

社会開発調査部報告書

FINAL REPORT

No. 52

# THE STUDY ON THE DEVELOPMENT OF RAJANG PORT IN MALAYSIA

EXECUTIVE SUMMARY

FEBRUARY 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

SSF

CR(3)

92-006



JICA LIBRARY



1096050 (8)

23322



*Final Report*

**THE STUDY  
ON  
THE DEVELOPMENT  
OF  
RAJANG PORT**

**IN  
MALAYSIA**

**EXECUTIVE SUMMARY**

**FEBRUARY, 1992**

**J I C A**

**Japan International Cooperation Agency**

国際協力事業団

23322

## PREFACE

In response to a request from the Government of Malaysia, the Government of Japan decided to conduct a study on the Development of Rajang Port in Malaysia and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Malaysia a survey team headed by Mr. Ikuo Mitsuhashi, the Overseas Coastal Area Development Institute of Japan, four times between August 1990 and November 1991.

The team held discussions with officials concerned of the Government of Malaysia, and conducted field surveys at study areas. After the team returned to Japan, further studies were made and the present report was prepared.

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

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

February, 1992



---

Kensuke Yanagiya  
President  
Japan International Cooperation Agency





LETTER OF TRANSMITTAL

February, 1992

Mr. Kensuke Yanagiya  
President  
Japan International Cooperation Agency

Dear Mr. Yanagiya:

It is my great pleasure to submit herewith the Report for the Study on the Development of Rajang Port in Malaysia.

The Study Team which consists of the Overseas Coastal Area Development Institute of Japan and the Ocean Consultants, Japan Co., Ltd., headed by myself, conducted a survey in Malaysia from August 1990 to November 1991 at the contract with the Japan International Cooperation Agency.

The findings of this survey were fully discussed with the Malaysian counterparts to formulate the Master Plan for the period up to the year 2010 and to formulate and examine the feasibility of the Short-term Plan for the period up to the year 1997 and were then compiled into this report. As a result of the Study, the implementation of the projects herein proposed is regarded as crucial to the socioeconomic development of Sarawak State; in addition, it is viable from an economic and financial point of view.

I earnestly wish that the Plan herein proposed will be implemented at the earliest possible moment by the Government of Malaysia.

On behalf of the Study Team, I would like to express my deepest appreciation to the Government of Malaysia, the State of Sarawak, the Rajang Port Authority and the various agencies concerned with the Study for their brilliant cooperation and assistance and for the heartfelt hospitality which they extended to the Study Team during their stay in Malaysia.

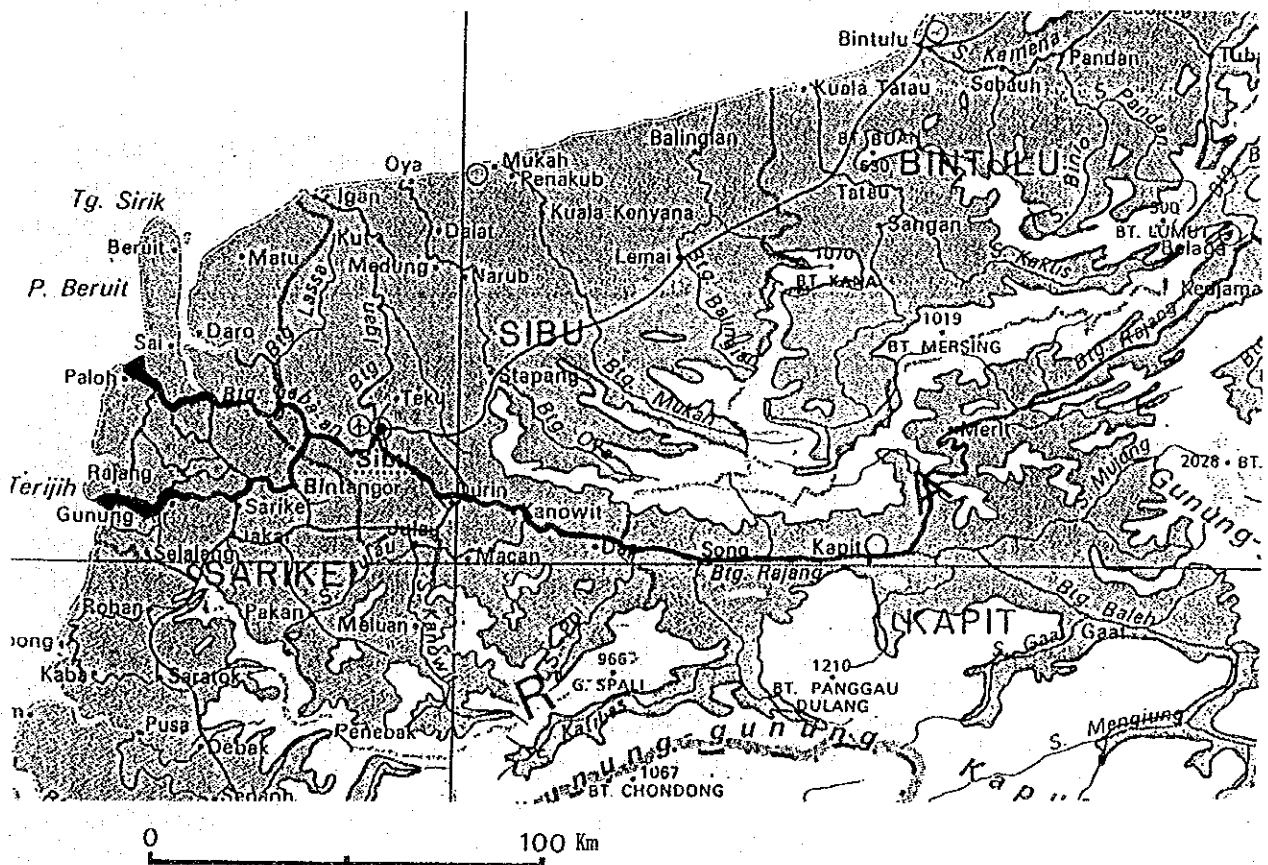
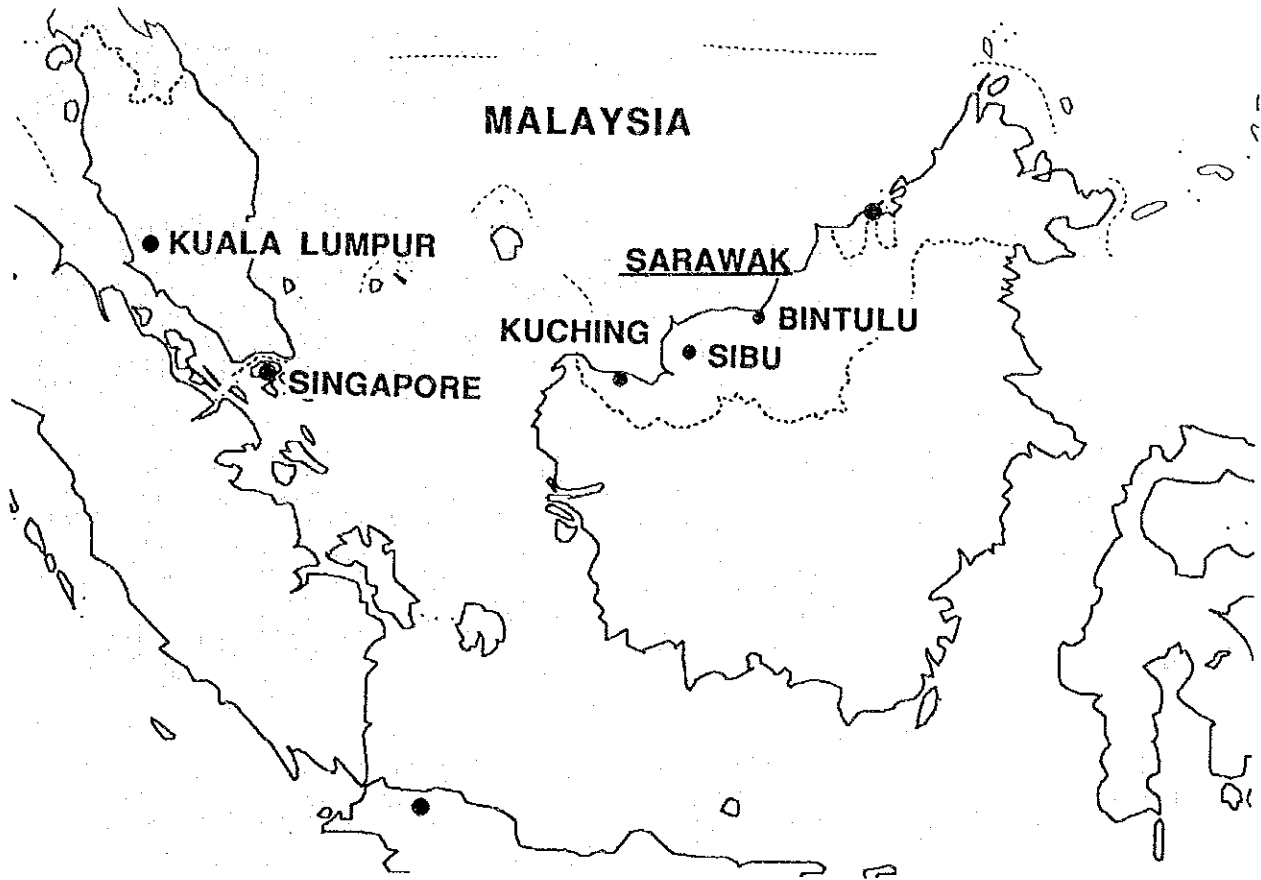
I am also greatly indebted to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Transport, the Japan Embassy and the JICA Office in Malaysia for giving us valuable suggestions and assistance during the field surveys and the preparation of this report.

Respectfully,

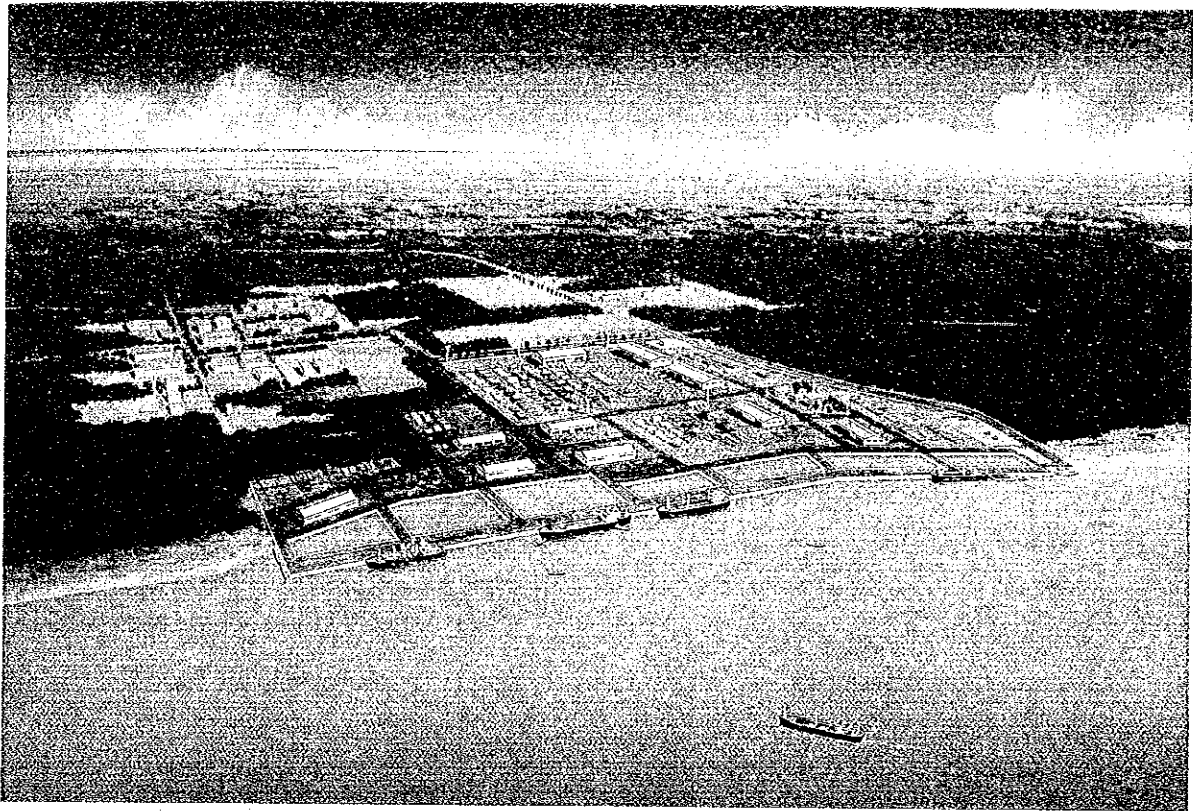
三橋郁雄

Ikuro Mitsuhashi  
Leader  
Japanese Study Team for  
the Study on the Development  
of Rajang Port in Malaysia  
(Senior Advisor, the Overseas  
Coastal Area Development  
Institute of Japan)









Tg. Sebul Timber Products Terminal



Sibul South Terminal



## CONTENTS (EXECUTIVE SUMMARY)

### INTRODUCTION

1. INTRODUCTION.....	1
2. OBJECTIVES OF THE STUDY.....	2
3. SCOPE OF THE STUDY.....	3
4. CONTENTS OF THE ENTIRE REPORT.....	6

### SUMMARY OF RAJANG PORT DEVELOPMENT

1. FUTURE OUTLOOK IN THE LOWER RAJANG RIVER REGION.....	9
2. DEVELOPMENT PLAN.....	10
3. COST.....	15
4. PROJECT FEASIBILITY.....	15

### CONCLUSION AND RECOMMENDATION

I. CONCLUSION.....	17
1. Development Relating to Rajang port Hinterland.....	17
2. Constraints on Development of Rajang Port.....	17
3. Development Policy for Rajang Port.....	18
4. Port Development.....	19
4.1 Main demand relating to Rajang Port.....	19
4.2 Evaluation of the existing wharves.....	19
4.3 Possible sites for new port development.....	20
4.4 Conclusion.....	21
5. Future Cargo and Passenger Volume.....	21
6. Master Plan.....	23
6.1 Roles of each wharf.....	23
6.2 Cargo volume at each wharf.....	23

6.3 Containers.....	24
6.4 Facility plan.....	24
6.5 Costs.....	26
7. Short-term Facility plan.....	27
7.1 Facility Plan.....	27
7.2 Costs.....	28
8. Feasibility Study on the Short-term Plan.....	29
9. Preliminary Environment Impact Assessment.....	30
<b>II. RECOMMENDATION.....</b>	<b>32</b>
1. Implementation of the Project.....	32
1.1 Timber products terminal.....	32
1.2 Coal terminal.....	32
1.3 New oil jetty.....	33
2. Related Facilities.....	33
3. Navigation Aids.....	33
4. Observation and Sounding in Rajang River.....	33
5. Port Management and Operation.....	34
6. Environment Impact.....	35
6.1 Countermeasures for environment conservation.....	35
6.2 Further study to be conducted.....	36
<b>SUMMARY</b>	
1. PRESENT SITUATION.....	37
1.1 Rajang Port.....	37
1.1.1 Port facilities.....	37



1.1.2	Port traffic at Rajang Port.....	38
1.1.3	Ships calling at Rajang Port.....	41
1.2	Socioeconomic Conditions.....	41
1.2.1	Population.....	41
1.2.2	Gross domestic product.....	42
1.2.3	Transportation.....	43
1.2.4	Natural resources.....	45
1.3	Natural Conditions.....	46
1.3.1	Topographic and bathymetric survey.....	46
1.3.2	Meteorology.....	46
1.3.3	Soil.....	47
1.3.4	Oceanography.....	48
2.	MASTER PLAN.....	49
2.1	Development Relating to Rajang Port Hinterland.....	49
2.2	Constraints on Development of Rajang Port.....	49
2.3	Development Policy for Rajang Port.....	51
2.3.1	Federal port policy.....	51
2.3.2	Port development policy of Sarawak State.....	52
2.4	Port Development.....	54
2.4.1	Main demand relating to Rajang Port.....	54
2.4.2	Evaluation of the existing wharves.....	54
2.4.3	Possible sites for new port development.....	55
2.4.4	Conclusion.....	57
2.5	Future Cargo and Passenger Volume.....	57
2.5.1	Population and GDP.....	57
2.5.2	Cargo volume.....	58
2.6	Master Plan.....	61
2.6.1	Roles of each wharf.....	61

2.6.2 Cargo volume at each wharf.....	61
2.6.3 Containers.....	62
2.6.4 Flow of timber and coal at Rajang Port.....	62
2.6.5 Ship size.....	64
2.6.6 Facility plan.....	65
3. SHORT-TERM FACILITY PLAN.....	72
3.1 Facility plan.....	72
3.2 Costs.....	77
3.3 Preliminary Design.....	78
3.4 Construction Program for the Short-term Plan.....	79
3.5 Cost Estimates.....	80
3.5.1 Cost for international trade.....	80
3.5.2 Rough cost for coastal and riverine cargo transportation.....	81
3.5.3 Rough cost for passenger boat service facility.....	82
4. RECOMMENDATION ON PORT MANAGEMENT AND OPERATION.....	83
4.1 Present Management and Operating Systems at Rajang Port.....	83
4.1.1 Outline of systems of port management and operation in Malaysia.	83
4.1.2 Outline of systems of port management and operation at Rajang Port.....	83
4.1.3 Productivity while staying at port.....	83
4.1.4 Financial situation of the RPA.....	84
4.2 Recommendations on Port Management and Operations.....	85
4.2.1 Efficient operation at wharves.....	85
4.2.2 Raising the port tariff.....	85
4.2.3 Restructuring the tariff system.....	85
4.2.4 Reinforcement of the organization of the RPA.....	85
4.2.5 Reinforcement of management of port limits.....	86
4.2.6 Management and operation plans for new terminals.....	86

5. NAVIGATION AIDS.....	88
5.1 Present Situation of the Waterways within Rajang Port.....	88
5.2 Planning of Navigational Aids.....	88
5.2.1 Facilities.....	88
5.2.2 Traffic control system.....	89
5.2.3 Conclusion.....	89
6. PROJECT FEASIBILITY.....	93
6.1 Economic Analysis.....	93
6.1.1 Purpose and methodology of economic analysis.....	93
6.1.2 Prerequisites.....	93
6.1.3 Benefits.....	93
6.1.4 Costs.....	94
6.1.5 Results (EIRR).....	94
6.2 Financial Analysis.....	94
6.2.1 Purpose and methodology of financial analysis.....	94
6.2.2 General prerequisites.....	95
6.2.3 Revenue.....	95
6.2.4 Costs.....	95
6.2.5 Conditions.....	95
6.2.6 FIRR.....	95
6.2.7 Financial soundness of the organization.....	96
7. PRELIMINARY ENVIRONMENT IMPACT ASSESSMENT.....	98
7.1 Introduction.....	98
7.1.1 Environmental policy in Malaysia.....	98
7.1.2 The environment impact assessment.....	98
7.2 Current Situation of the Environment.....	98
7.3 Environment Impact.....	99
7.3.1 Environmental impact related to the construction work.....	99
7.3.2 Environmental impact related to the utilization of the port.....	100

7.4 Recommendation.....	101
7.4.1 Countermeasures for environmental conservation.....	101
7.4.2 Further study to be conducted.....	102
8. CONCLUSION.....	103
8.1 Compliance of the Development Plan.....	103
8.2 Project Feasibility.....	103
8.3 Recommendation on Implementation of the Project.....	104
8.3.1 Timber products terminal.....	104
8.3.2 Coal terminal.....	104
8.3.3 New oil jetty.....	105

# INTRODUCTION

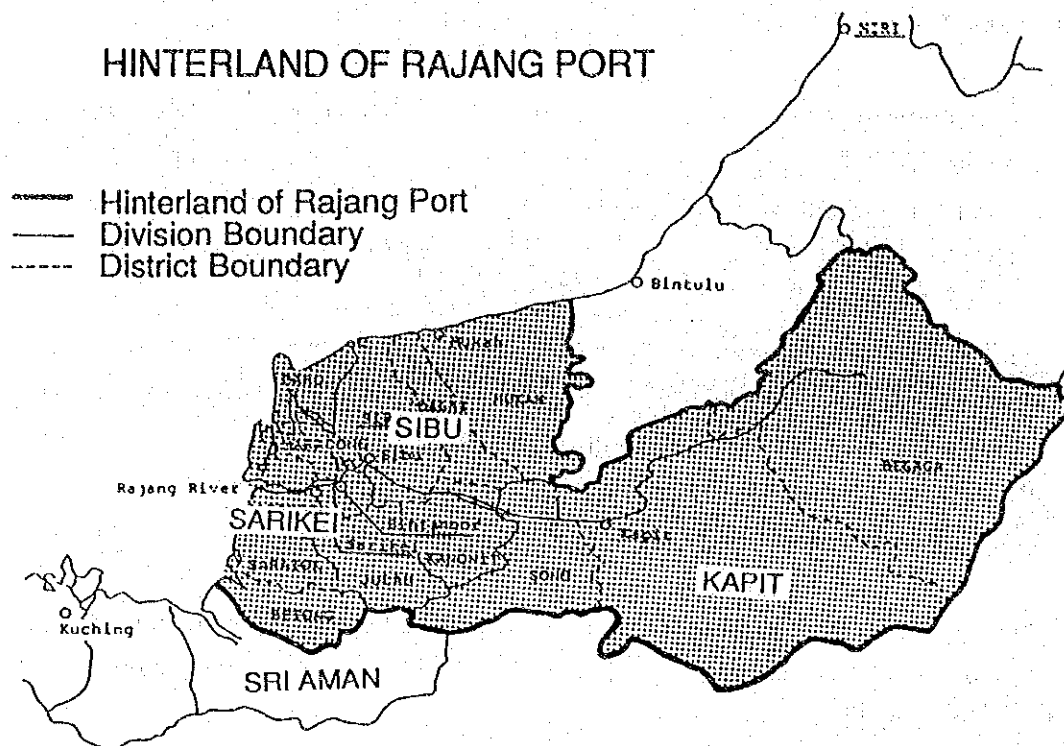


Rajang Delta



## 1. INTRODUCTION

- (1) In response to a request from the government of Malaysia, the government of Japan has decided to conduct a Study on the Development of Rajang Port (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.
- (2) Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "the JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, shall undertake the Study in close cooperation with the authorities concerned of the Government of Malaysia.
- (3) This report was prepared on the basis of the "Scope of Work" and the "Minutes of Discussion" signed by the JICA for the Government of Japan and by the Government of Malaysia on the 22nd and the 19th of January, 1990, respectively.
- (4) Rajang Port is defined as facilities under control of RPA (the Rajang Port Authority) at Sibul, Sarikei, Bintangor, Sungei Merah and Tg. Manis area.
- (5) Rajang Port should play a role as a regional gateway for the Rajang River basin. Various developments relating to the Rajang River basin (the Rajang Port Hinterland) are going on or proposed, such as timber processing zone development in Tg. Manis area by STIDC (the Sarawak Timber Industry Development Corporation), coal thermal power plant by SESCO (the Sarawak Electricity Supply Corporation), agricultural development, the arterial road improvement, etc. Development of Rajang Port is required in these circumstances.



## 2. OBJECTIVES OF THE STUDY

The objectives of the Study are:

- (1) To formulate a master plan for Rajang Port for the period up to the year 2010.
- (2) To determine the technical, economic and financial feasibility of a short-term plan for the Port within the framework of the mater plan. The short-term plan shall be prepared for the period up to the year 1997.



### 3. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the study shall cover the following items:

#### (1) Review and Field Survey

- 1) To collect and review available information and reports relevant to the Study;
- 2) To conduct field surveys for evaluating the present conditions of the Port.

#### (2) Observation of Natural Conditions

Field surveys for the following conditions will be carried out:

- 1) Meteorological conditions
- 2) Hydrographical conditions
- 3) Topographical conditions
- 4) Geological conditions

#### (3) Master Plan

- 1) To delineate the hinterland of the Port and estimate the economic potential of the hinterland.
- 2) To forecast port traffic up to the year 2010.
- 3) To establish the main goals and policy for the development of the Port.
- 4) To make recommendations on improvement of port facilities and cargo handling equipment.
- 5) To select the most appropriate site for the development of the Port.
- 6) To formulate a phased development plan for the Port.
- 7) To formulate a basic layout plan of land and water area utilization in the vicinity of the Port.
- 8) To formulate a basic layout plan of major port facilities and relevant infrastructure.
- 9) To make a rough cost estimation for the plan mentioned in the previous clause (8).

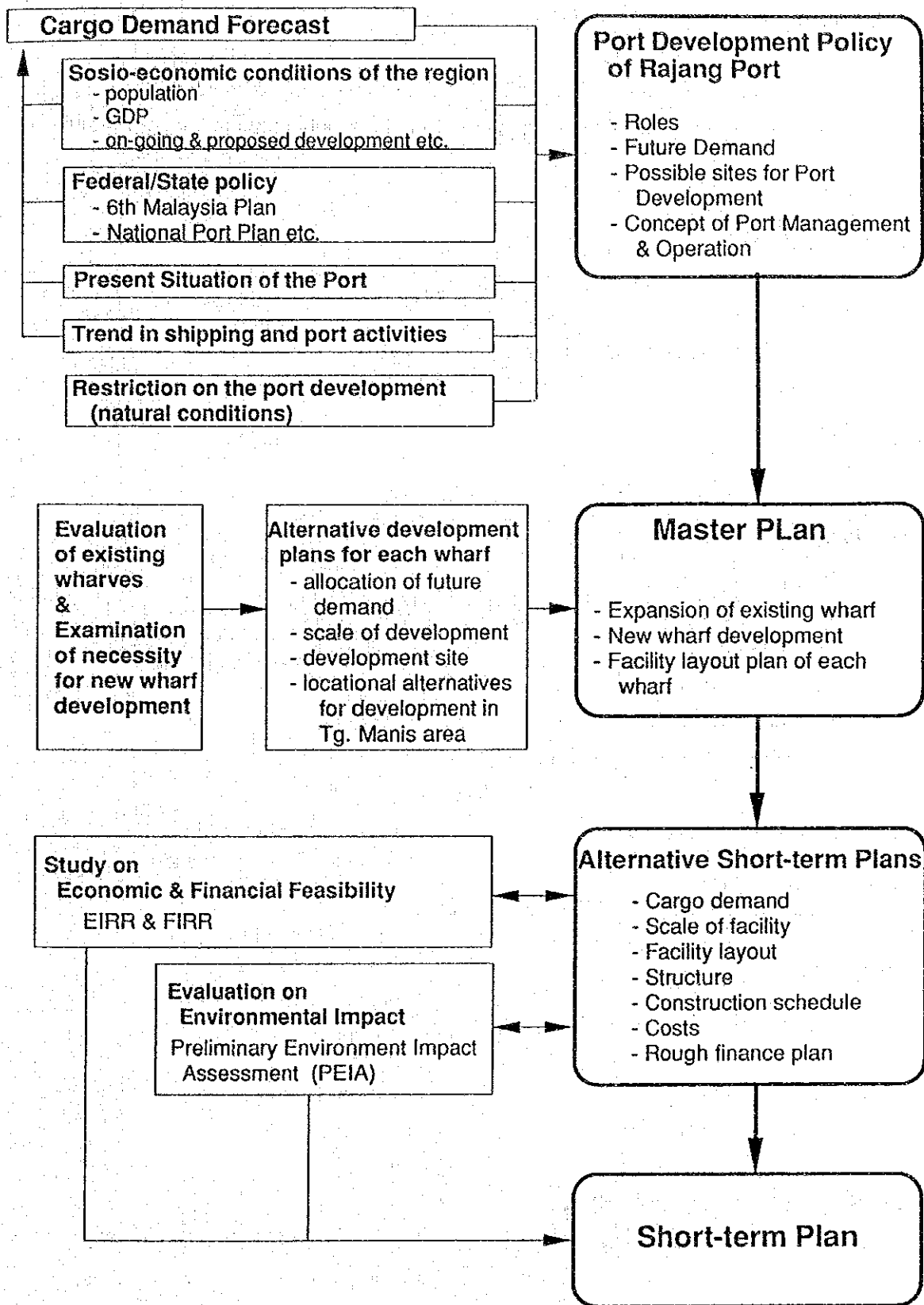
10) To make recommendations on management and operating systems for the Port.

(4) Feasibility Study on Short-Term Plan.

On the basis of the above master plan, a short-term plan on the selected site will be formulated for the target year, and a feasibility study on it will be conducted.

- 1) To forecast the port traffic in detail up to target year.
- 2) To formulate a detailed facilities improvement plan, including navigational aid and cargo handling systems.
- 3) To prepare a preliminary design.
- 4) To prepare and implementation programme.
- 5) To estimate capital and maintenance costs.
- 6) To conduct a preliminary environmental impact assessment.
- 7) To conduct an economic and financial analysis.
- 8) To make recommendations on management and operating systems.

The study was conducted according to the following planning flowchart.



**PLANNING FLOWCHART**  
Rajang Port Development

#### 4. CONTENTS OF THE ENTIRE REPORT

This report consists of the Executive Summary and the Main Report which consists of five volumes. The contents of the report are as follows:

##### EXECUTIVE SUMMARY

INTRODUCTION  
SUMMARY OF RAJANG PORT DEVELOPMENT  
CONCLUSION AND RECOMMENDATION  
SUMMARY

##### MAIN REPORT

###### VOLUME I --- INTRODUCTION AND PRESENT SITUATION

1. Introduction
2. Natural Conditions
3. Socioeconomic Conditions
4. Present Situation of Management and Operation

###### VOLUME II --- MASTER PLAN

1. Background of the Development
2. Development Possibility at Rajang Port
3. Port Development Policy
4. Demand Forecast
5. Required Facilities
6. Navigation Aids
7. Rough Costs and Preliminary Construction Program
8. Recommendation on Port Management and Operations

###### VOLUME III --- SHORT-TERM PLAN

1. Short-term Facility Plan
2. Preliminary Design of Port Facilities
3. Construction Program
4. Cost Estimates

5. Recommendation of Port Management and Operations
6. Economic Analysis
7. Financial Analysis
8. Project Feasibility

VOLUME IV --- PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT

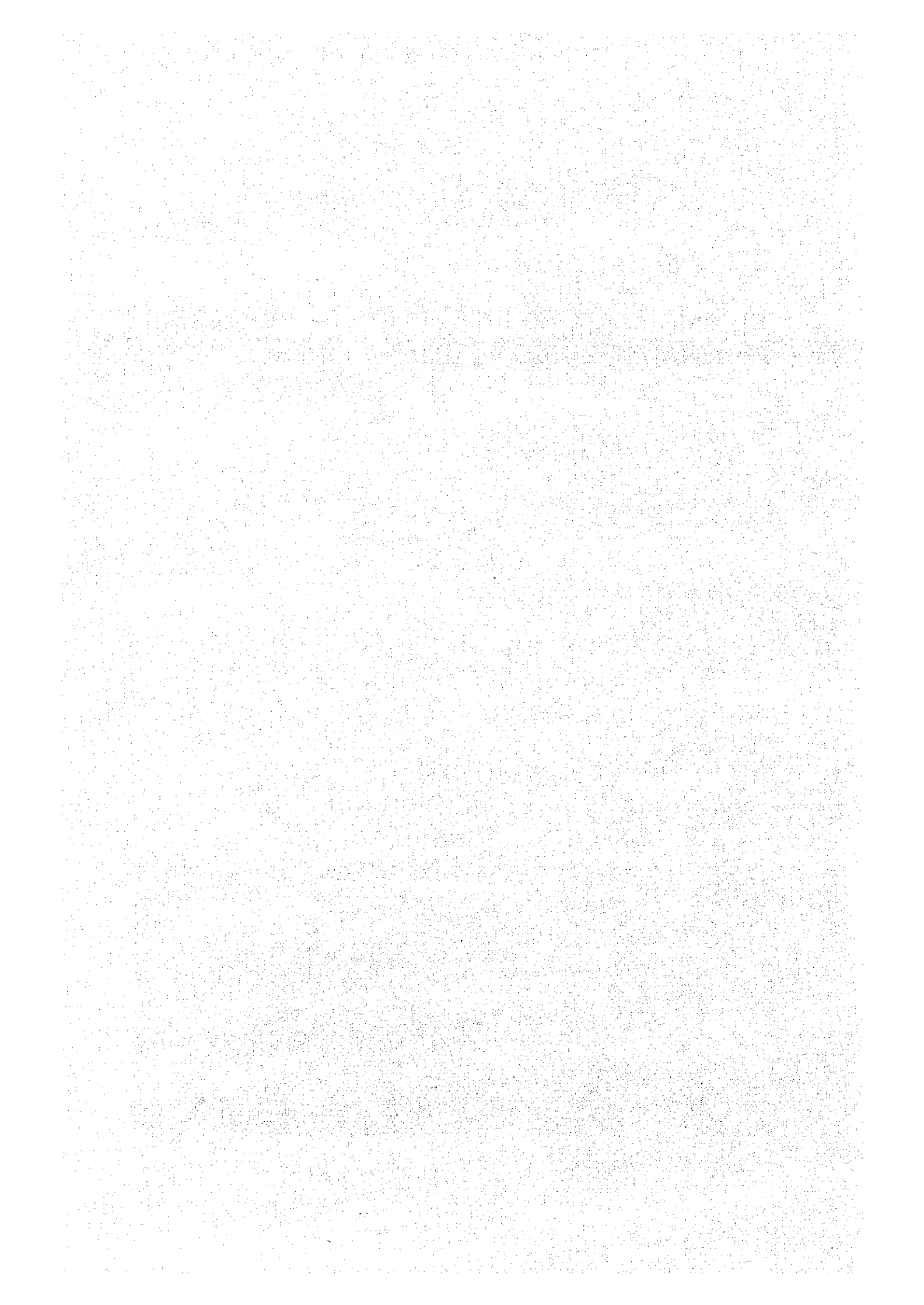
VOLUME V --- APPENDICES



# SUMMARY OF RAJANG PORT DEVELOPMENT



Tg. Sebuab

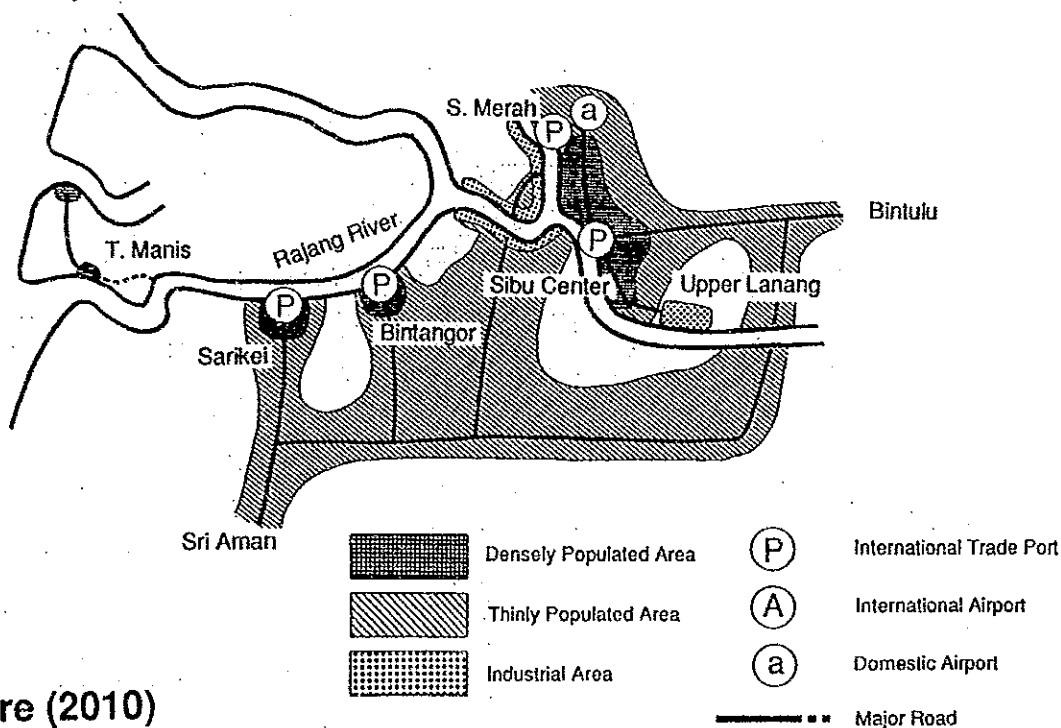




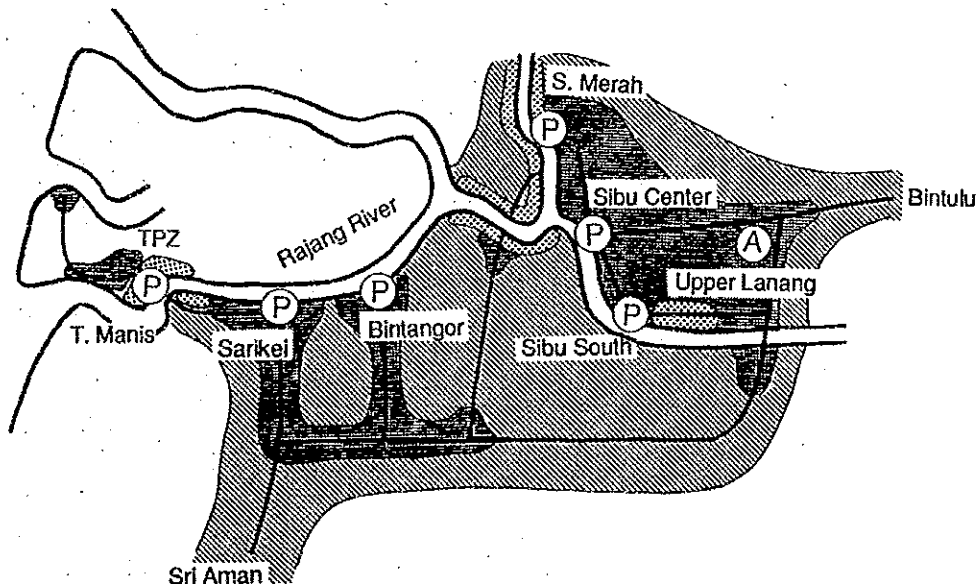
1. FUTURE OUTLOOK IN THE LOWER RAJANG RIVER REGION

In the process of formulating the master plan, we attempted to predict the future situation of the Lower Rajang River Region. In the future, infrastructures such as Rajang Port, a road network and the Sibiu International Airport will be developed and the southern Rajang River area and Tg. Sebubal TPZ will be urbanized. Following figures show the present and future regional situation.

Present (1990)



Future (2010)



## 2. DEVELOPMENT PLAN

Development plans for Rajang Port are proposed as shown in the following figures based on the cargo demand forecast. These figures show present facilities, facilities to be constructed up to 1997 (short-term plan) and facilities to be constructed between 1998 and 2010 (long-term plan, the master plan consists of the short-term plan and the long-term plan).

### Future Cargo Volume at Rajang Port

1,000 freight tons per annum

COMMODITY	1989	1997	2010
Export			
Timber Products	422	1481	3205
Logs	3715	2917	0
Coals	79	250	600
Agricultural Products	76	158	232
Petroleum Products	122	187	322
Others	25	56	96
Import			
Motor Vehicles	24	47	59
Food	71	91	137
Feed/Fertilizer	55	101	159
Petroleum Product	285	384	595
Others	350	458	726
<b>TOTAL</b>	<b>5224</b>	<b>6130</b>	<b>6131</b>

**Tg. Sebulal East Coal Terminal**

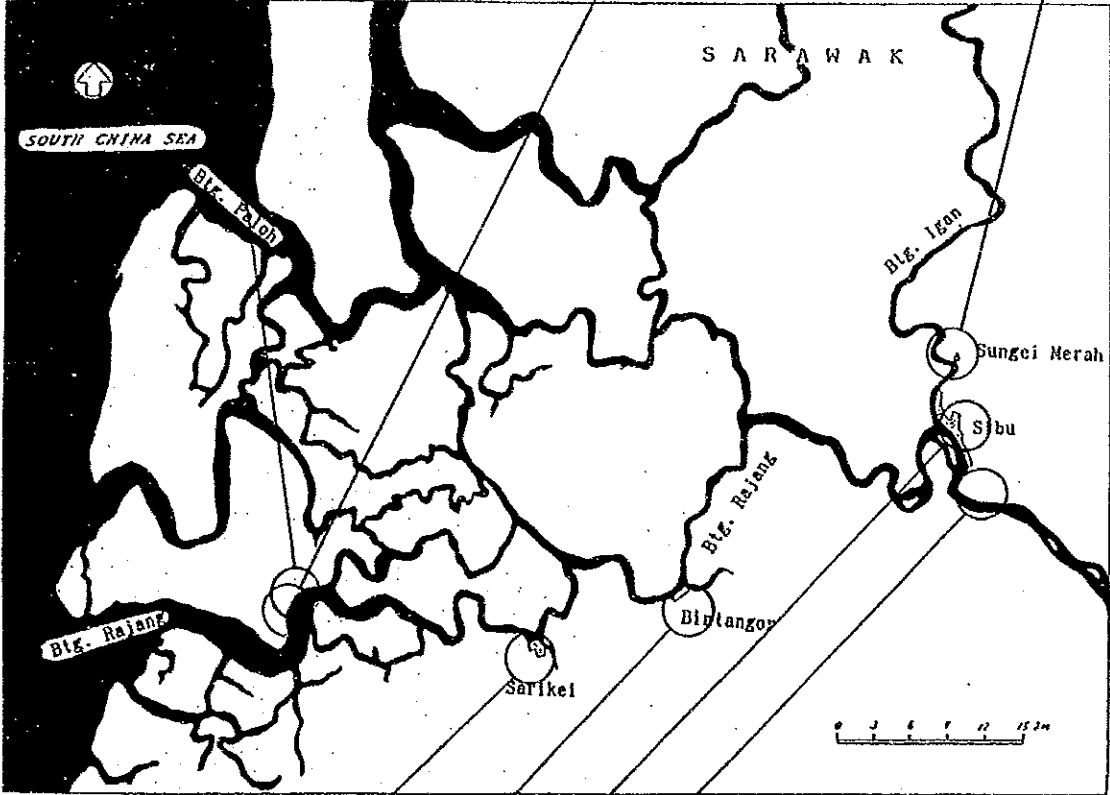
- ★ Wharf (-10m, 165m-long)
- ★ Wharf (-5m, 150m-long)
- ☆ Wharf (-10m, 35m-long)
- ☆ Wharf (-5m, 85m-long)

**Tg. Sebulal East Timber Products Terminal**

- ★ Wharf (-10m, 300m-long)
- ★ Wharf (-5m, 180m-long)
- ☆ Wharf (-10m, 450m-long)
- ☆ Wharf (-5m, 120m-long)

**Sungei Merah**

- ◎ Jetty (-5m)
- ★ Jetty (-5m)
- (Petronas will construct another jetty)



**Sibu South (Tg. Kumpel East)**

- ☆ Wharf (-6m, 440m-long)

**Sibu Center**

- ◎ Wharf (-8.5m, 444m-long, 148m-renovation included)

**Bintangor**

- ◎ Wharf (-5m, 48m-long)

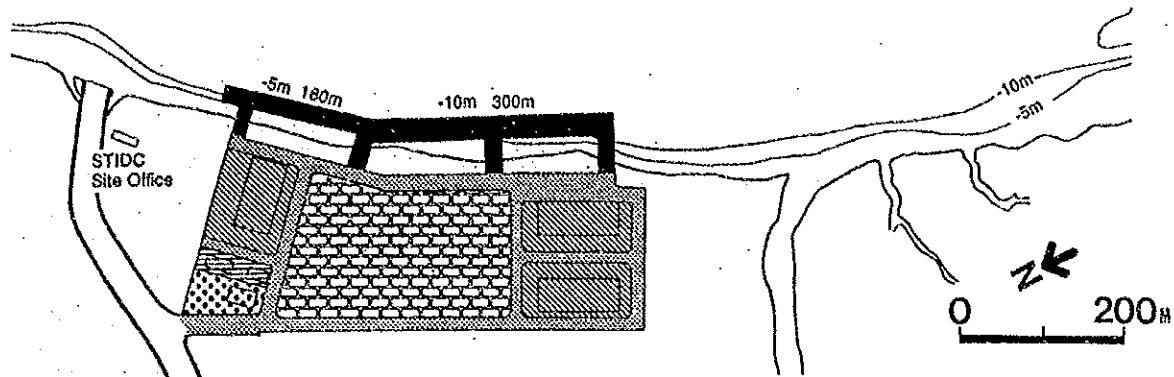
**Sarikel**

- ◎ Wharf (-5m, 60m-long)
- ◎ Wharf (-5m, 89m-long, renovation)
- ☆ Wharf (-5m, 75m-long)

**LEGEND**

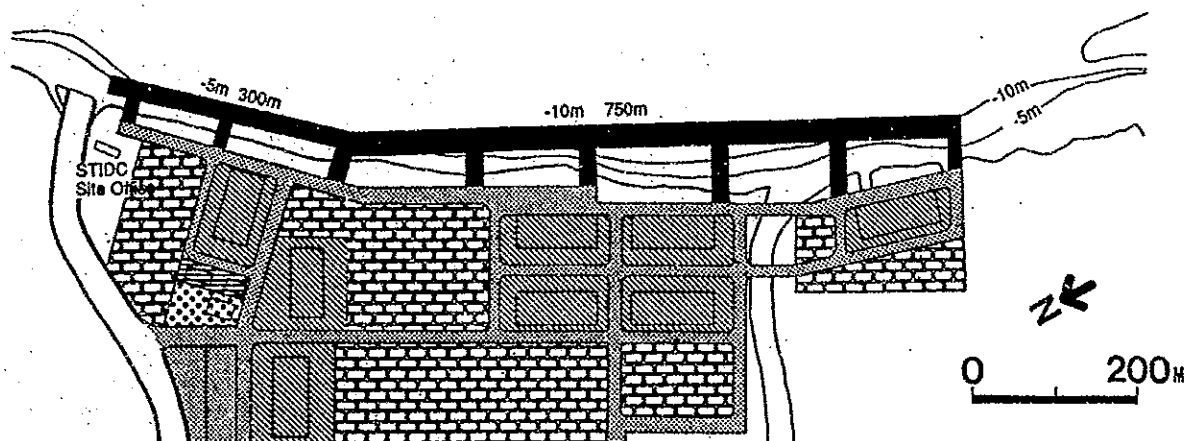
- ◎ Present
- ★ up to 1997 (short-term plan)
- ☆ 1998 ~ 2010





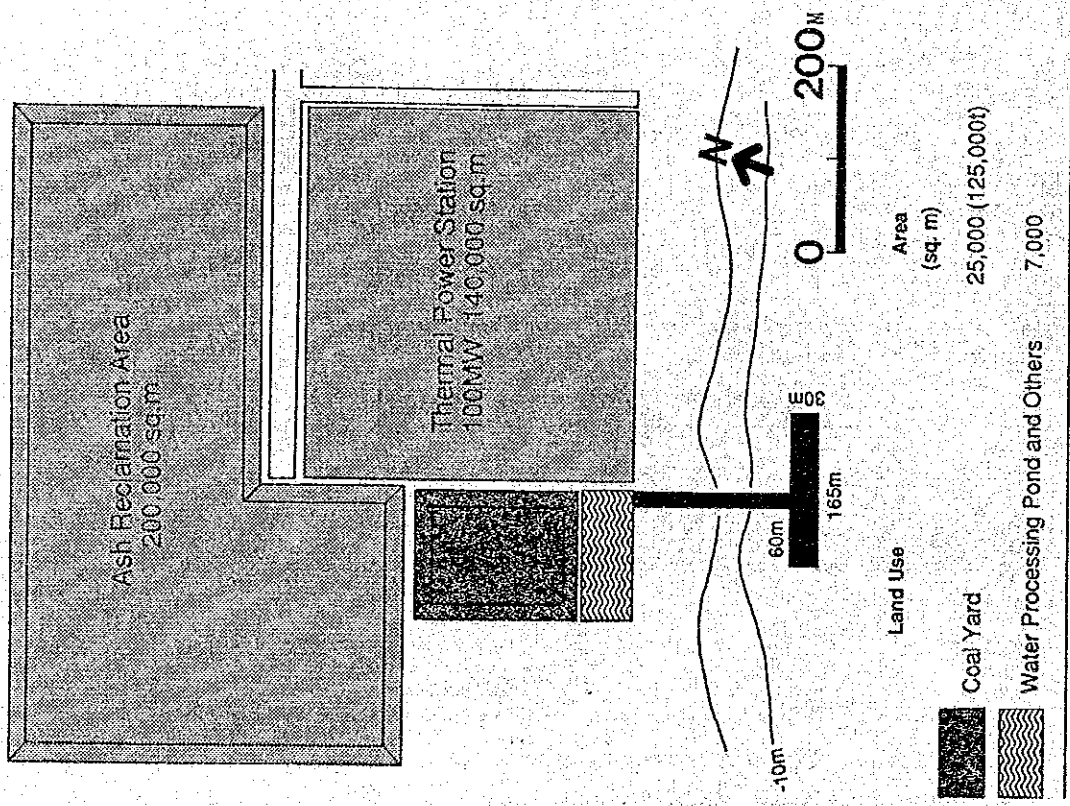
Land Use	Area (floor space) (sq. m)
Container Yard / Open Storage Yard	31,600
Transit Shed / Container Freight Station	32,000 (12,800)
Administrative Complex	4,000 (1,000)
Utility (Maintenance/Washing)	2,500 (1,100)
Road and Others	29,900
<b>Total 100,000</b>	

**Timber Products Terminal**  
**SHORT-TERM PLAN Terminal Layout**  
**(Tg. Sebulal)**

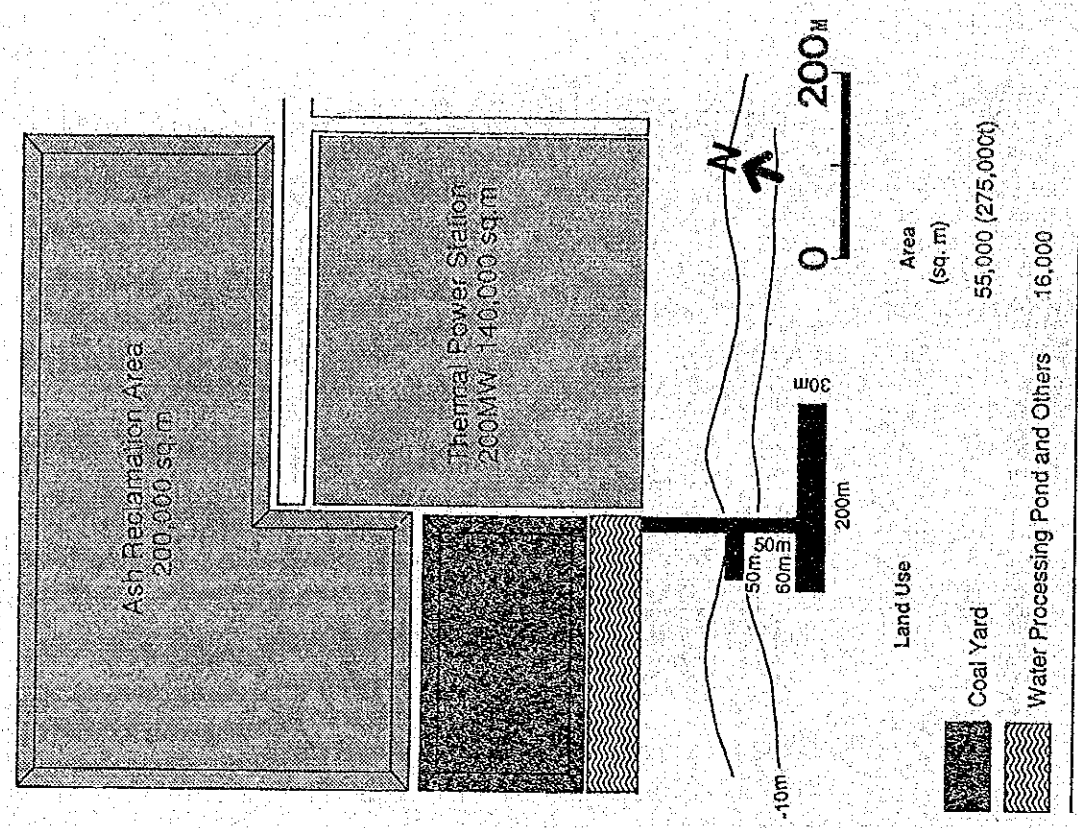


Land Use	Area (floor space) (sq. m)
Container Yard / Open Storage Yard	147,700
Transit Shed / Container Freight Station	82,000 (39,200)
Administrative Complex	4,000 (1,000)
Utility (Maintenance/Washing)	3,900 (1,900)
Road and Others	97,400
<b>Total 335,000</b>	

**Timber Products Terminal**  
**MASTER PLAN Terminal Layout**  
**(Tg. Sebulal)**



**Coal Terminal**  
**SHORT-TERM PLAN Terminal Layout**  
 (Tg. Sebulal)



**Coal Terminal**  
**MATER PLAN Terminal Layout**  
 (Tg. Sebulal)

### 3. COST

Costs for implementing the short-term plan and the master plan are as follows (costs for the short-term plan are included in the costs for the master plan):

#### COSTS (million Ringgit)

Master Plan		Short-term Plan	
Wharf/etc.	Cost	Wharf/etc.	Cost
Sibu South	58	Sungei Merah	3
Sarikei	7	Timber Wharf	78
Sungei Merah	3	Coal Wharf	27
Timber Wharf	181	Navigation Aids	17
Coal Wharf	31	Others	20
Navigation Aids	33		
Others	42	TOTAL	145
TOTAL	355		

### 4. PROJECT FEASIBILITY

Project feasibility is evaluated from the economic and financial points of view.

#### EIRR and FIRR\*

Case	Timber Products Terminal, Coal Terminal** & Oil Terminal (entire project package)	Timber Products Terminal	Coal Terminal
EIRR	22.2%	25.1%	10.6%
FIRR	10.6%	11.1%	8.9%

\* 20% tariff raising is assumed for FIRR calculation

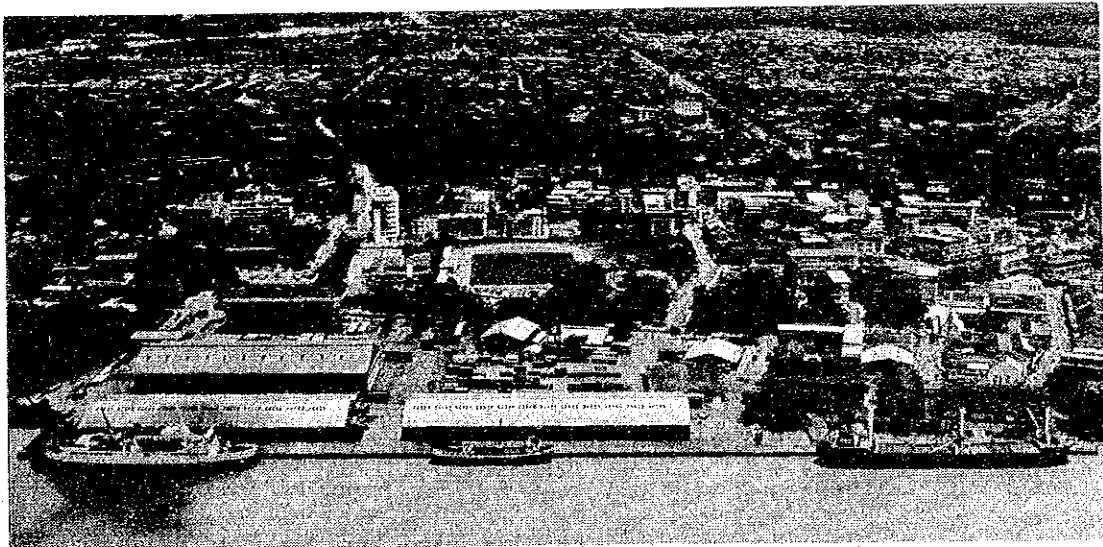
\*\* Coal terminal is included only in EIRR calculation.

\*\*\* guideline for EIRR and FIRR is 12% and 8%, respectively

- entire project package.....feasible
- timber products terminal.....feasible as an individual project
- coal terminal.....almost feasible as an individual project



# CONCLUSION AND RECOMMENDATION



Sibu Center Wharf (RPA)



## **I. CONCLUSION**

### **1. Development Relating to Rajang Port Hinterland**

Ongoing or proposed developments relating to the Rajang Port hinterland are as follows:

- a) the Timber Processing Zone development by STIDC in Tg. manis area which consists of STIDC sawmills, timber-related industry estate for private enterprise, business center, residential estate, recreational facilities, etc,
- b) private sawmills development on Rajang River and its branches,
- c) ongoing agricultural development in the Rajang Port hinterland such as palm tree plantation project in Saratok and Betong Districts
- d) coal thermal power plant development in the Sibu area proposed by SESCO
- e) improvement of the arterial road from Kuching to Bintulu and construction of a bridge over Rajang River
- f) other economic development in the hinterland

### **2. Constraints on Development of Rajang Port**

Rajang Port, facilities under control of RPA at Sibu, Sarikei, Bintangor, Sungei Merah and Tg. Manis, is located in the Rajang Delta and has two long and winding waterways called the Rajang Route and Paloh Route. As the depths of the estuaries are shallow, these depths determine the largest size of ship that can enter Rajang Port, that is, ships of up to 9m draught on the Rajang Route and 6.0m draught on the Paloh Route are able to enter. Littoral sand drift is so active at these estuaries that dredging is not recommended.

Moreover, the erosion and sedimentation caused by river current, ocean currents, tidal current, shore current, etc., currently offset each other, leaving the river bottom in a settled state. Large-scale dredging, reclamation or other changes would break the balance, resulting in erosion and/or sedimentation in currently stable areas.

Consequently, the development of Rajang Port should have the following constraints:

- the maximum ship size is determined by the current depth of the estuaries
- the development must not include large-scale dredging and reclamation
- the port facilities should not significantly disturb river current

### 3. Development Policy for Rajang Port

On the basis of the federal port policy, in the relationship between Rajang Port and other major ports in Sarawak, that is Kuching, Bintulu and Miri Ports, and development mentioned above, the following roles are ascribed to Rajang Port.

- Regional gateway port for Rajang River basin
- Multi-purpose port to handle full range of cargo classification
- Container handling port for geared vessels, most transhipped via Port Klang
- Gateway for timber product exports

Rajang Port should play a role as a gateway for general cargo imports, agricultural product exports, timber product exports and coal exports. The following is required if Rajang Port is to play its role efficiently:

- full utilization of the existing facilities
- renovation and expansion of the existing facilities
- new wharf development on the current water depth conditions (no large-scale dredging)
- rational allocation of roles among wharves
- rational container handling
- safe ship maneuvering and port operation

#### 4. Port Development

##### 4.1 Main demand relating to Rajang Port

According to the demand forecast, the following trade flow is to be expected:

- exports of timber products processed at the STIDC's TPZ at Tg. Sebulal and private sawmills located in the Rajang Delta
- imports of manufactured goods which would be consumed in Sibul town and the vicinity
- exports of agricultural products from the vicinity of Sarikei
- exports of coal

##### 4.2 Evaluation of the existing wharves

The existing facilities are evaluated in the light of the port demand as follows:

- The future cargo volume is expected to exceed the handling capacity at Sibul Center wharf even if the ongoing renovation is taken into consideration. A supplementary terminal is required.
- Even after the ongoing renovation is completed, the future cargo volume is expected to exceed the handling capacity at Sarikei. However, Sarikei has room for one more berth expansion.
- The existing facility at Bintangor is capable of handling the future demand.
- Although the existing oil jetty at sungei Merah has the capacity to handle the future demand, oil tankers are at risk in case of fast currents.
- Although at Tg. Manis anchorage, cargoes (logs, timber products, coal, etc.) are currently transferred from barge to ocean-going vessels without a port facility, future mooring facilities will be required to handle timber products rapidly, safely and economically, and handle coal rapidly and economically.

#### 4.3 Possible sites for new port development

Taking into consideration natural and socioeconomic conditions, possible sites for new port development and their respective navigable depth from the estuaries of Rajang and Paloh Rivers to the site are as follows:

- a) Tg. Manis East (-7.5m)
- b) Tg. Seubal East (-10m)
- c) the opposite side of Tg. Seubal (-10m)
- d) Sibul South (tg. Kumper East) (-6m)
- e) South bank between Tg. Leba-an and Tg. Binjei (-7.5m)

The possible sites for new development are evaluated as follows:

- A new terminal for timber product exports requires a site with deep water because the trade needs large vessels to reduce freight costs. Tg. Seubal has a sheltered and wide waterway with sufficient depth for the safe maneuvering of ships though there is currently no port facility.
- A new terminal for coal exports requires a site with deep water because the trade needs large vessels to reduce freight costs. Tg. Seubal has a sheltered and wide waterway with sufficient depth for the safe maneuvering of ships though there is currently no port facility.
- Sibul South is located near Sibul town and connected by a paved road with a sufficient width for truck traffic. Sibul South is the proper site for a supplementary terminal.

#### 4.4 Conclusion

Consequently, the expansion of the existing facilities and new port development is proposed as follows:

(expansion)

- Sarikei ..... expansion of handling capacity
- Sg. Merah ..... enhancement of safety

(new development)

- Tg. Sebal East ... timber products terminal
- Tg. Sebal East ... coal terminal
- Sibu South ..... supplementary terminal for Sibu Center

#### 5. Future Cargo and Passenger Volume

Based on future population in the hinterland, GDP and other economic indices, future cargo handling volumes have been forecast as follows. Cargo volumes of all commodities, except timber logs, will grow as the state economy grows. The export volume of logs is expected to decline to zero due to the reduction of log production in Sarawak and the shift to down-stream timber industries, that is, timber processing industries. By contrast, export volume of timber products is expected to increase.

**International Trade**  
(1,000 freight tons per annum)

COMMODITY \ YEAR	1989	1997	2010
<b>Export</b>			
Timber Products	422	1481	3205
Logs	3715	2917	0
Coal	79	250	600
Agricultural Products	76	158	232
Petroleum Products	122	187	322
Others	25	56	96
<b>Import</b>			
Motor Vehicles	24	47	59
Food	71	91	137
Feed/Fertilizer	55	101	159
Petroleum Products	285	384	595
Others	350	458	726
<b>TOTAL</b>	<b>5224</b>	<b>6130</b>	<b>6131</b>

**Coastal and Riverine Cargo Transportation**  
(1,000 tons, per annum)

WHARF \ YEAR	1989	1997	2010
<b>Coastal Transportation</b>			
Sibu (Govn.)	102	188	257
Sibu (Priv.)	40	52	65
Sarikei	21	25	31
Bintangor	9	10	13
Tg. Seubal	0	6	7
<b>Riverine Transportation</b>			
Sibu (Govn.)	29	34	44
<b>TOTAL</b>	<b>200</b>	<b>315</b>	<b>417</b>

**Passenger Transportation**  
(2 ways daily)

WHARF \ YEAR	1990	1997	2010
Sibu	3403	3850	4839
Sarikei	1852	2082	2548
Bintangor	504	565	705
Tg. Seubal	0	70	123
<b>TOTAL</b>	<b>5759</b>	<b>6567</b>	<b>8215</b>



## 6. Master Plan

According to the results of the demand forecast, the study on handling capacity of the existing facilities and possible sites for new port development at Rajang Port, the Master Plan is formulated as follows:

### 6.1 Roles of each wharf

- Sibul Center/Sibu South:  
trade center for consumption goods and some agricultural products in the region, especially, Sibu and Kapit Districts
- Sarikei:  
export center of agricultural products as well as import terminal of consumption goods for Sarikei town and vicinity
- Bintangor:  
import terminal of consumption goods for Bintangor town and vicinity
- Tg. Minis area (Tg. Sebulal East, new development):  
timber product export center and coal terminal

### 6.2 Cargo volume at each wharf

Wharf	1989	1997	2010
Sibu	495	711	1097
Sarikei	56	147	223
Bintangor	12	24	38
S. Merah	340	536	856
Tg. Sebulal	0	1388	3917
Tg. Manis Anchorage	4182	3324	0
<b>TOTAL</b>	<b>5088</b>	<b>6130</b>	<b>6131</b>
EXPORT	4378	5049	4455
IMPORT	710	1081	1676

unit: 1,000 tons, container cargo included

### 6.3 Containers

Wharf	1989	1997	2010
Sibu	12125	22400	61200
Sarikei	0	3600	9600
Bintangor	0	200	600
Tg. Sebulal	0	21200	114600
<b>TOTAL</b>	<b>12125</b>	<b>47400</b>	<b>186000</b>
LADEN	7597	26800	101300
EMPTY	4531	20600	84700

unit: TEU

### 6.4 Facility Plan

#### (1) International trade

##### Mooring Facility

Wharf	Depth	Length	Remarks
Sibu South	-6m	440m	
Sarikei	-5m	75m	
S. Merah	-5m	1 Jetty	
Tg. Sebulal	-10m	750m	Timber Products Terminal
	-5m	300m	Timber Products Terminal
	-10m	200m	Coal Terminal
	-5m	235m	Coal Terminal
<b>TOTAL</b>		<b>2,010m (plus 1 Jetty)</b>	

Storage/Sorting Facility (m2)

Wharf	Shed	Open Yard	Remarks
Sibu South	9,600	36,700	
Sarikei	-	2,800	
Tg. Sebubal	39,200	147,700	Timber Products Terminal
	-	55,000	Coal Terminal
<b>TOTAL</b>	<b>48,800</b>	<b>242,200</b>	

(2) Coastal and riverine cargo transportation

Wharf	Depth	Length	Remarks
Sibu	-5m	90m	jetty
Sarikei	-5m	30m	jetty (expansion)
Tg. Sebubal	-5m	30m	jetty
<b>TOTAL</b>		<b>150m</b>	

(3) Passenger boat service

Wharf	Description	Remarks
Sibu	15m x 15m x 6units	pontoon additional to the Upstream and Downstream Express Boat Wharves
Tg. Sebubal	30m x 10m x 1unit	pontoon

## 6.5 Costs

### (1) International Trade

(million Ringgit)

Wharf/etc.	Cost
Sibu South	58
Sarikei	7
S. Merah	3
Timber Terminal	181
Coal Terminal	31
Navigation Aids	33
Cargo Handling Equipment	25
Others	17
<b>TOTAL</b>	<b>355</b>

### (2) Coastal and riverine cargo transportation

(1,000 Ringgit)

Wharf	Cost
Sibu	3,100
Sarikei	800
Tg. Seubal	810
<b>TOTAL</b>	<b>4,710</b>

### (3) Passenger boat service

(1,000 Ringgit)

Wharf	Cost
Sibu	690
Tg. Seubal	460
<b>TOTAL</b>	<b>1,150</b>

## 7. Short-term Facility Plan

### 7.1 Facility Plan

#### (1) International Trade

##### Mooring Facility

Wharf	Depth	Length	Remarks
S. Merah	-5m	1 Jetty	
Tg. Seubal	-10m	300m	Timber Products Terminal
	-5m	180m	Timber Products Terminal
	-10m	165m	Coal Terminal
	-5m	150m	Coal Terminal
<b>TOTAL</b>		<b>795m (plus 1 Jetty)</b>	

##### Storage/Sorting Facility (m<sup>2</sup>)

Wharf	Shed	Open Yard	Remarks
Tg. Seubal	12,800	31,600	Timber Products Terminal
	-	25,000	Coal Terminal
<b>TOTAL</b>	<b>12,800</b>	<b>56,600</b>	

#### (2) Coastal and riverine cargo transportation

Wharf	Depth	Length	Remarks
Sibu	-5m	60m	jetty
Tg. Seubal	-5m	30m	jetty
<b>TOTAL</b>		<b>90m</b>	

(3) Passenger boat service

Wharf	Description	Remarks
Sibu	15m x 15m x 6units	pontoon additional to the Upstream and Downstream Express Boat Wharves
Tg. Seubal	30m x 10m x 1unit	pontoon

7.2 Costs

(1) International trade

(million Ringgit)

Wharf/etc.	Cost
<b>S. Merah</b>	<b>3</b>
Oil Jetty	3
<b>Timber Terminal</b>	<b>78</b>
Mooring Facility	49
Storage Facility	14
Other Facilities	8
Reclamation	3
Handling Equipment	4
<b>Coal Terminal</b>	<b>26</b>
Mooring Facility	21
Other Facilities	1
Reclamation	1
Handling Equipment	3
<b>Navigation Aids</b>	<b>18</b>
Tugboats	12
Buoys/etc.	6
<b>Others</b>	<b>20</b>
<b>TOTAL</b>	<b>145</b>

(2) Coastal and riverine cargo transportation

(1,000 Ringgit)

Wharf	Cost
Sibu	2,100
Tg. Sebulal	810
<b>TOTAL</b>	<b>2,910</b>

(3) Passenger boat service

(1,000 Ringgit)

Wharf	Cost
Sibu	690
Tg. Sebulal	460
<b>TOTAL</b>	<b>1,150</b>

8. Feasibility Study on the Short-term Plan

Project feasibility is evaluated from the economic and financial point of view.

EIRR and FIRR \*

Case	Timber Products Terminal, Coal Terminal ** & Oil Terminal (entire project package)	Timber Products Terminal	Coal Terminal
EIRR	22.2%	25.1%	10.6%
FIRR	10.6%	11.1%	8.9%

\* 20% tariff raising is assumed for FIRR calculation

\*\* Coal terminal is included only in EIRR calculation.

\*\*\* guideline for EIRR and FIRR is 12% and 8%, respectively

Study on the financial soundness of the RPA in case of the entire project package implementation shows that profitability, loan repayment capacity and operation efficiency of the RPA can be maintained at a proper level.

Consequently, the project feasibility is evaluated as follows:

- entire project package.....feasible
- timber products terminal.....feasible as an individual project
- coal terminal.....almost feasible as an individual project

### 9. Preliminary Environment Impact Assessment

Sixty environmental factors related to atmosphere, water quality, noise and ecology were examined to assess the environmental impact caused by the short-term plan project.

Impact on the environment during construction work and utilization of the facilities are as follows:

Factors	Construction Work	Utilization
Atmosphere	Negligible	Negligible
Water Quality	Negligible	Negligible
Noise	Negligible	Negligible
Ecology	(Flora) - small area (10ha) of mangrove forest removed - small and negligible impact on protected species	Negligible
	(Fauna) - no rare/protected wild life found in the area - sand bars (important for birds) not affected - small and negligible impact on habitats	Negligible



Consequently, impact on the environment caused by the project is deemed to be small and the project is considered feasible from an environmental point of view.

However, the PEIA study was carried out to evaluate impact caused by the port project which consists of development of a wharf and the related facilities. Therefore, a PEIA (and EIA, if necessary) related to the development of timber factories and the thermal power plant is recommended to grasp the total impact on the environment.

## II. RECOMMENDATION

### 1. Implementation of the Project

#### 1.1 Timber products terminal

The timber products terminal has a top priority. The terminal would provide export service by large ocean-going ships and deposit service for timber products which are processed at private sawmills located in the Rajang River region. A terminal facility is essential to export-oriented industry. The provision of the economic transportation service also attracts other private sawmills and the related industries to the TPZ area.

Two and five deep wharves are proposed in this study for the short-term plan (1997) and master plan (2010) respectively, according to demand forecast based on the STIDC production plan. Therefore, the construction of the terminal, especially beyond the short-term plan, should be carried out one berth at a time checking the progress of the STIDC production plan and the situation of the private sawmills.

In addition, the implementation of the terminal development should be kept in harmony with the material transportation plan of STIDC for TPZ development (the shallow wharves will be used to bring in construction materials for TPZ in the first stage).

#### 1.2 Coal terminal

The coal terminal is planned to supply coal to the thermal power plant proposed by SESCO and to export coal by large bulk carriers. The installation of a thermal power plant in Tg. Manis area is the first prerequisite. Second, since the present mining capacity of Merit Pila coal mine is not large, an expansion of coal production capacity is another prerequisite. Therefore, the coal terminal development should be carried out only after these prerequisites are satisfied.

In addition, only one private company has a license for coal transportation, which means that only two bodies, SESCO and a private license holder, would be involved in the coal terminal project. Therefore, construction and management/operation of the coal terminal could be conducted by the private sector.

### 1.3 New oil jetty

The new oil terminal has not been planned to meet the demand but to enhance the safety of oil carriers. The existing oil jetty is capable of handling the demand but the safety of each ship is at risk. Therefore, the restricted use of the terminal, such as the prohibition of small barge berthing during fast currents (consequently, handling capacity at the jetty would decline), should be a consideration. Then, if the demand exceeds the handling capacity under the restriction, the new oil jetty should be constructed.

### 2. Related Facilities

Infrastructure such as road (construction/improvement of access roads to the port and upgrading of city roads relating to port transportation), water supply pipeline, electricity transmission line related to timber products terminal, coal terminal and other port development should be constructed as soon as possible so that the development can be implemented as planned.

### 3. Navigation Aids

The procurement of tugboats, pilot etc., at least for development at Tg. manis area, is required to ensure safety of large ships for short-term development.

### 4. Observation and Sounding in Rajang River

The river bottom at the estuary is reasonably stable but moves slightly over a long period of time. Therefore, periodical sounding is recommended to ensure safety in the waterway.

The STIDC is dredging soil of the river bottom in Tg. Manis area to obtain reclamation soil for the TPZ. Other infrastructure development such as a road will also be needed to dredge the soil. It is possible that

these activities will have an effect on erosion and sedimentation in the river area vicinity. Therefore, periodical river bank observation and sounding in the vicinity are recommended.

## 5. Port Management and Operation

Not only infrastructure development but also improvement of port management and the operation system is also required for real port development. Recommendations on management and operations are as follows:

### - Efficient use of wharves

It is recommended that the RPA should make a further effort not only to improve productivity per gang hours but also to shorten the staying hours of vessels at port from the viewpoint of service for users.

### - Restructuring the tariff system

The tariff system should be designed to make cargo and vessel flow more efficiently. It is necessary to introduce storage charges for empty containers immediately and examine the possible introduction of dockage charges.

### - Raising the port tariff

The present tariff at the Rajang Port is at least 20% less than that of Kuching, the neighboring Port. The RPA can make the short-term plan project feasible by raising its tariff by 20% without losing its competitiveness.

### - Reinforcement of the organization of the RPA

It is necessary of the growth of the RPA to respond to port users' requirements. The RPA should establish a marketing department.

### - Reinforcement of management of the port limits

The RPA should have collective responsibility for all management within the port limits to manage them under a consistent policy (Port Master Plan).

- Establishment of branch office of port-related authorities in Tg. Manis area

Because Tg. Manis area will become one of major terminals of Rajang Port, it will be necessary to set up not only the RPA administration center but also a branch office for other port-related authorities. For the convenience of port users, it is desirable that these offices be concentrated in one building, called a joint administration office.

## 6. Environmental Impact

### 6.1 Countermeasures for environment conservation

When the implementation of the project commences, the project initiator should consider the basic matters listed below. These recommendations are offered from an environmental point of view.

#### (1) Construction Phase

To reduce the impact on the environment, the mitigating and abatement measures listed below should be undertaken in the construction phase.

The establishment of a sedimentation pond is an effective means of reducing the Suspended Solid from the reclaimed area. Additionally, some precipitant will be useful for reducing the concentration, if necessary.

It is necessary to protect the river bank and structures facing the Rajang River against erosion. Therefore, the stone gabions and sand bags type with chemical fiber sheet (as shown in Chapter 1.5.1) are recommended from the comprehensive view point of construction, maintenance cost and protection effect.

To preserve the natural forest and to protect the terrestrial vegetation and wild life, the working area (including a storage area for machines and material) should be made as small as possible.

#### (2) Operating Phase

##### 1) Timber Port

Although the team has taken the impact of the wharves on the water current into account and has designed the wharves to prevent water

disturbance as much as possible, it is necessary to monitor further erosion and accumulation of the river bank.

## 2) Coal Port

- to sprinkle water to prevent natural ignition and dispersion of coal dust from the piling area
- to set up a sufficiently large buffer zone to reduce the dispersion of coal dust
- to install covers over the conveyers to prevent the dispersion of coal dust in coal handling
- to set up a sedimentation pond for the treatment of water from the coal piling yard. This facility has been taken into account in the report.

## 6.2 Further study to be conducted

Although the impact of the project can be regarded as small, further study for some factors should be undertaken by the project initiator or constructor.

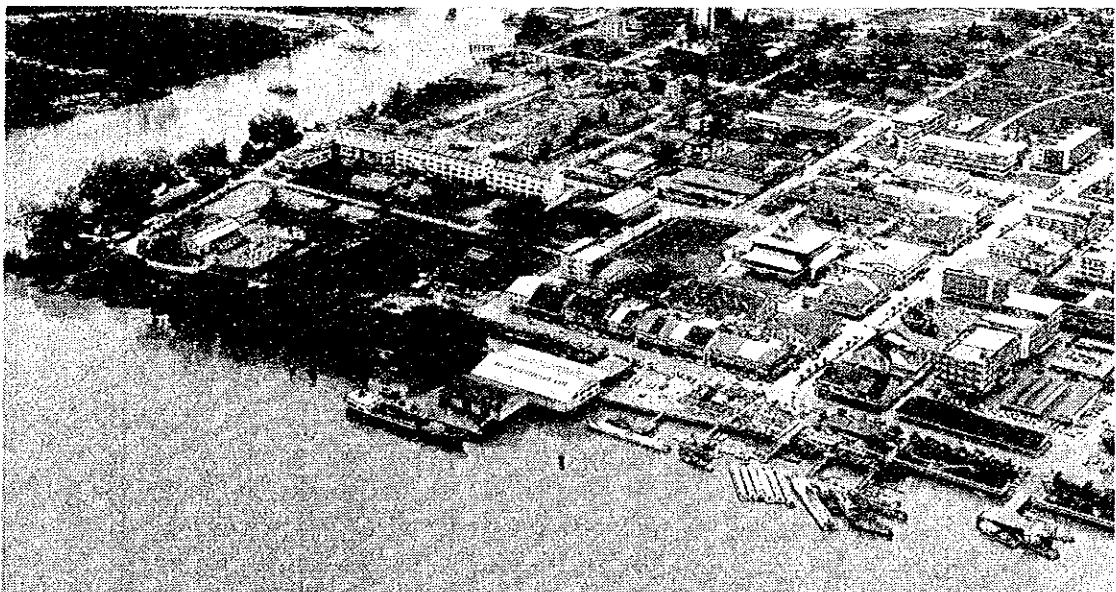
### (1) Port Project

- To determine the impact on water quality, the concentration of suspended solid should be observed during construction phase.
- To monitor further erosion and accumulation of the river bank, periodical observation of the shoreline is recommended.
- To grasp the populations of flora and fauna, further observation is recommended.

### (2) Other Project

Timber related industries, and Coal Thermal Power Plant may have a consequential impact on environment. Therefore, a thorough EIA will be required especially as concerns the atmosphere, water quality, flora and fauna, reclamation by ash and waste disposal.

# SUMMARY



Sarikei Wharf





1. PRESENT SITUATION

1.1 Rajang Port

1.1.1 Port facilities

Port facilities at Rajang Port can be summarized as follows:

(1) Present Mooring Facilities of the RPA

Wharf	Cargo	Length (m)	Depth (m)	Max. Ship Size (DWT)
Sibu	General Cargo <sup>1)</sup>	148	8.5	6,000
	General Cargo/ Container	295.6	8.5	
Sarikei <sup>2)</sup>	General Cargo	60.4	7.6	3,000
Bintangor <sup>3)</sup>	General Cargo	48.5	4.6	
Sg. Merah	Bulk Oil	48.8	4.6	74.7m(LOA)

- 1) renovation is ongoing
- 2) expansion project (88.5m) is ongoing
- 3) renovation was completed

(2) Present Government Mooring Facilities

Wharf	Length (m)	Remarks
Sibu	415	coastal and riverine cargo, passenger vessels
Sarikei	152	coastal cargo, express boats, exclusively used by JKR
Bintangor	101	express boats, local crafts, exclusively used by JKR
Tg. Manis	16	Custom Office

(3) Present Private Mooring Facilities

Wharf	Length (m)	Remarks
Sibu	103	coastal cargo
Sarikei	12	gravel discharge

(4) Present Storage/Sorting Facilities of RPA

Wharf	Transit Shed (m <sup>2</sup> )	Open Storage Area /Container Yard (m <sup>2</sup> )
Sibu	14,400 <sup>1)</sup>	11,100 <sup>2)</sup>
Sarikei	1,600 <sup>3)</sup>	1,500 <sup>3)</sup>
Bintangor	1,200	900

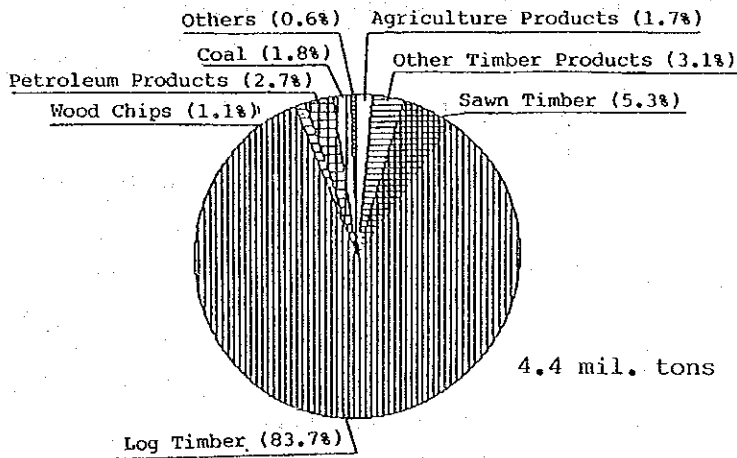
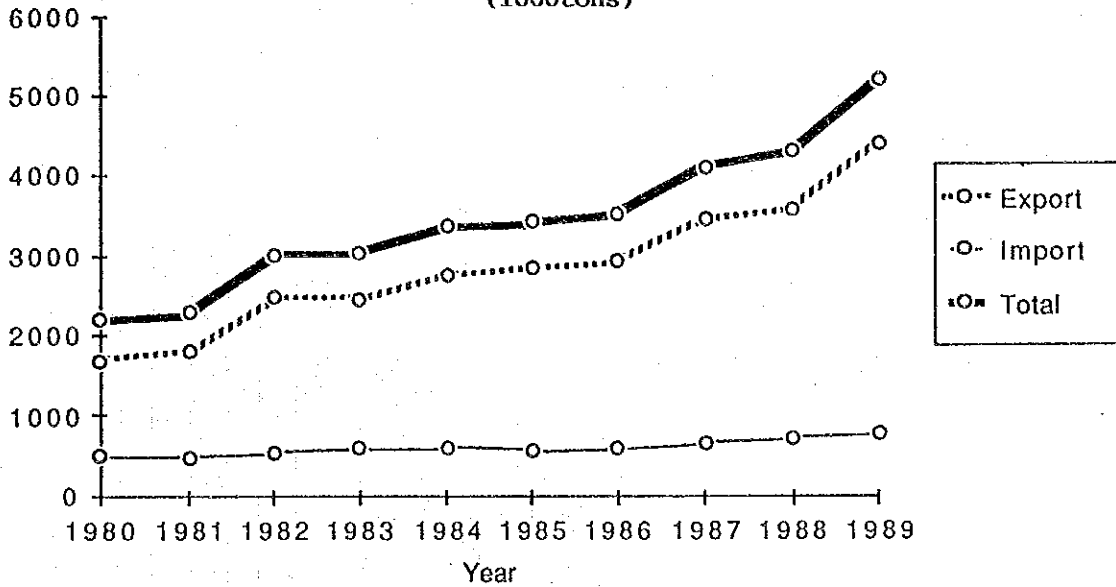
- 1) after the ongoing renovation is completed, Sibu will have a transit shed of 15,800m<sup>2</sup>
- 2) the ongoing expansion project will provide a container yard of more than 10,000m<sup>2</sup>
- 3) the ongoing renovation project will provide new 900m<sup>2</sup>-transit shed and 2,900m<sup>2</sup>-open storage yard

1.1.2 Port traffic at Rajang Port

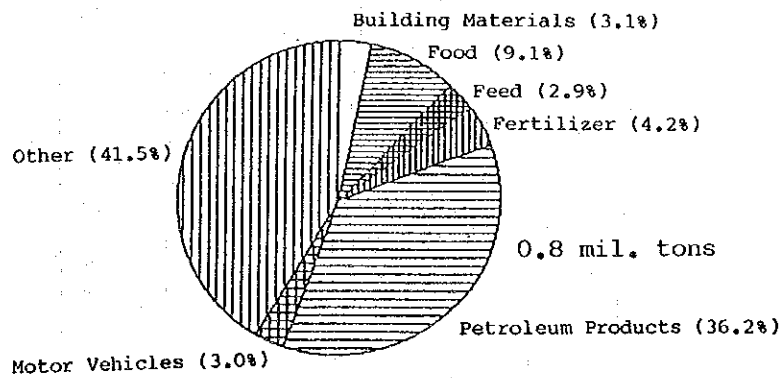
(1) International Trade

Cargo volume handled at Rajang Port has increased and exceeded 5 million tons in 1989. Major export commodities are log timber and timber products; these commodities accounted for about 90% of the exports. Major import commodities are petroleum products and others (consumption goods).

Cargo Volume at Rajang Port  
(1000tons)

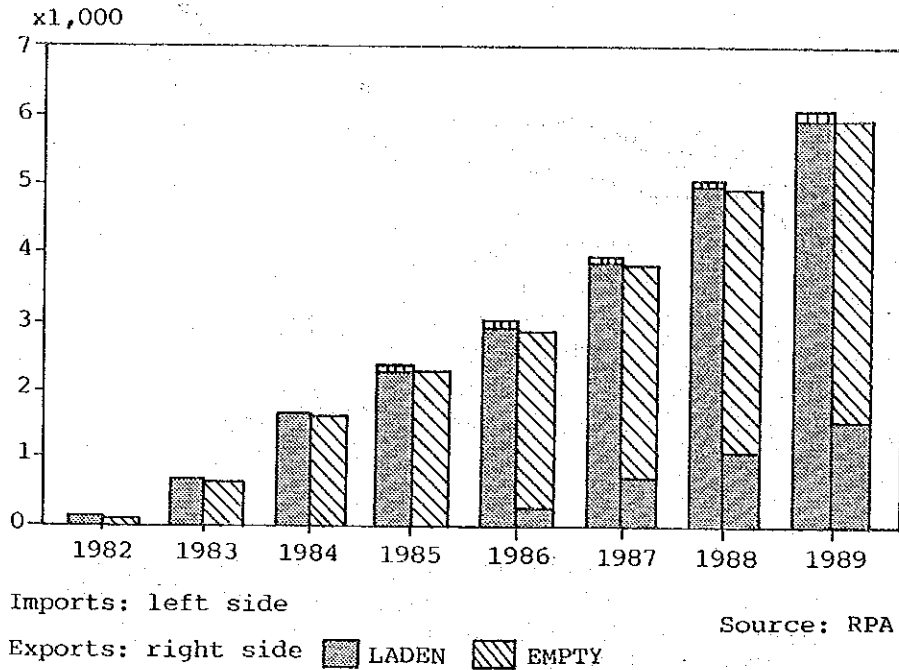


Share by Commodity at Rajang Port (Export)



Share by Commodity at Rajang Port (Import)

Container cargo handling began in 1982. Containers handled accounted for about 12,000 TEUs in 1989 and a further increase in TEU is expected in future.



Containers Handled (in TEU) at Rajang Port

(2) Coastal and riverine cargo transportation

Coastal and riverine cargoes are handled at the government and private wharves of Sibul, Sarikei, Bintangor as follows:

Coastal and Riverine Cargo Transportation  
(1,000 tons, per annum)

WHARF	YEAR	1988
Coastal Transportation		
Sibu (Govn.)		102
Sibu (Priv.)		40
Sarikei		21
Bintangor		9
Riverine Transportation		
Sibu (Govn.)		29
TOTAL		200

(3) Passenger boat service

Passenger Transportation  
(2 ways daily)

WHARF	Frequency
Sibu	3403
Sarikei	1852
Bintangor	504
Tg. Sebulal	0
TOTAL	5759

1.1.3 Ships calling at Rajang Port

The number of ships calling and average GRT at respective wharf in 1989 were as follows:

	SIBU	SARIKEI	BINTANGOR	S.MERAH	TG.MANIS	TOTAL
Ship Calls	490	140	51	144	1135	1816
Average GRT	1739	993	843	1028	4768	3634

The maximum sizes of ships were 6,000 GRT class at Sibu, 1,000 GRT class at Sarikei/Bintangor; ships between 2,000 and 6,000 GRT called mainly at the Tg. Manis anchorage.

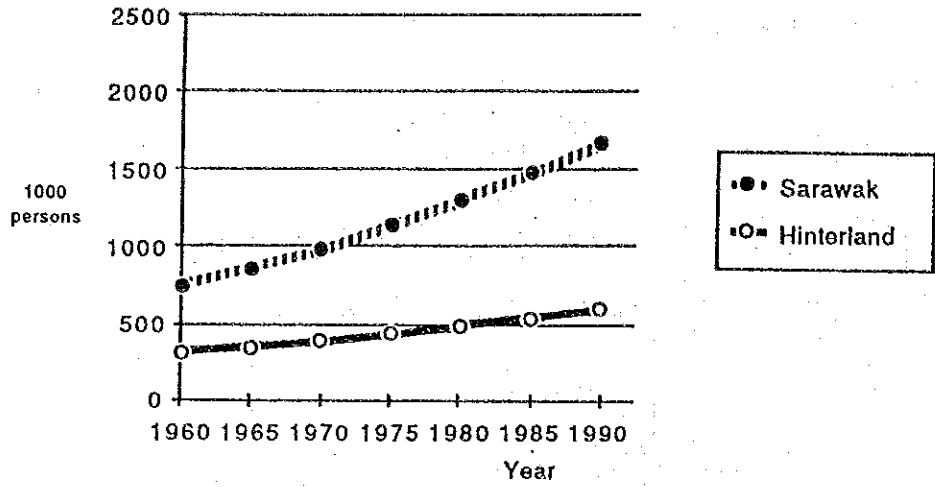
Almost all ships are general cargo ships, except the oil tankers that moor at the Sungei Merah oil jetty.

1.2 Socioeconomic Conditions

1.2.1 Population

Population of Sarawak State and the Rajang Port Hinterland in recent three decades are shown in following figure.

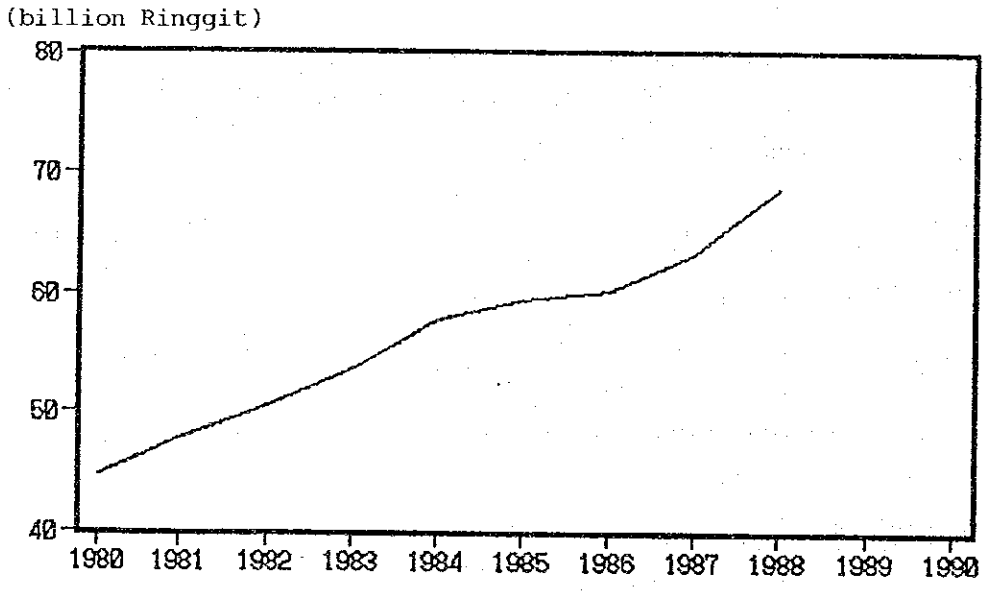
Population of the hinterland has steadily increased and reached 0.6 million in 1990.



Population  
in Sarawak and the Hinterland

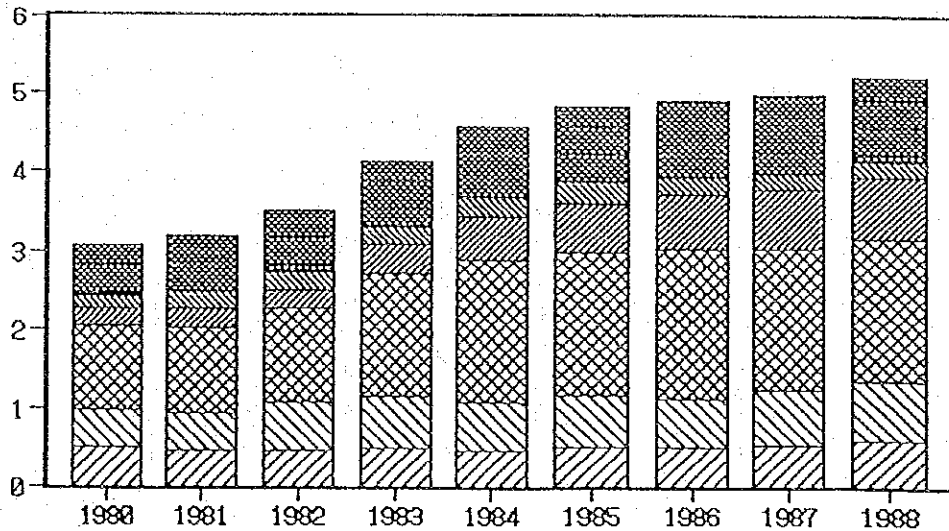
1.2.2 Gross domestic product

Gross domestic product (GDP) in Sarawak grew significantly up to 1984. In the three years that followed, Malaysia suffered a recession, but in 1988 the GDP in Sarawak (as well as in Malaysia) resumed its upward trend.



GDP in Malaysia

The mining sector had the largest share, 31.7%, followed by "services," "manufacturing" and "forestry" which share 13 - 14%, respectively, in 1988.



Agriculture
  Forestry
  Mining
  Manufacturing
  Construction
  Services

GDP by Industry in Sarawak  
(billion Ringgit)

### 1.2.3 Transportation

#### (1) Road

Generally, the road network in the Rajang Valley has not been well developed yet. An arterial road runs from Kuching to Miri via Sibu, but only half of the road is sealed and there is no bridge over Rajang River. Improvement of the arterial road and construction of the bridge are currently proposed.

↓ Road network in the Lower Rajang River Region is shown in following figure.





## (2) Water transportation

Water transportation is very important to the Rajang River Region because the road is not adequate and densely populated areas are located on the rivers. Rajang Port plays a major role in international trade, and Sibuan and Sarikei wharves are used as the coastal shipping center. In addition, a network of riverine cargo transportation and a passenger boat service are established in the Rajang River basin.

### 1.2.4 Natural resources

The major natural resources in Sarawak are oil, gas, coal, silica sand, clay and gold. Oil and gas are pumped out from offshore Miri and Bintulu. Coal deposits in Malaysia are all located in Central Sarawak. Silica sand can be mined in Bintulu and exported through Bintulu Port. Ball clay and kaolinitic clay are mined in Kuching, Sibuan and Sarikei areas and used for white wares, pottery, etc. Production of gold is not large. The most hopeful mineral resource in the Rajang River Region and the surroundings is coal.

### 1.3 Natural Conditions

For the purposes of the long and short-term plan of the Rajang Port Development Project, surveys of natural conditions have been carried out as the fundamental research for planning and designing the facilities. The surveys include a topographic and bathymetric survey, soil investigation, and meteorological and oceanographic surveys at the project points and its surroundings. Prior to the survey the existing available data were collected and analyzed.

#### 1.3.1 Topographic and bathymetric survey

All areas were found to be flat during the topographic survey, and water depths of survey points obtained during the bathymetric survey are shown as follows.

##### Water Depths of Survey Points (from CD)

Sibu	:-7~-15m
Sg. Merah	:-5~-7m
Sibu South	:-5~-6m
Bintangor	:-10~-11m
Sarikei	:-9~-10m
Tg. Seubal East	:-5~-15m
Rajang River Estuary	:-4~-7m

In particular, both sedimentation and erosion due to meandering were observed at Tg. Seubal East and at the opposite side of Tg. Seubal. As the major facilities for the timber terminal are planned in these areas, special consideration will be required to protect against erosion for the facility designing.

#### 1.3.2 Meteorology

Temperature: Monthly average through the year 25.7~27.1°C  
(At Sibu Airport)

Humidity: Monthly average 80~90%, Yearly average 86.3%

Precipitation: Yearly average 3,200mm, Average rainy days 231 day/year

Wind direction: Typical direction of yearly average N/SE  
(2~3m, Sibul Airport)

Visibility: Normally good, 2~3 miles (In the worst case)

### 1.3.3 Soil

Typical layer composition is shown as follows, though depth of layers varies at the bored points:-

Upper layer	Soft Silt (Decayed wood, with fine sand)
2nd layer	Medium sandy clayey Silt (with gravel or sand)
3rd layer	Clayey Silt (with gravel or consolidated silt)
4th layer	Weathered Sandstone/Mudstone with shell

#### Typical Soil Strata in Rajang Delta

The depth of hard strata at each of the bored points is as follows:



## 2. MASTER PLAN

### 2.1 Development Relating to Rajang Port Hinterland

Ongoing or proposed developments relating to the Rajang Port hinterland are as follows:

- a) the Timber Processing Zone development by STIDC in Tg. Manis area which consists of STIDC sawmills, timber-related industry estate for private enterprise, business center, residential estate, recreational facilities, etc,
- b) private sawmills development on Rajang River and its branches,
- c) ongoing agricultural development in the Rajang Port hinterland such as palm tree plantation project in Saratok and Betong Districts
- d) coal thermal power plant development in the Sibu area proposed by SESCO
- e) improvement of the arterial road from Kuching to Bintulu and construction of a bridge over Rajang River
- f) other economic development in the hinterland

### 2.2 Constraints on Development of Rajang Port

Rajang Port, facilities under control of RPA at Sibu, Sarikei, Bintangor, Sungei Merah and Tg. Minis, is located in the Rajang Delta and has two long and winding waterways called the Rajang Route and the Paloh Route. As the depths of the estuaries are shallow, these depths determine the largest size of ship that can enter Rajang Port, that is, ships of up to 9m draught on the Rajang Route and 6.0m draught on the Paloh Route are able to enter. Littoral sand drift is so active at these estuaries that dredging is not recommended.

Moreover, the erosion and sedimentation caused by river current, ocean currents, tidal current, shore current, etc., currently offset each other, leaving the river bottom in a settled state. Large-scale dredging, reclamation or other changes would break the balance, resulting in erosion and/or sedimentation in currently stable areas.