP8 and DP9 by the Government of Fiji.

As mentioned before, the Government of Fiji is evaluating the past experience of fishing industry and is establishing its next national development policies for each 5 year plan. The national policies encourage the following measures.

- to enlarge the protein supply resources to the nation and
- to generate the employment opportunity by cultivating current small scale coastal fishing into a commercial industry.

Fisheries scheme in Development Plan 9 (DP9) is applied to the five years from 1986 to 1990 with the following development concepts.

- development of fish resources and generating employment opportunity for the fish processing industry.
- increase of fish catch and its processing capacity to meet the consumer's demands and decrease of fish importing and
- increase of the national revenues through fish exporting.

The Fish Profile which is an official record declares the government development scheme on commercial fishing production.
Fisheries development in DP9 included five major targets.

- Programme 1 ; Rural Fisheries Development
- Programme 2 ; Commercial Artisanal Fisheries
- Programme 3 ; Industrial Fisheries Development
- Programme 4 ; Fishing Farming
- Programme 5 ; Government Support Services

The Lautoka fishing port improvement project is included in Programme 2 and constitutes a most important parts of it.

The Government of Fiji has appointed the Fisheries Division of the Ministry of Primary Industries as the executing agency of the project. The Fisheries Division is undertaking the Project implementation with their detailed development concepts on the project so as to realize the favorable effects of the improved fishing port at Lautoka leading to the maximum benefits of the fishermen and fishing industry.

The Division is planning to increase the number of registered fishing boats by 20% a year for 5 years and by 10% a year for the next 5 year scheme of DP10.

Period (year)		Number of Registered Boats
Beginning of DP9	(1986)	N : number of registered boats
End of DP9	(1990)	$N+5\times 0.2N=2N$
Beginning of DP10	(1991)	$=2N$
End of DP10	(1995)	$2N+5\times 0.1\times 2N=3N$

The national coastal and offshore area is divided by the Government of Fiji into 4 zones namely;

- Central Division; Western and northern sea of Viti Levu island centre of which is the capital city of Suva.
- Northern Division; Eastern sea area of Vanua Levu island and Taveuni island
- Western Divisnion; Western sea area of Viti Levu island including Lautoka, Mamanuca Group and Yasawa islands
- Eastern Division; Kadavu island, Lomaiviti Group including Levuka Island and other small islands off the east coast of Viti Levu.

The site of Lautoka Fishing Port Improvement Project belongs to the Western Division.

As discussed before major coastal fishing methods in the Western Division are hand-line fishing, gillnets and diving fishing. The most preferable fishing season for hand-line and diving fishing is during ten months of the year except two months of mid-summer; but, gillnet method is applicable throughout the year.

The Western Division plays an important role on fishing industry in Fiji. Major indices on the industry in 1984 are shown below:

- Total Production Recorded (fish and non-fish) ..... approx.1,000 ton
- Licensed Fishermen 414
- Registered Fishing Crew 881
- Registered Fishing Boats 391

This production accounts for approx. 1/6 of the recorded national commercial fishing sales of 6,000 tons excluding the production of such large scale industrial fishing as Ika Corporation.
Numbers of the licensed fishermen and registered fishing boats account for approx. 1/4 of national figures.
Lautoka is a sea terminal of inter-islands transportation of daily goods, fish catch and islanders from the Mamanuca Group and Yasawa islands.
Lautoka is one of the two largest cities in Fiji and the centre of Western Division on the sea transportation and fishing industry.

According to FAO survey on fish resources in Fiji, there are good and rich fish ground in the sea area near Yasawa Island and Mamanuca Group. Lautoka fishing port will play a great role in the coastal fishing industry of Western Division.

The existing fishing port facilities in Lautoka are located on the King's Wharf 300m south of FSC jetty. The King's Wharf was constructed in early 1950s and had a sheetpile wall with concrete lining 90m long. This quaywall is also utilized by ferry boats (Cutter Boats) 30m long which are travelling between Lautoka and Yasawa/ Mamanuca islands. Very few fishing boats call at the wharf for landing their catch and loading ice for the next trip. The wharf is parallel to the shoreline and approx. 25m in width. Northern half of the wharf is a terminal for ferry cutter boats and the rest of it is a fishing boats terminal, though very low wharf occupancy rate in general. On the southern half of the wharf, an office and an ice plant shed were constructed by the Fisheries Division. On the north, a waiting shed was constructed by the Ports Authority for the travelers by ferry boats.

The project site proposed by the Government of Fiji is the King's Wharf and the shallow water area within about 250m from the head line of the wharf. This area is relatively shallow, chart datum -0.5m, so that dredging has to be made for deepening the water depth at the port basin and approach channel, and an adequate countermeasure has to be taken to prevent heavy siltation inside the port.
However, this area is well sheltered against wave attacks by the outer reef 40km offshore, the Mamanuca Group islands and Vio island in the west direction. Construction of a breakwater will be one of the countermeasures against natural conditions to keep the port basin and channel calm and to prevent occurrence of heavy siltation at the basin.

The existing wharf is close to the main road and to the municipal market where fish is sold to consumers, thus posing no problem on access.
The proposed site is in relatively good natural circumstances, except for existence of soft soil layer and siltation problem, and in excellent conditions for going to the rich fishing grounds and for marketing fish catch to consumers.
The Government of Fiji aims at the improvement of existing facilities in terms of quality as well as quantity. Following are major items to be improved.

1) Inconvenience of boats operation due to shallow water.
2) Low wave calmness in the port basin and shortage of refuge area for boats against a heavy wave climate during cyclones.
3) Lack of port safety measures such as the navigation aids.
4) Aged quaywall and extremely shortness of berth length.
5) Low productivity of ice plant and inadequate ice storage capacity.
6) Lack of office space.
7) Lack of workshop space and its tools.
8) Limited services to fishermen due to inadequate facilities.
9) Insufficient efforts to maintain the civil facilities.

The first seven items are mainly caused by lack and shortage of fundamental fishing port facilities, but last two items can be solved by the Division 's efforts. These current problems have to be improved and solved as soon as possible by making the new fishing port facilities efficient for the public.

The grant aid request is made for the following facilities.

(1) Breakwater to keep required calmness in the port basin and fairway and to prevent an occurrence of heavy siltation.
Quaywall for fishing boats, and Ramp facilities for boat repairing.

(2) Port administration office with a workshop facilities.

(3) Ice plant and ice storage with shed

(4) Canteen with sales corner and parking area

(5) Others

a. Tools for workshop

b. Equipment for port administration office

c. Mobile workshop and tools for the regional fishing promotion

d. Spare parts for the previous Japanese Grant Aids Programme, ice plants and ice storages.

After signing an agreement between both governments, consultancy contract will be signed, which includes Detail Design and Documentation. It needs approx.3 months.
Upon tender evaluation, construction contract will be signed and actual construction work will commence, which requires about 1.0 months from tender offer to signing contract and 14 months is estimated for construction.

Operation and maintenance cost are estimated as follows:

Item	Cost (10^3 F$/year)
Personnel	48
Operation/manitenance (Facilities)	87
Maintenance dredging	4
Total	139

The income conceivable as financial revenue are such items as proceeds from ice-sale, port-usage fee, tool charge, utility charge, etc., as shown below.

Item	Reyenue (10^3 F$/yeat)
Revenue of ice-plant	F$ 123.0
Port-usage fee	F$ 5.5
Other Income	F$ 36.5
Total Financial Revenue	Total F$ 165.0

In the financial point of view, the project is feasible.

Both the preliminary survey made in January 1986 and this field survey reveal the fact that the present port does not meet the needs of the fishing industry. In other words, the mooring facilities of the present port which are the most basic among the port facilities, are outmoded and they are not large enough either. The navigational channel is not well maintained either. The operational facilities are also not functioning well and above all, the ice-production capabilities are well below the specified level. Under these circumstances, all the present facilities are suffering from malfunctioning resulting in under-utilization of the mooring facilities, increase in waiting-time, decrease in the value of the products, and damage to the improvement momentum by the fishermen.
In case the Lautoka port is rehabilitated and/or newly-constructed and thereby meeting the fishermen's needs, the following investment benefits should be naturally expected due to more vigorous fishing activities:

- More effective use due to reduction of waiting-time as a result of securing deeper water-depth in front of the mooring facilities.
- Increase in the catch due to the increase in the fishing activities brought about by the reduction in waiting-time for high water.
- Supply of shelter due to breakwater construction and reduction in vessel damages under severe weather/tidal conditions.
- Reduction in maintenance dredging cost by protecting the channel by breakwater and groin from sand-drift and eliminating adverse wave effects.
- More effective use by larger boats due to deeper water depth.
- More employment opportunity, direct or indirect, due to busier fishing activities.

- Maintenance of product values and prices due to the supply of more fresh products enabled by improvement in ice production/storage capabilities.
- Secondary effect to neighboring areas of the port due to the increase of ice-supply.
- Increase in the supply of fisheries products to tourists visiting western sight-seeing places such as Lautoka and Nadi as well as to the local residents.
- Economic effect due to the supply of a transportation base for daily commodities for the isolated islanders.
- Improvement in port administration expertise of the Fisheries Div. by actually administering a fully equipped fishing port.
- Transition from domestic-type to commercial-type fishing and possibly oragnizing of fishermen.

CHAPTER 1. INTRODUCTION

1 - 1 OBJECTIVES OF THE STUDY

The existing wharf, the King's Wharf, was constructed in 1950s by the Ports Authority of Fiji.

In the 1960s and 1970s there were remarkable port development and a large reclamation work near the King's Wharf. Presently the wharf is administered by the Fisheries Division and the Ports Authority of Fiji. The former operates their own office and ice plant and the latter controls the water front facilities and the transit shed for cutter boats.

There are 800 fishermen and 227 registered fishing vessels in the hinterland of the wharf in 1985, however they have difficulty in operating daily productive activities due to shallow water and lack of fishing port facilities including an ice plant.

In spite of the important position of the existing King's wharf of Lautoka in the fisheries industry of the western division of Fiji, the scale of facilities are so limited and aged that the industry was not satisfied with them due to increasingly larger demand on utilization of the water front facilities.

To overcome these problems the Government of Fiji set up an improvement plan of the Lautoka fishing port (hereinafter referred to as "the Project") and requested a grant aid from the Government of Japan in later 1985.

The Government of Japan decided to undertake a basic design study (hereinafter referred to as "the study") in order to appraise the character of the Project if it meets the guideline of Japanese grant aid programme.

Thus, the primary objectives of the study are to put the scope of the Project requested by the Government of Fiji into definite shape and reasonable quality and to materialize the plan requested into more accurate quantities of works with cost estimation.

For these purposes duties of the study team is to clarify the Project requested and its facility components in detail and to identify the background of the Project. The study team has to prepare necessary

information to conclude the soundness of the Project in line with social and ecnomic benefits concerning the fisheries industry at the western division and national development.

The study has to be conducted by the team in close cooperation with the Project executing agency, namely the Fisheries Division and other governmental ministries and agencies concerned including the Ports Authority of Fiji.

1 - 2 JAPANESE GRANT AID PROCEDURES

The Project will be executed in accordance with the five step and major activities which are scheduled as follows:

Step 1 : Applications - Request by the Government of Fiji on a grant aid assistance to be provided by the Government of Japan.

Step 2 : Preliminary Study - Undertaking of the preliminary study by the Government of Japan (JICA).

Step 3 : Basic Design Study- Undertaking of the basic design study by the Government of Japan (JICA).

- General Layout
- Basic design of facilities
- Cost estimates
- Construction schedule
- Evaluation of the Project
- Conclusions and Recommendations

Step 4 : Appraisal and Approval by both Governments

Step 5 : Implementation of the Project

- Undertaking of the management services, if required by the Government of Fiji.
- Operation and management advices
- *Training of officers and operators*

Step 1 and 2 have already been successfully executed, and JICA has now completed a Basic Design Study.

1 - 3 MISSIONS TO FIJI

In response to the request by the Government of Fiji for the Project, the Government of Japan decided to conduct a basic design study on the Project.

The Japan International Cooperation Agency, (hereinafter referred to as "JICA"), the official agency responsible for the implementation of economic and technical cooperation programme of the Government of Japan, was entrusted to carry out the Project.

Before undertaking of the basic study, JICA dispatched a mission headed by Mr. Kunihiro Shinoda to Fiji to conduct preliminary study of the Project as well as to hold discussions on the scope of the Project requested by the Government of Fiji.

In April 1986, JICA dispatched a second mission to Fiji headed by Mr. Kunihiro Shinoda to conduct the basic design study of the Project. The study in Fiji was undertaken for 22 days from 8th to 29th April,1986.

The study team consisted of 6 members as shown below;

Table 1-1 Members of Study Team (second mission)

Name	Status and Participation	Present Post
Mr. Kunihiro Shinoda	Leader of the team	Ministry of Agriclture, Forestry and Fisheries of Japan.
Mr. Katsumi Yoshida	Coordinator	JICA
Mr. Mamoru Amemiya	Project Manager, Overall Management and Fishing Port Planning	Pacific Consultants International (PCI)
Mr. Hiroshi Nishimaki	Expert, Plants and Fishing Port Operations	PCI
Mr. Toshio Yamada	Expert, Structural Design	PCI
Mr. Akira Kuraoka	Expert, Architectural Design	PCI

Returing to their head office in Tokyo, the study team undertood the basic design of the Project based on the results of field investigation and discussions with related government agencies of Fiji.

In July 1986, JICA dispatched the third mission to Fiji headed by Mr. Kunihiro Shinoda to submit the draft final basic design report of the Project on 11th July, 1986 to 20th July, 1986.

Table 1-2 Members of Study Team (Third Mission)

Name	Status and Participation	Present Post
Mr. Kunihiro Shinoda	Leader of the team	Ministry of Agriculture, Forestry and Fisheries of Japan.
Mr. Naoyoshi Sasaki	Coordinator	JICA
Mr. Mamoru Amemiya	Project Manager, Overall Management and Fishing Port Planning	Pacific Consultants International (PCI)
Mr. Hiroshi Nishimaki	Expert, Plants and Fishing Port Operations	PCI
Mr. Akira Kuraoka	Expert, Architectural Design	PCI

During third mission in Fiji,, detailed discussions were made between the Fisheries Division, the Ports Authority and the study team. Results of these discussions are incorporated into the final basic design report. Records of the study team in Fiji are shown in Appendix B.

1 - 4 MAJOR CONTENTS OF THE BASIC DESIGN STUDY

The study is being undertaken according to the "Flow Chart of Basic Design Study" as presented in Fig.1-1. The purpose of the basic design study is to formulate the general layout of fishing port and the inventory of facilities to be provided. And conclusions and recommendations have to be prepared for the final appraisal of the Project by both Governments.

All of the study for the basic design is performed by the study team based on the results of discussion which was concluded at the meeting on 18th of April, 1986, attended by the officers from the Fisheries Division of Fiji Government Dr. P. Hunt and Mr. S. Sewak and JICA's study team Messrs. K. Shinoda, K. Yoshida and M. Amemiya.

The basic design was performed in five stages as shown below.

Stage 1 ; Preparation Works in Japan

JICA's study team reviewed the related data including the request by the Government of Fiji and the background conditions of the Project. An inception report with questionnaires was prepared to explain the method of the basic design and other related matters.

Stage 2 ; Field Survey in Fiji

JICA's study team visited Fiji on 8th April, 1986 and presented a schedule and a fundamental method of the basic design which was described in the Inception Report. The team stayed in Fiji for 22 days and during which period the following engineering works were undertaken.

- Presentation of the Inception Report
- Discussion on the scope of facilities requested by the Government of Fiji
- Study on the basic demand to the improved fishing port
- Preparation of a draft general layout and alignment of the major port facilities with alternatives
- Attending the discussions between the Government of Fiji and JICA's Basic Design Team for determination of the draft

general layout and the inventory of facilities to be provided
- Study on management and operation, and
- Field investigation and data collection

Stage 3 ; Preparation of the Draft Final Report

Based on the data of field investigation and the principal scope of the Project discussed between both governments, the study team undertook the basic design in detail. Operational and managerial aspects of the improved fishing port were studied. Through the study, the study team justified for improvement of the existing facilities at the King's Wharf.

Stage 4 ; Submission and Discussion of the Draft Final Report

The report contains the results of the field surveys, a general layout, an inventory of the facilities to be provided, cost estimates, an implementation schedule with the conclusions and recommendations.

The report was submited by the study team to the Goyernment of Fiji on 12th of July, 1986.

The study team conducted a presentation of the report and discussed the contents of it with the officers from the Fisheries Divison, authorized executing agency of the Project and other agencies concerned of the Government of Fiji.

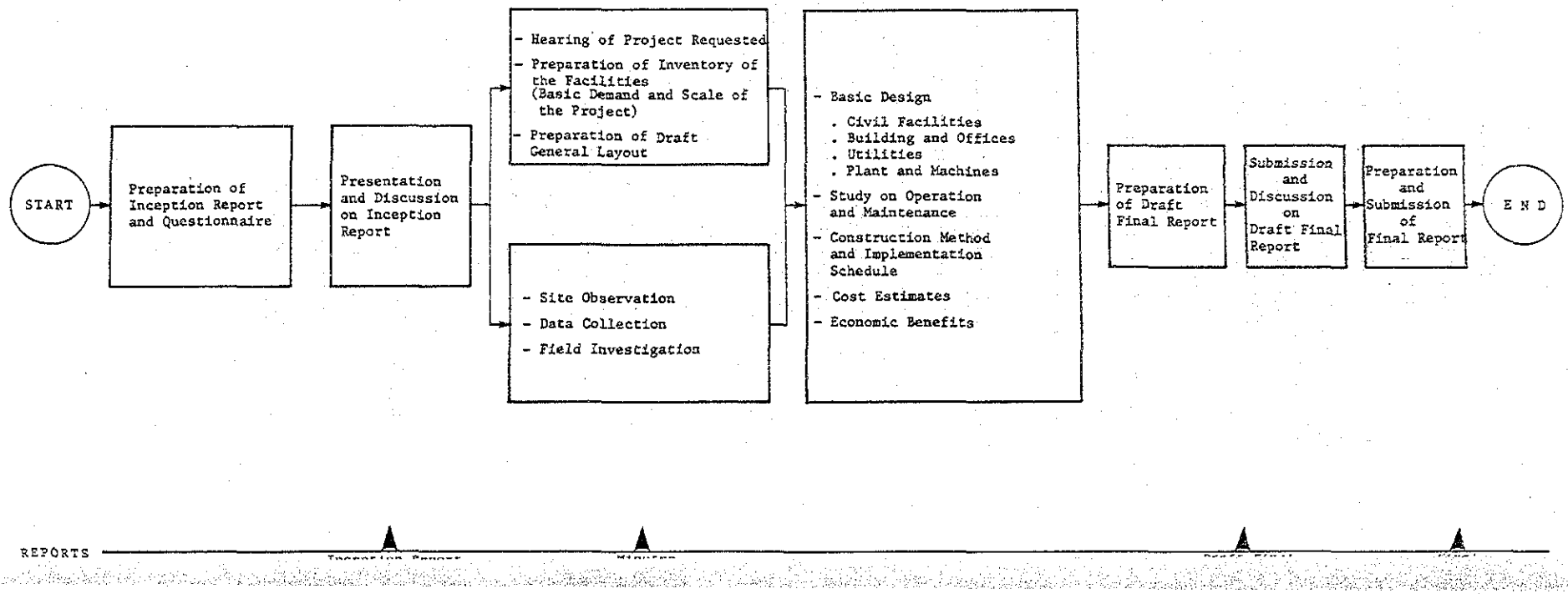
The Government of Fiji presented the study team with their official comments after receiving the report and the comments was incorporated by the study team into the Final Report.

Stage 5 ; Preparation and Submission of the Final Report

JICA scheduled to submit the Final Report through the diplomatic channels to the Government of Fiji by the end of September 1986.

FIGURE I- 1 FLOW CHART OF BASIC DESIGN STUDY: LAUTOKA FISHING PORT IMPROVEMENT PROJECT

STAGE-1	STAGE-2	STAGE-3	STAGE-4	STAGE-5
Preparation Works in Japan	Field Survey in Fiji	Preparation of the Draft Final Report	Submission of the Draft Final Report	Submission of the Final Report



CHAPTER 2. BACKGROUND OF THE PROJECT

2 - 1 OUTLINE OF FIJI

2-1-1 Social Aspects

In this section an outline of social aspects of Fiji is presented citing from "Fiji Today 1984-85" published by the Department of Information Publication.

Fiji's national Coat of Arms consists of the images of two Fijian warriors on either side of a shield, a takia(Fijian canoe) at the top of the shield and the motto "Rerevaka na Kalou ka Doka na Tui" below. The Fijian words mean "Fear God and honour the Queen."
The shield from the Coat of Arms has the image of a heraldic lion holding a cocoa pod across the top. Sugarcane, a coconut palm and bunch of bananas are represented in three of the shield's sections. The fourth contains the reproduction of a dove of peace, the main feature of trhe Cakobau Government's flag before Cession.
Fiji's flag flew for the first time on Independence Day, October 10, 1970. It includes the red, white and blue Union flag of Britain in the top left-hand corner and the shield from the Fiji Coat of Arms on a light blue background in the fly.

a) History
According to Fijian legend, the great chief Lutunasobasoba led his people across the seas to the new land of Fiji. Most authorities agree that people came into the Pacific from Southeast via the Indonesia islands. Here the Melanesians and the Polynesians mixed to create a highly-developed society long before the arrival of the Europeans.
The first European discoveries of the Fiji group were accidental, occurring when the early navigators were on their way elsewhere. The first of these discoveries was made in 1643 by the Dutch explorer. Abel Tasman. English navigators, including Captain James Cook who sailed through in 1774, made further explorations in the 18th century.
Major credit for the discovery and recording of the islands goes to Captain

William Bligh who sailed through the group after the mutiny on the "Bounty" in 1789. The first Europeans to land and live among the Fijians were shipwrecked sailors or run-away convicts from Australian penal settlements. Sandalwood traders and missionaries came by the mid-19th century.
The 20th century brought about important economic changes in Fiji as well as maturation of its political system. Fiji developed a major sugar industry and established productive copra milling, tourism and secondawry industries. As the country now diversifies into small-scale industries, the economy is strengthened and revenues provide for expanded public works, medical services and education. The country's central position in the region has been strengthened by recent developments in sea and air communications. Today, Fiji plays a major role in regional affairs and is recognised as the focal point of the South Pacific.

b) Population
Fiji's population in December 1983 was 677,481. This compares with a population figure of 588,068 in the 1976 census. The average annual growth rate for the past five years has been 1.9 per cent.
The 1983 total showed the following ethnic breakdown(percentage to total population in brackets):Fijians 304,575(44.9)+ Indians 339,456(50.1); Part-Europeans 11,344(1.7); Europeans 3,184(0.5);Rotumans 8336(1.2); Chinese 4,651(0.7); other Pacific Islanders 5846(0.9); and others 89(.01%).
City and town populations(est.1982/ growth rate): Suva City 71,000;Lautoka City 26,000;Nadi 9000; Vatukoula 7000; Ba 7000; Nausori 6000; Labasa 5000; Rakiraki 4200; Navua 3000; Tavua 2500; Sigatoka 2000; Savusavu 2600; Levuka 1395; Korovou 329.

Vital Statistics	1982	1983
Crude birth rate per 1,000 of population		
－Fijians	28.4	29.1
－Indians	33.0	29.6
Crude death rate per 1,000 of population		
－Fijians	5.4	5.4
－Indians	6.2	5.0

Infant death rate per 1,000 live births		
－Fijians	20.7	18.9
－Indians	36.3	23.4
Average annual rate of population growth(p.c.)	1.8	2.1
Population density(Km^2)	36.3	37.0

C) Employment - Labour Force

Fiji's total labour force in 1982 was estimated to be 207,100 of these, approximately 94,200 were estimated to be in paid wage and salary employment and 99,100 were gainfully occupied in other forms of employment. The number of persons unemployed was estimated to be some 13,300 or 6.4% of the total labour force. The overall supply of man power continued to be in excess of demand but in certain areas where skill and expertise were required the supply fell far short of demand. Such demands were satisfied by granthing permits to expatriates to work in Fuji.

In 1984 there were 2006 expatriates working in the private sector, the majority of them were in the Professional, Technical and Managerial capacity. However, government's plans are geared towards training local personnel to fill most of the positions now being occupied by expatriates, and to meet future manpower requirement of Fiji's expanding economy.

Distribution of labour force (000)	1982 (Dec)	1983 (Dec)
Agriculture, Forestry and Fishing	3	3
Mining and Quarrying	1	1
Manufacturing	14	12
Electricity, Gas and Water	2	2
Construction	7	6
Wholesale and Retail Trades and Restaurants	11	11
Hotels	4	4
Transport, Storage and Communications	7	8
Finance, Insurance, Real Estate and Business Service	5	5
Community, Social and Personal Services	26	27
Total Employment	82	80

Unemployed(000)	1982(r)
Both Sexes	13.3

d) Economy

The economy of Fiji is primarily agrarian and sugar is its backbone. Grown mainly on small holdings, the sugarcane is crushed and partly refined by the Government-owned Fiji Sugar Corporation and remains the country's major export accounting for some three quarters of domestic exports. The sugar industry provides employment to about 22% of the labour force.

Other major export earners are gold, copra, fish and coconut oil. Timber, ginger, cocoa, pine and certain processed consumer goods are rising export earners. Tourism is the second largest industry and brings in substantial foreign exchange every year.

The main economic aim of the Government as reflected in the current DP9 is to break away from the country's dependence on sugar. It is proposed to be realised by diversifying into broader agricultural products and greater secondary resource based industries.

Through diversification, Government is trying to reduce its trade gap and improve the balance of payment position. Essential imports, like food stuffs, mineral oils and medical supplies cannot be stopped. A major breakthrough, however, has been achieved through the completion of a multi-million dollar hydro-scheme which is expected to serve the country is excess of $20 million in fuel bill.

The country has achieved near self-sufficiency in chicken, pork and beef production. Goat meat imports however, still form a large part of total consumption.

The 1985 budget calls for a total expenditure of 4436.7 million an increase of 8.1 per cent over the 1984 figure. Of this $356.7 million has been allocated for recurrent spending and $80.0 million for capital expenditure.

The capital expenditure has been considerably increased. Government is placing great emphasis on projects which help promote creation of new job opportunities and generation and conservation of foreign exchange. Efforts are directed to provide a sound infrastructural base conducive to the growth of private sector initiatives and activities and development of basic resources on which the economy will depend in the future. Further tax concessions have been allowed to encourage investment in projects supportive to tourist

industry.

At the same time, nevertheless, Government is striving to ensure the substantive growth of the overall economy and to provide encouragement for private sector business and investment both local and overseas.

National Economy Indices(Gross Domestic Product)

Item	1982(r)	1983(p)
GDP at Current Factor Cost($million)	1029.2	1069.5
Annual Growth Rate of GDP(1p.c.)	7.9	3.9
GDP per Head of Population($)	1564	1592
Annual Growth Rate GDP per Head of Population (1p.c)	6.0	1.8
GDP at Constant Prices(1977)at Factor cost ($ million)	711.8	684.0
Annual Growth Rate of GDP(1p.c)at Constant Prices	-1.1	-3.9
GDP per Head of Population($) at Constant Prices	1082	1018
Annual Growth Rate of GDP per Head of Population (1p.c) at Constant Prices	-2.9	-5.9

Note: (r)revised
(p)provisional

e) Industry

The processing of sugarcane and copra, along with gold mining timber production, are the nation's main industries, but local industry is continuing to expand. The gross output of the manufacturing sector including mining and quarrying and electricity, gas and water during 1981 was manufacturing $474,618,000 mining and quarrying $16,856,000, and electricity, gas and water $49,367,000. The country produced 410,810 tonnes of sugar in 1982, 276,000 tonnes in 1983 and 379,257 tonnes in 1984.

In recent years, there has been a considerable increase in the number of new industries, besides the expansion of existing ones. Products manufactured are intended for both home consumption and export.

These include aluminium products, agricultural equipment, boats,beverages, building materials, cement, cigarettes, concrete products, footwear, handicrafts,ice cream, jewellery, masi, matches, meat products, plastic, plywood, packaging materials, soap products, sugar(castor and icing),tea

packing, wood products and wrought iron products.
In addition there is fisheries base which includes a free plant and cannery; there are rice and timber mills; and there are servicing industries that include general engineering, civil engineering, electroplating, printing, marine engineering and slipway management, real estate and advertising agencies, and data processing by computer system.

f) Trade
The country had a total export figure of $279,417,640 in 1984, this breaks down to $197,370,062 for exports of local products and $82,047,578 for reexports. Imports reached $487,105,482 in 1984 and the trade deficit was $207,687,842.

Main Exports (F$ F.O.B)	1983	1984 (provisional)
Sugar	111,934,852	109,954,702
Coconut Oil	10,579,423	18,467,383
Gold	16,864,014	20,520,115
Lumber	1,812,372	4,341,378
Molasses	3,171,140	6,677,928
Ginger	1,936,979	2,003,506
Veneer Sheets	2,179,224	2,859,723
Bakery products	1,131,073	1,203,861
Cement	127,134	395,108
Paints	509,296	401,908
Fish (canned)	14,823,751	14,242,807

Main Imports (f$ C.I.F)	1983	1984 (provisional)
Food	78,098,401	74,714,009
Machinery	93,040,297	86,499,103
Manufactured goods	91,480,368	90,983,373
Mineral fuels	114,753,401	107,050,885
Chemicals	39,062,510	44,286,128
Oils/ Fats	6,840,140	9,370,029
Beverage/ Tobacco	3,623,240	3,559,970

Crude materials	5,194,110	3,507,626

2-1-2 Natural Environment

a) Location

Fiji, independent from The U. K. on 10 October 1970, conprieses some 332 islands.

The two large islands among them are VITI LEVU with the capital Suva and such cities as Lautoka, Nadi, etc. and VANUA LEVU to the northeast.

Almost all of these islands are situated around International Date Line between long. 178° 12′ and 176 ° 53′ E, and between lat. 15 ° 42′ and 20° 02″ S. Total land area is 18,333 sq. Kilometres.

b) Meteorological Conditions

The climate of Fiji is of the tropical coastal type, and dry from May to October and wet from November to April.

(1) Temperature, Precipitation

There is little seasonal and regionel difference in temperature and the average is 25℃ at Nadi. As for precipitation, Suva in the south-east of VITI LEVU is much wetter than Lautoka in the west; so the total annual preciplitaion and total number of rainy days in Suva are 3,000mm and 230 days respectively, while those in Nadi are 2,000mm and 130 days.

Fig.2-1 shows annual precipitation in 1978, for reference.

(2) Wind (See Appendix H)

Wind records at the Nadi airport indicate the following;

- Predominant direction 230 ° ～ 290°
- Speed 10m/sec and less for ordinary wind 28.4m/sec for average gust wind recorded

c) Oceanographical Conditions

(1) Tide, Current

Various tide levels at Lautoka in tide table in 1986 are;

HAT *	+	2.20m
MHWS	+	1.90m
MHWN	+	1.60m
MSL *	+	1.15m
MLWN	+	0.70m
MLWS	+	0.40m
LAT *	+	0.00m C.D: (Chart Datum)

(By Hydrographer of Navy, * presumed)

No tidal current data was available, but the current observation carried out by the study team in April 1986 gives an approximate maximum speed of 0.3knot (15cm/sec).

(3) *Wave (See Appendices H and I)*

There are no wave record data around the area, but the following estimation was computed by the study team based on the above wind record at the Nadi airport;

- Predominant direction
  250° ~ 260° due to diffraction
- Equivalent off-shore wave
  H'_o = 2.35m in height, (Off-shore wave Ho=2.50m)
  T_o = 4.8sec in period

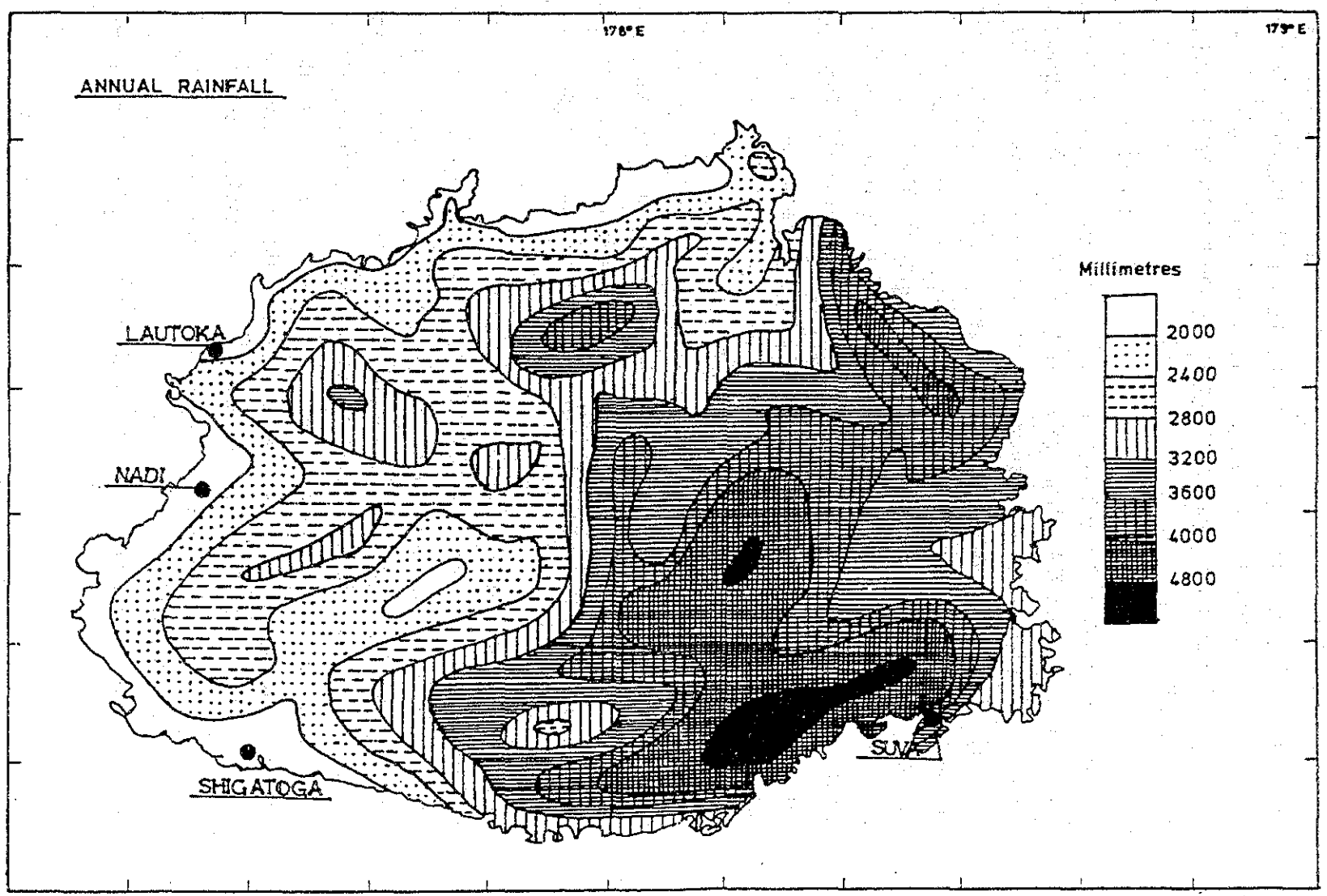


FIG. 2-1. ANNUAL RAINFALL

AS FOR 1978

2 - 2 PROJECT SITE

2-2-1 Hinterland

In this section an outline of social aspects of the Project Site is presented citing from"Fiji Today".

a) General Location of Lautoka

Fiji is made of about 332 islands, which vary in size from 10,000 square kilometres to tiny islets a few metres in circumference. These spread over thousands of square kilometres of ocean in the heart of the South Pacific. Around one third of these islands are inhabited.

The total land area of Fiji is 18,333 square kilometres. The largest island, Viti Levu, is 10,429 square kilometres and the second largest, Vanua Levu is 5,556. Other main islands are: Taveuni 470, Kadavu 411, Gau 140, Koro 104,Ovalau 101, Rabi 69, Rotuma 47 and Beqa 36.

Fiji lies between 15" and 22" south of the equator. The International Dateline has been diverted to the east of the island group.

Situated in the hub of the Southwest Pacific, Fiji has become the crossroads of air and shipping services between North America and Australia-New Zealand. Travellers and international vessels enter the country via the international airports at Nadi or Nausori or the natural harbours at Suva and Lautoka.

b) Lautoka in the Western Division

Fiji is divided into four divisions for administrative purposes. Each dividion has a commissioner and there are district officers in the main centres of the four divisions.

The Western Division is the largest and covers the western side of Viti Levu and includes Nadi and the Project Site, Lautoka and the islands to the north and west, notably the Yasawa and Mamanuca groups. The Central Division covers the eastern half of Viti Levu and includes the capital, Suva.

The Northern Division includes the second largest island, Vanua Levu, and Taveuni and other smaller islands nearby.

The Eastern Division includes Lomaiviti, the Lau Group, Kadavu and Rotuma. The

Director of Rural Development is the administrative officer in charge of the Eastern Division.

The country has a well-developed system of local government. City and town councils fall under the general supervision of the Ministry of Housing and Urban Affairs. Suva and Lautoka have city councils whereas Nadi, Ba, Sigatoka,Labasa, Nausori, Levuka, Savusavu and Lami have town councils.

c) Road Networks to Lautoka

There is a 500-kilometre highway that circles Viti Levu. The section between Suva and Lautoka along the southern coast is the Queens Road and between the cities along the northern coast is the Kings Road.

Fiji has almost 3300 kilometres of roads of which 1200 are all-weather links. The multi-million-dollar highway has been constructed between Nadi and Suva. A tar-sealed road links Suva and Deuba(Pacific Harbour) and Sigatoka and Tavua, via Nadi and Lautoka.

Buses operate all around Viti Levu and on other main islands as well as running scheduled routes through towns and suburban areas.

Road Distances Between Major Centres in Viti Levu

KINGS ROAD IN KILOMETRES

NADI AIRPORT							
24	LAUTOKA						
62	38	BA					
91	67	29	TAVUA				
132	108	70	41	RAKIRAKI			
239	215	177	148	107	KOROVOU		
270	246	208	179	138	31	NAUSORI	
289	265	227	198	157	50	19	SUVA

QUEENS ROAD IN KILOMETRES

SUVA						
49	PACIFIC HARBOUR					
96	47	KOROLEVU				
120	71	24	KOROTOGO			
127	78	31	7	SIGATOKA		
183	139	92	68	61	NADE TOWN	
197	148	101	77	70	9	NADE AIRPORT
221	172	125	101	94	33	24 LAUTOKA

d) Sea-transport and Lautoka

Fiji's three ports of entry are Suva, Lautoka and Levuka. In 1984, Suva port handled a total of 585,559 tonnes of cargo. This represents 347,533 tonnes of general cargo and 238,066 tonnes of bulk products. A total of 468 vessels called at Suva with a gross registered tonnage of 3,764,220.

Lautoka handled a total of 927,440 tonnes of cargo in 1984. This represents 281,931 tonnes of sugar, 116,018 tonnes of molasses, 344,977 tonnes of petroleum products and 176,332 tonnes of other cargo. 331 vessels called at Lautoka port with a total gross tonnage of 2,850,429.

Levuka port serves as a base for Fiji's only fish canning industry. In 1984, a total of 85 vessels called at the port with a total gross registered tonnage of 27,890.

Local shipping plays an important role in Fiji and provides services to scattered outer islands of the group. In Suva, a large part of the trade to the islands is handled from the Princess Wharf.

At Lautoka, the local shipping emphasis is on passenger traffic and provision of supplies to offshore tourist resorts. The port of Levuka serves the requirements of the people of Ovalau and the neighbouring islands.

Shipping services between the two main islands have increased considerably, both in passenger volume and cargo capacity in recent years with the introduction of roll on-roll off ferry services by two local operators.

2-2-2 Control of the Coastal Zone

The coast and its offshore zone are governed by the Government of Fiji based on the following policies.
The boundary between land and coast including offshore zone is defined as the shore line at the high water.

(1) Coast and its offshore zone are governed by the two government agencies, namely the Land Authority and the Ports Authority. Each agency has its own responsible zone.
(2) These agencies control the coast and the offshore zone up to a certain limit line, beyond which boundary control is to be mane by the Marine Department.
(3) Boundaries between these three government agencies are clearly shown on the maps as shown in Fig. 2-3.

The project site,namely the King's Wharf and its offshore zone, is located in the northern area of the Ports Authority's Lautoka District which is illustrated in Fig 2-3.
This means the Lautoka Fishing Port will be constructed in the Ports Authority's territory.

The Ports Authority has the right and responsibilty to control effectively its territory by legal power. The Ports Authority contributes to the economic utilization through the administration of the limited coastal area which gives easy access to the cities and to the offshore zone. Applicants (public sector or private sector) intending to use the areas have to register with the board of commissioners of the Authority and get an approval on the request. The board will evaluate the contents of application including name of applicant, period of occupation, purpose of occupation, financial aspects of applicant,
manegement capabilities of applicant etc., and will make a decision considering other development schemes which the Authority intends for the future. The Fisheries Division has to get an approval of the board to utilize the coastal area near the King's Wharf.

The Fisheries Division discussed this issue with the Authority, and the Division finally decided on the site of fishing port at the existing King's Wharf and its offshore zone according to the recommendations made by the Authority. See Appendix D-7.

Discussing with the Authority its future development plan near the King's Wharf, the study team has confirmed that the Authority has no objection to fishing port development there and that the Fisheries Division gets enough area fo future expansion of the fishing port. The Authority has stated their intention to give a right to the Fisheries Division to use the whole area between the existing FSC mole and PWD'S reclaimed land area excepting the southern zone of 50 meter wide paralle to the FSC mole and slip with enough width to allow FSC's discharge of their effluent to the sea at the north bank of PWD land. See Appendices D-10, D-11 and Fig. 2-4.

The study team has taken the above into account in considering the general layout of Lautoka Fishing Port Improvement Project.

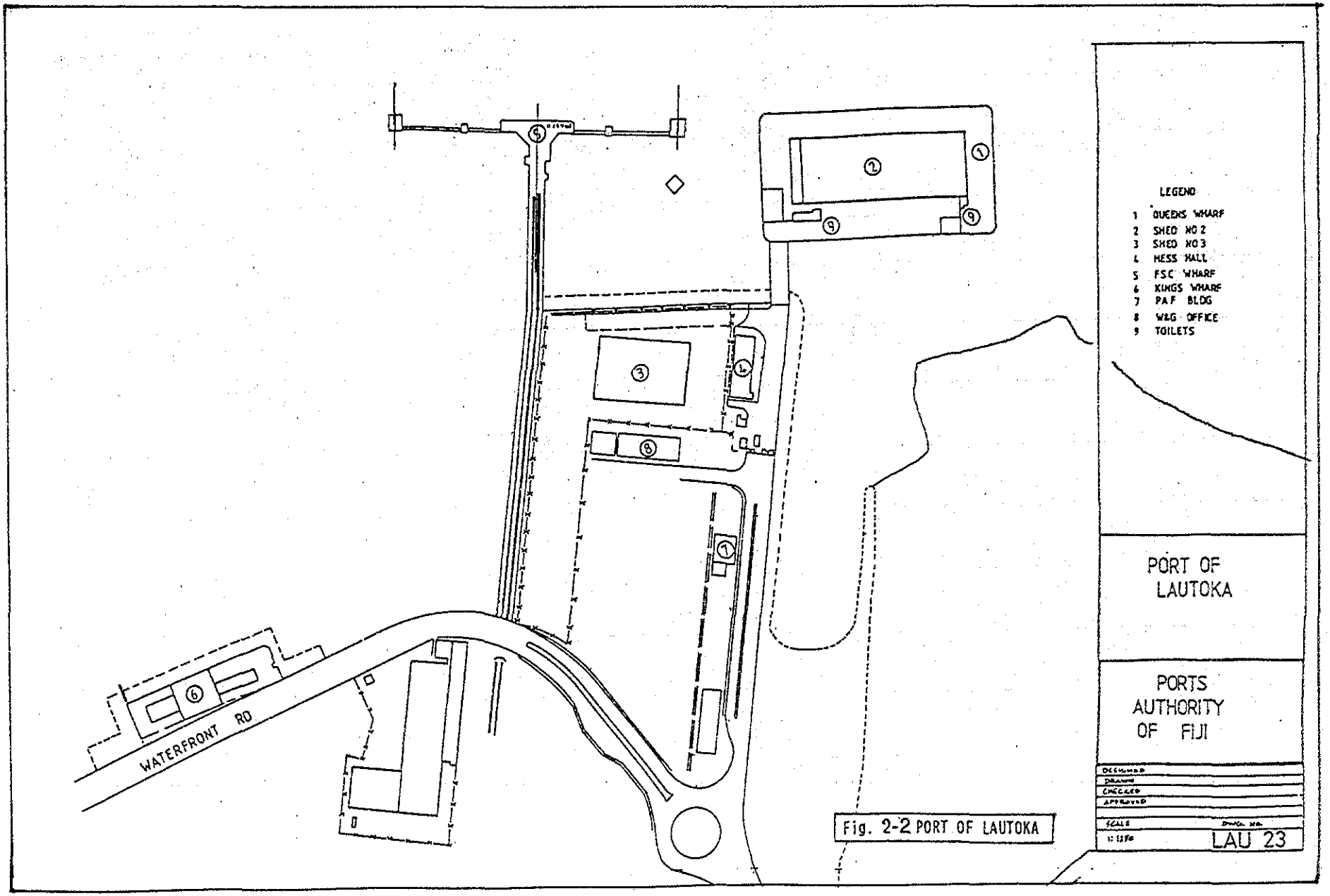


Fig. 2-2 PORT OF LAUTOKA

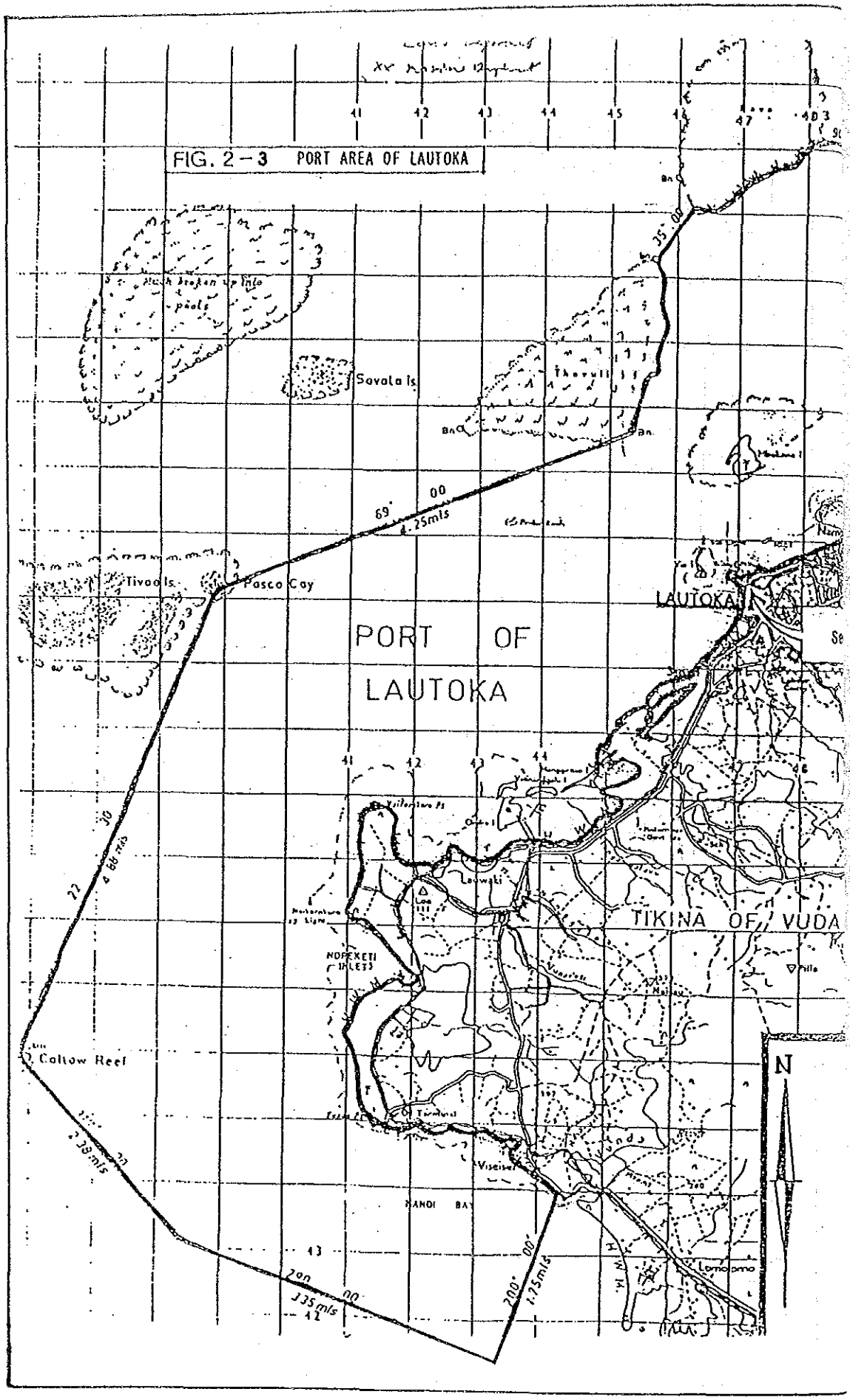


FIG. 2－3 PORT AREA OF LAUTOKA

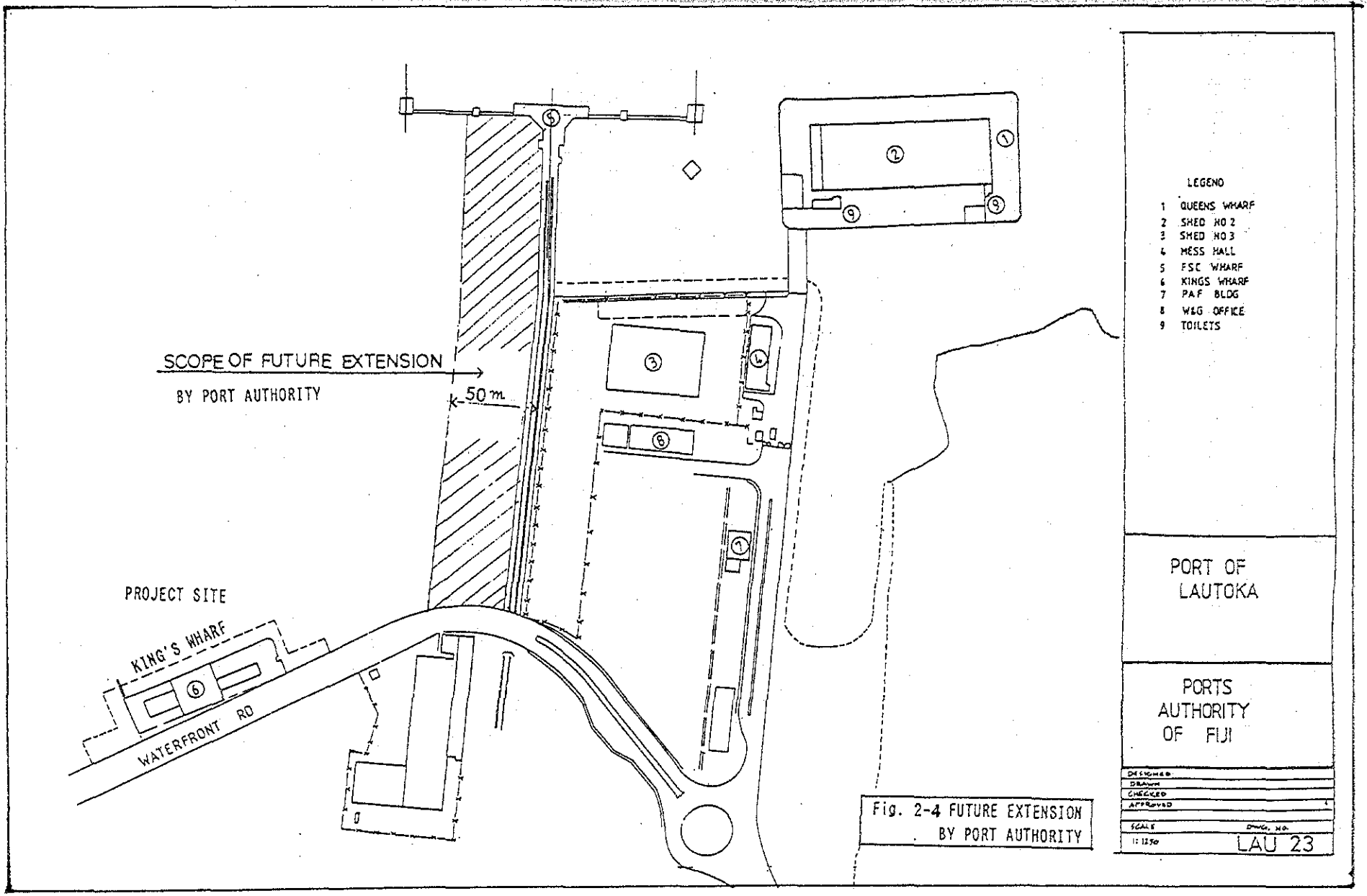


Fig. 2-4 FUTURE EXTENSION BY PORT AUTHORITY

2 - 3 LAUTOKA FISHING PORT AND NATIONAL DEVELOPMENT SCHEME

This section outlines the necessity of fishing port improvement based on the current National Development Plan and the present condition of the fisheries industry in Fiji.

2-3-1 Fisheries Industry

a) Overall View of Fisheries Industry

Fisheries industry in Fiji falls into two major categories by the type of production.

(1) Offshore Fishing
Bonito and tuna fishing and their canning.

(2) Coastal Fishing
Many types of fish catching at such coastal fishing ground as shallow water area near the reef, consisting of commercial fishing and subsistence fishing.

Up to the beginning of the 1970s, domestic and subsistence fishing predominated, however, in the late 1970s fishing industry came to enjoy a large scale extension by the introduction of offshore fishing based on the findings of fish resources research by FAO in the early 1970s. This study brought to light distribution of rich bonito and tuna resources.
The Government of Fiji took prompt actions to promote its fishing industry. New development in the early 1970s was supported by industrial activities of the following two organizations.

(1) Ika Corporation
A corporation invested in by the government for tuna fishing and supplying the catch to PAFCO.

(2) PAFCO (Pacific Fising Co., Ltd.)
A company co-invested in by the government and a Japanese company for tuna canning with fish catch supplied by Ika Corporation.

In this period, the export of canned fish dramatically increased and were becoming the second largest export sector immediately following the sugar industriy. Thus canning industry of bonito tuna are one of the most valuable earners of foreign currencies.

Unfortunately the study team was informed that the management of PAFCO is under a large burden due to the withdrawal of Japanese Company.
If PAFCO does not operate well, PAFCO will genarate large scale unemployment in the Central Division. The Government of Fiji intends strongly to solve these problems as early as possible. In the governmental policies, the solution of this problem is given a higer priority than the improvement of Lautoka Fishing Port. See to Appendix.D-1.

Table 2-1 National Fishieries Production

unit : ton

Type of Fishing	Circulation	1980	1981	1982	1983	1984	1984‡	Unit Consumption kg/capita・year
Coastal	Subsistence (estimated)	14.000	14.200	14.400	14.600	14.800	11.530 (40%)	17.0
	Commercial	3.545.1	4.183.9	4.486.7	5.631.1	5.903.5	16.910 (60%)	24.9
	Sub total	17.545.1	18.383.9	18.886.7	20.231.1	20.703.5	28.440 (100%)	41.9
Offshore	Ika Corporation	8.284.0	9.820.4	7.810.6	7.858.9	6.982.7	–	
Total	(including others)	26.112.5	28.476.0	26.994.4	28.491.6	28.115.6	–	

Source: Fish Profile 1985, Fisheries Division, Production in 1984 was estimated by the study team, see 5-3-1 "Estimation of Future Demands".
Approx. 10,000 tons out of 16,910 tons was sold at the "Road Side Market"

Contrary to the offshore fishing, the coastal fishing inside the reef is practiced in conventional ways in Fiji. The coastal fishing has variety of means such as seizing by hand, hand-line fishing, gillnets etc..

Fishing industry in Fiji is one of the major sources of protein supply and is generating a large amount of employment opportunities for the citizens. Following figures illustrate the scale of the coastal fishing industry.

- Number of fishing villages approx.850
- Licensed Fishermen (1984) 1,538
- Registered Fishing Crew (1984) 3,816
- Registered Fishing Boats (1984) 1,580

Other than figures shown above, there are many non-registered fishermen who play actually great roles in the industry and there are many villagers who are making subsistence fishing of fish and crustaceans for daily consumption by their own families and relatives.

In the way of distribution channels, approx. 60% of the total catch are sold through municipal markets, the NMA markets (NMA:National Market Authority), road side markets, and other means, and the rest of them are for subsistence use.

The estimated total sales of production through the coastal fishing was 8.2 million Fiji dollars in 1984.

Most of the catch sold through the various markets excluding road side markets is production by fishermen who live in the villages near the large consumption centers such as Suva, Lautoka, Lanvasa and other relatively densely populated areas. Due to under-development of the cooperatives of fishermen, catch in the municipal markets is sold directly to consumers from the fishermen.

Fishermen have to bring their catch into markets by themselves and have to pay the specified sales charge. This situation shows that any cooperative delivery and sale of catch does not exist. In some cases, middlemen buy catch from fishermen at prices lower than those the consumers engage to pay.

Of the total catch through the distribution channels, approx. 60% of them are sold at the road side markets due to the facts that;

- no official charge is levied;
- fish size is not lemited in effect; and
- it is easy to carry the catch into markets by boats, because most of this type of market are located near the coast and rivers.

This road side market means all of the sales activities other than the established markets and retailshops such as the municipal markets, NMA markets,supermarkets etc.. Selling on the road side markets is limited to a relatively short peried, normally in the morning, due to the difficulty to keep catch in fresh conditions under the open-air, though it is reported that a remarkable amount of catch is sold to the consumers in the city of Suva.
According to the investigation by the study team, it is observed that the fishermen have to pay a charge of 7 Fiji dollars per boat at the river bank market (one of the private markets). This means fishermen cannot sell their catch free of charge even on the road side markets.

In Lami, Lautoka and Labasa, there are NMA markets invested in by the government. One of the purposes of NMA markets is to guarantee a minimum selling price to fishermen through buying excess catch and storing them for other days to be sold to consumers at a reasonable price.
This means NMA intends stabilization of fishermen's income and maintaining continuous supply to consumers. However, the amount of catch to NMA is limited and its planning concepts have not been realized yet; see section 3-1-2b).

Table 2-2 National Sales of Commercial Fisheries Production
(Coastal Fishing)

(Unit : ton)

year / Distribution	1980	1981	1982	1983	1984	
Municipal market	1,800.3	2,224.0	2,416.8	2,263.6	2,513.3	
N M A	125.5	190.0	136.1	290.6	276.0	
Retail shops	1,619.3	1,750.4	1,912.3	3,007.3	3,083.2	
Others	–	19.5	21.5	69.6	31.0	
Total	3,545.1	4,183.9	4,486.7	5,631.1	5,903.5	

Source : Fish Profile 1985, Fisheries Division

The Government of Fiji provides seven ice plants and ice storages at Lami, Lautoka, Rabasa etc., for ice supply to fishermen at a price of 5.0 to 7.0 cents per kilogram.

Total ice sales in 1984 reached 2,607 tons which is a 20 % increase from the previous year's production, but this amount does not meet the requirement of the fishing industry. Shortage of ice supply is bottlenecking the industry's production increase. It can be said that there is large demand on ice consumption yet to be satisfied.

Table 2-3 Ice Plants and Ice Storages Controlled by the Fisheries Division (1984)

Location	Capacity of ice plant and ice storage	Ice sales (1984)
Lami	20t Cold Storage, 5t Cold Storage, 2 x 5t Chiller, 2 x 3t Ice Makers	682.5
Walnibokasi	1 x 3t Ice Plant	618.5
Laotoka	2 x 5t Ice Plant, 5t Blast Freezer	622.2
Labasa	2 x 3t Ice Plant, 5t Blast Freezer	527.1
Savusavu	1 x 300 kg/day Block Ice Plant	87.6
Taveuni	1 x 5t Ice Plant	69.4
Sigatoka	1 x 1t Ice Plant	–
Total		2,607.3

Source : Annual Report 1984, MAF
* Indicates facilities provided by the Japanese grant aid programme

As a conclusion of previous discussions, in spite of important roles to be played by the coastal fishing industry for maintaning national protein supply and providing employment opportunities to fishermen in villages, it is forced to underutilize the rich fish resources. Major reason of these situations is attributed to the primitive condition of distribution systems and the lack of required fundamental facilities.

b) Present Fishing Industry at the Lautoka Area

The national coastal and offshore area is divided by the Government of Fiji into 4 zones namely;

- Central Division; Western and northern sea of Viti Levu island centre which is the capital city of Suva.
- Northern Division; Eastern sea area of Vanua Levu island and Taveuni island
- Western Division; Western sea area of Viti Levu island in cluding Lautoka, Mamanuca Group and Yasawa islands
- Eastern Division; Kadavu island, Lomaiviti Group including Levuka island and other small islands off the east coast of Viti Levu.

The site of Lautoka Fishing Port Improvement Project belongs to the Western Division.

As discussed before major coastal fishing methods in the Western Division are hand-line fishing, gillnets and diving fishing. The most preferable fishing season for hand-line and diving fishing is during ten months of the year except two months of mid-summer; but, gillnet method is applicable throughout the year.

The Western Division plays an important role on fishing industry in Fiji. Major indices on the industry in 1984 are shown below:

- Total Production Recorded ..... approx.1,000 ton
  (fish and non-fish)
- Licensed Fishermen 414
- Registered Fishing Crew 881
- Registered Fishing Boats 391

This production accounts for approx. 1/6 of the recorded national commercial fishing sales of 6,000 tons excluding the production of such large scale industrial fishing as Ika Corporation.
Numbers of the licensed fishermen and registered fishing boats account for approx. 1/4 of national figures.
In addition to these registered figures, there are many non-registered fishing boats and fishermen. According to the hearings from the Fisheries Division there are approx. 150 non-licensed fishermen and approx. 150 non-registered fishing boats in Lautoka which is a sea terminal of inter-islands transportation of daily goods, fish catch and islanders from the Mamanuca Group and Yasawa islands.
Lautoka is one of the two largest cities in Fiji and the centre of Western Division on the sea transportation and fishing industry.

According to FAO survey on fish resources in Fiji, there are good and rich fish ground in the sea area near Yasawa island and Mamanuca Group. Laotoka fishing port will play a great role in the coastal fishing industry of Western Division.

2-3-2 National Development Programme

In the Fifth National Development Programme, DP5 (1965～1970) the Government of Fiji set up a national policy to develop the coastal fishing industry as well as the offshore fishing industry and to undertake an administrative and financial reform on the industry.
The Government has been promoting with the development on the local fisheries project by means of provision of financial and administrative assistance.

International technical aids by FAO and UNDP have been provided to the government to accelarate the development.
The Government of Japan has played a great role to assist the Fiji government's intention modernize the fishing industry by means of the grant aid programme as follows;

- Fishing Boats
- Research and Laboratories on Fish Resources
- Distribution Facilities
- Transportation Instrument
- Fishing Tools

The improvement of the Lautoka fishing port was initially proposed in the fishing ports study by FAO of 1977, and the recommendation was taken into consideration as a national project in DP8 and DP9 by the Government of Fiji.

As mentioned before, the Government of Fiji is evaluating the past experience of fishing industry and is establishing its next national development policies for each 5 year plan. The national policies encourage the following measures.

- to enlarge the protein supply resources to the nation and
- to generate the employment opportunity by cultivating current small scale coastal fishing into a commercial industry.

Fisheries scheme in Development Plan 9 (DP9) is applied to the five years from 1986 to 1990 with the following development concepts.

- development of fish resources and generating employment opportunity for the fish processing industry.
- increase of fish catch and its processing capacity to meet the consumer's demands and decrease of fish importing and
- increase of the national revenues through fish exporting.

The Fish Profile which is an official record declares the government development scheme on commercial fishing production as shown in Table 2-4.
Fisheries development in DP9 included five major targets.

- Programme 1 ; Rural Fisheries Development
- Programme 2 ; Commercial Artisanal Fisheries
- Programme 3 ; Industrial Fisheries Development
- Programme 4 ; Fishing Farming
- Programme 5 ; Government Support Services

The Lautoka fishing port improvement project is included in Programme 2 and constitutes a most important parts of it.
The Government of Fiji has appointed the Fisheries Division of the Ministry of Primary Induries as the executing agency of the project. The Fisheries Division is undertaking the project implementation with their detailed development concepts on the project so as to realize the favorable effects of the improved fishing port at Lautoka leading to the maximum benefits of the fishermen and fishing industry in the Western Division.
The Division is planning to increase the number of registered fishing boats by 20% a year for 5 years and by 10% a year for the next 5 year scheme of DP10.

Period (year)		Number of Registered Boats
Beginning of DP9	(1986) ·····	N : number of registered boats
End of DP9	(1990) ·····	N + 5× 0.2N =2N
Beginning of DP10	(1991) ·····	=2N
End of DP10	(1995) ·····	2N+ 5× 0.1×2N=3N

According to the survey by the study team, there are two types of fishing boats, namely the "registered fishing boats" with an official fishing license and the "non-registered fishing boats" without any licence. The number of registered fishing boats in the Lautoka fishing port hinterland only accounts for approx. 40% of the total number of boats, in 1985.

Number of Fishing Boats	1985	1990
total (natural increase)	N	1.10N
Registered (natural increase)	0.4N	0.44N
Registered (intentional increase)		0.80N
non-registered (natural increase)	0.6N	0.66N
non-registered (intentional increase)		0.30N

Note; Annual growth rate is assumed about 2% as same figure to the rate of growth of population.

The Fisheries Division is encouraging non-registered fishing boats to be registered. However, it is assumed that total number of boats may not be changed dramatically.

Table 2-4 Fish Production Target in DP9

(Unit : ton)

Distribution	1985	1986	1987	1988	1989	1990
Municipal market (Fish)	970	1.065	1.174	1.291	1.420	1.562
NMA (Fish)	350	385	424	466	512	564
Retail Shops (Fish)	2.900	3.190	3.509	3.860	4.246	4.670
Remote Corporation	150	165	182	200	220	242
Municipal Market(non-fish)	1.650	1.815	1.997	2.196	2.416	2.657
Others (non-fish)	250	300	360	432	518	622
Other products	35	40	46	53	61	70
Commercial production Total	6.305	6.962	7.692	8.498	9.393	10.387

(FISH PROFILE)

2 - 4 REQUESTS BY THE GOVERNMENT OF FIJI

The Government of Fiji requested the Government of Japan to provide a grant aid programme on the Project implementation.
The Government of Fiji decided the project site at Lautoka which is one of the major fishing centres servicing 227 licensed fishermen (almost the same figures as fishing boats) and approximately 360 non-licensed fishermen in 1985. The city of Lautoka is a centre of Western Division of Fiji and total current population of Lautoka and its hinterland including Ba, Nadi and Yasawa islands has reached approx. 200,000.

The request is mainly based on the fact that the present fishing port facilities of the King's Wharf, Lautoka, do not meet a larger demand of fish production because of remarkable shortage of facilities. And the Government of Fiji has a strong desire to improve the existing facilities into well-equipped and large enough ones to meet the demands of fishing port users. Outline of the existing Lautoka Fishing Port is summarized as below.

(1) Depth of water at the port basin and the fairway is too shallow and length of the berth is approx.45m serving only for 230 licensed fishermen.
(2) The port basin and fairway are directly exposed to the open sea and are in condition of low-calmness due to heavy wave attack during cyclones.
(3) Existing ice plant does not have enough capacity of ice production for a large demands. The equipment has persistence mechanical problems, thus making the a rate of ice production much lower than specified figures.
(4) Port administration office and repairshop are too small in scale to provide enough service to fishermen's requirements in the daily operations.
(5) Port basin and channel are suffering from a siltation problem because of no existence of any countermeasure to prevent the deposit of silt in the dredged area.
(6) All of the facilities are too aged and have to be rehabilitated to the large extent or to be replaced with new facilities.

For the reasons described above, the Government of Fiji has planned to improve these current conditions by the reconstruction of the Lautoka fishing port and has requested to the Government of Japan to provide a grant aid programme.

The grant aid request is made for the following facilities. Refer to Appendix.D-3.

(1) Breakwater to keep required calmness in the port basin and fairway and to prevent occurrence of heavy siltation.
Quaywall for fishing boats, and ramp facilities for boat repairing.
(2) Port administration office with workshop facilities
(3) Ice plant and ice storage with shed
(4) Canteen with sales corner and parking area
(5) Others
  a. Tools for workshop
  b. Equipment for port administration office
  c. Mobile workshop and tools for the regional fishing promotion
  d. Spare parts for the previous Japanese Grant Aid Programme, (ice plants and ice storages)

The Government of Fiji did not show any quantitative figures on each items except item (3) and item (5).

item (3)	Ice plant	3 sets of 5 ton/day ice plant
	Ice storage	45 ton capacity
item (5)	see the long list in Appendix, D-5	

Item (5) d. is not directly related to the project. Propriety of this item to the Japanese grant aid programme will be evaluated in Chapter 4 "Outline of the Project".

There have been no quantitative requests on the port facilities, but the Fisheries Division has referred to the scale of the port in the statement of their intention to double the number of registered boats in 5 years, from 1986 to 1990. See section 2-3-2.

2 - 5 OUTLINE OF EXISTING PROBLEMS

Lautoka is one of the two major sea transport centres in Fiji and Suva is the east gate port and Lautoka is the west gate port. At the northern area of the project site there is a commercial port and a private jetty.

- Commercial port : approx. 350m long wharves for general cargo and container transport, the Queen's Wharf.
- Private jetty : a jetty for 40,000 DWT bulk carriers, the FSC jetty.

The existing fishing port facilities in Lautoka are located on the King's Wharf 300m south of FSC jetty. The King's Wharf was constructed in early 1950s and had a sheetpile wall with concrete lining 90m long. This quaywall is also utilized by ferry boats (Cutter Boats) 30m long which are travelling between Lautoka and Yasawa/Mamanuca islands. Very few fishing boats call at the wharf for landing their catch and loading ice for the next trip. The wharf is parallel to the shoreline and approx. 25m in width. Northern half of the wharf is a terminal for ferry cutter boats and the rest of it is a fishing boats terminal, though very low wharf occupancy rate in general. On the southern half of the wharf, an office and an ice plant shed were constructed by the Fisheries Division. On the north, a waiting shed was constructed by the Ports Authority for the travelers by ferry boats.

The owner of the King's Wharf, except facilities constructed by the Fisheries Division, is the Ports Authority
According to the guidelines of the Japanese grant aid programme, the construction site has to be effectively controlled by the project executing agency, namely the Fisheries Division. Discussion has to be made on this issue to meet the guidelines between the Ports Authority and the Fisheries Division.

Outline of the Fisheries Division's existing facilities at the Project site is as follows:

- Office for 5 officers 170m²
- Ice plant and shed 160m²
  (actual ice production capacity : 2 ton a day)

Quaywall faces to the shallow water area which is connected to the deep water of the channel to the Queen's Wharf and FSC Jetty. Behind it the wharf faces the water-front road toward the centre of Lautoka City.

According to the survey made by the study team, the length of fishing boats ranges from 4m to 9m, the average being 6m long with 0.9m draft.
Total number of fishing boats at the hinterland of the Lautoka fishing port is estimated at 587 boats and 662 boats in 1985 and 1990 respectively. Rate of Registration of fishing boats will be approx. 40% and 70% in 1985 and 1990 respectively, if the registration will be accelarated dramatically as the Fisheries Division's target.

As described before, the project site proposed by the Government of Fiji is the King's Wharf and the shallow water area within about 250m from the head line of the wharf. As shown in the general layout, this area is relatively shallow, chart datum -0.5m, so that dredging has to be made for deepening the water depth at the port basin and approach channel, and an adequate countermeasure has to be taken to prevent heavy siltation inside the port. However, this area is well sheltered against wave attacks by the outer reef 40km off shore, the Mamanuca Group islands and Vio island in the west direction. Construction of a breakwater will be one of the countermeasures against natural conditions to keep the port basin and channel calm and to prevent occurrence of heavy siltation at the basin.
Geotechnical data of the site made by the study team shows that the upper layer of soil is soft enough to be consolidated by an additional loading on it. Careful consideration has to be provided on the structural design of the port facilities.

As mentioned before the wharf is close to the main road and to the

municipal market where fish is sold to consumers, thus posing no problem on access.

As mentioned above, the proposed site is in relatively good natural circumstances, except for existence of soft soil layer and siltation problem, and in excellent conditions for going to the rich fishing grounds and for marketing fish catch to consumers.

The Government of Fiji aims at the improvement of existing facilities in terms of quality as well as quantity. Following are major items to be improved.

1) Inconvenience of boats operation due to shallow water.
2) Low wave calmness in the port basin and shortage of refuge area for boats against a heavy wave climate during cyclones.
3) Lack of port safety measures such as the navigation aids.
4) Aged quaywall and extremely shorness of berth length.
5) Low productivity of ice plant and inadequate ice storage capacity.
6) Lack of office space.
7) Lack of workshop space and its tools.
8) Limited services to fishermen due to inadequate facilities.
9) Insufficient efforts to maintain the civil facilities.

The first seven items are mainly caused by lack and shortage of fundamental fishing port facilities, but last two items can be solved by the Division's efforts. These current problems have to be improved and solved as soon as possible by making the new fishing port facilities efficient for the public.

In Chapter 3 "Formulation of the Project", the planning concepts of the Project are discussed through the analysis of the present condition of the coastal fishing industry, marketing system and a general view on consumption of catch in the hinterland of Lautoka fishing port.

CAPTER 3 FORMULATION OF THE PROJECT

In this Chapter improvement of fishing port is studied considering the current productive activities of coastal fishing industry in the hinterland of the Project site which is designed Lautoka area and its surrounding area including Ba, Nadi and Yasawa islands and the national policies on fisheries industry.

The study team implemented direct hearing and interviews to the fishermen who would use the port and consumers in the vicinity in order to obtain necessary data for the planing of the project.

The survey was made by a joint study team between the officials in the Western Division office of the Fisheries Division and the study team for 20 days from 10th to 29th of April, 1986. The joint study team collected useful fresh data to strengthen the existing official records by the kind cooporation of the private sector and effective assistance made by fishermen.

3 - 1 PRESENT CONDITION OF FISHERIES

The investigation was executed for the fisheries in Fiji especially for the "Fish-Fisheries" considering a character of the Project. The fisheries industry is generally divided into two aspects of Fishing(Production) and the Distribution (Consumption). The results of the investigation are described below.

3-1-1 Actual Condition of Fishing (Production)

The fishing industry of Fiji generally consist of various types of fishing as indicated in Fig.3-1. The Industrial Fishing and Miscellaneous Fishing indicated in the figure are excluded from the objectives of investigation as these two items are not involved in this project.

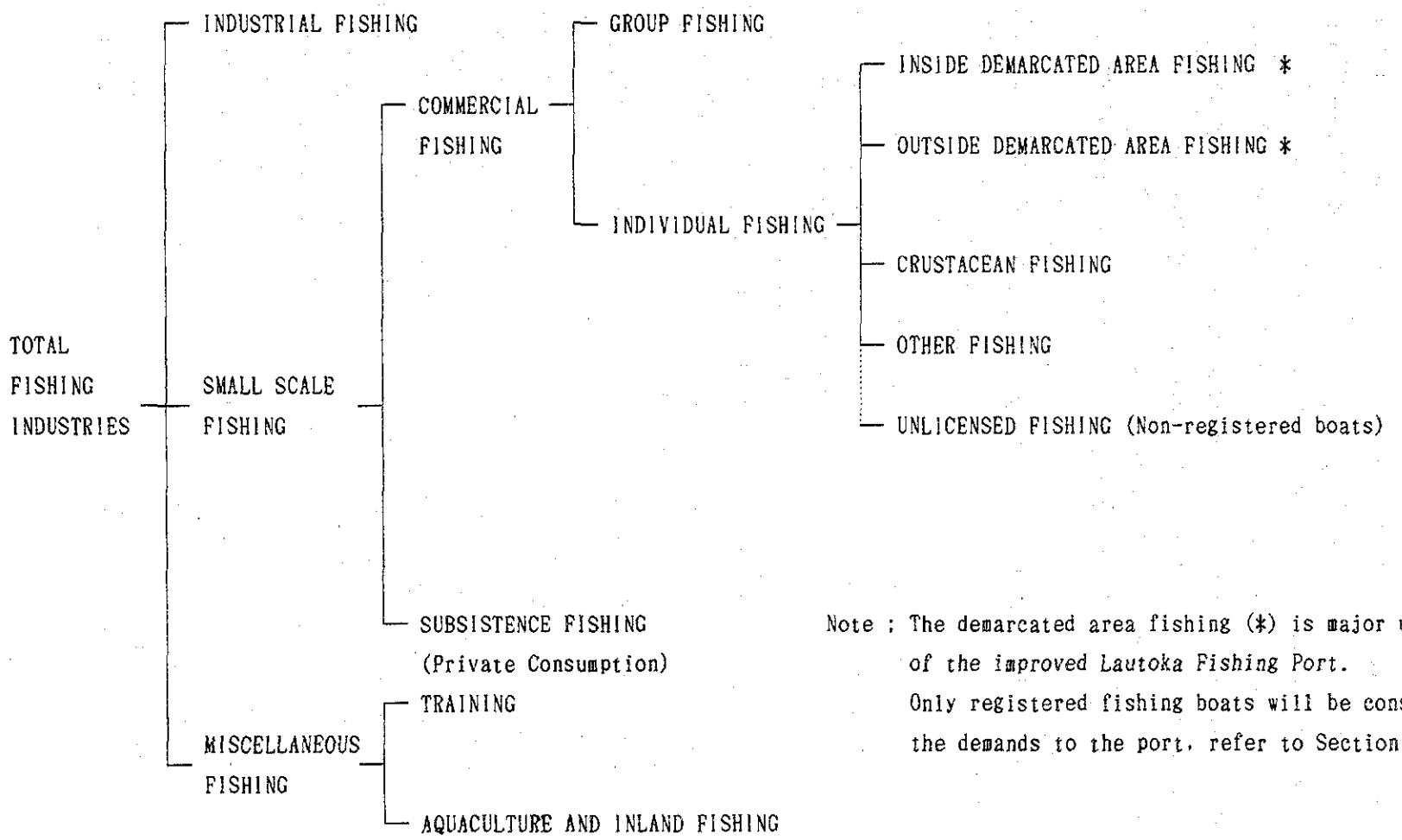
The Small Scale Fishing can be divided into the Commercial Fishing that deals with fish for sale and the Subsistence Fishing for private consumption which is not for sale. The Individual Fishing for commercial purpose requires the fishing license, and the Individual Fishing can be divided according to the class of fishing license. Outlines of fishing license, fishing boats, fishing methods and classified fishing are explained as follows:-

a) Fishing License

The terms "Licensed Fisherman", "Licensed (Registered) Crew" and "Licensed (Registered) Boat" are often seen in the printed materials issued by the Government, and their meanings are explained in this section. The only license for fisheries issued by the Government is the Fishing License. The Fishing License is issued to the captain (usually the owner of a fishing boat) in which the register No., type and dimension of the fishing boat, brand and HP of the engine, number of crew, details of boat used in conjunction, if any, and approved fishing area etc. are clearly described.

Those who are issued such a license are called licensed fishermen. Even if someone has two or more fishing boats he can obtain only one license for one boat, so he should appoint someone else as a captain for the boat other than his own use to get the fishing license.

Fig.3-1 Classification of Fisheries in Fiji



Note : The demarcated area fishing (*) is major users of the improved Lautoka Fishing Port. Only registered fishing boats will be considered for the demands to the port, refer to Section 5-3-2 a).

The fishing boat should be registered in the records of the Fisheries Division but no certificate of registration is issued for the registered boat and the registration No. is only written in the fishing license. Such fishing boat is called the Licensed (Registered) Boat. Regarding the crew, no name of any person is described in the license and anyone can go aboard the boat within the number of crew indicated in the license. Therefore the Licensed Crew means not the individual persons but the approved number of those who can be on board the indicated boat.
The validity of the fishing license expires on 31st December every year. Annual fee for the fishing license is F$4.00 and F$4.00 for the registration of the fishing boat, F$1.00 for each crew and F$1.00 for each connecting boat.
Procedure of issuing the fishing license is explaind in c) (2) of this section .

b) Fising Boats and Fishing Methods

(1) Fishing Boats

Four types of fishing boats, Launch, Half Cabin, Outboard Punt and Skiff, are usualy used in the field of the small scale fishing.
Launch (28 Footer) and Half Cabin (21 Footer) are called "FAO Design Boat" and built in the factory belonging to the Fisheries Division in Lami with a building capacity of 6 vessels every 5 weeks.
The selling price of a set of a Launch complete with a 20HP diesel engine, ice box etc., is F$12,500 and F$6,500 for a Half Cabin with 10HP diesel engine and complete accessories. O/B Punt is built by the private sector and is sold at a price of about F$4,200 including a 40HP outboard engine.
The small boat named a Skiff is a rowboat and is mainly used in conjunction with the fishing boat. When a large number of gillnets is required and the volume exceeds the boarding capacity of the fishing boat, Skiff is used to carry the excess nets to be towed by the mother boat.
The details of registration of the fishing boats in Western Division during 1985 are shown in Table 3-1.

(2) Fishing Method

The fishing methods using a boat are gillnet, hand line and the diving

fishing. The diving fishing is distinctive of the Fijian fishermen and the Indian fishermen are never engaged in it.
Some Fijian fishermen use both diving and other methods.

One example of dimension of gillnet
Length : 50yard/coil ×16coils
Width : 3inch/mesh ×25mesh
About every 6 hours, the gillnets are lifted to take the fish off the nets and while the nets are set the fishermen are usually fishing by hand line.

Herring, which are usually caught by fishermen themselves, of about 20cm long are used as bait for the hand line fishing.
At night a small gillnet is set at one side of a fishing boat to catch herring, and at the same time, the fishermen do the hand line fishing on the other side of the boat using the fish-luring lights on both sides of the boat.
In the diving fishing a traditional harpoon and/or hand made hydrogun using a piece of air tube of a bicycle is used. Any diving instrument like aqualung except hydroscope being prohibited by the regulations.

c) Small Scale Fishing

(1) Group Fishing

The operation of cooperatives explained in the FISH PROFILE seems to be the group fishing, but one example obtained by the interview survey with a fisherman is as follows:-

One launch is given to a registered fishing group with about 100 members for joint use.
Any of the group members can utilize the boat, but the fuel cost of which should be born those who use it, and the proceeds of catch will be shared equally by those who joined fishing except the fish of first stick in case of diving fishing or the catch during the the first one hour in case of other fishing methods, the prceeds of which is deposited in the trust acount for the future.

(2) Inside and Outside Demarcated Area Fishing

There are two kinds of Fishing License for fishing using boat, I.D.A. (Inside Demarcated Area) and O.D.A. (Outside Demarcated Area). Those areas are originated from the native customary fishing rights, and the Western Division has 28 of such areas.

Therefore the Chief of such area has a great influence on the issuance of the I.D.A. License. When a fisherman is going to apply for the fishing license he has to ask first the said Chief to give him a letter mentioning the chief's consent for the issuance of the license, then the letter should be endorsed by the Provincial Office, then the endorsed letter should be submitted to the Commissioner of Western Division for approval of issuance of the license.

Finally the fishing license is issued by the Fisheries Division based on the Commissioner's approval.

The number of the fishing license for certain demarcated area is not limited but depends only on the Chief's discretion.

There is no such complicated issuance procedure for O.D.A. and the license will be issued to all of the applicants who are qualified after examination for the type, age and stand-by engine of the fishing vessel in order to maintain safe operation on deep sea.

The O.D.A. license holders can not fish within the I.D.A. while the I.D.A. license holders can fish outside of the demarcated area.

(3) Crustacean Fishing

This category involves the fishing of so-called Non-fish asclassified in the FISH PROFILE and also called women's fishing in the industry. The crustacean and shell fish except lobster are mostly caught by women.

For this kind of fishing, the fishing license is compulsory but a lot of people who have no license are engaged in this field in addition to licese holder indicated in Table 3-4, and that can be easily understood from the quantity of non-fish production.

(4) Other Fishing

One of this category is Beach Seine which means that two fishermen holding each end of the fishing net drive fish towards the beach side. The other is diving fishing without using a fishing boat.
A limited number of fishermen are engaged in these types of fishing and a license has to be kept by them.

(5) Non-licensed Fishing

It might seem unusual to include the captioned activity in the classification of the fisheries in the official report. However the production in this field is too large to be ignored because many nonlicesed fishermen engage in the field of fishing and the number of them exceeds that of licensed fishermen.
According to the Fisheries Division 150 unlicensed fishermen against 95 licensed and 150 non-registered fishing boats against 102 licensed existed in Lautoka area in 1985.
Therefore fishing by unlicensed fishermen is included in the classification though their production is not indicated in any official records. For the necessity of the project formulation, the total catch and number of non-registered boats are estimated by the study team which is described in Section 5-3-1.
It is said that the existence of many non-registered fishing boats was caused by fisherme's neglecting the renewal of the registration. The Fisheries Division is promoting their application for the license.

(6) Subsistence Fishing

The term Subsistence Fishing is seen in the FISH PROFILE. It means fishing for fishermen's own consumption including their families, that is to say, the fishing for private consumption, not for sale.
This fishing does not require to obtain any fishing license as it is not for the commercial purpose.
The production by this fishing is not recorded clearly as no license is issued and production is not handled in the market but it accounts for nearly half of the natioanl production as indicated in Table 2-1.
So this fishing is also included in the classification.

d) Fishermen's Income and Profit Sharing

An average income of fishermen is explained in Section 3-1-3, but an outline of profit sharing among the captain and his crew is assumed as follows:-

The sharing ratios are fixed against crew's share and items of expenses and the revenue and income are divided by the total of the ratios.

For example ;

Revenue : F$1,100 by fish sales

Total crew : 3 including captain

Sharing ratio : 1 for each crew (3 for 3 crew)

: 2.5 for Captain covering expenses including depreciation cost of boat and engine, fuel, ice, provisions etc.

Share for an unit ratio =F$1,100 ÷ 5.5=F$200 then ordinary crew can get F$200 each and captain can get both the same share as a crew and the share for said expenses, that is F$200+ F$200× 2.5=F$700.

This study excludes the distribution cost such as sales fees at the Municipal Market. The further study is shown in Section 3-1-2 f). The ratio for expenses may differ case by case.

In each fishing trip, the crew usually bring 2～3kgs of fish free of charge back home for their own consumption.

Table 3-1 Fishing License Classified by Area and Type of Boats (1985)

Boat	Launch	H/Cabin	O/B Punt	Skiff	Total	Hinterlandof the Project
Vaileka	2	14	30	–	46	–
Tavua	2	7	23	–	32	–
Ba	–	69	8	–	77	77
Lautoka	5	71	6	–	82	82
Nadi	1	23	6	1	31	31
Sigatoka	2	24	16	–	42	–
Malolo/Yasawa	22	15	–	–	37	37
total	34	223	89	1	347	227

(Lautoka Fisheries Division)

Table 3-2 Fishing License Issued as of April 28. 1986 (Western Division)

License Area	I.D.A.	O.D.A.	Total
Vaileka	38	0	38
Tavua	23	4	27
Ba	28	45	71+(2)
Lautoka	56	22	77+(1)
Nadi	12	7	19
Sigatoka	19	18	37
Malolo/Yasawa	27	9	33+(3)
Total	203	105	302+(6)

( ) shows the number of the fishermen who get two kinds of licenses.

(Lautoka Fisheries Division)

Table 3-3 Fishing License Classified by Race

Area / Race	Western Division	Lautoka Area
Fijian	145 (39%)	38 (40%)
Indian	219 (59%)	57 (60%)
Others	7 (2%)	–
Total	371	95

(Lautoka Fisheries Division)

The ratio of diving fishing can be supported by this data which is important factor to determine the necessary capacity of ice making equipment.

Table 3-4 Detail of Issuance of Fishing License in Western Division in 1985

License / Area	Renewal	New	Beach Seine	Diving	Total	Crew	Crustan
Vaileka	43	7	3	1	54	91	35
Tavua	24	8	—	—	32	71	20
Ba	71	6	—	—	77	163	43
Lautoka	67	17	1	—	85	213	—
Nadi	21	9	—	—	30	61	—
Sigatoka	33	10	—	1	44	100	—
Malolo/Yasawa	24	14	—	—	38	90	—
Total	283	71	4	2	360	789	98
	78.6%	19.7%	1.1 %	0.6 %	100 %		

(Lautoka Fishries Office)

3-1-2 Present Conditions of Circulating Channel

The flow of fish catch by the commercial fishing is shown in Fig.3-2. Anyone can engage freely in the business of fish sale because no legal approval is required for such a business.

No fish catch is sold at auction and there is no typical straight marketing channel like Producer (Fishermen) -Wholesaler- Retailer, and the fish is supplied to the consumer through many channels as indicated in Fig.3-2.

This may be due to the present incomplete structure of distribution systems and the fact that anyone can handle the fish without any complicate legal restriction.

a) Middlemen

The operation by the middlemen covers all channels of both purchase and sale in the market except the roadside stalls, so their handling amount may be fairly large though there are no complete records regarding it. Alongside the specialists, sometimes the fishermen themselves handle fish as the middlemen, while the middlemen sometimes sell the fish at the municipal market as the retailer.

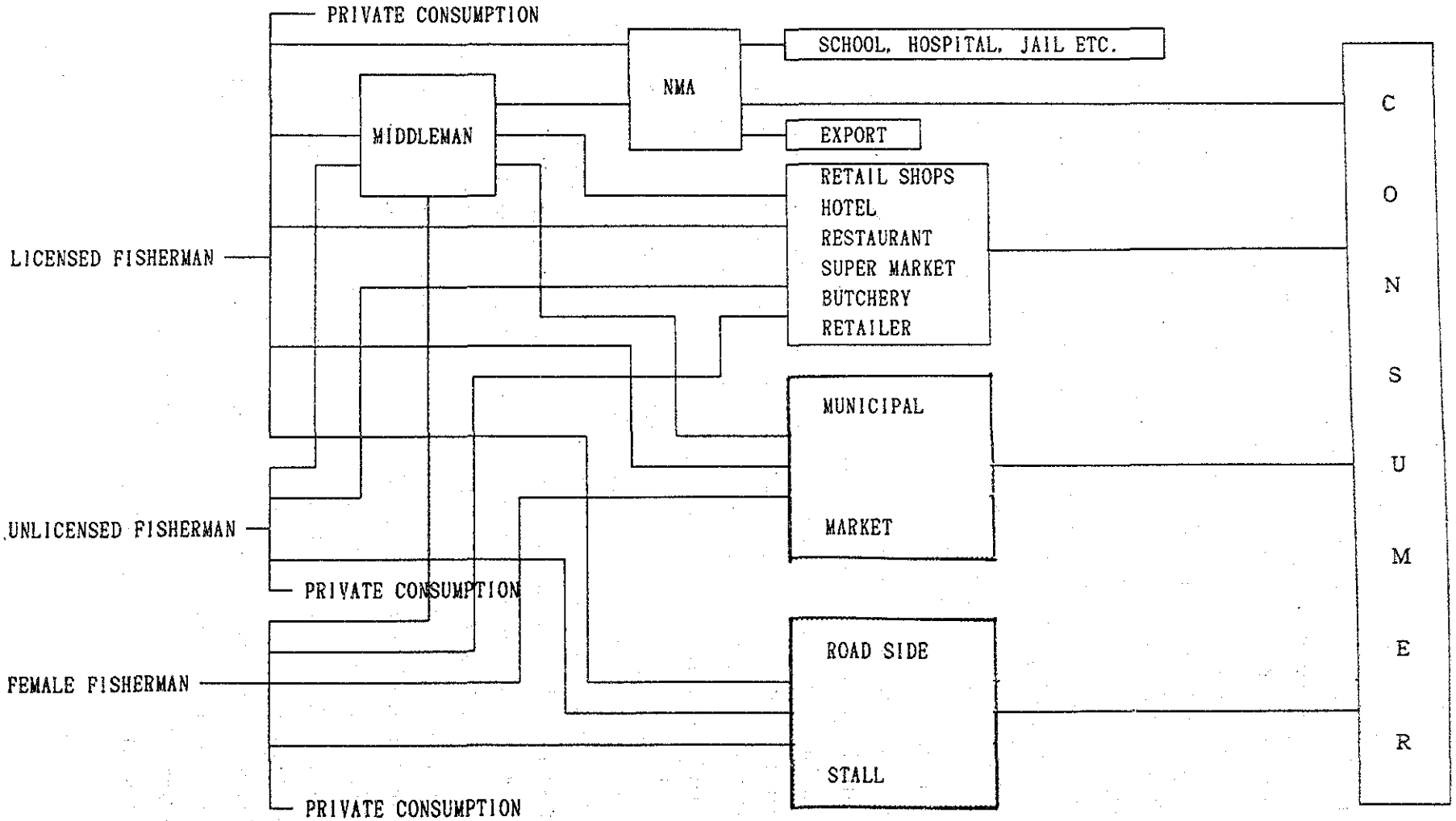
It is said that the number of middlemen in Western Division fluctuates from 10 to 50 due to the fishing seasons.

The middlemen's manner of business is that before purchasing fish from the fishermen the middleman takes the provisional order with required quantities and desired prices from several customers then he tries to collect fish based on the orders, and if the required quantity of fish cannot be purchased he sells the fish to the customers who have offered higher prices. Some middlemen said that they have been purchasing fish from the fishermen at the price lower than the selling price by 20 cents per kilogram, while the fishermen complain that haggling by middlemen is common when catch are very rich.

The amount of 20 cents a kg is 5 cents lower than distribution cost for the Municipal Market.

Anyway the middlemen's business is less risky because they never purchase fish without provisional orders.

Fig.3-2 Sales Circulations



Note: "Retail Shops"are classified as "other route " in the record. Fish Profile.

b) National Market by NMA (National Market Authority)

Though NMA exclusively and constantly supplies the fish to the governmental organizations such as school, hospital and jail, etc. based on the contract with the government as indicated in Table 3-5, they are not so effective for the consumers compared with other distribution channels.

The reason why the amount of fish handled by NMA can not increase is said that their purchase price is too low and the payment is made by the cheque which is inconvenient for cashing, so the fishermen are generally not willing to sell fish to NMA as far as there are other profitable customers.

c) Municipal Market

No license is required to utilize the municipal market. Even unlicensed fishermen can utilize the market, though there are no such fishermen at present . The quantity sold by one person can not exceed 100kgs a day, presumably in order to give an equal chance to all the users.

The market fee of Lautoka Municipal Market is 25cent for 1 kg of fish sold and the fish not sold may be stored in a cold storage (with about 20m3 capacity, at + 5℃ room temperature) attached to the market at the charge of 8 cent/ kg.

d) Retail Shops

A commercial distribution channel including super-markets, hotels and restaurants.

e) Roadside Market (Open-air Free Market)

There are few records about the sale by roadside stalls, but in the Lautoka Fisheries Division's survey, it is reported that 711kgs of fish and 1,024kgs of non-fish were sold at the roadside between Tavua and Lautoka in January 1986.

The whole picture can not be drawn based on the above record as it includes data only for a short period and at a limited place.

Inside the city boundary the roadside stalls and private markets are prohibited but free outside. Roadside market mean all the distribution channels other than the municipal markets, NMA markets and retail shops. Roadside markets are made not only along the road but also along the river bank,

namely floating market.

f) Distribution Cost and Net Income of Fisherman

The fishermen will choose the distribution channel based on various factors considered such as the fishing season, amount of catch, type of catch, grade of fresh, market price, his past experience, discussion with middlemen and other related factors.
And the fishermen will select the best channel in order to maintain the maximum income as longer as possible. On the contrary, the consumers will try to purchase fresh fish at the lowest price possible.

Comparison is made concerning the difference of the net income of a fisherman by main 4 types of distribution channels.

a. Net income through the Municipal Market
b. Net income through the middleman
c. Net income through the private marketplace
d. Net income through the free-market such as roadside stall

Fishermen are divided into two groups namely "Group-A " and "Group-B " as indicated in Section 3-1-3 a).

Table 3-4a Distribution Cost and Net Income of Fisherman

Group A	(a)	(b)	(c)	(d)
Monthly sales of boat(F$)	1,250	1,250	1,250	1,250
Cost (depreciation, fuel etc.,)				
$\frac{5.5-3.0}{5.5}=0.455$				
1,250 × 0.455= 570	570	570	570	570
Distribution Cost (F$)	720 x 0.25 = 180	720 x 0.20 = 144	7	0
Total of Costs	750	714	577	570
Net Income	500	536	673	680
Monthly Income of fisherman	167	179	224	227
(Total 3.0 Fishermen)	(74%)	(79%)	(99%)	(100%)

Group B	(a)	(b)	(c)	(d)
Monthly sales of boat(F$)	1,600	1,600	1,600	1,600
Cost (depreciation, fuel etc.,)				
$\frac{6.5-4.0}{6.5}=0.385$				
1,600 × 0.385= 616	616	616	616	616
Distribution Cost (F$)	600 x 0.25 = 150	600 x 0.20 = 120	7	0
Total of Costs	766	736	623	616
Net Income	834	864	979	984
Monthly Income of fisherman	209	216	244	246
(Total 4.0 Fishermen)	(85%)	(88%)	(99%)	(100%)

Note: All figures shown above are based on the survey results as indicated in Section 3-1-3.

As shown in Table 3-4a, the higher distribution cost of course makes the lower net income for the fisherman. Fluctuation of the net income in the Group-A is sensitive to the distribution cost because the commission are charged not to the selling price but to the weight of the fish sold. Net income through the Municipal Market decreased by 25% and 15% for Group-A and Group-B respectively compared to the net income through the roadside market. A fisherman earns 227$ per month through the roadside market, but the earning comes down to 167$ per month when handling fish through the Municipal Market.

According to the direct interview survey, the average fisherman does not like to sell his catch at the Municipal Market, presumable because of lower net income. There may be some other reasons why fishermen dislike the Municipal Market.
It can be said that there will be higher demands on fish if fresh fish are supplied timely a reasonable price to consumers. Generally the increase of fish consumption will be welcomed by both fishermen and consumers.
Therefore it is strongly recommended to establish a fish market with a low fee in the fishing port as soon as possible.

Table 3-5 Commercial Production (FISH PROFILE) Unit: ton

Channel	1978	1979	1980	1981	1982	1983	1984
Municipal Market Fish Sales	845.6	839.4	843.9	1,130.3	973.7	813.8	925.3
NMA Fish Sales	137.2	195.9	125.5	190.0	136.1	290.6	276.0
Other Outlet Fish sales	962.5	1,075.8	1,577.3	1,711.1	1,855.2	2,504.4	2,849.8
Municipal Market Non-fish Sales	1,012.0	885.0	956.4	1,094.0	1,443.1	1,450.3	1,588.0
Other Outlet Non-fish Sales	–	26.7	42.0	39.3	57.1	502.9	233.4
Miscellaneous Smoked Salted	–	–	–	19.5	21.5	69.6	31.0
Total	2,957.3	3,022.8	3,545.1	4,183.9	4,486.7	5,631.1	5,903.5

NMA Lautoka in 1985 : Sales abt.31.4ton. Purchase abt.14.5ton.(FISH PROFILE)
Non-fish means crustacean and shell fish.

Table 3-6 Sales Quantity at Municipal Market Unit: ton

market	Division	1983		1984		
		Fish	Non-fish	Fish	Non-fish	
Suva	Central	89.26	459.34	47.81	340.12	
Nausori	Central	11.72	250.90	23.00	211.51	
Navua	Central	12.58	64.94	13.00	63.58	
Karovou	Central	4.88	10.24	5.50	50.48	
Lautoka	Western	260.13	231.83	252.91	453.08	*
Ba	Western	116.27	32.25	173.07	190.89	*
Nadi	Western	80.63	61.43	83.44	49.71	*
Sigatoka	Western	17.52	121.93	22.09	85.32	
Tavua	Western	16.03	64.30	21.54	22.55	
Rakiraki	Western	21.88	13.96	21.26	18.64	
Labasa	Nothern	209.77	139.22	261.70	62.49	
Total		840.66	1,450.34	925.32	1,547.17	

(FISH PROFILE)

Note : Sales quantity at the Lautoka Fishing Port's hinterland (Lautoka, Ba, Nadi)are as follows.

Fish	509.42 t	(55.1% of 925.32t)
Non-fish	693.68 t	(44.8% of 1,547.17t)
Total	1,203.10 t	(48.7% of 2,472.49t)

Table 3-7 Species Composition of Retail Outlets (1984) Unit: ton

area	Central	Western	Northern	Lami	Lautoka	Labasa	Total
Fish	2,186.19	276.99	214.51	85.43	36.77	55.76	2,855.65
Non-fish	115.68	52.79	51.56	12.8	0.56	0.04	233.43
Imported	274.13	4.8	—	—	—	—	278.93
Total	2,576.00	334.58	266.07	98.23	37.33	55.8	3,368.01

(From FISH PROFILE)

Table 3-8 Details of Sales by Other Outlets (Oct.-Dec.1985) Unit: kgs

Area	Species	Hotel	Restaurant	Butchery	Super-market	Middleman	Total
Nadi	S/Mackerel	3,935	3,118	60	900		8,013
	B/Fish	2,709	393	210	225		3,537
	Crab		150				150
	Prawn	△60,120	644		150		974
	Lobster	1,586					1,586
	Scallop	△45					45
	Oyster	△30					30
Ba	S/Mackerel		360	2,460	120	13,000	15,940
	B/Fish		195	542		28,500	29,237
	Prawn		90				90
	Lobster		30	136		1,600	1,766
	Crab		60				60
Lautoka	S/Mackerel	619.6		400	1,229.5		2,249.1
	B/Fish	3,401		600	498		4,499
	Crab	318					318
	Lobster	712		55	8.7		775.7
	Lairo	332					332
	Ark Shell	8					8
	Turtle	17					17
Tavua	S/Mackerel	81.7					81.7
	B/Fish				1,200		1,200
	Prawn	9					9
Total		13,983.3	5,040	4,463	4,331.2	43,100	70,917.5

(From Lautoka Station) △ : Import

3-1-3 Results of Direct Interview Survey

In order to survey the actual condition of the fisheries in Fiji and to collect important information to determine the character of the fishing port and its scale including length of the berth and necessary capacity of the icemaking plant which is one of the important problem of this project, direct interview with fishermen, ordinary consumers and large scale consumers was executed as shown in Fig.3-3.

The original form for interviewing is shown in Appendix K.

All of the figures obtained by the direct interview can not be considered very accurate and reliable because they are not based on precise records and some of them are based on the interviewees' memory or feeling, though they can be a good guidance to knowing the tendency and estimating the fish catch.

a) Interview with Fishermen

Survey on seven items was made for 31 fishermen. The results and analysis are shown below.

To analyze the results of interview the answers of the interviewees are sorted into two groups:

Table 3-9 Groups By Fishing Method

Group	Fishing Method	Length of trip
A	Diving Fishing	Within one day *
B	Gillnet or Hand line	More than 2days

Note: One day means 24 hours.

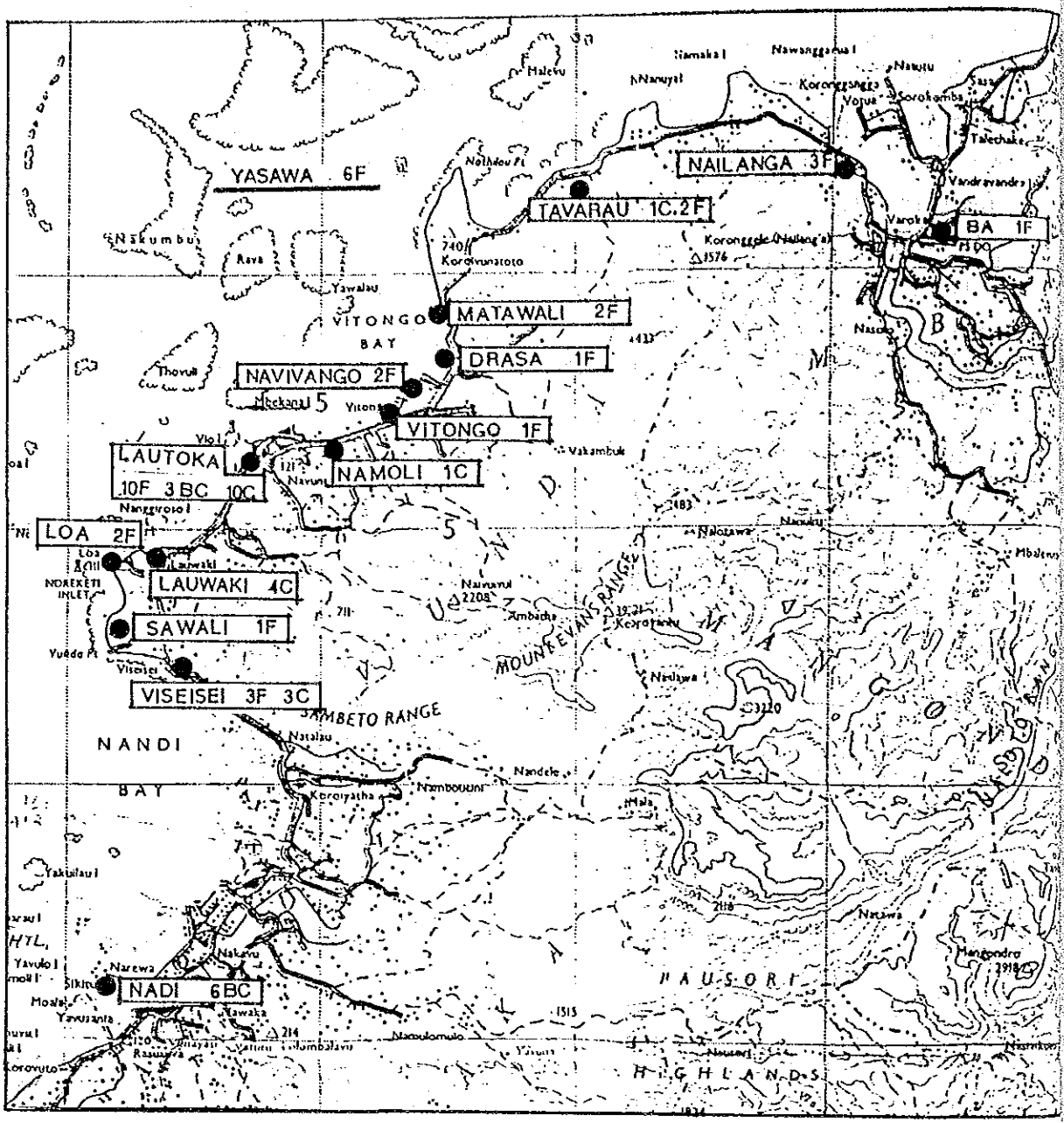
Group A has a tendency to use less ice and Group B engages in long trip fishing that uses more ice but one trip usually does not take more than 4 days.

(1) Term of Fishing Trip

Table 3-10a Length of a Trip

Days/trip	1	2	3	4	5	6	over 6
Answerer	12	3	12	4	0	0	0
%	38.7	9.7	38.8	12.9	0	0	0

Fig. 3-3 Details of Direct Interview Survey



Interviewee : 31-Fishermen (F)
9-Big Consumer(BC)
21-Ordinary Consumer(C)

※ Underlined places are not in this map.

Table 3-10b Trip per Month

Trips/Month	below 5	6～8	9～12	13～16	17～20	21～24	over 25
Answerer	13	7	4	1	5	1	0
%	42	22.6	12.9	3.2	16.1	3.2	0

To summerize the above:-

Group	%	Trip/Month	Trip/Week	Day/Trip
A	40	15.6	4	1
B	60	4.1	1	3

The answer of one day trip indicates high percentage presumably because most of the answerers are diving fishermen.

The operation by the gillnet and hand line fishing can be considered as 3 day trip on an average. The frequency of operation in one month is typically 16 times in case of diving fishing and 4 times for gillnet and hand line fishing.

As almost no fishermen go fishing on Saturday and Sunday, the weekly pattern of fishing operation of 10 vessels including 4 boats of A group and 6 boats of B group can be supposed as follows.

Day	A Group		B Group		Total		Berthing
	Departure	Return	Dept.	Ret.	Dept.	Ret.	S L U
Mon.	—	—	B1 B2	—	2	0	10 2 0
Tue.	A1 A2 A3 A4	—	B3 B4	—	6	0	8 6 0
Wed.	A1 A2 A3 A4	A1 A2 A3 A4	B5 B6	—	6	4	6 6 4
Thu.	A1 A2 A3 A4	A1 A2 A3 A4	—	B1 B2	4	6	6 4 6
Fri.	A1 A2 A3 A4	A1 A2 A3 A4	—	B3 B4	4	6	8 4 6
Sat.	—	A1 A2 A3 A4	—	B5 B6	0	6	10 0 6
Sun	—	—	—	—	0	0	10 0 0

Note : Berthing means boats in the port.

where, S : Stand-by Berth, waiting for next trip

L : Loading Berth, loading ice, fuel and others

U : Unloading Berth, landing catch

See Section 5-3-2 C).

(2) Fish Catch

Table 3-11 Average Catch per Trip Unit: kgs

Catch	less 50	51-100	101-150	151-200	201-250	251-300	over 301
Answerer	6	12	5	4	4	0	0
%	19.3	38.8	16.1	12.9	12.9	0	0

Table 3-12 Average Catch per Month Unit: kgs

Catch	less 500	501-1000	1001-1500	1501-2000	2001-2500	2501-3000	over 3001
Answerer	7	14	2	7	0	1	0
%	22.6	45.2	6.5	22.6	0	3.2	0

To summarize the above by group:-

Group	%	Trip/Week	Average Catch			Weighted Average
			kgs/Trip	kgs/Week	Kgs/Month	kgs/Month
A	40	4	45	180	720	720× 0.4= 288
B	60	1	150	150	600	600× 0.6= 360
						Total 648 kgs

From the above, the average catch per month per boat can be considered as about 650kgs.

(3) Income

Table 3-13 Average Income per Fishing Boat Unit: F$/month

Income	less 500	501-1000	1001-1500	1501-2000	2001-2500	2501-3000	over 3001
Answerer	2	8	10	4	2	2	3
%	6.5	25.8	32.3	12.9	6.5	6.4	9.7

Table 3-14 Average Income of Fisherman Unit: F$/month

Income	less 50	51-100	101-150	151-200	201-250	251-300	over 301
Answerer	0	2	1	19	1	2	6
%	0	6.5	3.2	61.3	3.2	6.5	19.4

To summarize the above by group:-

Group	%	Monthly Income per Boat (F$)	Monthly Catch per Boat (F$)	Average Fish Price (F$/kg)	Monthly Average Income per Fishermen
A	40	1,250	720	1.74	209
B	60	1,600	600	2.70	209
Weighted Average		1,450	650	2.23	209

From the above, it is understood that the average catch for one vessel is 650kgs/month, average price of fish is F$2.23 kg and average income of one fisherman is F$209/month.

Meanwhile the average price for A group is lower than that for B group and it may be due to the difference of species, sales route and manner of storing.

Following is income for the ship owner (usually captain) and crew by group, assuming the number of crew is 3 for A and 4 for B.

Group	%	※Sharing Ratio	Average Income F$/month		
			one vessel	crew	owner
A	40	5.5	1,250	1,250÷ 5.5=227	1,250×3.5/5.5 =795
B	60	6.5	1,600	1,600÷ 6.5=246	1,600× 3.5/6.5=862
Weighted Average		6.1	1,450	239	835

※Refer to 3-1-1 d)

From the above it is supposed that the average income for one vessel is F$1,450/month and F$210 ～F$240/month for one crew.

(4) Consumption of Ice

Table 3-15 Ice Consumption for One Trip Unit: kgs.

Consumption	unused	less 50	51- 100	101- 150	151- 200	201- 250	over 251
Answerer	8	1	2	7	4	0	9
%	25.9	3.2	6.5	22.6	12.9	0	29.0

The respondents for "unused" are supposed to be diving fishers with one day operation, and the consumption of ice in gillnet and hand line fishing is estimated at about 220kgs for one trip.

The summary by group is as follows:

Group	%	Consumption/Trip	Trip/Month	Consumption/Month
A	40	18kgs	15.6	280kgs
B	60	221kgs	4.1	905kgs
Weighted Average		140kgs	8.7	655kgs

(5) Other Response

There are very few fishing boats at present which berth at King's Wharf constantly as the home port not only because the sea bed is exposed to air at low tide but also because these are security problems.

The fishermen's responses for the improved fishing port are:-

i) Those who utilize the present port and will utilize the new port too. : 45%(14 respondents)

ii) Those who do not utilize the port now, but will utilize the new port. : 42%(13 respondents)

iii) Those who do not utilize the port now and will not either : 13%(4 respondents)

The reason why some fishermen do not wish to utilize the improved fishing port is that the port is located far from their home and they never feel the present circumstance is inconvenient.

The fishing boats which will come to the Lautoka fishing port to ship ice, fuel and provisions etc. will increase very much but the number of boats which are going to choose the port as their constant mooring place will be limited to the boats which are owned by the fishermen living in the adjoining area to Lautoka.

b) Interview with Ordinary Consumers

This survey was executed to estimate the quantity of production from the consumption. However as shown in Fig.3-3 the interviewees are selected mostly from the places near the sea coast and not including people living inland, so that the mean value of answers collected by this interview may show a higher consumption than that of national level.

Table 3-16 Frequency of Fish Dish in a Week.

Times	1	2	3	4	5 5	over
Answerer	0	11	7	0	2	1
%	0	52.4	33.3	0	9.5	4.8

Average: 2.8times/week

Table 3-17 Family's Consumption of Fish in One Meal in kgs.

Times	less 2	3-4	5-6	7-8	9-10	over 10
Answerer	15	5	1	0	0	0
%	71.4	23.8	4.8	0	0	0

Average: 1.6kgs/meal

Table 3-18 Consumption of Fish in One Meal by One Person in kgs.

Times	less 0.15	0.16- 0.25	0.26- 0.35	0.36- 0.45	0.46- 0.55	over 0.56
Answerer	0	7	1	5	5	3
%	0	33.3	4.8	23.8	23.8	14.7

Average: 0.39kgs/head

Annual consumption of fish per one family

2.8meals/week ×52weeks ×80%× 1.6kgs/meal=186kgs/year.

Annual consumption of fish per one person

0.39kg/head × 2.8meals/week×52weeks ×80%=45.4kgs/year.

Assuming that a family has five members, annual consumption of fish per one person will be:-

186 ÷ 5=37.2kgs/head/year

Though the average family member of the interviewees was 4, considering the result of the national census (seven on a average), 5.0 has been is taken in the above calculation.

Table 3-19 Monthly Consumption of fish per One Person in kgs.

Times	less 1	1.1- 2.0	2.1- 3.0	3.1- 4.0	4.1- 5.0	over 5.1
Answerer	0	3	4	4	2	8
%	0	14.2	19.0	19.0	9.5	38.1

Average: 4.1kgs/head /month

Annual consumption of fish per one person

4.1kgs/month×12month × 80%＝39.4kgs/head/year.

This estimation shows the annual consumption of fish per head is more than 35kgs and these results are due to the surveyed area's character as explained at the beginning of this section.

Therefore the collected figures may lack accuracy and it may be difficult to calculate national consumption from these figures. However, it can be said that the average rate of fish consumption of population is not small. In the area of higher consumption, the maximum annual consumption per head can be considered as between 30 to 40kgs, but it can not be applied to the whole hinterland of the Project. The unit rate of consumption should be adjusted downward according to the character of each area.

(1) Others

Q. Where do you purchase fish ?

A. at Market:13 at Wharf:5 at Roadside:6 from Fisherman:5

Q. What do you think about price?

A. High:10 Reasonable:10 Low:1

Q. Will you buy, more fish ?

A. Yes:21 No:0

Q. If yes, Why ? and What is the requirement?

A. Like fish:8 If cheaper:16 If fresher:15 If can buy near home : 5

The numbers of answers and respondents do not coincide due to multiple answering system.

Regarding the frozen fish, all the responses of the consumers were negative as "not tasty" or "don't like it", etc.

c) Interview with Big Consumers

Table. 3-20 Method of Purchase;Big Consumers

Where/Whom / Purchaser	Direct from Fisherman	Middleman	Butchery	Municipal Market	Others
Hotel	2	2	1	–	–
Restaurant	2	–	–	1	–
Butchery	1	–	–	–	–

Table. 3-21 Monthly Purchase in kgs;Big Consumers

Qty. / Purchaser	less 100	101-200	201-300	301-400	over 401
Hotel	–	–	–	2	3
Restaurant	2	–	–	1	
Butchery	–	–	–	–	1

As to the future tendency, more consumption can be expected provided that the price is lower and quality is higher.

3-1-4 Technical Capabilitis of Maintenance

To foresee the technical standard of maintenance after the completion of the improved Lautoka Fishing Port, investigation was made on maintaining the present port and technical standard and/or repairing capapcity of existing facilities controlled by the Fisheries Division.

a) Fishing Port Facilities

Basic problem is that the Fisheries Division has no experience to manage and maintain the marine facilities, and the only organization which has such experience and ability is the Ports Authority of Fiji.

Fishing port menagement requires appropriate operation and maintenance of the facilities in terms of civil engineering, architectural engineering and machinery.

An efficient and stable utillization will be required not only by the efforts of the Fisheries Division but by technical assistance by foreign countries including the Government of Japan.

b) Ice Making Equipment

The Lautoka Ice Making Factory was installed by the refrigeration engineer and the staff of the Fisheries Division in 1977 except the ice storage room which was built by some Australian contractor.

The facility consists of 2 sets of 5ton/day Flake Icer, totaling to 10tons/day nominal capacity but the real capapcity has been dropped to 2tons/day or less in total at the time when the study team visited.

The reduced of capacity was attributable to the accumulation of lubricating oil in the evaporator due to disorder of oil the returning system.

By the request of the Fisheries Division an expert from the study team inspected the machine and made recommendation to drain the oil. After the oil draining was executed for No.2 ice Maker, the capacity recovered up to about 3.1ton/day. And some more capacity increase can be expected if the inside surface of the ice making drum is polished and the center of the ice scraper is adjusted.

But just before the survey team left the oil return seemed to be getting worse again and the expert recommended to the Fisheries Division to check the float valve in the oil separator.

The capacity may decrease again after some months if the disorder of the oil return system can not be eliminated.
From the fact that the ice making facilities were installed by the Fisheries Division's staff and their performance for oil draining practice as well as their explanation against technical questions, they seem to have fair practical knowledge. But at the same time, the systematic education of refrigeration engineering must be very usefull for them because they could not find the trouble caused by oil accumulation.
In developing countries, consideration has to be made for selecting the refrigerant to be used when designing the refrigeration plant, because some kinds of refrigerant are difficult to obtain in the local market.
But in Fiji, any kind of refrigerant, even R-502 which has low frequency in use, is obtainable in the local market, and there are several shops handling refrigerant.
Therefore the refrigeration plant installed in future can be maintained under good condition if the necessary spare parts are supplied sufficiently at the initial stage.
The refrigeration equipment to be managed and controlled by the Fisheries Division will be increased and larger scale of the eguipment and installation of facilities requiring higer standard of technical knowledge are expected in future. Meanwhile only the Fisheries Division Lami has the specialists of refrigeration and only a few ice making factories are looked after by those who have some practical knowledege of maintenance.
The training of technical staff can not be accomplished in a short period, so it is essential to establish a training scheme as soon as possible considering long future, and the most practical manner is to send the staff and plant operator of the Fisheries Division to Japan for training through the technology transfer by the Government of Japan to heighten their technical standard.

3 – 2 EXPECTATION FROM THE PROJECT

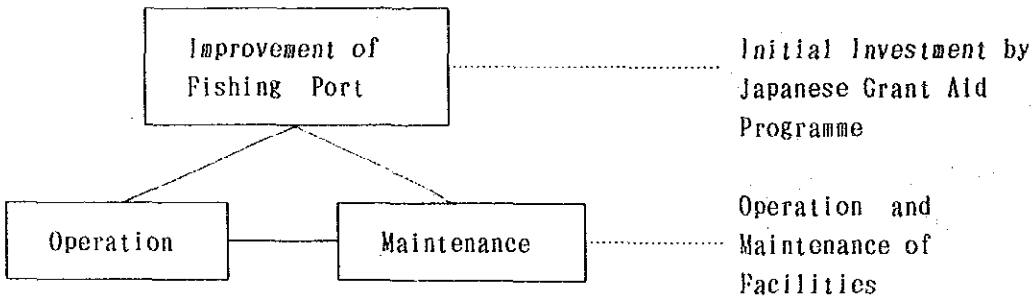
Extension of the commercial fishing and its related industries is one of the most important issues since the national development plans of DP7, DP8 and present DP9 for 1990. The purpose of these promotions are summarized below;

1) to encourage the production by coastal fishing and an effective distribution channel.
2) to expand the current domestic fishing of relatively small scale to a stabilized commercialized industy, and
3) to maintain and enlarge the employment of fishermen and their income.

To fulfill these project purposes, a well organized cooperation between fishermen and the Fisheries Division has to be maintained.

Considering the fact that the fishing industry depends upon the fresh fish catch from the natural open sea and its sale to consumers, a fishing port with necessary facilities and equipment such as breakwater, quaywall and ice plant has to be constructed for the continuous fish production by fishermen.
Thus, there are three main themes for the Project.

1) To invest the capital to improve fishing port with necessary facilities such as civil works, architectural works and mechanical works.
2) To establish an organization to operate the port safely and economically.
3) To establish a measure to maintain facilities in appropriate condition.



To solve the present problems of fishing port facilities at the King's Wharf, Lautoka, these three functions have to be established and developed. These three factors are inter-related with each others.

Facilities have to be designed as simple as possible so as to be maintained easily in actual operation considering the present technical capabilities and the past experience in Fiji. The most important factor will be the human resources who will maintain the facilities and will run the improved fishing port.

3 - 3 GUIDELINE FOR PROJECT

In order to practically solve the aforementioned problems (Section 3-2), it is necessary to construct more simple and more effective facilities and to properly manage those facilities. In the following sections, the guidelines for the coustruction and operation/management of the fishing port facilites are discussed.

3-3-1 Facilities

For the revival of the Lautoka fishing port as mentioned before, the newly constructed fishing port must respond well to the needs of the fishermen and fishing industry, while functioning well as a fishing port by balanced coordination of "facilities" "operational management" and "maintenance". The desirable facilities and their present conditions are discussed below.

a) Bacic Facilities

The bacic facilities include, but are not limited to, the measures to protect the port form such external forces as adverse wave effect, sand-drift and tidal current, vessels-mooring installations for the purpose of loading/unloading, resting and preparation for boat departure and a harbour basin to assure safe departure, return and anchoring.

As of today, except a few unloading berth, the Lautoka port does not possess any of those basic facilities, and a newly planned construction is required. The outline of the facilities to be planned should be as follows:

Mooring installation:Berths

-Loading/Unloading Berths

There are about 600 registered or non-registered fishing boats altogether in the overall Lautoka hinterland; however, the total berth

length for the fishing boats being only 45m long, the berth does not meet the requirement. The facilities to unload the catch and to ship it to the market need to be planned. The boats shall be anchored parallel to the berth equipped with steps. The loading berth for the preparatory purpose prior to the boat-departure should also be constructed.

－Stand-by Berth

The present port does not possess any installations to keep boats moored for resting after unloading the catch. The berth for this purpose, therefore, must be newly planned. The mooring system shall be designed to be a perpendicular berthing type.

－Cutter-boat Berth and Barge Berth

The location of these berths, which shall afford mobility to the people in isolated islands and provide facility for transporting daily commodities, shall be detatched from the fisheries berth.
The present quaywall 90 m in length is under the jurisdiction of the Ports Authority ; however, the transfer of it to the Fisheries Division will be desirable since it is expected to become part of the Lautoka Fishing Port.

－IKA BOAT Berth

Ika Boats are bonito-angling boats owned by Ika Coporation under the management of the Fisheries Division. They are larger than the ones that presently engage in fishing around Lautoka and have their base in Suva. Only few of these vessels come to the Lautoka port in a year; therefore the accommodation of these vessels in the Lautoka port need not be considered at present from the economic point of view.

－Breakwater

The planned location is behind a creek island (Vito Island; 0.4 k m^2) surrounded by reefs and has the effect of the WSW wind-wave coming from offshore. Especially the southern edge will be gravely affected by the wave action; therefore, a breakwater should be planned to secure calm water in front of the berths and not to disturb the smooth

use of the fisheries port. The breakwater simultaneously protects the harbour basin from the sand drift from the south, thus reducing maintenance dredging of the navigational channel and port basin.

-Navigational Channel

It is quite necessary to construct a navigational channel to secure safe traffic of the fishing boats. The facilities to keep out siltation and/or sand-drift from the channel will be constructed as mentioned above.

-Ancillary Installations

To achieve safe traffic of the fishing boats, the navigational beacons/ marks should be installed at the toe of the breakwater and in the channel. The installation of the fenders, bollards, lightings, water service pipes, wheel-stops and steps should be also included in the plan.

b) Functional/Operational Facilities

The functional facilities are the ones that enable more modern and more effective fisheries distribution within the port and include ice making plants and ice storage.

The planned facilities are described below.

Administrative Office Building(two-stories)

Ground flr.	workshop, storage, repair shop for fishing gear, fishing net,engines, etc.
1st flr.	office, meeting room, research lab, radio room.

The present office is leased in the Lautoka city area and too far away from the port, with small number of rooms, thus functioning not too well. The new Fisheries Division's Administrative office, therefore, should be constructed in the port area to enhance management capabilities.

Ice Plants

Ground flr. ice-storage
1st flr. ice-production plants

The present ice-plant(installed 9 years ago) is an out-moded type with frequent mechanical troubles and therefore under-functioning (present capacity 2t/day as compared with 10t/day as per specifications). It is thereby necessary to construct new ice-production and storage facilities to keep ice-supply to the desired level.

The basic ice-supply objectives are three fold, i.e. for fisheries, for marketing/distribution, and for miscellaneous uses. The facilities must meet all the requirements.

Canteen and Restroom

A stand for foods and other commodities, a canteenand and a resting room for the fishermen, shall be also made available.

Ancillary Equipment

Ancillary installations, utensils, spare parts, repair-gear for the effective utilization of the above facilities shall be also made available.

3-3-2 Operation

The present Lautoka port is managed by five staff members of the Fisheries Division. The establishment of the port-administrative organization is necessary for the realization of the effective administration of the Lautoka Fishing Port and the following points should be kept in mind in establishing the system:

(1) Adequate administrative staff

The present five members might not be enough, and increase in the technical, financial and administrative staff would be necessary. The special emphasis should be placed upon the recruitment and trainig of the technical staff.

(2) Establishment of cooperation between administration and users

Without good cooperation and understanding of the user-fisherman, the effective port utilization, stable and long-term, can not be achieved. The fishermen, on the other hand, must observe the rules and regulations, while realizing higher production by the use of the public fisheries port. For this purpose, some kind of fishermen organization must be established so that both parties can discuss about that, agree upon and observe the said rules and regulations, which include thefollowing:

- regulation with regard to the use of facilities concerned
- time and scope of the service supplied in the facilities
- safety supervision
- service fee and charges
- others

(3) Establishment of administrative facilities

The present office does not have enough space, and therefore, a new administrative office needs to be constructed and effective administration must be further pursued.

(4) Establishment of technical problem-solving system

It is not an easy task for developing countries to tackle all technical problems. Such problems shall include, alongside the administration and maintenance of the port facilities, repair/maintenance of fishing gear owened by fishermen.

- administration and maintenance of port facilities
- repair/maintenance of fishing gear

The facilities for maintenance of the private property of the fishermen shall include workshop for minor repairs, warehouse, and boat-lifting installation, and the fishermen's efforts are essential for maintenance. In the meantime, the port facilities will be administered by the Fisheries Division and the administrative body must be well organized.

The system-improvement shall be achieved by the selection proper methods from among the following:

- to let the technical staff members, who tend to be concentrated in Suva, take charge of the Lautoka port. The staff will be stationed in Suva, but they will make regular visits to Lautoka to check the facilities for necessary repairs.

- to commission the maintenance of the facilities to the private sector

- to prepare "Regular-check Guideline" (check-list) If the above is impossible, and the to make staff members of the Fiseries Div. stationed in Lautoka check the facilities and report to the Suva head office for necessary instructions on a day to day or other reguler basis.

With regard to the primary facilities such as ice-plant and other onshore facilities, the suppliers (makers, contractors) should be responsible for maintenance a certain longer period, so that the technology may be transferred to the Fisheries staff.

This maintenance period can be extended over the contractual maintenance period for each installation.

3 - 4 ROLES OF THE PROJECT

Both the preliminary survey made in January 1986 and this field survey reveal the fact that the present port does not meet the needs of the fishing industry. In other words, the mooring facilities of the present port which are the most basic among the port facilities, are outmoded and they are not large enough either. The navigational channel is not well maintained either. The operational facilities are also not functioning well and above all, the ice-production capabilities are well below the specified level. Under these circumstances, all the present facilities are suffering from malfunctioning resulting in under-utilization of the mooring facilities, increase in waiting-time, decrease in the value of the products, and damage to the improvement momentum by the fishermen.

In case the Lautoka port is rehabilitated and/or newly-constructed and thereby meeting the fishermen's needs, the following investment benefits should be naturally expected due to more vigorous fishing activities:

- More effective use due to reduction of waiting-time as a result of securing deeper water-depth in front of the mooring facilities.

- Increase in the catch due to the increase in the fishing activities brought about by the reduction in waiting-time for high water.

- Supply of shelter due to breakwater construction and reduction in vessel damages under severe weather/tidal conditions.

- Reduction in maintenance dredging cost by protecting the channel by breakwater and groin from sand-drift and eliminating adverse wave effects.

- More effective use by larger boats due to deeper water depth.

- More employment opportunity, direct or indirect, due to busier fishing activities.

- Maintenance of product values and prices due to the supply of more fresh products enabled by improvement in ice production/storage capabilities.

- Secondary effect to the neighboring areas of the port due to the increase of ice-supply.

- Increase in the supply of fisheries products to tourists visiting western sight-seeing places such as Lautoka and Nadi as well as to the local residents.

- Economic effect due to the supply of a transportation base for daily commodities for the isolated islanders.

- Improvement in port administration expertise of the Fisheries Div. by actually administering a fully equipped fishing port.

- Transition from domestic-type to commercial-type fishing and possibly oragnizing of fishermen.

3 - 5 TARGET YEAR OF THE PROJECT

The target years under the plan are divided into two phases, i.e. initial development and long-term development, for years 1990 and 2005, respectively.

Table 3-22 Project Target Year

year	contents
1990	As phase I the facilities satisfying a minimum requirement with necessary functions as fisheries port. To be investigated as a potential Japanese grant aid project . Year of 1990 is the final year of the present National Development Plan DP-9.
2005	As a long-term development, the next 20 years is considered.

3 - 6 HINTERLAND OF THE PROJECT

A hinterland is assumed to be the area where the fishing boats using the Lautoka port will be engaged in the production activities.
The Lautoka region is included in the Western Division under regional classification by the Fisheries Division. The Lautoka and its neighboring areas are the ones with highest potentials in Fiji with regard to fisheries resoures.
The hinterland of the Lautoka port shall consist of the following, as a result of 3-1-3 "Interview Survey" and others;

- Lautoka Region
- Ba "
- Nand; "
- Yasawa "

Of course, it does not mean that all the boats in the above regions will use the Lautoka port, but the fishermen will use their own discretion inchoosing a port, taking account of geography, distribution route, etc. On the other hand, the Lautoka port itself will not have the capacity to accommodate all the boats that intend to use the port; therefore, only a portion of such boats will be allowed to come to the port. As can be seen in Table 3-1, the number of the registered fishing boats in all four regions is 227(as of 1985).82 account of which belong to the Lautoka region.

CHAPTER 4. OUTLINE OF THE PROJECT

4 - 1 Objectives of the project

As described in Chpater 3 "Formulation of the Project", an extension of the fisheries industry is one of the most important national development policies. Among the industries, so-called the small scale fishing industry are planned to be improved its present conditions into more effective one.

Meanwhile, no public fishing port is existing in Fiji, and a large demand on the fishing port by the fishermen has not fulfilled yet.

Lautoka, one of the two largest cities in Fiji, has a larger consumption demand in its hinterland and its coast line are protected against waves by the natutral hazards, namely "good natural port". However, most of the fishermen berth their boats in the commercial port, on the river bank and on muddy coast because of lack of the common fishing port facilities.

Thus, the improved Lautoka fishing port has to be the first public fishing port of optimum size with the common fising port facilities.
The basic planning target will be as follows;

(1) To ensure the safety maneuver of fishing boats
(2) To assure all phase activities of fishing boat in the port, namely undoading catch, stand-by for next trip to fishing grounds, loading fuel, water, other materials for departure.
(3) To cope with the demand of such supply as fuel, ice, water, etc.
(4) To provide an integrated base concentrating nessesary functions for extension of fisheries.
(5) To provide oppotunity to the fishermen to maintain easily their boats, engine tools and fishing gears in the port.

Thus, the objective of the project is to generate a circumstance required which stabilize the daily living of fishermen and their families by the regulated income enough to sustain their lives through the enlargement of employment opportunities.

4 – 2 General View of the Requests

In this section a preliminary qualitative evaluation is made on the suitability of scope of works requested. Detailed quantitative study of them are discussed in Chapter 5 "Basic Design".
As shown in Section 2-4 "Requests by the Government of Fiji", the scope of works requested are as follows;

The grant aid request is made for the following facilities.

(1) Breakwater to keep required calmness in the port basin and fairway and to prevent an occurrence of heavy siltation.
Quaywall for fishing boats, and Ramp facilities for boat repairing.
(2) Port administration office with a workshop facilities.
(3) Ice plant and ice storage with shed
(4) Canteen with sales corner and parking area
(5) Others
a. Tools for workshop
b. Equipment for port administration office
c. Mobile workshop and tools for the regional fishing promotion
d. Spare parts for the previous Japanese Grant Aids Programme, ice plants and ice storages.

The Government of Fiji did not show any quantative figures on each items except item (3) and item (5).

item (3)	Ice plant	3 sets of 5 ton/day ice plant
	Ice storage	45 ton capacity
item (5)	refer to a long list in Appendix, D-5	

An assessment on these works is carried out by means of looking them if they are effective to the basic planning targets of proposed.

General Evaluation of the Requests

Items of Works	Assessment
(1)	Effective to the target
(2)	Effective to the target
(3)	Effective to the target
(4)	Effective to the target
(5) a.	Effective to the target
b.	Effective to the target
c.	Effective to the target
d.	Effective to the target, however, scope and scale of works has to be based on the final dicision by the Government of Japan.

Note; Detailed scope and scale are discussed in Chapter 5.

4 - 3 Project Development

In this Section, an organization of executing agency, an inventory of the works and proposed undertakings by the Government of Fiji are discussed.

a) Project Agency and its Organization

As described before, the Fisheries Division was appointed by the Government of Fiji as an executing agency for the project. The Division is the responsible governmental organization on the administration of fisheries and has enough experience on the grant aid programme procedures. The organization of the Division and its position in the governmental administrative organization are shown in Fig. 4-1 and 4-2 respectively. The study team discussed related issues on the project with the Chief Fisheries Officer Dr. P. C. Hunt, Principal Fisheries Officer Mr. S. Sewak, Principal Fisheries Officer in the Western Division Lautoka Mr. C. Evening, other officers and engineers.

THE SOVEREIGN
THE GOVERNOR-GENERAL
OTHER CONSTITUTIONAL AUTHORITIES
OMBUDSMAN
DIRECTOR OF PUBLIC PORSECUTIONS
ELECTORAL COMMISSION
JUDICIAL & LEGAL SERVICES COMMISSION
PUBLIC SERVICE COMMISSION
POLICE SERVICE COMMISSION
AUDITOR-GENERAL
PUBLIC SERVICE APPEALS BOARD
FIJI LAW REFORM COMMISSION
CONSTITUENCY BOUNDARIES COMMISSION
COMMISSION OF PREROGATIVE OF MERCY
PARLIAMENT
HOUSE OF REPRESENTATIVES AND THE SENATE
THE EXECUTIVE
PRIME MINISTER, DEPUTY PRIME MINISTERS AND CABINET
MINISTRIES, DEPARTMENTS, CORPORATIONS, ETC.
JUDICIARY
FIJI COURT OF APPEAL
FIJI SUPREME COURT
MAGISTRATE COURTS
MINISTRY FOR LANDS ENERGY AND MINERAL RESOURCES
MINISTRY OF EDUCATION
MINISTRY FOR ECONOMIC DEVELOPMNET, PLANNING TOURISM
MINISTRY OF HOUSING & URBAN AFFAIRS
MINISTRY OF HOME AFFAIRS
MINISTRY OF FOREIGN AFFAIRES
OFFICE OF THE PRIME MINISTER
MINISTRY OF RURAL DEVELOPMENT
MINISTRY OF FIJIAN AFFAIRES
MINISTRY OF FINANCE
MINISTRY OF PRIMARY INDUSTRIES
- Agriculture Department
- Fisheries Department
- Office of the Agricultural Tribral
Ika Corporation
MINISTRY OF EMPLOYMENT & INDUSTRIAL RELATIONS
MINISTRY FOR COMMUNICATIONS, TRANSPORT AND WORKS
MINISTRY FOR HEALTH AND SOCIAL WELFARE
ATTORNEY - GENERAL

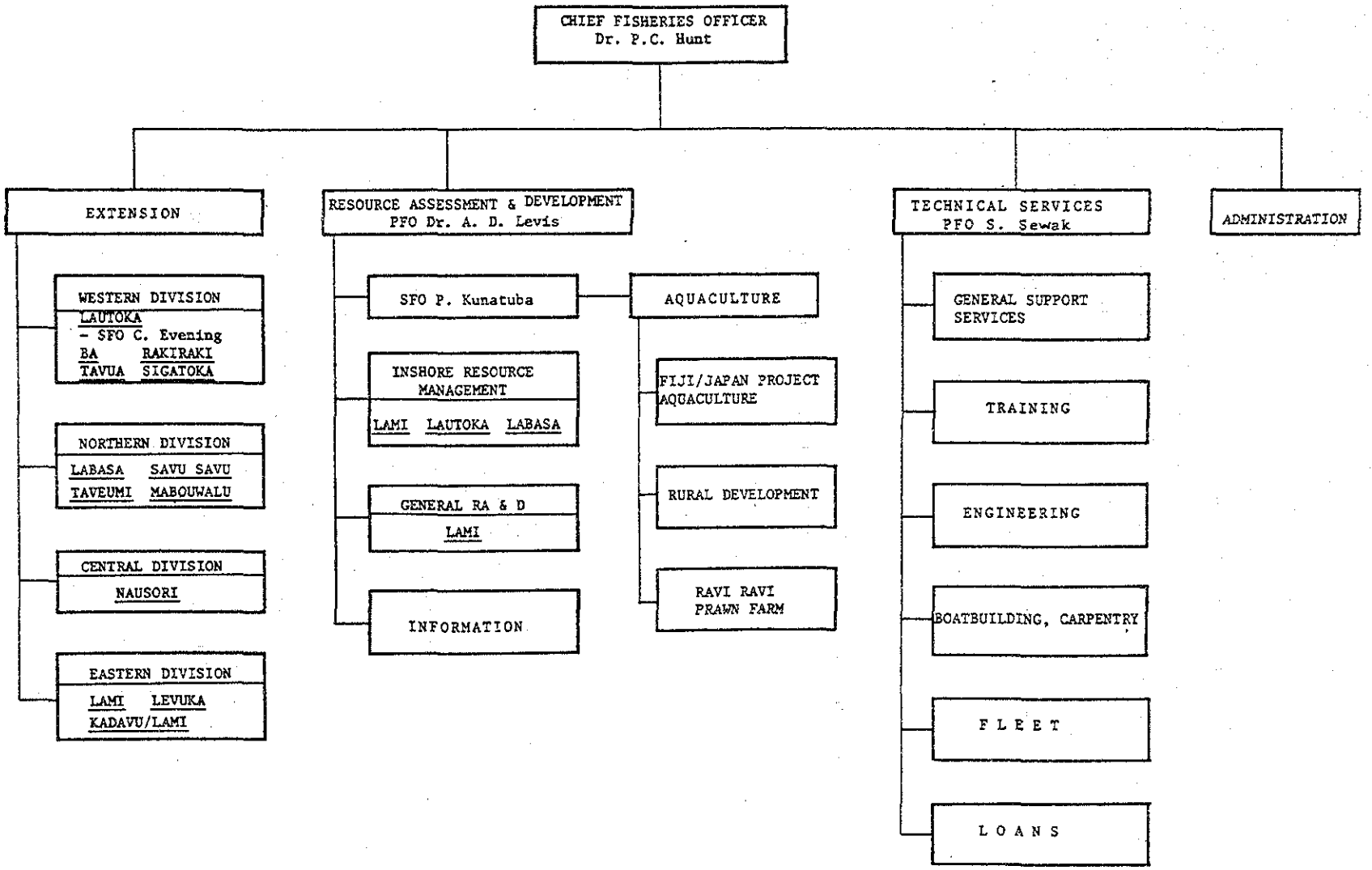


Fig. 4-2. ORGANIZATION OF THE FISHERIES DIVISION