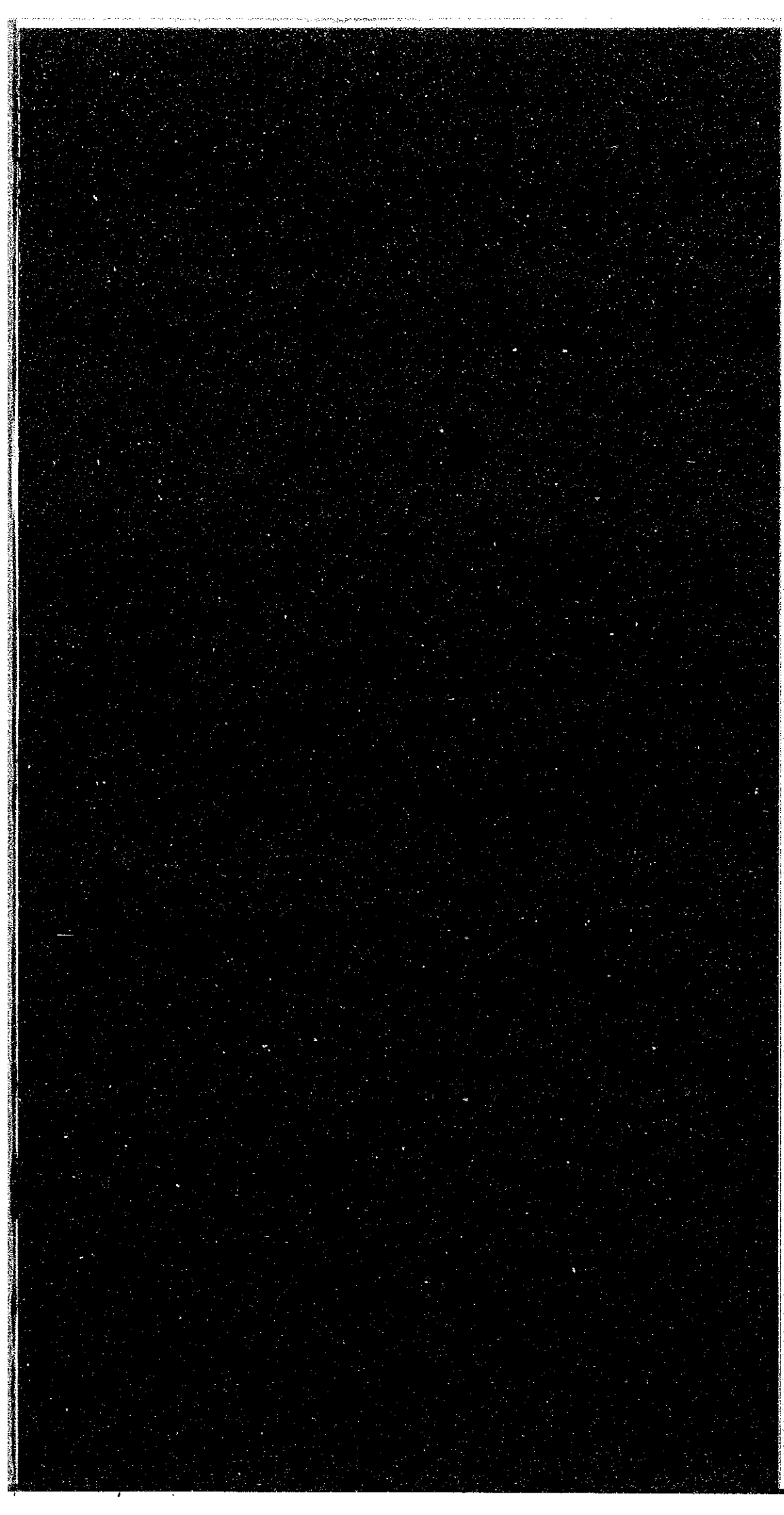
GOVERNMENT OF MALAYSIA

NATIONAL WATER RESOURCES STUDY, MALAYSIA

SECTORAL REPORT

VOL. 3

IRRIGATION
WATER SUPPLY
RECREATION



GOVERNMENT OF MALAYSIA

NATIONAL WATER RESOURCES STUDY, MALAYSIA

SECTORAL REPORT

VOL. 13

INLAND NAVIGATION
WATER-RELATED RECREATION

OCTOBER 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

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COMPOSITION OF THIS VOLUME

This Sectoral Report Volume 13 contains two sectoral studies, Inland Navigation and Water-Related Recreation. Each sector in this Volume consists of two parts: Part 1 deals with the subject matters of Peninsular Malaysia and Part 2 is devoted to the States of Sabah and Sarawak.

ABBREVIATIONS

(1) Plan

FMP	:	First Malaysia Plan
SMP	:	Second Malaysia Plan
TMP	:	Third Malaysia Plan
4MP	:	Fourth Malaysia Plan
5MP	:	Fifth Malaysia Plan
6MP	:	Sixth Malaysia Plan
7MP	:	Seventh Malaysia Plan
NEP	:	New Economic Policy
OPP	:	Outline Perspective Plan
RESP	:	Rural Environmental Sanitation Program

(2) Domestic Organization

DID (JPT)	:	Drainage and Irrigation Department
DOA	:	Department of Agriculture
DOE	:	Division of Environment
DOF	:	Department of Forestry
DOFS	:	Department of Fishery
DOM	:	Department of Mines
DOS	:	Department of Statistics
EPU	:	Economic Planning Unit
FAMA	:	Federal Agricultural Marketing Authority
FELCRA	:	Federal Land Consolidation and Rehabilitation Authority
FELDA	:	Federal Land Development Authority
ICU	:	Implementation and Coordination Unit
MARDI	:	Malaysian Agricultural Research and Development Institute
MIDA	:	Malaysian Industrial Development Authority
MLRD	:	Ministry of Land and Regional Development
MMS	:	Malaysian Meteorological Service
MOA	:	Ministry of Agriculture
MOF	:	Ministry of Finance

MOH	:	Ministry of Health
MOPI	:	Ministry of Primary Industries
MRRDB	:	Malaysia Rubber Research and Development Board
NDPC	:	National Development Planning Committee
NEB (LLN)	:	National Electricity Board
PORIM	:	Palm Oil Research Institute of Malaysia
PWD (JKR)	:	Public Works Department
RDA	:	Regional Development Authority
RISDA	:	Rubber Industry Small-holders Development Authority
RRIM	:	Rubber Research Institute of Malaysia
SEB	:	Sabah Electricity Board
SEBC	:	State Economic Development Corporation
S(E)PU	:	State (Economic) Planning Unit
SESCO	:	Sarawak Electricity Supply Corporation
UDA	:	Urban Development Authority

(3) International or Foreign Organization

ADAA	:	Australian Development Assistance Agency
ADB	:	Asian Development Bank
ASCE	:	American Society of Civil Engineers
FAO	:	Food and Agriculture Organization of the United Nations
IBRD	:	International Bank for Reconstruction and Development
ILO	:	International Labour Organization
IMF	:	International Monetary Fund
IRRI	:	International Rice Research Institute
JICA	:	Japan International Cooperation Agency
JSCE	:	Japan Society of Civil Engineers
MOC	:	Ministry of Construction, Japan
OECD	:	Organization for Economic Cooperation and Development
OECF	:	Overseas Economic Cooperation Fund, Japan
UK	:	United Kingdom
UNDP	:	United Nations Development Program

UNSF	:	United Nations Special Fund
US or USA	:	United States of America
US/AID	:	United States Agency for International Development
USBR	:	United States Bureau of Reclamation
WHO	:	World Health Organization
WMO	:	World Meteorological Organization

(4) Others

B	:	Benefit
BOD	:	Biochemical Oxygen Demand
C	:	Cost
CIF	:	Cost, Insurance and Freight
COD	:	Chemical Oxygen Demand
D&I	:	Domestic and Industrial
dia	:	Diameter
EIRR	:	Economic Internal Rate of Return
El.	:	Elevation above mean sea level
Eq.	:	Equation
Fig.	:	Figure
FOB	:	Free on Board
FSL	:	Full Supply Level
GDP	:	Gross Domestic Product
GNP	:	Gross National Product
H	:	Height, or Water Heád
HWL	:	Reservoir High Water Level
LWL	:	Reservoir Low Water Level
O&M	:	Operation and Maintenance
Q	:	Discharge
Ref.	:	Reference
SITC	:	Standard International Trade Classification
SS	:	Suspended Solid
V	:	Volume
W	:	Width

ABBREVIATIONS OF MEASUREMENT

Length

mm = millimeter
cm = centimeter
m = meter
km = kilometer
ft = foot
yd = yard

Area

cm^2 = square centimeter
m^2 = square meter
ha = hectare
km^2 = square kilometer

Volume

cm^3 = cubic centimeter
l = lit = liter
kl = kiloliter
m^3 = cubic meter
gal. = gallon

Weight

mg = milligram
g = gram
kg = kilogram
ton = metric ton
lb = pound

Time

s = second
min = minute
h = hour
d = day
y = year

Electrical Measures

V = Volt
A = Ampere
Hz = Hertz (cycle)
W = Watt
kW = Kilowatt
MW = Megawatt
GW = Gigawatt

Other Measures

% = percent
PS = horsepower
° = degree
' = minute
" = second
°C = degree in centigrade
10^3 = thousand
10^6 = million
10^9 = billion (milliard)

Derived Measures

m^3/s = cubic meter per second
cusec = cubic feet per second
mgd = million gallon per day
kWh = kilowatt hour
MWh = Megawatt hour
GWh = Gigawatt hour
kWh/y = kilowatt hour per year
kVA = kilovolt ampere
BTU = British thermal unit
psi = pound per square inch

Money

M$ = Malaysian ringgit
US$ = US dollar
¥ = Japanese Yen

CONVERSION FACTORS

	From Metric System	To Metric System
Length	1 cm = 0.394 inch 1 m = 3.28 ft = 1.094 yd 1 km = 0.621 mile	1 inch = 2.54 cm 1 ft = 30.48 cm 1 yd = 91.44 cm 1 mile = 1.609 km
Area	1 cm^2 = 0.155 sq.in 1 m^2 = 10.76 sq.ft 1 ha = 2.471 acres 1 km^2 = 0.386 sq.mile	1 sq.ft = 0.0929 m^2 1sq.yd = 0.835 m^2 1 acre = 0.4047 ha 1 sq.mile = 2.59 km^2
Volume	1 cm^3 = 0.0610 cu.in 1 lit = 0.220 gal.(imp.) 1 kl = 6.29 barrels 1 m^3 = 35.3 cu.ft 10^6 m^3 = 811 acre-ft	1 cu.ft = 28.32 lit 1 cu.yd = 0.765 m^3 1 gal.(imp.) = 4.55 lit 1 gal.(US) = 3.79 lit 1 acre-ft = 1,233.5 m^2
Weight	1 g = 0.0353 ounce 1 kg = 2.20 lb 1 ton = 0.984 long ton = 1.102 short ton	1 ounce = 28.35 g 1 lb = 0.4536 kg 1 long ton = 1.016 ton 1 short ton = 0.907 ton
Energy	1 kWh = 3,413 BTU	1 BTU = 0.293 Wh
Temperature	°C = (°F - 32)·5/9	°F = 1.8°C + 32
Derived Measures	1 m^3/s = 35.3 cusec 1 kg/cm^2 = 14.2 psi 1 ton/ha = 891 lb/acre 10^6 m^3 = 810.7 acre-ft 1 m^3/s = 19.0 mgd	1 cusec = 0.0283 m^3/s 1 psi = 0.703 kg/cm^2 1 lb/acre = 1.12 kg/ha 1 acre-ft = 1,233.5 m^3 1 mgd = 0.0526 m^3/s
Local Measures	1 lit = 0.220 gantang 1 kg = 1.65 kati 1 ton = 16.5 pikul	1 gantang = 4.55 lit 1 kati = 0.606 kg 1 pikul = 60.6 kg

Exchange Rate
(as average between July and December 1980)

$1 = M$2.22
¥100 = M$1.03

INLAND NAVIGATION

PART 1

PENINSULAR MALAYSIA

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SPECIAL ABBREVIATIONS

G.W.T. : Gross weight ton

1. INTRODUCTION

Inland navigation in Peninsular Malaysia comprises i) marine fishing boats, ii) river fishing boats, iii) passenger boats, iv) cargo boats, v) traffic by village people for daily activities including attending school, commuting and shopping.

Though inland navigation played a certain role for transport of goods and people along the rivers, its significance has constantly been reducing these decades. Construction of new roads and bridges as well as their expansion has steadily replacing the inland navigation, resulting in stoppage of ferry and cargo boat services.

Present principal river traffic is the marine fishing boats which ascend the rivers either for anchoring or unloading their fish catch at markets along the rivers. The others play minor role except in a few rivers.

2. PRESENT CONDITION OF INLAND NAVIGATION

2.1 General

A number of marine fishing boats have their bases around the river mouths or upstream jetties located along the rivers. They come and go through river mouths for fishing and some go upstream for unloading their fish catch at the markets along the rivers.

In 1979, about 8110 powered boats and 2085 non-powered boats were registered at the Fishing Department at various jetties located along 55 major rivers in Peninsular Malaysia. The biggest boat had 795 tons in G.W.T. with 2.6 m draft. The most upstream jetty where powered boats were registered was located 57 km from the river mouth in the Perak river. The biggest boat registered at this jetty had 51 tons with 1.9 m draft. The number of boats registered at each jetty is shown in Tables 1 & 2 according to classification. The size of the biggest boat in each river and the location of the most upstream jetty together with the size of the biggest boat registered at the most upstream jetty are shown in Tables 3 & 4.

Some fishermen catch fish and prawns in the rivers using small sampans or outboard engine boats with less than 0.9 m draft. However, the total catch of river fishery is very small compared with that of marine fishery and is likely to remain so in the coming years.

The passenger boats ply between villages or across the rivers. Their seating capacity is legally fixed at 12. Their capacities are usually less than 10 tons with the drafts in the range of 0.6 m to 0.9 m. The frequency varies from regular service of 1 trip an hour to irregular service. The fare varies from M$0.5 to M$3.5 per person for one way according to the distance.

Cargo boats go either upstream or downstream, carrying various goods including agricultural products and their inputs, sawn timber, palm oil and petroleum. The biggest cargo boats currently in operation are oil tankers of about 4,000 G.W.T. with 7.5 m draft. In case of the Perak river, they go upstream as far as 57 km from the river mouth.

Although passenger boats and cargo boats still play certain role in the transportation of passengers and goods, the opening of new roads and the construction of bridges has been steadily depriving them of their significance.

Some villages located along the rivers can afford only river transport for their daily activities including attending school, commuting and shopping. Its significance, however, has been waning these decades with the expansion of road network.

Except a few rivers, marine fishing boats dominate the river traffic at present. The others play minor role and their significance has been declining these decades with the expansion of road networks.

2.2 Marine Fishing Boats

In 1979, a total of 10,195 marine fishing boats were registered at the jetties in 55 major rivers in Peninsular Malaysia. Of 10,195 boats, 6,674 (65% of the total) were inboard engine boats. Outboard engine boats numbered 1,436 (14%). Powered boats, inboard and outboard engine boats accounted for 79% of the total. The rest, 2,085 boats (21%) were non-powered boats.

In terms of the number of powered boats registered, Johor State is ranked in the first place with 2,207 (27%) of the total for Peninsular Malaysia. Trengganu State comes next with 1,514 (19%) and Pulau Pinang State comes in third with 879 (11%). Kedah State is ranked fourth with 824 (10%). They together account more than two thirds of the total number of powered boats in Peninsular Malaysia. Number of marine fishing boats in each river is shown by classification in Tables 1 & 2.

The biggest boats registered at the jetties of each river are shown in terms of tonnage as well as of draft in Tables 3 & 4. The distance of the most upstream jetty of each river from the river mouth is also shown in the table together with G.W.T. and the draft of the biggest boat registered at the jetty.

The biggest boat among the boats registered in 55 rivers was in the Bernam river with 795 tons in G.W.T. The draft of the boat was 2.6 m. The most upstream jetty of the Perak river was located 57 km from the river mouth, being the furthermost jetty among all. The biggest boat registered at this jetty was 50.6 tons in G.W.T. with 1.9 m draft.

2.3 Other River Traffic

2.3.1 State of Perlis

Only limited number of sampans ascend the Perlis river up to Kg. Tebing Tinggi. A new bridge is under construction near Kg. Tebing Tinggi. Once completed, no boats can go upstream from this point (Ref. 2).

2.3.2 State of Kedah

River traffic is very seldom except marine fishing boats in the Kedah river. Passage through the barrage lock is very limited at present (Ref. 2).

No commercial boats navigate the Muda river.

Cargo boats ascend the Perai river to feed factories and warehouses located 8.5 km from the river mouth (Ref. 2).

2.3.3 State of Pulau Pinang

According to the information obtained by the Inquiry on River Flow Use, river traffic is quite limited except marine fishing boats in the rivers in this State (Ref. 3).

2.3.4 State of Perak

The existing river traffic in the Perak river comprises passenger, cargo, marine fishing and river fishing boats as well as tankers carrying petroleum.

Some 140 passenger boats operate around Teluk Anson and 18 boats at Bagan Datok. Twelve jetties are found along the river bank between Bagan Datok, located near the river mouth, and Kg. Bandar which is 28 miles north of Teluk Anson. At Bagan Datok, these boats carry passengers across the river to Spynie, an estate on the opposite bank. The frequency of boat trip is one every hour. Their draft is usually in the range of 0.6 m to 0.9 m. Some boats carry passengers between Pauline jetty at Teluk Anson and Kg. Bandar.

Cargo boats transporting mainly agricultural goods such as copra, oil palm fruits, rice and paddy ply this river. A total of 111 such boats navigate to and from Teluk Anson and 4 boats to and from Bagan Datok. Cargoes are charged according to the number of bags. In most cases, the tariff lies in the range of M$0.50 to M$1.00 per bag. These boats have very shallow draft, ranging from 0.6 m to 0.9 m.

Oil tankers navigate the river mouth only during high tides to go upstream and unload its cargo at the railway wharf in Teluk Anson. Between 25 to 30 tankers call at the wharf per month on the average. The maximum gross tonnage of these tankers is 999 with 4.5 m draft.

At the river mouth, the depth is about 2.1 m during low tides, which is not sufficient for oil tankers. During high tides, the depth becomes 3.9 m to 4.8 m depending on the tides. At the river mouth, siltation is taking place with sand bar formation. No dredging of the river mouth, however, has been proposed because it is not economically justifiable due to the limited river traffic (Ref. 2 & Ref. 4).

There is not much river traffic in the Krian river. A bridge was constructed a few years ago across the river to replace the ferry service. The main river traffic is marine fishing boats which are anchored near the river mouth (Ref. 2 & Ref. 4).

In the Bernam river, 2 passenger boats ply the route between Hutan Melintang and Sg. Bernam estate and one between Hutan Melintang and Kg. Kota.

About 10 cargo boats ply the river. The most upstream village the cargo boats go to is Ulu Bernam estate and Sg. Samak estate on the opposite bank.

Two palm oil tankers, owned by the proprietors of Unitata Oil Palm Plantations, travel 10 miles upstream from the river mouth to the plantations to load palm oil for export to Pulau Pinang and overseas. About 12 to 15 trips are made by such tankers per month. The maximum gross tonnage of the tankers is 600 with 2.4 m draft (Refs. 2 & 4).

In the Dinding river, 20 passenger boats are engaged in river transport. Ten operate across the river at Lumut and another 10 across the river at Batu Undan for Malayan Flour Mill workers.

Cargo boats, less than 50 in number, navigate through the river mouth for carrying goods to the Pangkor island.

A naval base and a marine police base are located at Lumut near the river mouth. All river traffic from these bases are within the port limit, about 1 mile from the river mouth (Ref. 4).

2.3.5 State of Selangor

Timber transport plays an important role in the Kelang river and the Aur river. Tongkangs (junks) are used to carry these sawn timber from the sawmills located along these rivers. In both rivers, these tongkangs are towed by tugboats downstream to the Straits of Lumut where their timber cargoes are unloaded on the awaiting ships to be exported. These boats operate up to 3.2 km upstream of each river. The operation can only be carried out during high tides.

Over 200 such tongkangs with the maximum gross tonnage of 99 and the maximum draft of 3.0 m operate in the Aur river and roughly 5 of each type in the Kelang river.

Oil tankers with the maximum gross tonnage of 4,000 and the maximum draft of 7.5 m unload petroleum at the Shell jetty which is located about 1.6 km upstream from the river mouth of the Kelang river (Ref. 4).

2.3.6 State of Negeri Sembilan

No passenger boats nor cargo boats are registered at the Marine Department in this State. Marine fishing boats are the only river traffic.

2.3.7 State of Melaka

Marine fishing boats and cargo boats navigate the Melaka river. The cargo boats consist of lighters which are towed by tugboats. There are 50 lighters and 4 tugboats in this river. The maximum tonnage of the lighters is 50 to 60 tons and the maximum draft is 2.1 m. The capacity of the biggest tugboat is 20 tons.

These cargo boats transport mainly maize, fertilizer and rice from ships anchored out at sea to a godown located at the entrance of the river. The goods are unloaded at the Tanjung Pruas.

The river mouth suffers from siltation. At present dredging operation is being carried out by the Marine Department throughout the year at the river mouth. The maximum depth of the river at the river mouth during high tides is 2.4 m and 1.2 m during low tides (Ref. 4).

There are 20 passenger boats operating in the Umbai river from Pulau Besar to Umbai, which is located about 1.6 km upstream of the river mouth. Each passenger is charged M$4.00 for a round trip. The maximum tonnage of the boats is 7 tons and the maximum draft is 0.9 m. No cargo boats use the river but some 24 marine fishing boats use the river for the purpose of mooring.

2.3.8 State of Johor

In the Johor river, passenger boats ply the following routes:

(1) between Kong Kong Laut and Teluk Sengat,

(2) between Kong Kong Laut and Kg. Pengerang, and

(3) Teluk Sengat and Changi, Singapore.

The average number of round trips is 1 to 4 per day. The fare ranges between M$1.5 to M$3.5 per person according to the route. The capacities of the boats serving these routes vary from 7 to 10 tons.

There is some river fishing activities between the river mouth and about 25 km upstream of Kota Tinggi (Ref. 2).

In the Pontian Besar river, only a few river fishing boats navigate the river other than marine fishing boats. There is a bridge over the river about 10 km upstream from the river mouth, which the boats cannot pass through (Ref. 2).

Sand bars are formed during monsoon seasons at the river mouths of the Sedili Besar river, Mersing river and Endau river. Due to sand bar at the river mouth, only the boats with less than 0.9 m draft can negotiate the entrance (Ref. 4).

2.3.9 State of Pahang

The principal river traffic in the lower reach of the Pahang river comprises marine and river fishing vessels. Large vessels cannot navigate the river because of shallow entrance and sand bar formation along the river due to the sediment transport particularly during monsoon seasons. No passenger boats are registered at the Marine Department.

However, the river still remains a valuable means for the transport of the people living along the river bank (Refs. 2, 4 & 6).

Marine fishing trawlers, local trade ships, i.e., a combination of tugboat and lighter and passenger boats ply the Kuantan river.

There are about 15 tugboats and 25 lighters registered at the Marine Department in 1980. Some trade ships transport sawn timber from the sawmills located 6 km upstream of the river mouth. Some trade ships transport petroleum from Port Dickson and unload it in Kuantan.

Tugboats have less than 1.5 m draft and the lighters less than 2.4 m. They are generally less than 75 tons in G.W.T. During high tides vessels with less than 2.7 m can negotiate the river mouth. During low tides, depth at the river mouth is only 0.6 m (Refs. 1 & 3).

In the Rompin river only 2 passenger boats and 2 cargo boats are registered with the Marine Department. These boats have a capacity of 10 tons and below. Cargo and passenger boats navigate the river between the river mouth and 8 km upstream. In the upper reaches, village people use the river for their daily transport. Navigational use is likely to decrease after the completion of the road to be executed by DARA (Refs. 2 & 4).

There are no registered passenger boats nor cargo boats in the rivers of Temperloh, Nenasi, Merchong and Jelai. The only river traffic is the sampans and outboard engine boats as a means of transport between villages along the river banks (Refs. 2 & 4).

2.3.10 State of Trengganu

Both passenger and marine fishing boats can be seen moored near the river mouth of the Trengganu river.

Four round trips are made per passenger boat per day from Keda Pinta to Pengkalan Tuan Cik. Fare per passenger is M$0.5 for one way. These boats have a draft of less than 0.9 m and their tonnage less than 4 tons. Even during the dry season, the river is still navigable to these boats.

A market at Pulau Kambing receives the fish catch from the marine fishermen.

The depth of the river at the entrance is 2.4 m to 3 m during low tides and 7.5 m during high tides. The maximum gross tonnage and draft of vessels allowed to come into the river from the sea by the Marine Department are 500 tons and 2.5 m, respectively. Big ships can come in only during high tides but vessels less than 10 G.W.T. can negotiate the river mouth even during low tides. The Marine Department is trying to maintain the navigable channel at the river mouth by dredging the river using its own dredger (Refs. 2 & 4).

The Besut river has less than 15 passenger boats and 2 or 3 cargo boats. All these boats are concentrated in Kuala Besut and the most upstream village they go to is Kg. Raja. Dredging work near the mouth of this river is currently being carried out by DID (Refs. 3 & 4).

The primary river traffic of the Marang river is the marine fishing boats. Road transport is available up to Pengkalan Berangan. Neither passenger boats nor cargo boats play a significant role.

At present, sand bars are protruding from the both banks at the river mouth. Large-scale marine fishing boats coming in and going out to the sea can navigate the entrance only during high tides. To improve the condition, dredging works were initiated by the Fishery Department and are being carried out by DID. After the completion of the dredging works, boats with a draft up to 2.5 m will be allowed to enter the river mouth during low tides (Refs. 2, 3 & 4).

A road is running in parallel with the Dungun river. No passenger boats are in operation except upstream of Jerangun. Even these boats will stop operation after the completion of a new state road (Ref. 4).

Some cargo boats navigate the Kemaman river to transport sawn timber from the sawmills 5 km upstream from the river mouth. In Kg. Jakar a timber complex will be constructed and cargo boat operation is likely to be intensified (Ref. 4).

Setiu river, Marang river, Merang river, Merchang river, Kerteh river, Ibai river, Besut river, Kemasik river and Trengganu river suffer from sand bar formation at their river mouths. This is one of the characteristics of the rivers in the East Coast. An exception is Sg. Dungun where the formation of a sand bar at the river mouth has been prevented by a rocky outcrop from the left bank of the river.

2.3.11 State of Kelantan

The river traffic in the Kelantan river comprises passenger, cargo and marine fishing boats.

Passenger boats serve the following routes:

(1) Palekbang ferry terminal located opposite to Kota Bharu and Kota Bharu, and

(2) Kg. Laut and Kota Bharu.

The frequency is 4 to 6 trips a day. In total 71 passenger boats are registered in the Kelantan river. The maximum capacity is 10 tons and the maximum draft is 0.8 m.

At Pasir Mas, a road bridge has been completed across the Kelantan river. As a result, the ferry service across the river has been developed. At Kota Bharu, another bridge has been constructed and the use of the ferry service across the river has disappeared.

Cargo boats ply the route between the small islands at the mouth of the Kelantan river and Kota Bharu. These boats carry mainly coconut and banana. Total number of cargo boats is 197. The maximum capacity and the maximum draft are 53 tons and 1 m, respectively.

Sand bars are observed at the river mouth. From June to September this year a dredger had been used to dredge the river mouth using Marine Department dredger. It was first dredged in 1978 (Refs. 2 & 4).

The river traffic in the Semarak river and Pengkalan Batu river is made up solely of sampans either for river prawn catching or for plying between the villages (Ref. 2).

2.4 Taman Negara

Kuala Tahan, which is the entrance of the Taman Negara, can be reached by 3 hour boat ride from the jetty at Kuala Tembeling which is located 19 km from Jerantut. In Taman Negara, boat trip can be enjoyed at various routes as follows:

Origin	Destination
Kuala Tahan	Lata Berkoh
Kuala Tahan	Kuala Trengganu
Kuala Trengganu	Kuala Kenyam
Kuala Kenyam	Kuala Perkai

Department of Wildlife and National Parks owns 9 outboard engine boats with a seating capacity of 12 passengers each at Kuala Tembeling. At Kuala Tahan, the Department possesses 9 outboard engine boats with a seating capacity of 3 passengers each.

From March to August, daily boat service is available. Except this period, there is no fixed schedule. Boat service depends on tourist demand. Taman Negara is closed from November 15 through January 15 due to monsoon. The boat charge varies from M$3.3 to M$85.8 per boat according to the route (Ref. 7).

3. INLAND NAVIGATION DEVELOPMENT PLAN

For the foreseeable future, no large-scale inland navigation development plans have been conceived.

Dredging at the river mouths for cargo and marine fishing vessel traffic and river dredging for flood control purpose will be the main activities relevant to the improvement of inland navigation.

4. ALTERNATIVE TRANSPORT

4.1 General

The road transport has been and will be the only alternative means which competes with inland navigation.

4.2 Road

The road distance in Peninsular Malaysia in 1977 totalled 20,920 km, which consisted of 17,540 km of bituminous and concrete road, 2,340 km of gravel and stone road and 1,040 km of earth road. It expanded at the average rate of 2.6% per annum during 1970 - 1977 period (Fig. 1).

The number of vehicles registered in Peninsular Malaysia totalled $1,609 \times 10^3$ including motor cycles and scooters in 1977. It increased at the average rate of more than 13% per annum (Fig. 2).

As stated in Section 2.3, road expansion has been steadily depriving inland navigation of its function as passenger and cargo transport. This situation is most likely to continue in the coming decades.

5. PROSPECT OF INLAND NAVIGATION

During 1970 - 1977 period, about 3,500 km of new road has been constructed. During the same period, total number of motor vehicles has increased by 140%. Though road development plan for the Fourth Malaysia Plan has yet to be finalized, rapid improvement of road network is anticipated. With the opening up of new roads and the construction of bridges, the significance of the inland navigation is likely to be reduced in the coming years except fishing boat traffic mainly around the river mouth.

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TABLES

Table 1 NUMBER OF MARINE FISHING BOATS REGISTERED IN EACH RIVER BY CLASSIFICATION (1/2)

State	River	Total Number of Boats by Classification for the Major Rivers in Peninsular Malaysia: Inboard Engine Boat	Outboard Engine Boat	Sub-Total of Powered Boats	Non-Powered Boat
Perlis	Perlis	266	56	322	84
Kedah	Kedah	572	58	630	85
	Merbok	130	63	193	101
	Muda	1	-	1	-
	Total	703	121	824	186
Pulau Pinang	Jawi	93	21	114	18
	Muda	392	33	425	45
	Tengah	4	3	7	4
	Prai	27	4	31	-
	Juru	1	28	29	16
	Pinang	45	126	171	22
	Kongsi	18	84	102	28
	Total	580	299	879	133
Perak	Bernam	208	1	209	68
	Perak	111	4	115	78
	Total	319	5	324	146
Selangor	Tengi	130	16	146	16
	Selangor	218	-	218	15
	Buloh	56	13	69	18
	Kelang	25	30	55	27
	Bernam	-	-	-	10
	Total	429	59	488	86
Negeri Sembilan	Lukut	14	3	17	6
Melaka	Umbai	3	15	18	14
	Linggi	58	37	95	7
	Baru	111	8	119	N.A.
	Melaka	330	19	349	N.A.
	Total	502	79	581	21

Table 2 NUMBER OF MARINE FISHING BOATS REGISTERED IN EACH RIVER BY CLASSIFICATION (2/2)

State	River	Total Number of Boats by Classification for the Major Rivers in Peninsular Malaysia: Inboard Engine Boat	Outboard Engine Boat	Sub-Total of Powered Boats	Non-Powered Boat
Johor	Muat	48	58	106	62
	Kesang	-	10	10	8
	Batu Pahat	60	56	116	41
	Senggarang	49	17	66	43
	Pontain Besat	67	7	74	14
	Pontain Kecil	261	15	276	30
	Benut	72	25	97	56
	Pulai	16	76	92	32
	Sekudai	5	42	47	45
	Tetrau	-	2	2	-
	Melayu	-	52	52	25
	Johor	107	308	415	474
	Sedili Besat	247	14	261	65
	Mersing	385	35	420	73
	Endau	169	4	173	-
	Total	1,486	721	2,207	968
Pahang	Rompin	74	4	78	5
	Pahang	179	11	190	48
	Kuantan	357	-	357	20
	Total	610	15	625	73
Trengganu	Besut	291	N.A.	291	18
	Chalok	13	N.A.	13	58
	Seitu	118	N.A.	118	154
	Trengganu	343	N.A.	343	11
	Merang	19	N.A.	19	22
	Ibai	26	N.A.	26	14
	Marang	255	N.A.	255	14
	Dungun	123	N.A.	123	-
	Kemaman	259	1	260	46
	Paka	66	N.A.	66	8
	Total	1,513	1	1,514	345
Kelantan	Kemasin	21	1	22	14
	Peng Deto	7	71	78	3
	Semerak	53	-	53	15
	Kelantan	171	5	176	5
	Total	252	77	329	37
	Total for 55 Rivers	6,674	1,436	8,110	2,085

Source; Ref. 1

Table 3 JETTIES OF REGISTRATION OF MARINE FISHING BOATS (1/2)

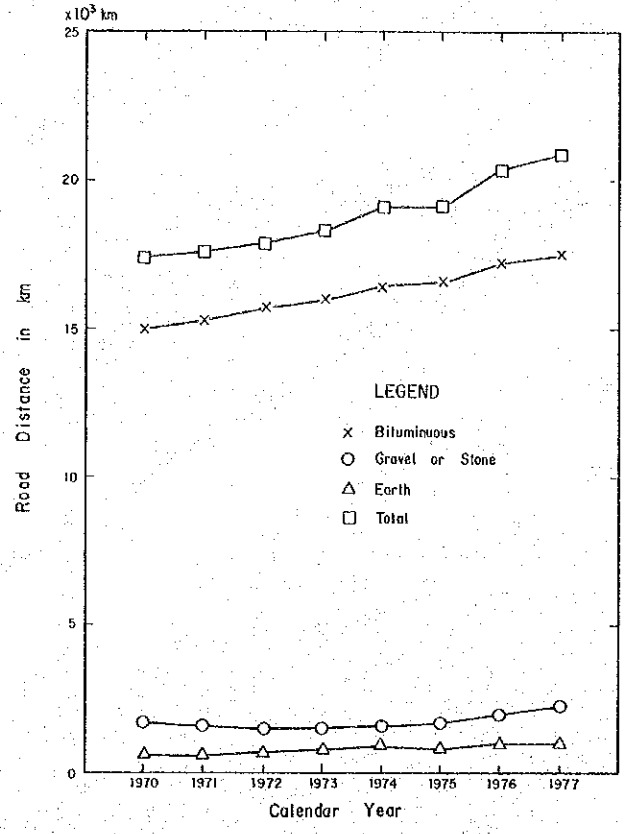
State	River	Max. Tonnage (ton)	Max. Draft (m)	Most Upstream Jetty: Distance (km)	Most Upstream Jetty: Max. Tonnage (ton)	Most Upstream Jetty: Max. Draft (m)
Perlis	Perlis	54.1	2.0	0.8	54.1	2.0
Kedah	Kedah	54.9	2.6	12.9	46.0	1.8
	Merbok	70.1	2.1	17.4	62.0	2.1
	Muda	5.5	0.9	4.5	5.5	0.9
Pulau Pinang	Jawi	7.5	1.0	3.9	7.5	1.0
	Muda	58.0	2.0	1.9	58.0	2.0
	Tengah	5.3	0.8	9.7	5.3	0.8
	Prai	10.9	1.1	10.3	10.9	1.1
	Juru	2.5	0.6	0	2.5	0.6
	Pinang	8.4	1.0	1.3	8.4	1.0
	Kongsi	8.7	1.0	1.3	8.7	1.0
Perak	Bernam	795.0	2.6	13.5	50.0	2.0
	Perak	50.6	1.9	56.7	50.6	1.9
Selangor	Tengi	25.3	1.5	5.0	12.5	1.0
	Selangor	28.8	1.6	3.4	12.3	1.0
	Buloh	41.6	1.9	1.3	41.6	1.9
	Kelang	11.3	1.1	14.2	7.0	0.9
	Bernam	10.7	1.1	3.2	10.7	3.2
Negeri Sembilau	Lukut	9.4	1.1	1.0	9.4	1.1
Melaha	Umbai	6.3	0.9	1.0	6.3	0.9
	Linggi	7.9	1.2	0	7.9	1.2
	Baru	8.0	1.2	1.0	8.0	1.2
	Melaha	16.8	1.2	0	16.8	1.2
Johor	Muar	24.3	1.4	0	24.3	1.4
	Kesang	8.5	0.9	7.1	N.A.	0.9
	Batn Pahat	19.0	1.2	6.2	19.0	1.2
	Senggarang	20.0	1.1	5.8	20.0	1.1
	Pontain Besar	25.3	1.3	0	25.3	1.3
	Pontain Kecil	26.0	3.0	2.6	2.6	3.0
	Benut	33.6	1.6	5.8	33.6	1.6
	Pulai	4.5	0.9	20.0	4.3	0.8
	Sekudai	2.1	0.8	16.1	2.1	0.6
	Tebrau	N.A.	0.6	9.7	N.A.	0.6
	Melayu	N.A.	0.9	0	N.A.	0.9
	Johor	49.4	1.9	43.2	49.4	1.9
	Sedili Besat	72.9	2.4	0	72.9	2.4
	Merging	63.5	4.0	0	63.5	4.0
	Enclau	68.0	2.8	3.2	68.0	2.8

Table 4 JETTIES OF REGISTRATION OF MARINE FISHING BOATS (2/2)

State	River	Max. Tonnage (ton)	Max. Draft (m)	Most Upstream Jetty		
				Distance (km)	Max. Tonnage (ton)	Max. Draft (m)
Pahang	Rompin	47.7	2.3	0	47.7	2.3
	Pahang	52.9	2.6	5.8	18.0	1.3
	Kuantan	77.9	2.4	4.4	6.9	1.2
Trengganu	Besut	47.4	1.7	0	47.4	1.7
	Chalok	19.6	1.3	8.4	19.6	1.3
	Setiu	11.4	1.0	5.8	11.4	1.0
	Trengganu	53.4	2.6	7.7	2.4	0.6
	Merang	24.1	1.5	4.5	N.A.	0.7
	Ibai	15.2	1.4	0	15.2	1.4
	Marang	34.0	1.3	0	34.0	1.3
	Dungun	36.7	1.6	3.9	20.4	1.3
	Kemaman	39.7	2.1	2.6	37.7	1.8
	Paka	16.0	1.7	0	16.0	1.7
Kelantan	Kemasin	6.3	1.0	2.6	6.3	1.0
	Peng Dato	22.6	1.4	0	22.6	1.4
	Semerak	51.8	1.9	0	51.8	1.9
	Kelantan	161.5	2.7	13.5	25.5	1.3

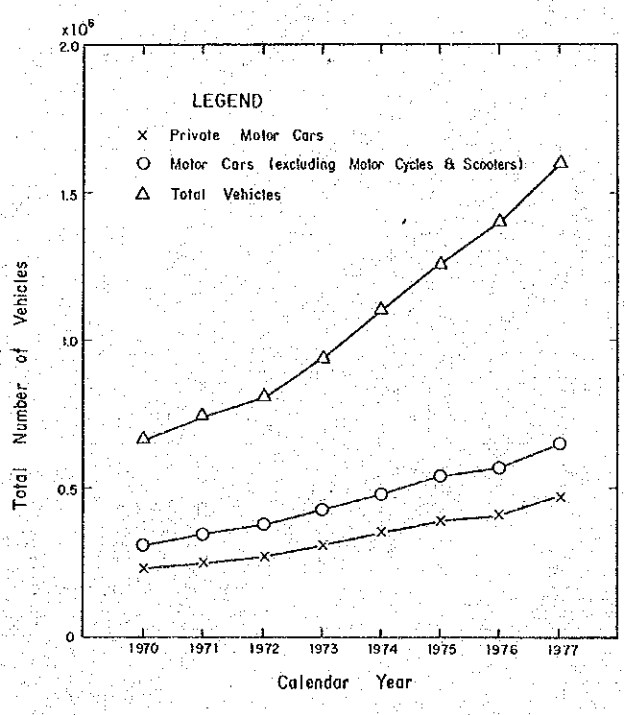
Source; Ref. 1

FIGURES



Source ; Ref. 8

Fig. 1 Road Distance in Peninsular Malaysia (1970 - 77)



Source ; Ref. 8

Fig. 2 Total Number of Registered Vehicles in Peninsular Malaysia (1970 - 77)

INLAND NAVIGATION

PART 2

SABAH AND SARAWAK

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SPECIAL ABBREVIATIONS

GWT = Gross weight ton

NWT = Net weight ton

MHHW = Mean higher high water

1. INTRODUCTION

Inland navigation has been playing significant role in moving goods and people in the States of Sabah and Sarawak as a relatively cheap mode of transport. Trunk road network is developed along coast, but it is not yet completed, connecting only some of the big towns. Air transport is also only available for big towns. Inland navigation is the only transport means for the residents in the smaller towns and the interior areas.

Although road construction as well as the air transport development has been in progress, the pace has been rather slow. Rapid development cannot be expected in the future due to the sparse population in these States and the difficulty of road construction due mainly to heavy rainfall, shortage of construction materials and hard access to the construction site.

Inland navigation is most likely to remain the essential transport means in the States of Sabah and Sarawak in the foreseeable future.

2. PRESENT CONDITION

2.1 State of Sabah

2.1.1 General

In the State of Sabah, two big rivers located in the Sandakan area, the Kinabatangan and Labuk rivers, are dominated in terms of inland navigation usage. Besides these, considerable use has been observed for the rivers of Kalabakan, Segama, Sugut, Bengkoka, Klias and Padas. The main usage of these rivers is for the movement of logs from the point adjoining the felling area to the ports of loading. In case of the Padas river, logs cannot be floated above Beaufort. Logs are, therefore, carried by railway from Tenom to Beaufort. Besides log transportation, this river has also been utilized for carrying goods and people.

Major river traffic in the rivers comprises towing boats of 25 gross weight tons (GWT) on the average, commercial vessels under 25 net weight tons (NWT) and small outboard engine boats for daily communication by village people.

Although records of vessels are kept in the Marine Department offices located in Lahad Datu, Tawau, Semporna, Kota Kinabalu, Sandakan and Labuan and the district offices, they do not show whether the vessels are used mainly in the rivers of for the coastal works. Routes of navigation are not given, either. The number of boats plying in the rivers described in the following sections are, therefore, estimated figures based on the records and experience of the officials of the Marine Department.

2.1.2 River traffic

(1) Kinabatangan river

There are about 200 tug boats for towing logs with 25 GWT and 1 to 1.25 m of draft on the average. They tow logs along the coastal line either placed on the barges or formed as rafts from the point adjacent to felling area down to the river mouth and further to the Sandakan port which is the major port for logs export in the State of Sabah. The most upstream point of navigation is the town of Kuamut. Although the river is navigable except for flood time, logs towing activities are interrupted during the northeast monsoon because of rough sea between the river mouth and the Sandakan port.

Besides the logs towing boats, about 100 private cargo boats of less than 15 NWT with inboard engines ply the river. They mainly carry agricultural commodities and daily necessities. About several hundreds of private outboard engine boats ply the river for travelling between villages. Their sizes are usually in the range of a few tons with 10 to 15 m length, 0.5 m draft and 5 to 50 PS of engine capacity. There is no regular commercial passenger boats nor commercial cargo boats plying in the river. Though some riverine fishing boats are operating, the number is quite limited. The majority of them are sampans and outboard

engine boats. Marine fishing vessels are operating only in the sea and bay area and do not go upstream of the river.

Even during low flow period, adequate water depth is maintained in the river from the viewpoint of river navigation. Although siltation has been formed at the river entrance, it does not cause any difficulty on the logs towing boats plying between the Sandakan port and the river.

(2) Labuk river

There are about 100 tug boats for towing logs with 25 GWT and 1 to 1.25 m of draft on the average. They tow logs either placed on the barges or formed as rafts from the point adjacent to felling area down to the river mouth and further to the Sandakan port. The most upstream point where they ply is the village of Trasak. Although the river is navigable except for flood time, logs towing activities are interrupted during the northeast monsoon due to the rough sea condition between the river mouth and the Sandakan port.

About 20 cargo boats with average capacity of 120 GWT and a palm oil tanker with 200 GWT are plying in the river. They transport oil palm fruits, fertilizer, crude palm oil and daily necessities to and from the oil palm estates upstream. There are about 50 passenger boats in the river plying between Beluran and Pamol. Their seating capacity is 20 passengers with 40 to 70 PS of outboard engines. They charge M$20 of fair per person. About several hundreds of private outboard engine boats ply the river for travelling between villages.

Some 200 marine fishing boats are registered at the town of Belman. They ply up to Beluran for unloading their fish catch, which are marketed to Sandakan, Ranau and other towns. Though some riverine fishing boats, mainly comprising sampans, are operating in the river, their number is quite limited.

Even during low flow period, adequate water depth is maintained in the river from the viewpoint of river navigation. At the river entrance, siltation has been formed. Though it does not cause any problem for small boats, cargo boats and the oil tanker with more than 100 GWT must wait for high tide.

2.2 State of Sarawak

2.2.1 General

The State of Sarawak is the most notable state among the 13 States of Malaysia regarding inland navigation. The rivers with jetties for transport number as many as 53 as shown in Table 1. Number of jetties in these rivers totals 160. Major rivers alone, where river navigation plays key role in moving goods and people, count as many as 13, i.e., the Lawas, Limbang, Baram, Miri, Kemena, Mukah, Igan, Paloh, Rajang, Saribas, Lupar, Sadong and Sarawak rivers. The river ports of Kuching along the Sarawak river and Tanjung Mani along the Rajang river have been used as the major

ports in Sarawak for import and export, though later Port of Miri including the offshore berths at Lutong emerged as major oil loading port.

Number of vessels surveyed and registered at the ports of licensing in the State of Sarawak is given by classification.

Devoid of major road network, the rivers provide a vast mileage of inland waterways which penetrate deep into the interior area, being a sole measure of transport for the inhabitants.

2.2.2 River ports and river traffic

(1) Lawas river

Cargo and passenger boats ply the river up to the town of Lawas, which, the second largest town in the Fifth Division, lies about 18 km from the river entrance. There is an open anchorage, with a depth of 18.3 m, located 2.4 km eastward of the entrance, where ocean-going vessels can lie mainly to load timber. There are one custom wharf and one commercial wharf.

There is a least depth of 0.5 m on the bar located at the river entrance. Mean higher high water (MHHW) is 2.2 m.

(2) Limbang river

Passenger and cargo boats for trading and communicating with Brunei and Lanuan ply the river up to the town of Limbang, which is the principal town of the Fifth Division and is located 12.8 km above the river entrance. There is an anchorage for ocean-going steamers, 8 km below the Limbang bar buoy, with a least depth of 7.9 m. There are two wharves including the one for the Customs.

The least depth on the bar at the river entrance is 0.6 m. MHHW is 2.4 m.

(3) Baram river

Express passenger boats and cargo boats with a few hundreds GWT carrying local produce and imported consumer goods ply up to the town of Marudi, which is located about 199.8 km from the river entrance. There are one custom wharf and a pontoon wharf for Government launches. At Kuala Baram village, on the south-side of the river, there is a belian pile wharf.

Greatest depth over the bar at the river entrance is 0.9 m. MHHW is 1.5 m.

(4) Miri river

Miri town lies on either side of the Miri river. The town is only accessible to coastal vessels of shallow draft. Above the town, there is not much river traffic.

The sand bar at the river mouth is very shallow and often dangerous with a narrow channel which usually changes at the turn of monsoon seasons as well as at odd times in-between. The least depth over the bar is usually about 0.3 m, but can be as much as 0.9 m depending on the location. MHHW is 1.6 m.

(5) Kemena river

Numerous number of timber boats and passenger boats with less than 10 GWT ply the river as far upstream as the Tuban village, located 106 km from the river mouth.

The port of Bintulu is located on the north bank of the Kemena river, about 1.2 km from the river entrance. There are a customs wharf, a small belian wharf for Government launches and a number of small wharves and jetties for commercial use.

There is a least depth of 0.6 m over the bar at the river entrance.

(6) Mukah river

Passenger and small cargo boats with less than 10 GWT ply up to the Kenyana village, located 40.5 km from the river entrance.

The town of Mukah is located near the river mouth. Logs towed out from the river are loaded on ocean-going vessels anchoring off Mukah. The depth on the bar limits the use of the Mukah port to launches and smaller coastal vessels. The channel into the river mouth tends to shift both in position and depth. The bar sometimes dries. MHHW is 2.2 m.

(7) Igan river

The Igan river has an access to Sibu from the north. It is about 96 km to Sibu from the river entrance. The depth over the bar of the river mouth is 0.9 m. MHHW is 2.3 m. Ocean-going oil tankers of up to 2,000 tons displacement enter the river from Sibu and unload at the Sungai Merah Oil Wharf, located about 4.8 km from Sibu. The largest vessel which has used this wharf to date is a ocean-going vessel of about 1,600 GWT with a draft of 4.9 m.

A 9.6-km long canal has been dredged to join the Igan river with the Oya river at about 72 km downstream of Sibu. This canal joins the Oya river at the location about 3.2 km above Dalat. With this canal, smaller coastal and river vessels can save coastal passage to enter the Oya village.

(8) Paloh river

The bar at the river mouth is 2.7 m below chart datum. Some shoals have also recently been formed. MHHW is 3.8 m. An inner bar with a least depth of 3.7 m lies where the Paloh river joins the Saradong river.

The limit for vessels plying to Sibu via the Paloh channel is 153 m of overall length and 5.8 m draft. During the North-east Monsoon period, the draft is reduced to 5.0 m due to the swell. This route to Sibu is mainly used by overseas vessels.

(9) Rajang river

The least depth over the bar at the river mouth is 5.8 m below chart datum. MHHW is 4.6 m. The Kuala Rajang is well lit by lighthouses, light beacon and light buoys.

Tanjung Mani is a deep water anchorage located about 25.6 km from the river entrance. Vessels for loading timber mainly use this anchorage. Timber exports recorded in 1980 through this point was about 1.7×10^6 tons of logs and sawn timber.

The town of Sarikei, which was the administrative center of the Sixth Division, is located about 48 km from the river entrance on the left bank. The least depth of the channel of the river passing by the town is 4 m. There are one Rajang Port Authority's wharf and five other wharves in the Sarikei port.

Binatang is located on the left bank of the Rajang river between the entrances to Binatang river and Meradong river, 17.6 km above the town of Sarikei. This port is accessible to the vessels of about 2,000 GWT. In the Binatang port, there are one Rajang Port Authority's wharf and two pontoon wharves for commercial vessels and two jetties for the use of the Government launches.

The port of Sibu lies about 112 km from the sea in case the Rajang route is taken and 81.6 km from the sea if the Paloh route is used. Between Sibu and the junction between the Rajang and Paloh routes, sandbanks obstruct the channel, prohibiting the passage of the vessels with more than 61 m length and with more than 4 m draft.

Sibu is the major town in the Third Division and is one of the busiest port dealing with exports and imports as well as internal movement of goods and people in the State. The major wharves are the Rajang Port Authority's wharf and the Sungai Merah wharf. The largest vessel ever recorded to berth at Sibu port is a vessel of about 7,400 GWT with overall length of 137 m. The deepest draft vessel is a vessel of 7.1 m draft.

Express passenger boats ply as upstream as the Belaga village and cargo boats with 200 GWT at maximum ply up to the town of Kapit.

(10) Saribas river

Some cargo and passenger boats with about 20 GWT ply the river up to the town of Betong.

(11) Lupar river

The Lingga town is located about 25.6 km from the river entrance of the Lupar river at the confluence with the Lingga river. In the village, there is a commercial wharf.

A bore takes place in the Lupar river above Lingga. Beyong Lingga, the Lupar river becomes shallower and only coastal launches can ply up to the town of Simanggang which is the main town of the Second Division. Vessels up to 35.7 m long and 2.0 m draft have entered the port in the past, but they had to utilize the flood tide to go further upstream. There are two commercial wharves and one Government launch wharf.

Besides the sand bar at the river entrance, dangerous sand bars are reported at Pulau Seduku and in the neighbourhood of Tanjung Skait.

(12) Sebuyan river

Sebuyan is a small port located about 0.8 km from the river entrance. Main export is stone produced at the granite quarry, bound for many centers in the State for road and other construction works. There exists an extensive bar of mud and sand, having a least depth of 1.2 m.

There are two wharves, one as quarry wharf and the other as commercial wharf at the port.

(13) Sadong river

Cargo and passenger boats with the 50 GWT at the maximum ply up to Simunjan.

Simunjan is a small port located about 32 km from the river mouth and is situated at the Simunjan Lama river on the eastern bank of the Sadong river. The Simunjan Lama river gets almost dry at low tide and no vessel can enter except at high water.

There is a wharf in the Simunjan Lama river which becomes dry at low tide.

(14) Sarawak river

The anchorage off Sejingkat village located about 22.4 km from the river mouth is the main timber loading place in the First Division. In 1980, 94 vessels with 365,404 GWT in total called the place and loaded 145 x 10^3 tons of round logs and sawn timber.

The town of Kuching, the Capital of the State of Sarawak, is located about 35.2 km from sea. Overseas vessels are handled by the Kuching Port Authority at Tanah Puteh situated 3.2 km from the town center and at Pending situated 8 km from the center. The largest vessel to berth recorded to date at Tanah Puteh is a vessel with about 4,000 GWT. The limit of the vessels plying beyond Pending Point to the Kuching Port Authority's wharf at Tanah Puteh is 133 m of overall length with a maximum draft of 5.2 m. Coastal vessels are accommodated at upstream wharves located in the town of Kuching.

There are three major wharves under the control of Kuching Port Authority. In 1978, 39 x 10^3 tons of cargo was loaded and 400 x 10^3 tons was discharged at these wharves.

Some small cargo boats ply up to Buso.

3. DEVELOPMENT PLAN

3.1 State of Sabah

Although expansion programs for the marine ports of Tawau, Sandakan, Kota Kinabalu and the construction of an industrial jetty complex at Sepangar Bay are envisaged in 4MP, no river port construction nor river dredging projects for the purpose of river navigation are included in the Plan.

3.2 State of Sarawak

3.2.1 River channel dredging

No river channel dredging will be implemented during 4MP period for the rivers in the State of Sarawak.

Blasting of rocks and rapids has been conducted up to now and will be continued in the coming years, considering the importance of rivers as principal means for transport. However, since the availability of the service of PWD officers for blasting is limited and the work must be carried out when the water level is at its lowest, the blasting works have to be carried out on priority basis.

Clearing of logs and stumps from rivers will be carried out mainly be the people using the rivers with government assistance when the task is beyond their capability.

3.2.2 Ports construction and improvement

The State of Sarawak heavily depends on shipping for her imports of capital and consumer goods as well as exports of agricultural and manufactured products. Without efficient port facilities, her economy will be forced to be slowed down. Although the Bintulu port development is underway and it is expected that the Bintulu port would outgrow the Kuching port in handling capacity, the Bintulu port facilities are to be utilized mainly for meeting the needs of the heavy industries proposed for Bintulu.

The port of Kuching and these on the Rajang river as well as the Miri port should continue to be upgraded, therefore, in order to satisfy the growing needs in their hinterlands.

The road network in Sarawak has yet to be developed. Due to the climate and a sparse population, long time would be required to construct adequate road systems. River transport should continue to play the vital role in inland communication of rural inhabitants as in the past. The construction of new jetties and improvement and extension of the existing ones are quite justifiable from the viewpoint of social well-being and should be materialized.

The Sarawak State PWD has drawn up a development plan consisting of wharf, jetty and anti-erosion projects for 4MP comprising 35 continuation projects and 60 new ones. The total expenditure amounts to M$109 x 10^6 of which M$38 x 10^6 would be disbursed during 4MP period. The proposed plan is summarized in Tables 2 to 4.

The beggest budget of M$30 x 10^6 has been earmarked for the improvement of the Kuching port. The Kuching Port Authority will expand its port facilities at Datuk Sim Kheng Hong Port, Pending in order to handle overseas general and containerized cargo. According to the information obtained at the Authority, this project will include (1) dredging in the berthing area to a depth of -8.5 m above chart datum, (2) piled wharf deck construction, (3) anti-erosion works to the river banks along the Sarawak river between Pending Point and the Biawak Oil Jetty, (4) transit shed and container freight station construction. By the expansion, the capacity of the Port will be increased from 700 x 10^3 to 1.3 x 10^6 tons per annum.

4. ALTERNATIVE TRANSPORT

4.1 State of Sabah

4.1.1 General

Although air transport is available in the State of Sabah, it only connects the major towns along the coast, i.e., Semporna, Sapulut, Tawau, Lahad Datu, Keningau, Ranau, Kudat, Sandakan, Kota Kinabalu and Labuan, flying almost at right angles to the major rivers, and does not compete with river transport which moves goods and people between the interior area and the coastal area.

Railway extends for 138 km only between the towns of Kota Kinabalu and Tenom. In this area, railway and river transports in the Padas river are complementary to each other in carrying logs from Tenom as described in Section 2.1.1. Logs are transported by railway from Tenom to Beaufort and by the Padas river down the stream. No expansion program for railway is envisaged in 4MP.

In 1979, the total distance of existing trunk road amounted to about 4,400 km, and rural road networks extended for some 4,800 km. However, the existing trunk road network links only some of the major towns. Further out of the 4,400 km, only 1,400 km is metalled and sealed. The rest is gravel and earth road and is susceptive to heavy rainfall. The rural roads are mainly earth and gravel ones. Up to now, road transport has replaced river transport including ferry service to some extent. However, chief role in carrying logs as well as moving goods and people in the rural areas still is played by inland navigation.

4.1.2 Road

In 1979, metalled and sealed road stretched for some 1,400 km, and gravel road and earth road ran for 2,600 km and 400 km, respectively. The existing road network is as shown in Fig. 1. In 1979, about 85,000 motor vehicles excluding motor cycles were registered in the State. During 1970 - 1979 period, the total number of registered motor vehicles increased at an average annual growth rate of 12%.

In 4MP, priority will be placed on the completion of paving all the existing gravel roads connecting the major towns and the construction of new roads linking up minor population centers. The existing gravel roads will be reconstructed for some 350 km. Construction works on the Semporna-Lahad Datu, Tamparuli-Ranau and Papar-Sindumin roads continue to be carried out. A program for the reconstruction and improvement of trunk roads including the stretches from Berungis to Kota Belud, Lahad Datu to Sandakan and Sandakan to Telupid will also be commenced during the Plan period. The road stretches to be completed during 4MP period and the proposed future roads are as shown in Fig. 1 together with the existing ones.

4.2 State of Sarawak

4.2.1 General

Although air transport is available in the State of Sarawak, they only connect the major towns of Miri, Bintulu, Sibu, Kuching and several others. The air routes stretch almost at right angles to the major navigable rivers and do not compete with river transport. Although new airports at Limbang, Bintulu and Sibu and the expansion of the Kuching Airport are envisaged in 4MP, no plan has been conceived for constructing airports in the interior area.

Railway transport is not in existence in the State. No program for developing railway has been contemplated either in 4MP or any other long-term plan.

In 1978, the total distance of existing trunk road amounted to about 2,600 km. However, the existing network links only some of the major towns. Further out of the 2,600 km, only 750 km is bitumen or concrete. The rest is gravel and earth roads and is susceptible to heavy rainfall, which is peculiar characteristics of the State. Up to now, road transport has replaced river transport including ferry service to some extent. However, considering the various constraints which hinder rapid road expansion in the State, including sparse population, heavy rainfall, shortage of construction material and others, river transport will remain the principal mode of transport in the foreseeable future.

4.2.2 Road

In 1978, bitumen and concrete road stretched for some 750 km, and gravel road and earth road ran for 1,600 km and 250 km, respectively. The existing road network is as shown in Fig. 2. In 1978, about 54,000 motor vehicles excluding motorcycles were registered in the State. During 1970 - 1978 period, the total number of registered motor vehicles increased at an average annual growth rate of 12%.

In 4MP, priority will be placed on the completion of the First Trunk Road System, which will play as spinal road in the road network of the State. The road stretch between Ulu Batang Mukah and Bintulu will be carried out. Improvement and bitumen surfacing of the Miri-Bintulu road at various sections will also be accelerated. Work will be started on the Second Trunk Road System. Roads which lead to important development projects will be continued to be developed. The road stretches to be developed during 4MP period are as shown in Fig. 4 together with the existing ones.

5. PROBLEMS AND NEEDS

5.1 State of Sabah

Siltation occurs at the river mouth of the Labuk river, and cargo boats and a oil tanker of more than 100 GWT have to wait for high tide for passing the river entrance. In general, however, no serious problems are reported to be existent in the rivers of the State of Sabah from navigation viewpoint.

According to the Sabah Regional Planning Study, the Marine Department may in the future enter into discussions with district officers for studying the needs and requirement for river navigation, ferry services in particular.

5.2 State of Sarawak

Most of the rivers in the State of Sarawak have bars at their mouths, restricting the size of vessels which can enter the river. In many rivers, shallows and mud flats are frequently encountered in their lower reaches. Rapids and rocks also hinder the movement of vessels.

As described in Section 2.2.2, sand bar lies at the mouth of the Miri river, which often endangers the entering vessels with a narrow channel that usually changes at the time of monsoon seasons as well as odd times in-between. The depth of the bar at the mouth of Mukah river prohibits the entering of large scale ocean-going vessels, allowing only launches and smaller coastal vessels. In the Rajang river, sand banks obstruct the channel between Sibu and the junction between the Rajang and Paloh rivers, thus prohibiting the passage of the vessels with more than 4 m draft. Sand bar at the mouth and dangerous sand bars at Pulau Seduku and in the vicinity of Tanjung Skait are reported in the Lupar river.

The Simunjan Lama river gets almost dry at low tide, prohibiting the entrance of any vessels except at high water.

In many rivers, rocks and rapids hinder river navigation. Although blasting of these has been and will continue to be carried out in the future, the work progress is restricted due to the shortage of PWD officers for blasting.

6. PROSPECT OF INLAND NAVIGATION

6.1 State of Sabah

Although road network will continue to be developed in the coming years, river transport will remain the principal means where road opening does not affect the existing traffics. In case of carrying logs and sawn timber, river usage will remain dominant mode as relatively cheap means. New river traffic may be generated for transporting agriculture and forestry products with the opening up of new roads which provide access to the rivers.

Rivers are likely to play a key role in moving goods and people especially in the remote areas in the future, though their importance may be reduced to some extent.

6.2 State of Sarawak

The rivers in the State of Sarawak provide vast extension of water courses which penetrate deeply into the interior area. Almost all the towns and villages are situated along or in the vicinity of the river banks, thereby having access to the sea. River ports including Kuching and Sibu have been playing chief role for export and import activities.

Though new roads have been opened and continue to be expanded in the future, the pace is likely to be moderate due to the various constraints including heavy rainfall, shortage of construction material, availability of funds and others. Rivers are most likely to play dominant role in moving goods and people, providing immense distance of waterways with the advantage of smaller operation and maintenance cost over roads.

Considering the significance of the inland navigation development for the economic development and the enhancement of social well-being in the State of Sarawak, it is recommended that in the short-run the plan for 4MP proposed by the State PWD, which envisages to implement 95 continuation and new projects at the cost of some M$38 x 10^6, should fully be implemented.

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13. FOURTH MALAYSIA PLAN FOR PORTS DEVELOPMENT PROPOSED BY SARAWAK STATE PWD, 1980

14. FOURTH MALAYSIA PLAN PROPOSED BY SARAWAK SPU, 1980

TABLES

Table 1 RIVER WITH JETTIES IN SARAWAK

Name of River	No. of Jetties	Name of River	No. of Jetties
1. Sarawak	26	29. Rajang	33
2. Sadong	3	30. Loba Lembangan	1
3. Simunjan Lama	1	31. Merah	1
4. Lundu	2	32. Mukah	4
5. Kuap	1	33. Balingian	2
6. Lupar	4	34. Oya	4
7. Samarahan	8	35. Kanowit	1
8. Tabuan	1	36. Miri	4
9. Kayan	1	37. Baram	5
10. Semantan	1	38. Sibuti	1
11. Bako	1	39. Niah	1
12. Buntal	1	40. Bintulu	2
13. Mayan	1	41. Kemena	2
14. Nonok	1	42. Tatau	1
15. Reba	1	43. Baram	-
16. Semera	1	44. Suai	1
17. Lingga	1	45. Limbang	9
18. Sebuyau	3	46. Ranggau	1
19. Betong	1	47. Lawas	3
20. Paku	2	48. Merapok	1
21. Rimbas	2	49. Punang	1
22. Melango	1	50. Awat Awat	1
23. Krian	3	51. Trusan	4
24. Sablak	1	52. Limbang	-
25. Layar	1	53. Nyelong	2
26. Maludam	1	54. Matu	1
27. Saribas	1	55. Daro	2
28. Skrang	1	Total	160

Table 2 PORTS DEVELOPMENT PLAN FOR 4MP PROPOSED BY SARAWAK STATE PWD (1/3)

Unit: M$10^3

Name of Projects	Division No.	Investment Total	Investment 4MP
Continuation Projects			
Riverwall Kut Canal	3	443	150
Riverwall Bukit Lima Sibu	3	500	100
Extension to Wharf Kuala Baram	4	550	225
Extension to Wharf at Fish Market Kuching	1	100	75
Government Wharf Sambir	1	200	40
Kanowit Wharf Extension	3	450	150
Mukah Riverwall Extension	3	1,398	598
Commercial Wharf Marudi	4	178	50
Jetty Sejingkat	1	150	60
Jetty Tg. Bako	1	220	130
Jetty Goebilt	1	350	100
Jetty Simunjan	1	300	150
R.C. Wharf Pusa	2	300	200
Riverwall Sebuyau	2	400	400
Kanowit Riverwall Extension	3	500	400
Riverwall Dalat	3	480	480
Industrial Wharf, Upper Lanang Road	3	600	600
Concrete Wharf Kuala Baram	4	400	400
Wharf Long Lama	4	250	250
R.C. Ramp Kapit	7	150	100
Belian Jetty Belaga	7	150	140
Kapit New R.C. Wharf	7	950	940
Song Bazaar Retaining Wall	7	400	400
Extension to Custom Wharf Miri	4	1,200	1,020
R.C. Wharf Bintulu	4	900	400
New Coastal Wharf Sibu	3	2,500	1,000
Ports Investigation	State	1,187	982
Coastal Wharf Sibu	3	265	50
Marine Wharf Bintulu	4	180	180
Extension to Marine Wharf Miri	4	180	180
Retaining Wall Simunjan	1	2,000	0
Improvement to Sg. Miri Channel	4	3,600	3,600
Miri Port Development	4	25,000	5,000
Commercial Wharf Saratok	2	400	300
R.C. Jetty Rejang	6	500	400
Total for Continuation Projects		47,331	19,250

Table 3 PORTS DEVELOPMENT PLAN FOR 4MP PROPOSED BY SARAWAK STATE PWD (2/3)

Unit: M$10^3

Name of Projects	Division No.	Investment Total	Investment 4MP
New Projects			
Sibu Express Boart Pontoon Wharf	3	600	600
Marudi Custom Wharf	4	200	200
Jetty Ukong	5	200	200
R.C. Wharf Belawai	6	300	300
Jetty Gedong	1	60	60
Government Wharf Simanggang	2	160	160
Riverwall at Penakub/Tutus Mukah	3	700	700
Retaining Wall Tg. Batu	4	60	60
Custom Pontoon Wharf Limbang	5	120	120
R.C. Pontoon Wharf, Selalang	6	220	220
Sematan Riverwall	1	250	250
Simanggang Riverwall Extension	2	700	200
Wharf Semara	1	180	180
Commercial Wharf Tatau	4	140	140
Merapok Wharf, Lawas	5	60	60
R.C. Pontoon Wharf Extension Binatang	6	200	200
Lingga R.C. Wharf Extension	2	200	200
Oya Riverwall	3	100	100
Batu Niah Retaining Wall	4	100	100
Jetty for Inland Boats, Limbang	5	65	-
Belian Jetty Ng. Geat	7	100	100
Government Wharf Sematan	1	120	120
Commercial Wharf Roban	2	120	120
Belian Jetty at Sg. Antu, Sibu	3	80	80
R.C. Pontoon Wharf Kuala Baram	4	180	180
Jetty Batu Danau	5	100	100
R.C. Jetty Paloh	6	150	150
Jetty Lundu Bazaar	1	120	120
Pontoon Wharf Pantu	2	120	120
Government Wharf Extension Mukah	3	200	200
Government Wharf Marudi	4	80	80
Punang Gabion Seawall, Lawas	5	300	100
Igan Belian Jetty	3	150	150
Belian Jetty Uma Badang	7	100	100
Riverwall Petra Jaya	1	30,000	6,000
Government Boat Wharf Spaoh	2	80	80
Balingian Riverwall	3	240	50
Mukah New R.C. Commercial Wharf	3	400	60
Steel Pontoon, Stapang	3	80	80
Pontoon Wharf Lawas	5	120	120
R.C. Jetty Bruit	6	150	150
Improvement of Kut Canal	3	6,000	0
Landing Stage Lubok Antu	2	60	60
Riverwall Kpg. Tanam Dalat	3	120	120

Table 4 PORTS DEVELOPMENT PLAN FOR 4MP PROPOSED BY SARAWAK STATE PWD (3/3)

Unit: $M\$10^3$

Name of Projects	Division No.	Investment Total	Investment 4MP
Pontoon Wharf Bekenu	4	160	160
Binatang Riverwall Extension	6	2,300	300
Improvement to Kubu Jetty Kapit	7	75	75
Belian Wharf Kpg. Melango	2	80	80
R.C. Pontoon Wharf Dalat	3	200	200
Sarikei Riverwall	6	2,600	1,000
P.W.D. Wharf Sarikei	6	250	250
Kabong Commercial Wharf Extension	2	200	200
Riverwall Pulau Babi	3	2,500	1,000
Kubu Wharf Extension Lawas	5	60	60
Riverwall Fort Lily Betong	2	200	200
Riverbank Protection Betong	2	250	50
Canal Melanti/Maludam/Semarang	2	2,000	0
Riverwall Kuching	1	4,000	1,650
Commercial Wharf Kuching	1	1,200	600
Sibu New R.C. Commercial Wharf	3	1,500	500
Total for New Projects		61,360	18,815
Grand Total		108,691	38,065

FIGURES

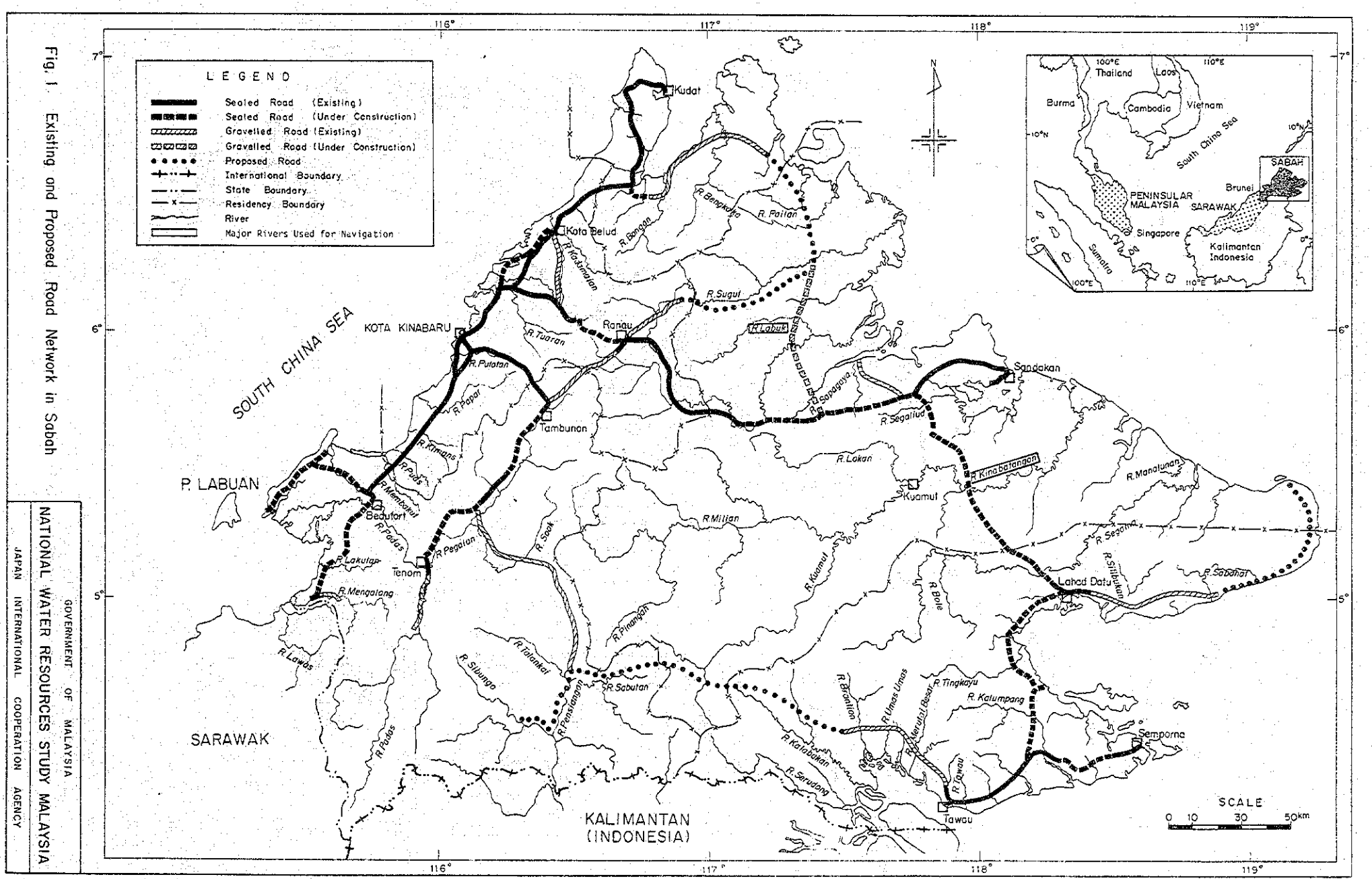

Fig. 1 Existing and Proposed Road Network in Sabah

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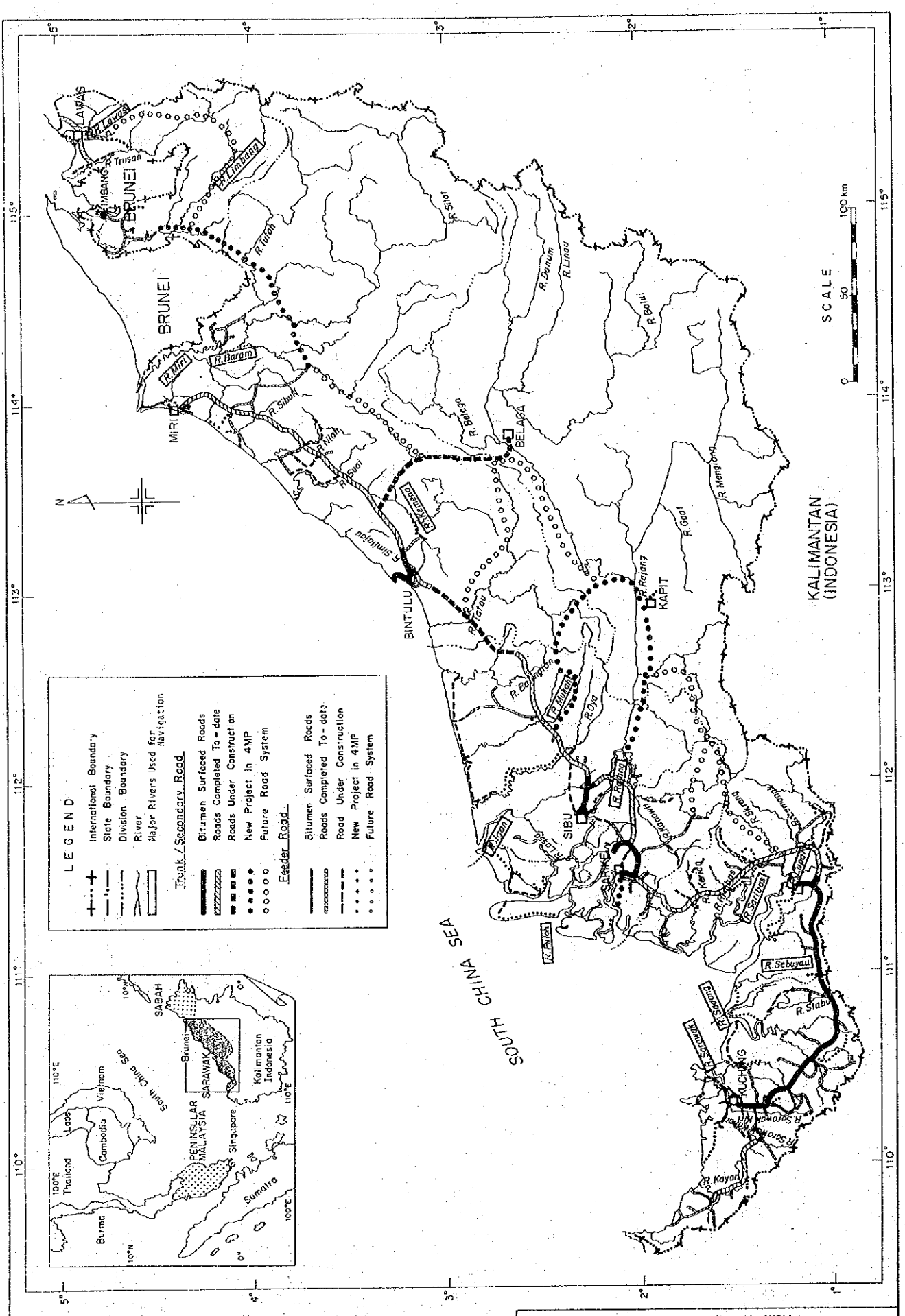

Fig. 2 Existing and Proposed Road Network in Sarawak.

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WATER-RELATED RECREATION

PART 1

PENINSULAR MALAYSIA

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1. INTRODUCTION

1.1 Objective of Water-related Recreation Study

The objective of the water-related recreation study is to project the number of foreign and domestic tourists for Peninsular Malaysia in 1990 and 2000 by state of destination.

1.2 Projection Methodology

Total number of foreign tourists excluding Singaporean coming by land was estimated based on the figures in 1979 and the average annual growth rates during 1971 - 1985 period projected by TDC. The number of Singaporean visitors coming by land was projected based on the growth trend during 1976 - 1978 period.

The destination distribution of foreign visitors was determined by the historical data obtained by TDC. The duration of stay was projected for 1990 and 2000 according to the destinations and modes of arrival based on the duration of stay by state given in the Survey of Foreign Visitors by Air to Peninsular Malaysia, 1976.

Number of trip-days was obtained by the duration of stay by destination and by mode of arrival and the number of foreign tourists by destination and mode.

The number of domestic tourists in Peninsular Malaysia was estimated for 1990 and 2000 based on per capita trip generation and the population projected.

The number of domestic tourists by destination was obtained based on the absorbing power of each state considering its regional GDP.

The average duration of stay was determined for non-hotel staying tourists and hotel staying tourists. They were estimated to be 2 days and 3.6 days, respectively.

Number of trip-days was obtained by the duration of stay by destination and the number of domestic tourists by destination.

2. PRESENT CONDITION

2.1 Hotel Facilities and Hotel Guests

According to the Hotel Occupancy Report of 1977 prepared by TDC, there are 486 hotels in Peninsular Malaysia with a total of 16,121 rooms.

As shown in Fig. 1, number of hotel rooms is correlated to the level of economic activity as indicated by GDP except for Selangor State and Pulau Pinang State. About 7,000 rooms corresponding to 40% of the total of Peninsular Malaysia were located in Selangor State while 3,400 rooms or 21% were in Pulau Pinang State. The concentration of accommodation capacity in these 2 states is extremely high relative to their level of economic activity as represented by their GDP. This exception is due to the following reasons:

(a) Selangor and Pulau Pinang States, with their international airports, are entry points for the foreign visitors both as tourists as well as on business; and

(b) Pulau Pinang State, with her large-scale resorts, is able to absorb a large number of tourists.

There is a linear correlation between number of hotel guests and hotel accommodation capacity (Fig. 2).

2.2 Tourists

2.2.1 Foreign tourists

Foreign tourists are classified into 3 groups in view of the differences in their activities, access into Peninsular Malaysia and income level, namely:

(a) Singaporeans,

(b) Thais, and

(c) Other foreigners.

(1) Number of foreign tourists in Peninsular Malaysia (1975)

The number of foreign tourists to Peninsular Malaysia in 1975 was estimated as shown in Table 1 based on the data obtained from the Malaysia Tourist Development by TDC. The total number of foreign tourists in 1975 was estimated to be $1,037 \times 10^3$, including 541×10^3 Singaporeans coming via the Causeway by road and rail. The Singaporeans make up 60% of all the foreign tourists numbering 648×10^3. The number of Thai and Singaporean tourists, excluding Singaporeans coming via the Causeway, is nearly equal to that of the other foreigners. The former was 202×10^3 as compared to the latter of 294×10^3.

(2) Point of entry of foreign tourists (1978)

Their point of entry into Peninsular Malaysia was different for the different nationalities and different modes as follows:

(A) Singaporeans

In case of tourists coming by air, 85×10^3 or 80% entered via Subang Airport in Selangor State while 20×10^3 or 20% enter via Penang Airport. Those who came by rail and road came via the Causeway to Johor Bahru in Johor State.

(B) Thais

The tourists who came by air enter via Subang Airport and Penang airport, each group numbering 7 to 8×10^3. In case of those coming by rail, they entered via Pedang Besar in Perlis while those coming by road entered via Rantau Panjang in Kelantan.

(C) Other foreigners

Among the tourists who came by air, 260×10^3 or 70% came via Subang Airport while 110×10^3 or 30% entered via Penang Airport. Those coming by road, almost 236×10^3 or 90% came from Singapore to Johor Bahru via the Causeway.

Details are given in Table 2.

(3) Destination of visitors (1978)

(A) All foreigners

Ninety percent of the total of 429×10^3 visitors made trips to Selangor State, Genting Highland and Fraser's Hill. Forty percent or 176×10^3 visited Pulau Pinang State, with multiple trips. Thirty-four percent or 146×10^3 visited Perak State, mainly making trips to Pangkor Island. In the east coast, trips to Pahang State were made by only 8×10^3 of the visitors, excluding those who visited Genting Highland, Fraser's Hill and Cameron Highland while trips to Trengganu State, by 5×10^3 of the visitors.

(B) Singaporeans

All the Singaporean visitors took trips to Selangor State with 25% of them also visiting Pulau Pinang State.

(C) Thais

Selangor State was visited by 61% of the Thai visitors while Pulau Pinang State accounted for 30% of the total.

(D) Other foreigners

84% of the other foreigners visited Selangor State while 46%, Pulau Pinang State.

(4) Duration of stay (1976)

Duration for stay for the Singaporeans was 3.9 while for the Thais, it was 4.4 nights. Among the other foreign visitors the duration of stay of the Japanese was the shortest, only 3.6 nights while those from India stayed the longest, over a period of 7.3 nights. The visitors from continental Europe stayed for 6.8 nights. The average duration of stay for the foreign visitors was 4.7 nights.

2.2.2 Domestic tourists (1975)

(1) Number of tourists in Peninsular Malaysia

In 1975, the number of tourists was estimated at 7,617 x 10^3, based on the total person trips of tourists in 1977 and the average annual trips per person which corresponded to 0.73. In 1975, hotel tourists were estimated at 417 x 10^3 while non-hotel tourists, 7,200 x 10^3.

(2) Trips of tourists generated by state

Out of a total of 7,617 x 10^3 tourists, the 3 states of Selangor, Perak and Johor had the highest numbers of trips generated by tourists which were 1,453 x 10^3, 1,325 x 10^3 and 1,101 x 10^3, respectively.

The total number of trips generated by state was estimated assuming that the distribution of tourists was the same as that of population of each state based on the assumption that the per capita income gap would be comparatively small in the future and accordingly, per capita trips generated would be similar in all the states.

(3) Number of tourists by state of destination

Twenty-nine percent of the tourists were destinated to Selangor State, 19.5% in Perak State, 12.5% in Pulau Pinang State and 11.9% in Johor State. The distribution was closely related to the scale of GDP of each state.

2.2.3 Distribution of hotel guests (1978)

Out of a total of 3,359 x 10^3 hotel guests in Peninsular Malaysia, 1,249 x 10^3 or 37% were found in Selangor State, 653 x 10^3 or 19% in Pulau Pinang State and 361 x 10^3 or 11% in Perak State while the three states in the east coast, namely Kelantan, Trengganu and Pahang States accounted for only 13% or 431 x 10^3. The remaining 5 states accounted for the rest, 20%. Except for Selangor and Pulau Pinang States, more than 80% of the hotel guests in the states were domestic tourists.

In Selangor and Pulau Pinang States, the percentage of domestic and foreign guests was almost equal. This indicates that the travel of the foreigners was mainly restricted to the areas of more advanced economic activity and large-scale resort areas and that the hotels of the other states mainly catered for the domestic guests.

3. PROJECTION OF TOURISTS

3.1 Projection of Foreign Tourists

The foreigners are divided into three categories according to their nationality and in view of their access to Peninsular Malaysia.

(a) Singaporeans,

(b) Thais,

(c) Other foreigners including Japanese, Europeans and Americans.

Projection was made in 6 steps as follows:

Step 1: Number of foreign tourists

Step 2: Number of foreign tourists by nationality

Step 3: Number of foreign tourists by nationality and by mode of arrival

Step 4: Number of foreign tourists by point of entry into Peninsular Malaysia

Step 5: Number of trips of foreign tourists by destination in Peninsular Malaysia

Step 6: Number of trips-days of foreign tourists by destination in Peninsular Malaysia

3.1.1 Projection of foreign tourists excluding Singaporeans coming by road and railway

According to the projection by TDC, the average annual growth rate during 1980 - 1985 period is as follows:

1980 - 1981	5.0%
1981 - 1982	6.0%
1982 - 1983	7.0%
1983 - 1984	7.0%
1984 - 1985	7.0%

The number of foreign tourists was projected based on the number in 1979, which was 772×10^3 (see Table 3), and the above-mentioned growth rate, assuming that 6.0% average annual growth rate will be maintained during 1985 - 1990 and 5.0% during 1990 - 2000. The numbers were projected as follows:

1980: 810×10^3

1985: $1{,}124 \times 10^3$

1990: $1{,}504 \times 10^3$

2000: $2{,}450 \times 10^3$

3.1.2 Projection of foreign tourists by nationality

(1) Tourists excluding Singaporeans coming by road and railway

The number and proportion of tourists excluding Singaporeans coming by road and railway by nationality in 1979 was shown in Table 3 together with their growth rates dueing 1976 - 1979. Foreigners other than Singaporeans and Thais formed 65% of total foreign tourists. The remainder 35% was distributed about equally between the two nationalities, namely, Singaporean and Thai. The past trend during 1976 - 1979 shows a steadily increasing proportion of the other foreigners. Considering these, the percentage distribution in 1990 and 2000 was projected as shown in Table 4. The projected number of tourists in 1990 and 2000 is shown in Table 5.

(2) Singaporeans coming by road

The number of Singaporean visitors coming by road is shown in Table 6. The average annual growth rate during 1976 - 1978 was 3.9%. The number of Singaporean visitors coming by road was projected on the assumption that the average annual growth rate during 1978 - 1990 would be 3.0% and 2.0% during 1990 - 2000.

In 1973, the proportion of Singaporean tourists coming by road was about 21% of the Singaporean visitors coming by road. The number of Singaporean tourists coming by road in 1990 and 2000 was projected on the assumption that this percentage would be maintained up to 2000. The projected number of tourists in 1990 and 2000 is shown in Table 5.

(3) Singaporeans coming by railway

The ratio of Singaporean visitors coming by railway to those coming by road was about 5 to 95 as shown in Table 6. The number of Singaporean visitors as well as tourists coming by railway in 1990 and 2000 was projected, assuming that this ratio would be maintained until 2000. The projected number of tourists in 1990 and 2000 is shown in Table 5.

3.1.3 Projection of foreign tourists by nationality and mode of arrival

Singaporeans coming by road and railway is as projected in the previous section. The distribution by mode of arrival of the other tourists was based on that in 1978 assuming that both distribution of tourists and visitors by mode of arrival is the same for 1975, 1990 and 2000 (see Table 7). The number of tourists by nationality and mode of arrival for 1975, 1990 and 2000 are given in Tables 8 to 10.

3.1.4 Projection of foreign tourists by point of entry into Peninsular Malaysia

The point of entry of foreign tourists into Peninsular Malaysia by mode of travel and nationality in 1978 is as follows:

(1) Air

(a) Singaporeans : 80% in Subang, 20% in Penang

(b) Thais : 53% in Subang, 47% in Penang

(c) Other Foreigns : 70% in Subang, 30% in Penang

(2) Sea

(a) Singaporeans : 73% in Pengerang

(b) Thais : No specific sea port

(c) Other Foreigns : No specific sea port

(3) Road

(a) Singaporeans : 100% in Johor Bahru

(b) Thais : 70% in Rantau Panjang

(c) Other Foreigns : 90% in Johor Bahru

(4) Rail

(a) Singaporeans : 100% in Johor Bahru

(b) Thais : 100% in Padang Besar

(c) Other Foreigns : 60% in Johor Bahru, 40% in Padang Besar

The number of tourists by point of entry was projected based on the assumption that the distribution in 1975, 1990 and 2000 is the same as that in 1978. The number of tourists by point of entry in 1975, 1990 and 2000 are given in Tables 11 to 13, respectively.

3.1.5 Projection of trips of foreign tourists by destination in Peninsular Malaysia

(1) Methodology

Foreigners coming by air through the entry points, Kuala Lumpur (Sukang) and Pulau Pinang, traveler to the States, sometimes making multiple trips. Number of trips by destination was made on the assumption

that trips per 100 tourists of each nationality by destination is the same for 1975, 1990 and 2000 as that for 1978 which is given in Table 14.

Tourists who come by sea are assumed to stay in the state of their point of entry. Thus those entering via Pengerang port in the south-east of Johor would stay within Johor while those coming via Penang and Klang ports would stay in Pulau Pinang and Selangor.

The destination of tourists from Singapore coming by road and railway via causeway was projected assuming that the number of trips per 100 tourists by destination is the same as that for Australian visitors coming via causeway as shown in Table 15.

Those from Thailand entering via Rantau Panjang in Kelantan were assumed to stay in the east coast of the Peninsula. Their distribution in the three states of Kelantan, Trengganu and Pahang was according to that of population of these states.

According to historical data, almost all those coming via Padang Besar from Thailand were distributed to the west coast of Peninsular Malaysia. The number of trips per 100 tourists to three states were estimated taking the figures of tourists from Singapore via causeway as shown in Table 16.

(2) Number of trips by destination

The number of trips by destination is shown for 1975, 1990 and 2000 in Table 17.

3.1.6 Projection of trip-days of foreign tourists by destination

The duration of stay varies depending on the destination of the trip. It is longer in the east coast than the west coast. As shown in Table 18, in Selangor and Pulau Pinang States, it is between 3 and 5 days while in Trengganu State, Pahang State and Johor State, it is about 10 days. The coast thus seem to be a typical resort area for a long vacation while Selangor and Pulau Pinang States are more suitable for package and group tours over a shorter duration.

The duration of stay also varies according to the mode of travel for entering Peninsular Malaysia. Those who come by air or sea have an inclination to stay longer than those who come by land in order to maximize their economics over cost and time expended as shown in Table 19.

Considering these, the duration of stay by mode and by destination was estimated as shown in Table 20.

Number of trip-days by destination was estimated by the number of trips by destination and the duration of stay by destination. Number of trip-days by destination for 1975, 1990 and 2000 is shown in Table 21.

3.2 Projection of Domestic Tourists

Projection of domestic tourists was made in 6 steps as follows:

Step 1: Number of domestic tourists

Step 2: Number of domestic hotel guests

Step 3: Number of domestic tourists among domestic hotel guests

Step 4: Number of domestic tourists who are not hotel guests

Step 5: Number od domestic tourists by destination

Step 6: Number of trip-days of domestic tourists by destination

3.2.1 Projection of domestic tourists in Peninsular Malaysia

Number of domestic tourists in Peninsular Malaysia was estimated using the following formula:

$$TG = A \cdot P$$

where, TG: Total number of tourist trips generated in Peninsular Malaysia

A : Per capita tourist trip generated

P : Population

The future population was projected in the Sectoral Report PA as follows:

1975	$10,434 \times 10^3$
1990	$14,820 \times 10^3$
2000	$17,497 \times 10^3$

A preliminary survey on domestic tourism was jointly conducted by TDC and the Department of Statistics among 6,518 Malaysian interviewees of 15 years of age and above during the period of January to March, 1977. The survey indicated an average of 0.73 trips per person per annum for the value of A. This value was assumed to be constant until 2000.

The number of trips of domestic tourists was estimated as follows:

1975	$7,617 \times 10^3$
1990	$10,819 \times 10^3$
2000	$12,773 \times 10^3$

3.2.2 Projection of domestic hotel guests

The number of domestic hotel guests consisting tourists and these with other purposes was estimated using the following formula:

$$TG = B \cdot P$$

where, TG: Number of hotel guests in Peninsular Malaysia
B : Per capita generation of hotel guests
P : Population

Per capita generation of hotel guests, B, was determined at 0.2 based on the figures during 1976 - 1978 (Table 22).

The number of domestic hotel guests in Peninsular Malaysia was estimated as follows:

1975	$2,087 \times 10^3$
1990	$2,964 \times 10^3$
2000	$3,499 \times 10^3$

3.2.3 Projection of domestic tourists among hotel guests

According to the survey of international and domestic visitors conducted by TDC, the distribution of visitors by purpose is as shown in Table 23.

In this study, the proportion of domestic tourists to total Malaysian hotel guests is assumed to be 20%, based on the proportion of holiday/ vacation.

The number of domestic tourists among hotel guests as estimated as follows:

1975	417×10^3
1990	593×10^3
2000	700×10^3

3.2.4 Projection of domestic tourists who are not hotel guests

Number of domestic tourists who do not stay at hotels but stay at relatives' or friends' house was estimated by subtracting the number of domestic tourists among hotel guests from the total number of domestic tourists as follows:

1975	$7,200 \times 10^3$
1990	$10,226 \times 10^3$
2000	$12,073 \times 10^3$

3.2.5 Projection of domestic tourists by destination

Number of domestic tourists by destination was obtained from the preliminary survey on domestic tourism in 1977 by TDC and DOS. The proportion of person-trips is closely correlated to the potential absorbing power of each state which is represented by GDP as shown in Fig. 3. From the figure, the following formula was derived for the relationship between the proportion of person-trips by State and proportion of GDP by State.

$$r = 0.85g + 1.54$$

where, r: Proportion of person-trips by State
g: Proportion of GDP by State

The correlation coefficient was calculated at 0.95.

Domestic tourists by destination was estimated on the assumption that the relationship would be maintained until 2000 and that the destribution by destination would be the same for both hotel tourists and non-hotel tourists as shown in Table 24.

3.2.6 Projection of trip-days of domestic tourists by destination

The average duration of stay of non-hotel staying tourists including those staying with family, relatives or friends was assumed at 2 days in view of the popularity of weekend trips.

The Malaysian hotel tourists are considered to be in the higher income group. Their duration of stay, therefore, was assumed at 3.6 days based on the 1973 figure of Singaporean tourists.

Number of trip-days of domestic tourists by destination in Peninsular Malaysia was estimated for 1973, 1990 and 2000 as shown in Table 25.