

Table 2 PRELIMINARY FISH FAUNA IN JOHOR AND  
SEDILI BESAR RIVER SYSTEMS (1/2)

Species	Local Name	Approximate Length (cm)	Johor river system	Sedili Besar river system
<i>Cypriniformes</i>				
<i>Macrochirichthys macrochirus</i>	Parang sungai	50	o	o
<i>Chela anomalura</i>	Ikan lalang	10	o	o
<i>Rasbora elegans</i>	Seluang	4	o	o
<i>R. sumatrana</i>	Seluang	4	o	o
<i>R. trilineata</i>	Seluang	4	o	o
<i>R. panciperforata</i>	Seluang	4	-	o
<i>R. maculata</i>	Seluang	4	o	o
<i>R. einthoveni</i>	Seluang, Susur batang	4	o	o
<i>R. heteromorpha</i>	Seluang	4	o	o
<i>Hampala macrolepidota</i>	Sebarau, Barau-barau	25	o	o
<i>Cyclocheilichthys apogon</i>	Champeras, Temperas	20	o	o
<i>C. heteronema</i>	Champeras	10	o	o
<i>Cyprinus carpio</i>	Leekoh	50	-	o
<i>Puntius orphoides</i>	Pipi merah	25	o	o
<i>P. binotatus</i>	Putih, Tebal sisek	7	o	o
<i>P. lateristriga</i>	Bagoh	7	o	o
<i>P. partipentazona</i>	Pelampong jaring	5	o	-
<i>P. hexazona</i>	Pelampong jaring	5	o	-
<i>P. schwanenfeldii</i>	Lampam sungai, Kepiat	20	-	o
<i>P. gonionotus</i>	Lampam jawa	30	o	o
<i>Osteochilus vittatus</i>	Ikan rong	20	o	o
<i>O. hasseltii</i>	Ikan terbol, Terbui	15	o	o
<i>Labiobarbus</i> spp.	Ikan kawan	20	o	o
<i>Leptobarbus hoevenii</i>	Ikan jelawat	40	o	o
<i>Epalzeorhynchus siamensis</i>	Selimang siam	15	-	o
<i>Homaloptera orthogoniata</i>	Susoh batu, Puting baliong	10	o	-
<i>Acanthopthalmus semicinctus</i>	Ikan pasir	10	o	-

Remarks: o : Species confirmed to be present  
- : Species not confirmed to be present

Table 3 PRELIMINARY FISH FAUNA IN JOHOR AND  
SEDILI BESAR RIVER SYSTEMS (2/2)

Species	Local Name	Approximate Length (cm)	Johor river system	Sedili Besar river system
<b>Siluriformes</b>				
<i>Clarias macrocephalus</i>	Keli bunga	40	o	o
<i>C. batrachus</i>	Ikan keli	40	o	o
<i>Prophagorus nieuhofti</i>	Keli limbat	50	o	o
<i>Silurichthys hasseltii</i>		15	-	o
<i>Kryptopterus</i> spp.	Ikan anak tapah	15	o	o
<i>Wallago dinema</i>	Tapah	60	o	o
<i>W. attu</i>	Tapah	100	o	o
<i>Ompok bimaculatus</i>	Lais, Tapah bemban	30	o	o
<i>Chaca chaca</i>		30	o	o
<i>Tachysurus maculatus</i>	Seludu, Duri	25	-	o
<i>Mystus baramensis</i>	Baung	30	o	o
<i>M. nigriceps</i>	Baung, Pisang	30	o	o
<i>M. nemurus</i>	Baung	30	-	o
<i>M. wyckii</i>	Tengku lolah	30	-	o
<i>M. vittatus</i>	Baung	15	o	o
<b>Non-Ostariophsi</b>				
<i>Scleropages formosus</i>	Ikan kelasa, Kelisa	50	o	o
<i>Notopterus notopterus</i>	Ikan belida	40	o	o
<i>N. chitala</i>	Ikan belida	50	-	o
<i>Dermogenys pusillus</i>		15	o	o
<i>Monopterus albus</i>	Belut	90	o	o
<i>Mastacembelus maculatus</i>	Tilan	30	o	o
<i>M. armatus</i>	Tilan	40	o	o
<i>Channa micropeltes</i>	Toman	100	-	o
<i>C. striatus</i>	Aruan, Haruan, Tuan	50	o	o
<i>C. lucius</i>	Bujok, Ubi	40	o	o
<i>Trichogaster tricopterus</i>	Sepat	15	o	o
<i>Osphronemus goramy</i>	Kalui	60	o	o
<i>Betta splendens</i>	Sepiai, Pelaga, Belaga	6	o	o
<i>Anabas testudineus</i>	Puyu	25	o	o
<i>Helostoma temminckii</i>	Temakang, Tambakang	30	o	o
<i>Luciocephalus pulcher</i>	Tembok tebing	18	-	o
<i>Chanda siamensis</i>	Ikan seriding	6	-	o
<i>Nandus nebulosus</i>		15	o	o
<i>Pristolepis fasciatus</i>	Patong, Kepor	8	o	-
<i>Oxyleotris marmoratus</i>	Ketutu, Belantok	40	o	o
<i>Achiroides leucorhynchus</i>	Ikan nabi	6	-	o
<i>Chonerhinus modestus</i>	Buntal	10	-	o
<i>Tetraodon leiurus</i>	Buntal	10	-	o
<i>T. fluviatilis</i>	Buntal	10	-	o
<i>Toxotes jaculator</i>	Ikan sumpit	15	o	o

Remarks: o : Species confirmed to be present  
- : Species not confirmed to be present

Table 4 CORRELATION CHART OF THE HABITAT PREFERENCE AND FOOD HABIT IN SPECIES OCCURRING IN JOHOR AND SEDILI BESAR RIVER (1/2)

1) Main habitat: Mountain stream and Brook

Group of fish	Food habit		
	Carnivorous	Omnivorous	Herbivorous
Cypriniformes	Homaloptera orthogoniata Chela anomalura Rasbora elegans R. trilineata R. panciperforata R. maculata R. einthoveni R. heteromorpha	Puntius binotatus P. lateristriga P. partipentazona P. hexazona Acanthopthalmus semicinctus Rasbora sumatrana	(-)
Siluriformes	(-)	(-)	(-)
Non-ostariophysii	Luciocephalus pulcher Nandus nebulosus	(-)	(-)

2) Main habitat: Stagnant water

Group of fish	Food habit		
	Carnivorous	Omnivorous	Herbivorous
Cypriniformes	(-)	(-)	(-)
Siluriformes	Silurichthys hasseltii Clarias macrocephalus(*) C. batrachus(*)	Prophagorus nieuhofi	(-)
Non-ostariophysii	Notopterus notopterus(*) Channa micropeltes(*) C. striatus(*) C. lucius(*) Betta splendens Monopterus albus	Osphronemus goramy Helostoma temminckii Anabas testudineus	Trichogaster tricopterus

Remarks: 1) See Ref. 1 and Ref. 2.  
2) (\*): the higher order predators or piscivorous species  
(-): Absent

Table 5. CORRELATION CHART OF THE HABITAT PREFERENCE AND FOOD HABIT IN SPECIES OCCURRING IN JOHOR AND SEDILI BESAR RIVER (2/2)

3) Main habitat: River, non-migratory

Group of fish	Food habit		
	Carnivorous	Omnivorous	Herbivorous
Cypriniformes	Macrochirichthys macrochirus Cyclocheilichthys heteronema	Cyprinus carpio Puntius orphoides Cyclocheilichthys apogon	Osteochilus vittatus O. hasseltii
Siluriformes	Kryptopterus spp. (*) Wallago dinema (*) W. attu (*) Ompok bimaculatus (*) Mystus baramensis M. wyckii	Chaca chaca Tachysurus maculatus Mystus nigriceps M. nemurus M. vittatus	(-)
Non-ostariophysii	Scleropages formosus (*) Notopterus chitala (*) Chanda siamensis Oxyleotris marmoratus (*) Toxotes chatareus Mastacembelus maculatus M. armatus Chonerhinus modestus Tetraodon leirus T. fluviatilis Dermogenys pusillus Achiroides leucorhynchus	Pristolepis fasciatus	(-)

3) Main habitat: River, migratory

Group of fish	Food habit		
	Carnivorous	Omnivorous	Herbivorous
Cypriniformes	Hampala macrolepidota (*)	Puntius schwanenfeldii P. gonionotus Labiobarbus festiva Leptobarbus hoevenii	Epalzeorhynchus siamensis
Siluriformes	(-)	(-)	(-)
Non-Ostariophysii	(-)	(-)	(-)

Remarks: 1) See Ref. 1 and Ref. 2.  
2) (\*): the higher order predators or piscivorous species  
(-): Absent

Table 6. COMPARISON OF EXISTING WILDLIFE RESERVES  
AND PROPOSED RESERVES IN JOHOR STATE

Name of exist- ing wildlife reserves	Approx- imate area(ha)	Area over- lapping with Forest Reserve	Proposed reserves	
			Name of reserve / National Park	Approx- imate area(ha)
Endau-Kluang	101,174	82,899	-	-
Endau-Kota Tinggi (west)	61,956	61,959	G. Belumut Wildlife Reserve	20,910
Endau-Kota Tinggi (east)	7,413	7,413	Mersing Wildlife Reserve	7,413
Four Bird Islands	2	-	-	-
Segamat	31,080	-	Endau-Rompin 1) National Park	48,775

Remarks: 1) Total area of Endau-Rompin National Park reaches  
87,464 ha, of which 38,687 ha is in Pahang State.

Source: Ref. 8

Table 7 LIST OF IMPORTANT ANIMAL PROTECTED AND INHABITED  
AROUND ENDAU-KOTA TINGGI WILDLIFE RESERVE

Rank of protection 1)

and

English name

Scientific name

Malay name

Totally protected wild animal

Sumatran Rhinoceros	<i>Didermocerus sumatrensis</i>	Badak kerbau
Tapir	<i>Tapirus indicus</i>	Badak chipan, badak

Protected wild animal

Part I Big game animals

Elephant	<i>Elephas maximus</i>	Gajah
Gaur	<i>Bos haurus hubbacki</i>	Seladang

Part II Game animals

Sambur Deer	<i>Cervus unicolor equinus</i>	Rusa
Barking Deer	<i>Muntiacus muntjak</i>	Kijang
Large Mouse-Deer	<i>Tragulius napu</i>	Napoh
Lesser Mouse-Deer	<i>Panthere tigris</i>	Palandok
Tiger	<i>Panthera tigris</i>	Harimau belang
Malayan Honey-Bear	<i>Helarctos malayanus</i>	Beruang
Wild Pig	<i>Sus scrofa</i>	Babi hutan
Bearded Pig	<i>Sus barbatus</i>	Babi bodoh

Remarks: 1) See Ref. 9.

Source: Department of Wildlife and National Parks in Johor State

Table 8 RECENT OCCURRENCE OF MALARIA BY DISTRICT IN JOHOR STATE

District	1983		1984		1985	Total ( % )
	Jan. -Jun.	Jul. -Dec.	Jan. -Jun.	Jul. -Dec.	Jan. -Jun.	
Segamat	11	3	0	1	5	20 ( 3.0)
Muar	14	44	4	3	4	69 (10.5)
Batu Pahat	6	7	6	8	5	32 ( 4.9)
Kluang	32	57	28	38	104	259 (39.2)
Mersing	26	12	3	5	24	70 (10.6)
Kota Tinggi	16	43	6	28	32	125 (18.9)
Johor Bahru	3	6	12	13	29	63 ( 9.6)
Pontian	1	10	1	7	3	22 ( 3.3)
Total	109	182	60	103	206	660 (100.0)

Source: Vector control office in Johor State

Table 9 OCCURRENCE OF FILARIASIS BY DISTRICT IN JOHOR STATE

District	1979	1980	1981	1982	1983	1984	Total ( % )
Segamat	-	63	70	-	-	39	172 (64.7)
Muar	20	-	-	-	44	5	69 (25.9)
Batu Pahat	-	-	-	-	-	-	- ( 0.0)
Kluang	-	-	-	-	-	-	1 ( 0.4)
Mersing	-	-	-	13	1	1	14 ( 5.3)
Kota Tinggi	10	-	-	-	-	-	10 ( 3.7)
Johor Bahru	-	-	-	-	-	-	- ( 0.0)
Pontian	-	-	-	-	-	-	- ( 0.0)
Total	30	63	70	13	45	45	266 (100.0)

Source: Vector control office in Johor State

Table 10 LIST OF HISTORICAL SITES<sup>1)</sup> IN KOTA TINGGI DISTRICT

Location	Name of the remains
In the vicinity of Sayong Pinang	1) Makam Tujuh 2) Makam Dua
In the vicinity of Kota Tinggi	1) Makam Siti Mashor (Kg. Seberang) 2) Makam Tauhid (Kg. Makam) 3) Makam Bendahara (Kg. Makam) 4) Makam Sultan (Kg. Makam) 5) Makam Laksamana Bentan 6) Makam Raja Putih (Panchor) 7) Makam Sultan Abdul Jalil Shah I (Panchor) 8) Makam Johor
In the vicinity of Seluyut	1) Makam Sultan Muzaffar (Bukit Seluyut) 2) Kota Seluyut (Bukit Seluyut)
In the vicinity of Johor Lama	* 1) Kota Johor Lama 2) Kubur Budak 3) Makam Raja Johor (Tg. Belading) 4) Makam Lama (Telok Sengat) 5) Makam Raja (Kg. Bukit Belading) 6) Makam Tanjong Batu (Mukim Johor Lama)

Remarks: 1) Those which agreed with Johor State Government to be declared as "Historical and Ancient Monuments" under the Antiquities Act, 1976.  
2) \* : the site gazetted officially at present.

Source: National Museum, Kuala Lumpur



Table 11. KINDS OF HERBICIDES USED FOR OIL PALM ESTATES

Weed to be reduced	Chemicals used	feature	Actual quantity (kg/ha)	Remarks
Mixed weed	MSMA	liquid	2.5 + 5.0	Spray it around the tree 4 times a year.
	+	+		
	Sodium Chlorate	Mixed powder		
	2,4-D amine	liquid	1.0-5.0	same as above
	+	+		
Sodium chlorate	mixed powder			
	Diuron	mixed powder	1.0-3.0	Use it to the land, which glasses are already clean.
	Paraquat	liquid	1.4	Spray it to weed carefully. Don't use motorblower.
Lallang and other weeds	Dalapon	mixed powder	13.0-17.0 kg in 900-1100 of water/ha	Spray it to weed.
	Glyphosate	liquid	0.25-1.5	same as above

Source: Ref. 12

Table 12 DESCRIPTION OF THE EXISTING DAM RESERVOIRS

	Macap dam	Semberong dam	Layang dam
Location	Upper reach of Macap river in Benut river system	Upper reach of Semberong river	Upper reach of Layang dam in Johor river system
Purpose	1. flood mitigation 2. domestic use 3. powering of a small mini-hydroelectric generator scheme	1. flood mitigation 2. domestic and other use	supply of domestic water (treatment water)
Total capacity	30 x 10 <sup>6</sup> m <sup>3</sup>	18 x 10 <sup>6</sup> m <sup>3</sup>	45 x 10 <sup>6</sup> m <sup>3</sup>
Surface area	9 km <sup>2</sup>	8.5 km <sup>2</sup>	8.0 km <sup>2</sup>
Maximum depth	7.5 m	8.5 m	14 m
Year of impoundment	1982	1983	1983
Year of operation	1983	1985	1986

Source: Refs. 13-15

Table 13 CHANGE IN FISH FAUNA IN THE RESERVOIR OF MACAP DAM

Category	Species	Main habitate	Food habit
A. Species disappeared or conspicuously decreased after dam construction	Hampala mactolepidota	R.M	C
B. Species decreased after dam construction	Mystus baramensis	R.N	C
	M. nigriceps	R.N	O
	Mastacembelus maculatus	R.N	C
C. Species maintaining as same as before dam construction	Rasbora elegans	B	C
	R. trilineata	B	C
	R. panciperforata	B	O
	Cyclochilichthys apogon	R.N	O
	Puntius binotatus	B	O
	Osteochilus hasseltii	R.N	H
	Tachysurus maculatus	R.N	O
	Channa striatus	S	C
	C. lucius	S	C
	Betta pugnax	S	C
	B. splendens	S	C
	Anabas testudineus	S	O
	Helostoma temminckii	S	C
Chanda siamensis	R.N	C	
D. Species relatively increased after dam construction	Cyprinus carpio (*)	S	O
	Puntius gonionotus (*)	R.M	O
	Leptobarbus hoevenii (*)	R.M	O
	Cirrhina molitorella (*)	R.N	O
	Clarias macrocephalus	S	C
	C. batrachus	S	C
	Prohagorus nieuhoffi	S	O
	Trichogaster pectoralis	S	H
	T. tricopterus	S	H
	Tilapia spp. (*)	S	O
Oxyeotris marmoratus	S	C	

Remarks: 1) As for the habitate preference and food habit of each species, see Ref. 1 and Ref. 2.

2) Abbreviations in main habitate are:

B: Mountain stream and Brook

S: Stagnant water

R.N: River, non-migratory

R.M: River, migratory

3) Abbreviations in food habit are:

C: Carnivorous

O: Omnivorous

H: Herbivorous

Table 14 CHANGE IN FISH FAUNA IN DOWN STREAM OF SEMBERONG DAM

Category	Species	Main habitate	Food habit
A. Species disappeared or conspicuously decreased after dam construction	<i>Hampala mactolepidota</i>	R.M	C
	<i>Mystaceleucus marginatus</i>	R.M	O
	<i>Leptobarbus hoevenii</i>	R.M	O
	<i>Mystus nemutus</i>	R.N	O
	<i>Mastacembelus maculatus</i>	R.N	C
B. Species decreased after dam construction	<i>Cyclocheilichthys apogon</i>	R.N	O
	<i>Osteochilus vittatus</i>	R.N	H
	<i>O. hasseltii</i>	R.N	H
	<i>Mystus spp.</i>	R.N	C or O
	<i>Monopterus albus</i>	S	C
	<i>Pristolepis fasciatus</i>	R.N	O
C. Species maintaining as same as before dam construction	<i>Rasbora spp.</i>	M	C or O
	<i>Ompok bimaculatus</i>	R.N	C
	<i>Channa striatus</i>	S	C
	<i>C. lucius</i>	S	C
	<i>Silurichthys hasseltii</i>	S	C
	<i>Kryptopterus spp.</i>	S	C
	<i>Anabas testudineus</i>	C	O
D. Species relatively increased after dam construction	<i>Rasbora sumatrana</i>	B	O
	<i>Clarias macrocephalus</i>	S	C
	<i>C. batrachus</i>	S	C
	<i>Prophagorus nieuhoffi</i>	S	O
	<i>Channa micropeltes</i>	S	C
	<i>Helostoma temminckii</i>	S	C
	<i>Trichogaster tricopterus</i>	S	H

Remarks: 1) As for the habitate preference and food habit of each species, see Ref. 1 and Ref. 2.

2) Abbriviations in main habitate are:

- B: Mountain stream and Brook
- S: Stagnant water
- R.N: River, non-migratory
- R.M: River, migratory

3) Abbriviations in food habit are:

- C: Carnivorous
- O: Omnivorous
- H: Herbivorous



# ***FIGURES***



Name of the interviewed places  
on inland fishery and Fish fauna

- |                       |                     |
|-----------------------|---------------------|
| 1. Kg. Sayong pinang  | 6. Kg. Simpang      |
| 2. Kg. Rantau panjang | 7. Benut            |
| 3. Kota Tinggi        | 8. Kg. Semberong    |
| 4. Kg. Mawai Baru     | 9. Felda Air Hitam. |
| 5. Kg. Gembot         |                     |

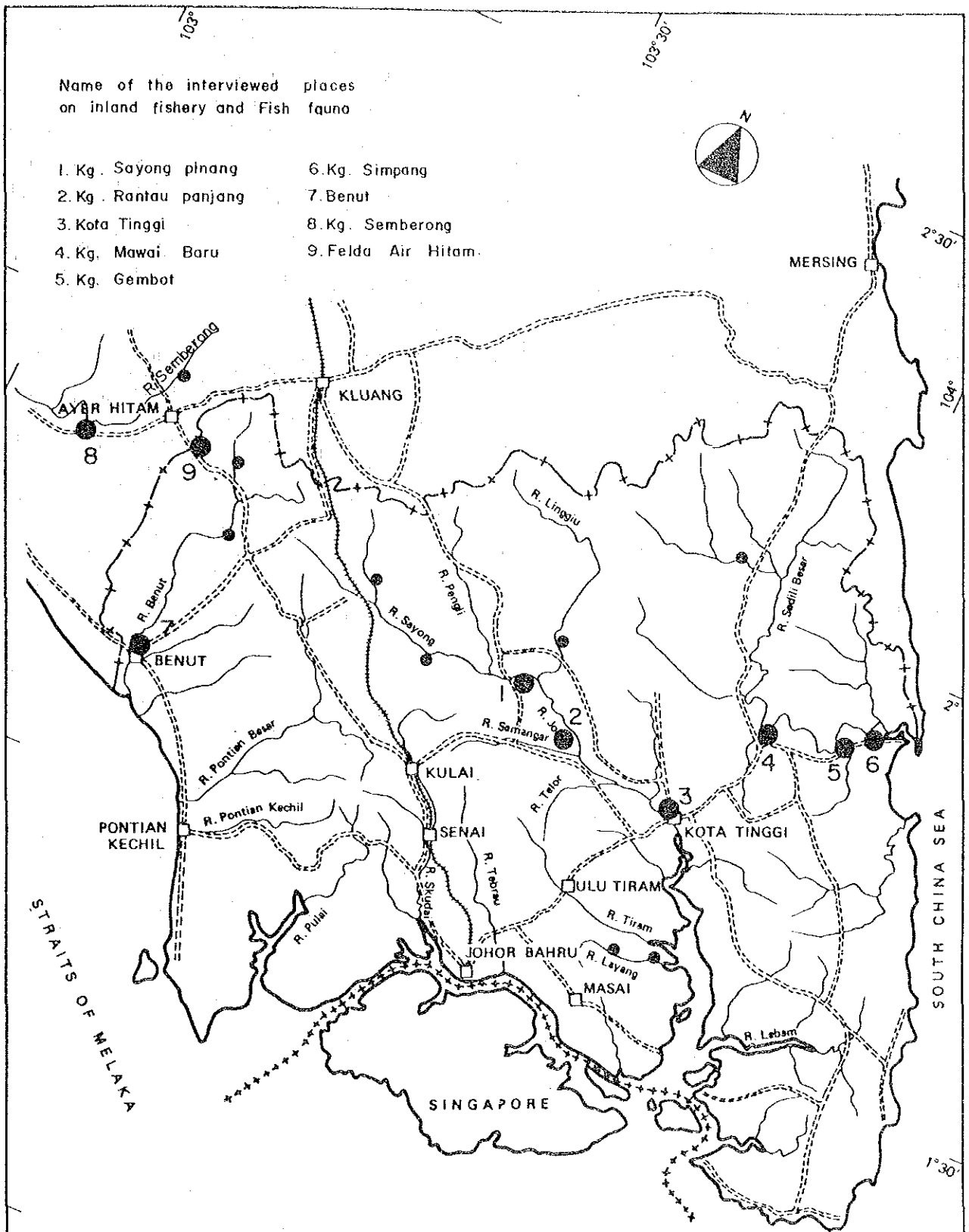
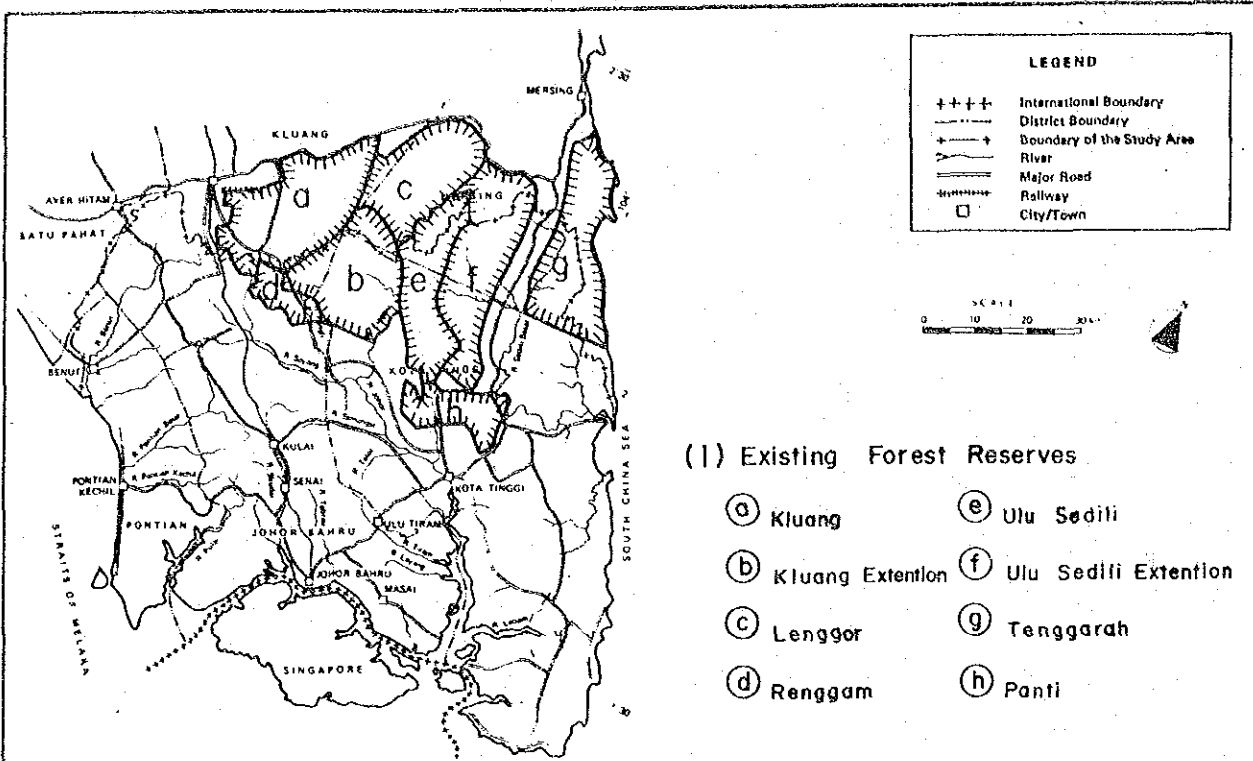


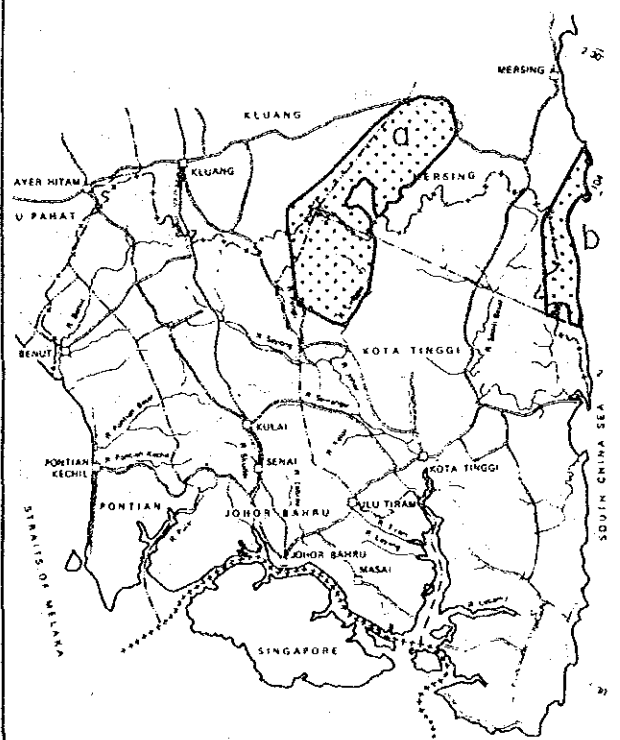
Fig.1 Location Map of Survey Points

GOVERNMENT OF MALAYSIA  
**NATIONAL WATER RESOURCES STUDY, MALAYSIA**  
**SOUTH JOHOR**  
**REGIONAL WATER RESOURCES STUDY**  
 JAPAN INTERNATIONAL COOPERATION AGENCY

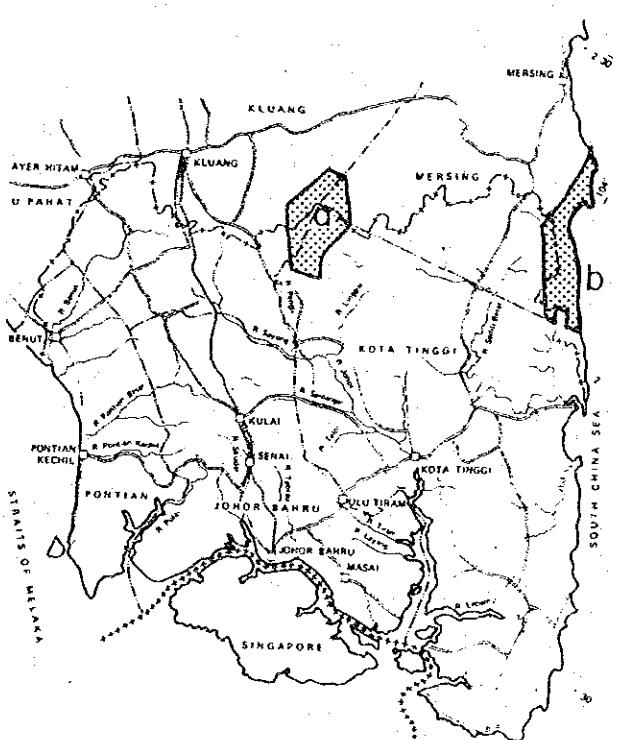




- (1) Existing Forest Reserves
- (a) Kluang
  - (b) Kluang Extension
  - (c) Lenggong
  - (d) Renggam
  - (e) Ulu Sedili
  - (f) Ulu Sedili Extension
  - (g) Tenggara
  - (h) Panti



- (2) Existing Wildlife Reserves
- (a) Endau - Kota Tinggi (West)
  - (b) Endau - Kota Tinggi (East)



- (3) Proposed New Wildlife Reserves
- (a) G. Belumut
  - (b) Mersing

**Fig. 2 Location Maps of Existing Forest Reserves, Existing Wildlife Reserves and Proposed New Wildlife Reserves in the Vicinity of the Proposed Damsites**

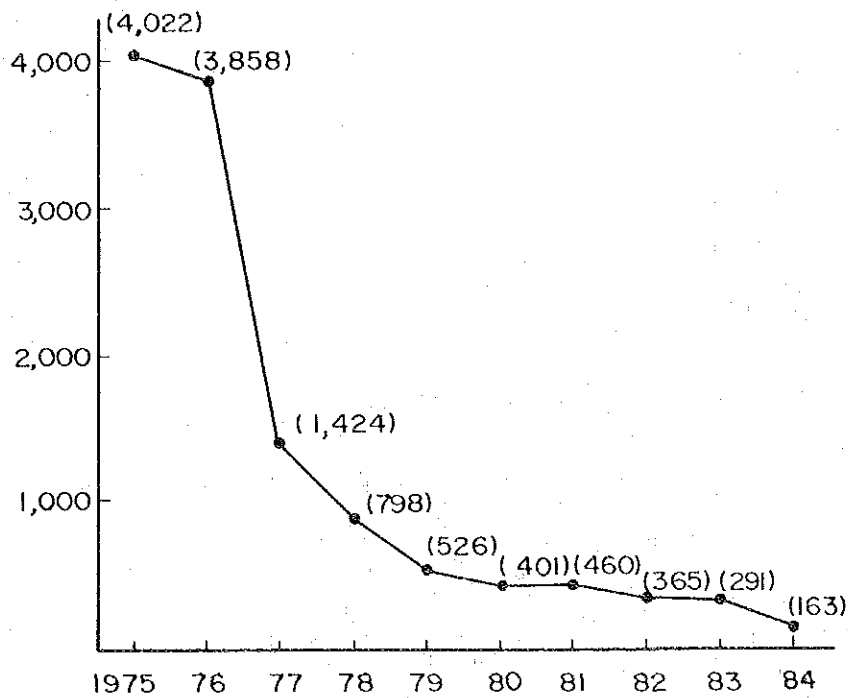


Fig.3 Changes of Malaria Cases in Johor State

Source : Vector Control office , Johor

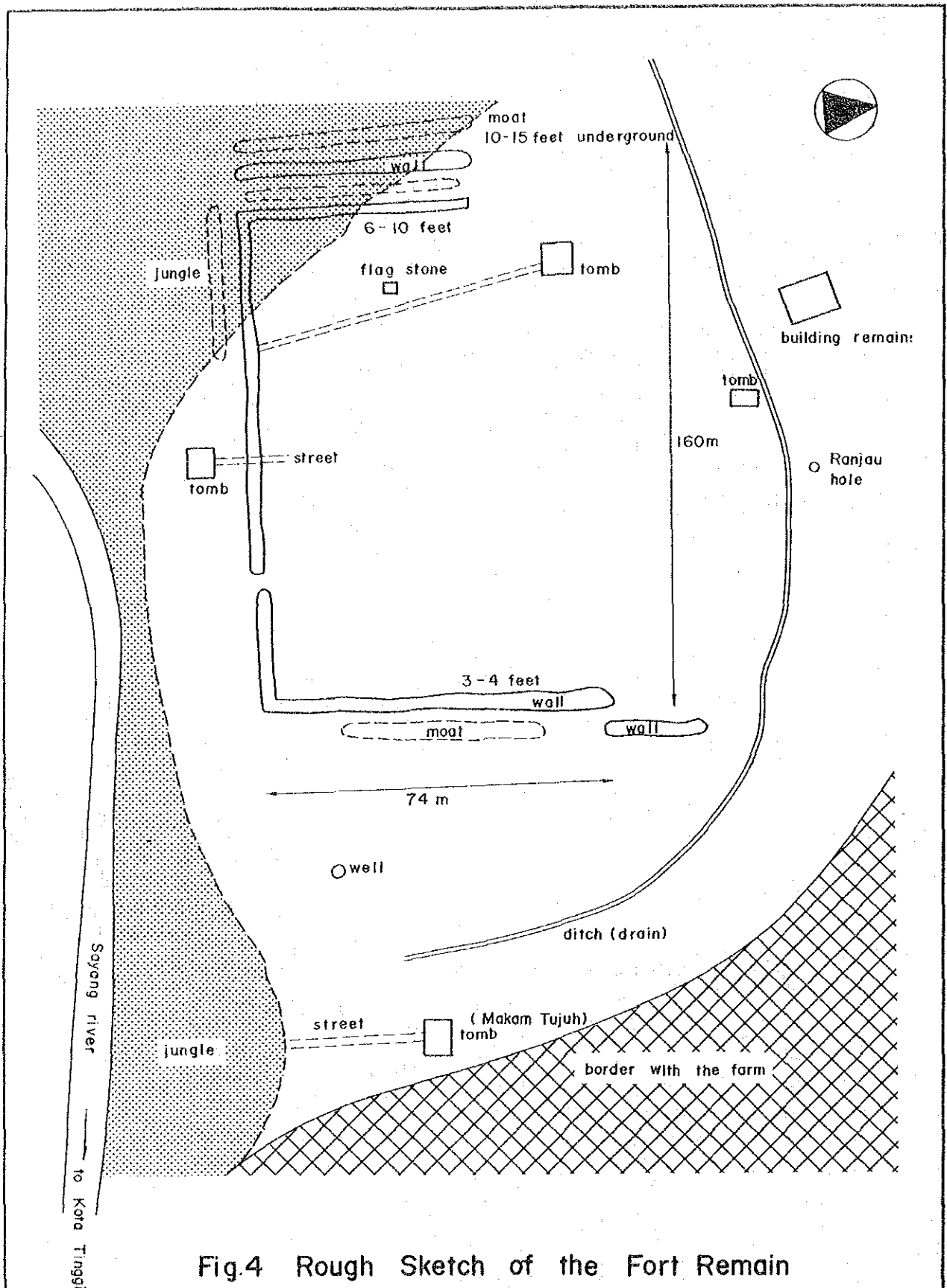


Fig.4 Rough Sketch of the Fort Remain at Sayong Pinang

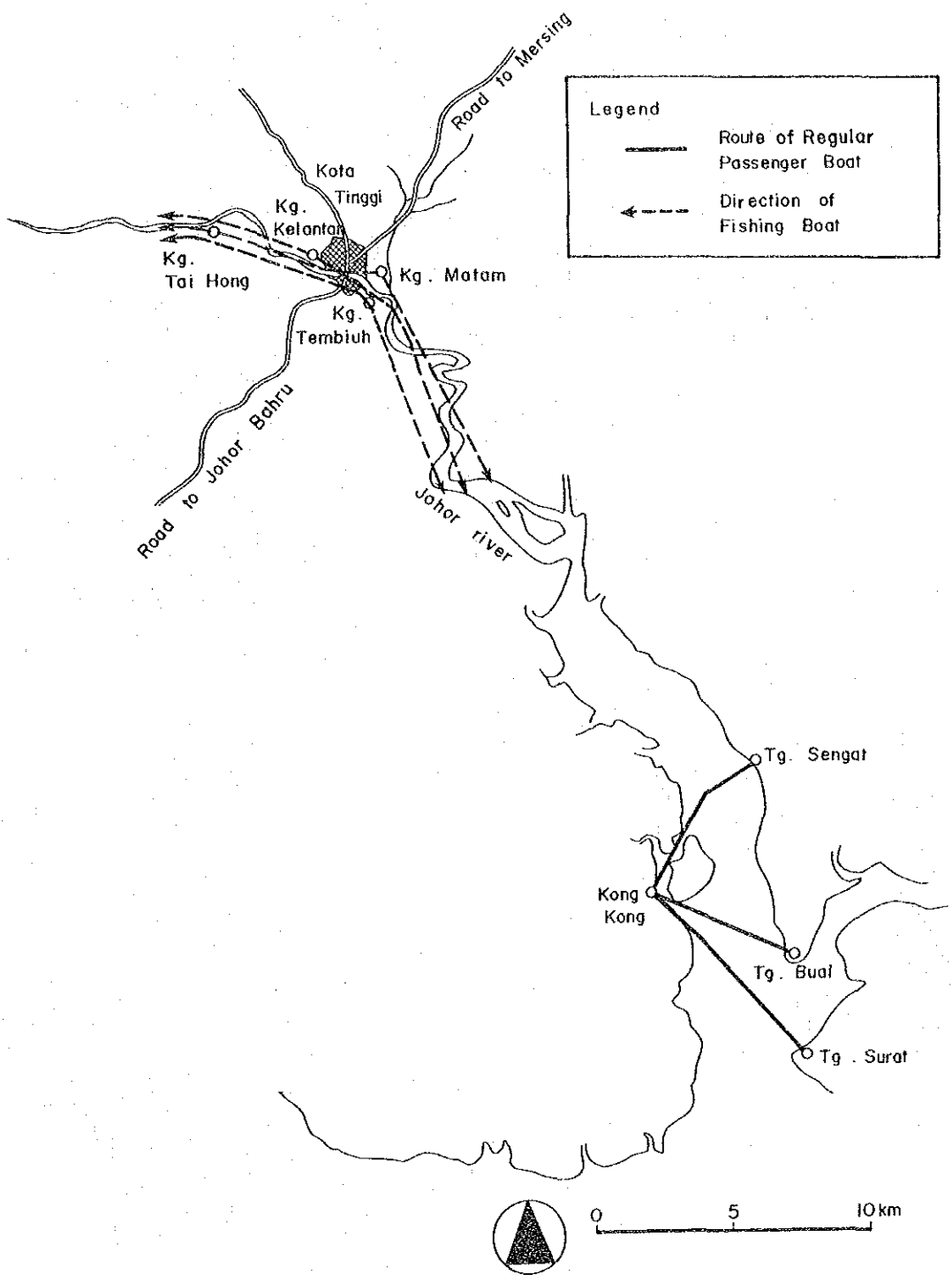


Fig.5 Route of Inland Navigation in Johor River

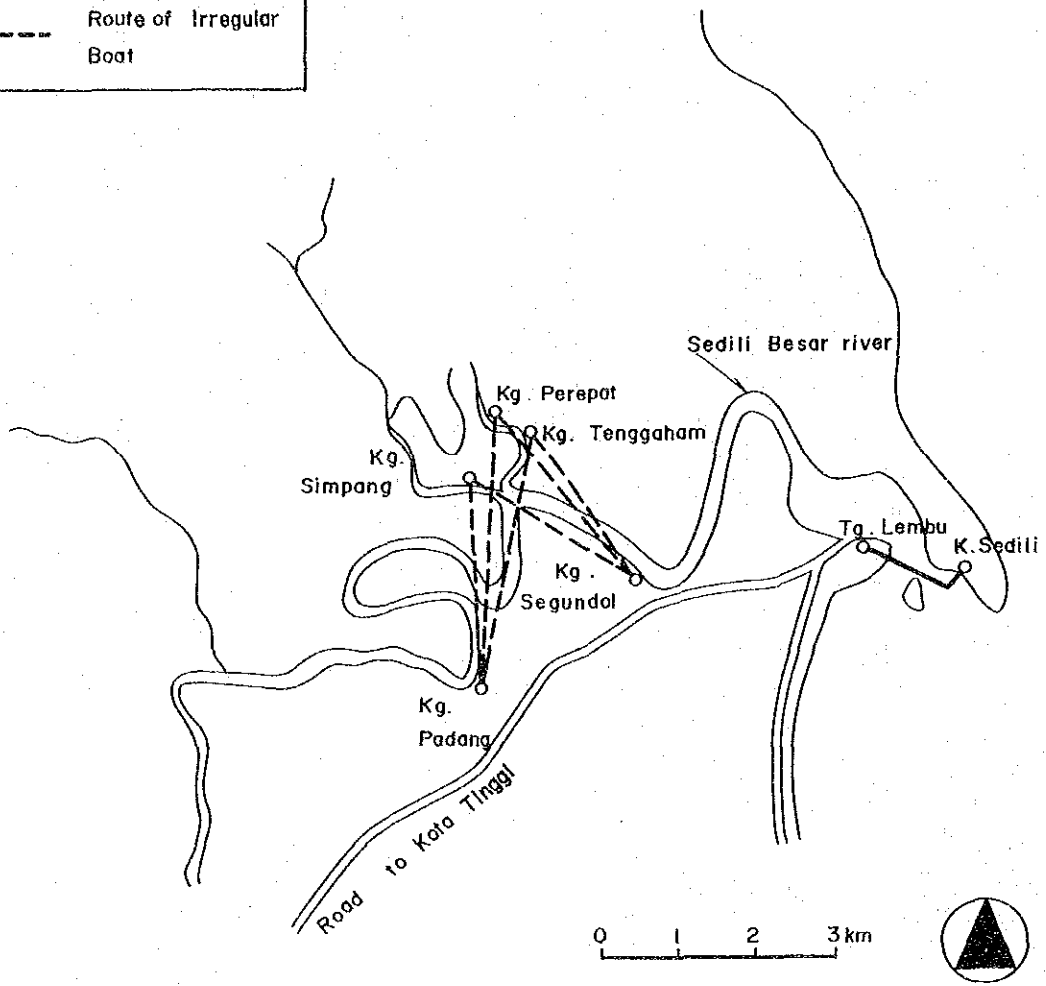
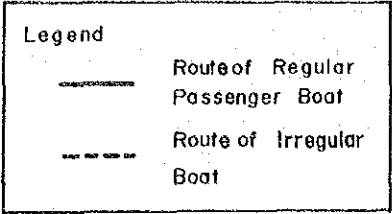


Fig.6 Route of Inland Navigation in Sedili Besar River

***ANNEX 0  
LEGAL AND  
INSTITUTIONAL ARRANGEMENT***



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## 1. INTRODUCTION

The purpose of the study in legal and institutional sector is to clarify administrative issues on the water resources development and use within the South Johor region, and to make recommendation if necessary. Some type of water resources development will require additional agreements between both parties for the smooth implementation and operation. The report also briefs the necessary administrative procedures to implement the water resources development project.



## 2. CONSIDERATION ON THE DEED

### (1) Development of a dam in the Johor river basin

DEED specified the schedules for alienation of lands to SCC to utilize them for the construction of the treatment plantyard and the right-of-way of pipe lines.

However it does not specify the land for dam and reservoir nevertheless in INDENTURE the land for dam construction is specified. Accordingly it is considered that the DEED does not grant Singapore any right to construct a dam in the Johor river basin. It also does not forbidden Singapore to construct a dam in the Johor river basin. Accordingly it is considered that both parties may construct a dam without special revision of the Agreement with regard land use, provided that such dam construction does not affect the land specified in the DEED. However agreement may be necessary to develop a dam jointly with regard to conditions of joint development.

### (2) Water use of the Johor river

The upper limit of water abstraction by Singapore set in the DEED seems to be different from that of water use license stipulated in Waters Enactment. It shall be regarded as the priority in water use for the present and future.

The construction of a dam entails a considerable change in flow conditions of the Johor river especially in the downstream reach. Since the Agreement granted the full and exclusive right to use the water at the maximum rate of 1,137 Mld or 250 Mgd of the Johor river to Singapore, the water resources development scheme should so planned as not to jeopardize the right. In other word, the water resources development scheme should handle the exceeding water granted to Singapore. In order to testify that the operation of a dam is not causing any infringement to Singapore's rights the river runoff should be always recorded and the runoff under without scheme condition

should be estimated. The methods for the recording and the estimation should be agreed between both parties.

In INDENTURE it is stipulated that the State of Johor may abstract water from the Skudai and Tebrau rivers provided the State has the prior consent of Singapore. However this provision deleted from Deed. And it granted Singapore the full and exclusive right to abstract water upto 250 Mgd from the Johor river provided Singapore does not cause problem due to the shortage of the river maintenance flow. In spite of this the State of Malaysia has constructed 6 intakes, R25, R26, R34, R35, R39 and R40 in the upstream reach from the intake site of PUB, R41. The total abstraction from these 6 intakes are estimated at 6.0 Mld in 1983. The demand to the intakes is projected to increase to 54.8 Mld in 2005 in total.

The state PWD has a plan to divert water of 7.4 Mld to the upstream basin, Sayong, Renggam and Layang Layang. Further the return flows of these abstracted water are expected to be around 40%. Accordingly the net consumption of the river flow in the upstream reach is estimated around 27.4 Mld in 2005. This consumption should be considered insignificant compared with the total demand at R41 and R42 of 1,216.4 Mld in 2005. And it is considered that Singapore should consent the abstraction by the state PWD at 6 intakes mentioned above. Present situations mentioned above are presumably based on the mutual goodwill of both parties. However in order to clarify the situation, it is considered that an agreement should be prepared on this matter at an appropriate opportunity.

The water resources development plan was formulated taking account the water tapping of 109.6 Mld by the State of Johor from the PUB's water main in accordance with the decision of the Government. While the existing Agreement stipulates that the right of tapping is not more than 2% of the water conveyed to Singapore through the causeway. And the maximum amount to be tapped is estimated at 14.5 Mld assuming the water conveyed is 728 Mld or 160 Mgd. The present tapping has been conducted based on the goodwill of both parties. However it is advisable to prepare an agreement on this matter.

### 3. REQUIRED AGREEMENT WITH SINGAPORE

#### 3.1 Joint Development

The water resources is developed jointly by the State of Johor and Singapore. And following conditions should be discussed with Singapore and both parties should reach agreement on these matters.

##### (1) Scale of development

Singapore should cooperate with the State of Johor to develop the water resources facilities in such a scale as to supplement the water deficit of the State. The proposed facilities should supplement the water deficit of  $69 \times 10^6 \text{ m}^3$  in 2005 although only  $20 \times 10^6 \text{ m}^3$  is attributable to the demand of Singapore.

##### (2) Executing body

In case only the staff of the State form the executing body for the implementation and operation of the project, the system for monitoring and inspection by Singapore should be established in the form of an official agreement just like the existing Agreement, Deed.

In case the executing body is formed by both the State and SCC, legal arrangements may be necessary as an international treaty in addition to the agreement with Singapore on the operation. This incurs the necessity of involvement of Federal Government.

##### (3) Land use by Singapore

In case the joint development is attained through the joint investment and joint ownership of the dam and the related structures, an agreement on the use of land in the State of Johor should be prepared with effective period because present Agreement does not specify the land use for dam construction by Singapore in the State of Johor unlike the other agreement, Indenture.

(4) Allotment of cost

Both the State and Singapore should have agreement on the share of cost allotment to both parties. In case the joint development is attained through cost sharing by Singapore in terms of water tariff, the Government of Malaysia invests and owns the dam and the related structures singly and an agreement on the water tariff should be prepared. In this case the provision of DEED regarding unit water price of M\$3/1,000 gal. should be reviewed.

(5) Reservoir operation against flood

The provision of a dam should not deteriorate the hydrologic conditions of both up- and downstream reach especially for flood. The reservoir operation rule against flood should be established with due regard to this.

(6) Agreement on Water Shortage

In case the plan fails to supplement the water deficit by the proposed reservoirs, both parties should reduce their abstraction in agreed manner. An agreement should be prepared with a provision on the manner of reductions.

3.2 Developed by State of Johor

In case the water resources development scheme is implemented by the State of Johor alone, there shall be agreement between the State and Singapore to ensure smooth operation of the facility. The agreement shall include following items:

- operation rule of the dam, or formula to determine discharge from the dam gate,
- method to exchange communication including establishment of committee,
- counter measures against drought,
- method to modify or terminate agreement, and

- cost allocation in terms of water tariff.

### 3.3 Development by Singapore

In case the water resources development scheme is implemented by Singapore alone, several agreements shall be formed.

Such agreement shall include the provisions for:

- specification of area for dam and reservoir and watershed area,
- operation rule of the dam and intake,
- water abstraction in the upperstream reach by the State,
- method to exchange communication including the establishment of committee,
- counter measures against drought,
- cost allocation, and
- expediency of agreement.





#### 4. NECESSARY INSTITUTIONAL PROCEDURES

In order to implement the water resources development project, following institutional arrangement is required;

(1) Project Initiation

The implementing agency should inform the intention to other agencies, especially to EPU or State EPU.

(2) Feasibility Study

The feasibility of the proposed project should be examined from the technical, economical, social and environmental points of view. The study may be carried out either the agency concerned or EPU. Foreign finance is available for the study.

(3) Interdepartmental coordination

With regard to water use, land use and environmental impact, the adjustment among agencies concerned are to be carried out. For this purpose, a committee is usually established managed by EPU or State EPU.

(4) Budgetary and financial preparation

Since the considerable cost is estimated for the dam construction, the budget of Federal Government will be applied based on Development Fund Act. In case a corporation is established to implement the project, the budget of Federal Government may be utilized through the State Government.

(5) Approval

All the public works shall be approved. Approval of the project is attained by implication of the project in the Malaysia Five Year Development Plan.

(6) Land acquisition

State should acquire whole necessary land and alienate the land to the implementation agency. As for the land acquisition, compulsory acquisition is the common practice based on the land Acquisition Act.

In case the land is reserved for forest, wild life or national park under the National Code, the reservation should be cancelled prior to utilize it.



