10. PRELIMINARY DEVELOPMENT SCENARIO OF THE PRINCIPAL RIVER PORTS

10.1 Present Capacity

10.1.1 Target Productivity

During the first stage of the Study, the Study Team obtained productivity data of the seven river ports. Since there is a possibility to increase the operational efficiency in those ports, target productivity needs to be determined before starting to evaluate the present capacity of the seven ports. Handling productivity differs widely depending on the cargo type and handling system. It also varies according to a country's labor force and practices. It is therefore difficult to establish a worldwide standard productivity. UNCTAD has nevertheless prepared a standard productivity checklist to serve as a model for port planners (Table 10.1.1).

Table 10.1.1 Productivity Checklist

Cargo Type	Productivity (tons/ship-day)
Conventional General Cargo	
On Ocean Shipping	700
On Coastal Shipping	500
Fully Palletized General Cargo	900
Packaged Forest Products	1,500
Bundled Iron and Steel Products	2,000
Pre-slung Cargo	900
Ro/Ro Units	2,500
Containers	
On Ocean Shipping	450 TEU
On Coastal Shipping	275 TEU
Dry Bulk	
Loading	70 % of the Shiploader rated capacity
Unloading	50 % of the Unloader rated capacity
Liquid Bulk	Ship's Pumping Capacity (approximately 5-10 % of the DWT per hour)

(Source: Port Development, UNCTAD)

JICA Study on the Port Development Strategy examined the productivity of major Indonesian ports (Table 10.1.2). Since key factors impacting on the productivity are not likely to change in the short-term, the Study Team prepared a set of baseline productivity figures based on the average productivity of major Indonesian ports (Table 10.1.3). The baseline productivity assumed a slight improvement in the operational efficiency.

Table 10.1.2 Productivity of Major Indonesian Ports

	Oceangoing							Domestic						
Port	General cargo (t/g/h)	Bagged cargo (t/g/h)	Unitized cargo (t/g/h)	Liquid bulk (t/h)	Dry bulk (t/h)	Container (CT) (TEU/crane/h	Container (Conv.) (TEU/crane/h	General cargo (t/g/h)	Bagged cargo (t/g/h)	Unitized cargo (t/g/h)	Liquid bulk (t/h)	Dry bulk (t/h)	Container (CT) (TEU/crane/h	Container (Conv.) (TEU/crane/h
Tg. Priok	25.0	36.0	26.0	-	37.0	17.0	-	22.0	33.0	19.0	-	33.0	-	-
Tg. Perak	27.0	-	-	95.0	153.0	17.0	10.0	25.0	30.0	-	81.0	118.0	-	-
Tg. Emas	33.0	34.0	-	-	26.0	-	10.0	19.0	6.0	-	71.0	129.0	-	-
Belawan	20.7	25.7	39.3	93.9	39.8	16.8	-	-	-	-	-	-	-	-
Banjarmasin	24.0	20.0	25.0	-	-	-	8.0	-	-	-	-	-	-	-
Balikpapan	15.0	25.0	24.3	121.7	-	-	-	14.3	24.6	25.4	-	-	-	-
Makassar	14.0	28.0	26.0	113.0	133.0	-	10.0	14.0	27.0	26.0	116.0	156.0	-	-
Panjang	21.7	24.6	-	117.8	26.5	-	26.5	20.7	23.4	-	74.3	64.9	-	-
Palembang	18.0	27.5	98.6	115.2	-	8.0	-	17.3	26.8	81.2	176.7	46.0	-	-
Pontianak	41.0	19.0	-	-	-	-	-	25.0	30.0	9.0	-	-	-	-
Lhok Seumawe	25.0	27.7	37.2	136.5	39.5	-	-	27.0	13.9	25.6	-	28.0	-	-
Dumai	18.6	-	-	137.5	-	-	-	85.0	-	-	-	-	-	-
Pekanbaru	14.7	-	-	31.4	-	-	-	-	-	-	-	-	-	-
Jambi	34.6	23.0	-	-	-	-	6.0	26.0	24.1	-	79.7	28.0	-	-
Teluk Bayur	18.0	29.7	32.8	225.6	112.4	-	6.4	16.0	38.0	31.0	203.4	30.1	-	6.0
Bengkulu	13.0	2.0	-	-	224.0	-	-	4.0	17.0	-	61.0	129.0	-	-
Pangkal Balam	-	34.0	-	-	-	-	-	18.0	16.0	-	52.0	19.0	-	-
Cirebon	21.0	35.0	-	154.0	-	-	-	16.0	36.0	-	115.0	181.0	-	-
Meneng	18.0	22.0	-	60.0	-	-	-	18.0	22.0	-	200.0	-	-	-
Benoa	17.0	-	-	-	-	-	-	8.0	19.0	-	-	-	-	-
Lember	9.0	19.0	-	-	-	-	-	20.0	30.0	-	-	-	-	-
Bima	-	-	-	-	-	-	-	11.0	11.0	-	-	-	-	-
Kupang	14.0	16.0	45.0	-	-	-	-	13.0	18.0	-	-	38.0	-	-
Ende	-	-	-	-	-	-	-	48.0	16.0	-	-	-	-	-
Dilli	1.0	1.0	-	-	-	-	-	26.0	27.0	-	-	-	-	-
Sampit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samarinda	-	16.0	19.0	-	-	-	-	-	18.0	19.0	-	-	-	-
Tarakan	13.0	25.0	-	-	-	-	-	13.0	18.0	16.0	-	-	-	-
Kendari	-	18.0	-	-	-	-	-	11.1	24.4	-	-	-	-	-
Pantoloan	11.0	19.0	24.0	-	-	-	-	12.0	25.0	-	-	-	-	-
Bitung	15.0	25.0	27.0	119.0	128.0	-	-	14.0	23.0	25.0	167.0	-	-	-
Ternate	13.0	14.0	-	-	-	-	-	11.0	22.0	22.0	-	-	-	-
Ambon	14.0	24.0	24.0	128.0	-	-	-	18.0	14.0	-	-	-	-	-
Sorong	13.4	28.9	23.2	-	-	-	-	-	26.1	-	-	-	-	-
Biak	18.0	-	-	-	-	-	-	16.0	15.0	-	-	-	-	-
Jayapura	11.0	19.0	23.0	-	-	-	-	-	21.0	27.0	-	-	-	-
Total	551.7	638.1	494.4	1648.6	919.2	58.8	76.9	588.4	695.3	326.2	1397.1	1000.0	-	6.0
Exmaples	30	28	15	14	10	4	7	29	31	12	12	13	0	1
Average	**18.4**	**22.8**	**33.0**	**117.8**	**91.9**	**14.7**	**11.0**	**20.3**	**22.4**	**27.2**	**116.4**	**76.9**	**-**	**6.0**

(Source: Final Report, The Study on the Port development Strategy in the Republic of Indonesia, 1999, JICA)

Table 10.1.3 Baseline Productivity

Cargo Type	Productivity
General Cargo	20 (t/gang/hour)
Bagged Cargo	25 (t/gang/hour)
Unitized Cargo	30 (t/gang/hour)
Liquid Bulk	120 (t/hour)
Dry Bulk	90 (t/hour)
Container (Container Terminal)	20 (TEU/crane/hour)
Container (Conventional Terminal)	10 (TEU/crane/hour)

Another key aspect in evaluating the port operation is berth occupancy ratio. The Study Team took into account the maximum berth occupancy proposed by UNCTAD (Table 10.1.4).

Table 10.1.4 Maximum Berth Occupancy

Number of Berths in the group	Recommended Maximum Berth Occupancy (%)
1	40
2	50
3	55
4	60
5	65
6-10	70

(Source: Port Development, UNCTAD)

10.1.2 Pekanbaru

Operation records of Pekanbaru are summarized below (Table 10.1.5-6). Judging from the quay length, Pekanbaru has at least four berths at the old port and one berth at Perawang. Although the berth occupancy ratio is relatively high, shed occupancy and yard occupancy is very low. There seems to be room for improvement in the handling efficiency as well. Since the cargo volume of Pekanbaru has been static, it will take some time to reach the capacity unless major industrial development takes place behind the port.

Table 10.1.5 Berth Occupancy in Pekanbaru

Year / Indicators	1999 (A)	2000 (B) (Projection)	2001 (C) (Target)	C/A	B/A
Berth Throughput (t/m)	353	463	473	134.0	102.2
Shed Throughput (t/m^2)	23.9	13.8	14.3	59.7	103.2
Yard Throughput (t/m^2)	5.8	1.9	2.0	59.7	103.2
Berth Occupancy Ratio (%)	59.2	54.2	54.1	91.3	99.8
Shed Occupancy Ratio (%)	1.8	0.7	0.8	41.9	111.9
Yard Occupancy Ratio (%)	1.3	0.4	0.5	35.2	107.1

Source: IPC1 Pekanbaru Office

Table 10.1.6 Productivity in Pekanbaru

Year / Indicators	1999 (A)	2000 (B) (Projection)	2001 (C) (Target)	C/A	B/A
General Cargo (t/gang/hour)	15.7	15.5	15.6	99.2	100.3
Bag Cargo (t/gang/hour)	21.0	21.2	21.2	100.9	100.1
Dry Bulk					
Truck loading (t/gang/hour)	-	103.4	103.4	-	100.0
Conveyor loading (t/conveyor/hour)		5.2	5.5		105.0

Source: IPC1 Pekanbaru Office

10.1.3 Jambi

Operation records of Jambi are summarized below (Table 10.1.7-8). Since Talang Duku has only three berths, the current berth occupancy is judged high. Yard occupancy ratio is also high. There seems little room for improvement in the handling efficiency except container cargo. Unless a substantial portion of the cargo is diverted to Muara Sabak, expansion of Talang Duku will be necessary. The new wharf at Muara Sabak has not started cargo handling due to the poor condition of the access road. Since Muara Sabak is located some 110 km away from the city of Jambi, the need for expansion of Muara Sabak should be judged from a viewpoint of regional development.

Table 10.1.7 Berth Occupancy in Jambi

Year / Indicators	1996	1997	1998	1999	2000
Conventional Wharf					
Berth Occupancy Ratio (%)	40.7	55.9	70.7	42.3	70.7
Berth Throughput (t/m)	909	1151	319.9	1475	347
Shed					
Shed Occupancy Ratio (%)	13.7	0.8	9.6	44.8	42.8
Shed Throughput (t/m^2)	1.7	15.3	1.8	3.1	15.1
Yard					
Yard Occupancy Ratio (%)	45.5	59.0	68.1	48.1	92.1
Yard Throughput (t/m^2)	4.2	4.7	4.8	4.0	9.0

Source: IPC2 Jambi Office

Table 10.1.8 Productivity in Jambi

	1996	1997	1998	1999	2000
General Cargo (t/gang/hour)					
International Shipping	34.6	19.0	20.4	21.0	18.4
Domestic Shipping	25.3	20.2	20.6	21.5	9.6
Bag Cargo (t/gang/hour)					
International Shipping	23.0	30.0	3.2	24.8	20.4
Domestic Shipping	24.1	13.7	80.0	11.7	11.2
Container (box/crane/hour)					
Container Wharf	-	-	-	-	-
Conventional Wharf	6.0	6.0	6.0	6.0	7.0

Source: IPC2 Jambi Office

10.1.4 Palembang

Operation records of Palembang are summarized below (Table 10.1.9-10). Judging from the quay length, Boom Baru has four-five berths. Compared with the maximum berth occupancy ratio (Table 10.1.4), Boom Baru is judged a busy port. Operational efficiency is also high compared with the baseline productivity (Table 10.1.3). It is necessary to verify the sudden rise in the container handling productivity in 2000. Shed and yard occupancy is low. If cargo demand continues to grow, Boom Baru will need capacity expansion. Although Sungai Lais does not serve vessels at present, this area is expected to play an active role in the near future. After Boom Baru is saturated with cargoes, Sungai Lais would be an alternative site for port expansion.

Table 10.1.9 Berth Occupancy in Palembang

Year / Indicators	1996	1997	1998	1999	2000
Wharf					
Berth Occupancy Ratio (%)	58.3	63.9	60.8	62.9	57.9
Berth Throughput (t/m)	1,641	2,190	919	1,485	1,349
Shed					
Shed Occupancy Ratio (%)	18.9	12.2	7.8	5.1	9.0
Shed Throughput (t/m^2)	9.7	4.5	1.3	3.5	17.0
Yard					
Yard Occupancy Ratio (%)	14.8	13.2	18.0	5.1	13.4
Yard Throughput (t/m^2)	17.3	21.8	41.0	36.5	41.8

Source: IPC2 Palembang Office

Table 10.1.10 Productivity in Palembang

Cargoes	1996	1997	1998	1999	2000
General cargo (t/gang/hour)					
International shipping	18.0	19.7	22.7	35.5	27.7
Domestic shipping	17.3	19.2	22.8	23.4	39.3
Bag cargo (t/gang/hour)					
International shipping	27.5	26.8	25.3	30.3	33.8
Domestic shipping	26.8	27.4	23.7	23.4	33.9
Liquid bulk (t/gang/hour)					
International shipping	115.2	-	105	149.3	104.5
Domestic shipping	178.7	188.9	185.2	199.8	47.6
Dry bulk (t/gang/hour)					
International shipping	84.3	-	-	-	-
Domestic shipping	46.3	50	43.8	-	149
Container (box/gang/hour)	8	8	10	13	21

Source: IPC2 Palembang Office

10.1.5 Pontianak

Operation records of Pontianak are summarized below (Table 10.1.11-12). Judging from the quay length (710m), there are seven berths at the Port of Pontianak. Although the berth occupancy ratio is relatively high, shed occupancy and yard occupancy are very low. There seems to be room for improvement in the handling efficiency as well. However, port cargoes at Pontianak are steadily increasing recently, in addition container cargoes have been increasing rapidly with the average growth rate of more than 25% per year. Therefore, the port will be overflowing with increasing port cargoes, unless the port expansion is carried out without delay.

Table 10.1.11 Berth Occupancy in Pontianak

Year / Indicators	1999 (A)	2000 (B)	B/A
Berth throughput (t/m)	1,833	1,972	107.6
Shed throughput (t/m^2)	13.1	16.3	124.4
Yard throughput (t/m^2)	17.4	21.8	125.3
Berth occupancy ratio (%)	69.3	71.5	103.2
Shed occupancy ratio (%)	16.6	24.9	150.0
Yard occupancy ratio (%)	12.7	15.0	118.1

Source: IPC2 Pontianak Branch Office

Table 10.1.12 Productivity in Pontianak

Year / Indicator	1999 (A)	2000 (B)	B/A
International general cargo (t/gang/hour)	16.0	16.5	103.1
International bag cargo (t/gang/hour)	28.5	28.0	98.2
International container cargo (box/hour)	9	11	122.2

Source: IPC2 Pontianak Branch Office

10.1.6 Kumai

Operation records of Kumai are summarized below (Table 10.1.13 & 14). Since the Port of Kumai has only three berths, the current berth occupancy is judged high. Yard occupancy ratio is also high. There seems little room for improvement in the handling efficiency. Unless a substantial portion of the cargo is diverted to Bumiharyo, 11km up the stream, the Port of Kumai will need a capacity expansion to catch up with increasing demand of port cargoes.

Table 10.1.13 Berth Occupancy in Kumai

Year / Indicators	1996	1997	1998	1999	2000
Conventional Wharf					
Berth Occupancy Ratio (%)	75.0	80.0	81.0	80.0	80.0
Berth Throughput (t/m)	1,300	1,200	1,240	1,245	1,250
Shed					
Shed Occupancy Ratio (%)	N.A.	N.A.	N.A.	N.A.	N.A.
Shed Throughput (t/m^2)	N.A.	N.A.	N.A.	N.A.	N.A.
Yard					
Yard Occupancy Ratio (%)	15.0	40.0	80.0	80.0	80.0
Yard Throughput (t/m^2)	1,400	1,500	1,500	2,000	2,100

Source: IPC3 Kumai Branch Office

Table 10.1.14 Productivity in Kumai

Productivity	1996	1997	1998	1999	2000
General Cargo (t/gang/hour)					
Domestic Shipping	160	180	200	210	215
Bag Cargo (t/gang/hour)					
Domestic Shipping	190	200	210	215	220

Source: IPC3 Kumai Branch Office

10.1.7 Sampit

Operation records of Sampit are summarized below (Table 10.1.15-16). Since the Port of Sampit has only three berths, the current berth occupancy is judged high. There seems little room for improvement in the handling efficiency. Unless a substantial portion of the cargo is diverted to Bagendang, 22km down the stream, the Port of Sampit will need a capacity expansion to catch up with increasing demand of port cargoes.

Table 10.1.15 Berth Occupancy in Sampit

Year Indicators	2000
Wharf	
Berth Occupancy Ratio (%)	80.0
Berth Throughput (t/m)	1,063

Source: IPC3 Sampit Branch Office

Table 10.1.16 Productivity in Sampit

Year Indicators	2000
General Cargo (t/gang/hour)	16.8
Bag Cargo (t/gang/hour)	18.2
Container (box/gang/hour)	12

Source: IPC3 Sampit Branch Office

10.1.8 Samarinda

Operation records of Samarinda are summarized below (Table 10.1.17-18). Judging from the quay length (937m), there are nine berths at the Port of Samarinda. The berth occupancy ratio is not provided by the latest port statistics of Samarinda. However, the actual berth occupancy ratio is supposed to be very high according to the field observation by the JICA Study Team. On the contrary, operational efficiency at Samarinda is low compared with the baseline productivity (Table 10.1.3). There seems to be room for improvement in the handling efficiency. However, port cargoes at Samarinda are steadily increasing recently, in addition container cargoes have been increasing rapidly with the average growth rate of more than 35% per year. Therefore, the port will be overflowing with increasing port cargoes, unless the port expansion is carried out without delay.

Table 10.1.17 Berth Occupancy in Samarinda

Year / Indicators	1999 (A)	2000 (B)	B/A
Berth Throughput (t/m)	1,052	1,253	119.1
Shed Throughput (t/m^2)	7.2	80.5	1,118.1
Yard Throughput (t/m^2)	42.0	52.3	124.5
Berth Occupancy Ratio (%)	64.0	64.8	101.3
Shed Occupancy Ratio (%)	3.9	44.0	1,128.2
Yard Occupancy Ratio (%)	60.2	70.0	116.3

Source: IPC4 Samarinda Branch Office

Table 10.1.18 Productivity in Samarinda

Year / Indicators	2000
General Cargo (t/gang/hour)	16.0
Bag Cargo (t/gang/hour)	18.0
Dry-bulk Cargo (t/gang/hour)	18.0
Liquid Cargo (t/gang/hour)	17.0
Container Cargo (box/hour)	7.0

Source: IPC4 Samarinda Branch Office

10.2 Development Needs

10.2.1 Pekanbaru

(1) Problem Areas

The Study Team identified the problem areas of Pekanbaru as follows:

1) Sharp Bends from Perawang upward

There are numerous tight bends between Perawang and Pekanbaru, thereby limiting the maximum LOA for vessels calling at Pekanbaru to only 50m. Night navigation is not allowed in this section of the river. Two shipwrecks highlighted the navigational difficulty of the Siak River this year.

2) Limited Expansion Potential at Pekanbaru

The expansion potential of Pekanbaru Port is constrained by two factors. Urban land-use around the port is one reason. The existing facilities are located on the right bank of the river, but the access road to the port is narrow and congested as the city's commercial center is developed right behind the port. For this reason, DINAS has a plan to transform the existing port into a waterfront park. On the other hand, development of the left bank of the river will require relocation of substantial numbers of people since this side is occupied by make-shift houses.

3) Limited Function of Perawang Container Terminal

DGSC and IPC 1 jointly carried out a master plan study on Pekanbaru in 1996. After comparing three alternative locations, Perawang was selected as the site for long-term development. As the first stage of the project, DGSC constructed a 58m-wharf for container handling at Perawang in 1997-1998.

However, this container terminal is playing only a limited function at present. One of the reasons is the competition among the neighboring terminals. Currently three container terminals are in operation in the Pekanbaru/Perawang area. The private container wharf of PT Indah KIAT is by far the largest among the three. The Siak Haska Container Terminal is the second largest and Perawang public container terminal is the smallest one. Siak Haska Container Terminal is officially a private wharf but handles container cargo of common users. This is an exceptional case since the Port Regulation allows special ports to handle public cargo only in limited conditions. Another reason is the poor condition of the access road from the highway to Perawang. This is hampering the competitiveness of the public container terminal.

4) Vessel Size Limitation at Perawang

According to the decree, maximum vessel size calling at Perawang is limited to 90m in LOA and 6m in draft. On the other hand, vessels calling at Perawang have been increasing in size. If this trend continues, port users could divert their cargo from Perawang to a new location with a deeper draft. Vessels which require deeper draft may be diverted to Dumai for example.

5) Distribution of Roles between Pekanbaru and Dumai

Port of Dumai has a 400m quay with an alongside depth of 9-10m and is extending the quay by 200m. Although Dumai handles CPO and general cargo at present, it has a plan to handle containers in the future. Dumai's potential to be the main port of the Riau Province could have a negative impact on the future development needs of Pekanbaru.

(2) Development Potential

1) Prospective Industries

Oil and gas production greatly contribute to the economy of Riau. This province is the largest producer of crude oil in Indonesia. Plantations of palm oil, coconut, and rubber are also the province's major industry. The Study Team identified the following prospective industries for the Riau Province: Plantation of oil palm, CPO processing factory, pulp and paper production, and coal mining.

Table 10.2.1 Economic Indicators of the Riau Province

Item	Indicators	Remarks
Area (km^2)	94,561	
Population (1,000)	3,900	In 1995
GRDP with Oil & Gas (billion Rp.)	42,491	Market Price in 1998
GRDP without Oil & Gas (billion Rp.)	16,049	Market Price in 1998
Industrial Output (billion Rp.)	4,373	Non Oil and Gas Manufacturing, Market price in 1998
Area for Crop (ha)	588,385	
Area for Forestry Production (ha)	4,770	
Crude Oil Production (BBLS)	302,427,510	In 1998
Natural Gas Production (MSCF)	113,413,320	In 1998

2) Demand Forecasts

The Study Team prepared a preliminary cargo projection (See Table 10.2.2 and Section 3). The Team assumed that improved service and facility at the public berths would attract a part of private cargo in the future.

Table 10.2.2 Preliminary Demand Forecast for Pekanbaru

(1,000 t)

Item / Year	International	Domestic	Total	Public	Total Container Cargo
1988/89	1,008	557	1,565	190	40
2000	2,091	3,502	5,593	260	892
2007	3,133	6,825	9,958	490	2,099
2025	7,769	12,677	20,446	1,901	4,635
Growth Rates per Year					
1988/9-2000	6%	17%	11%	3%	
2000-2007	6%	10%	9%	9%	13%
2007-2025	5%	3%	4%	8%	4.5%
2000-2025	5%	5%	5%	8%	7%

Note: Bulk cargo is included in the total

Figure 10.2.1 Location Map of Pekanbaru

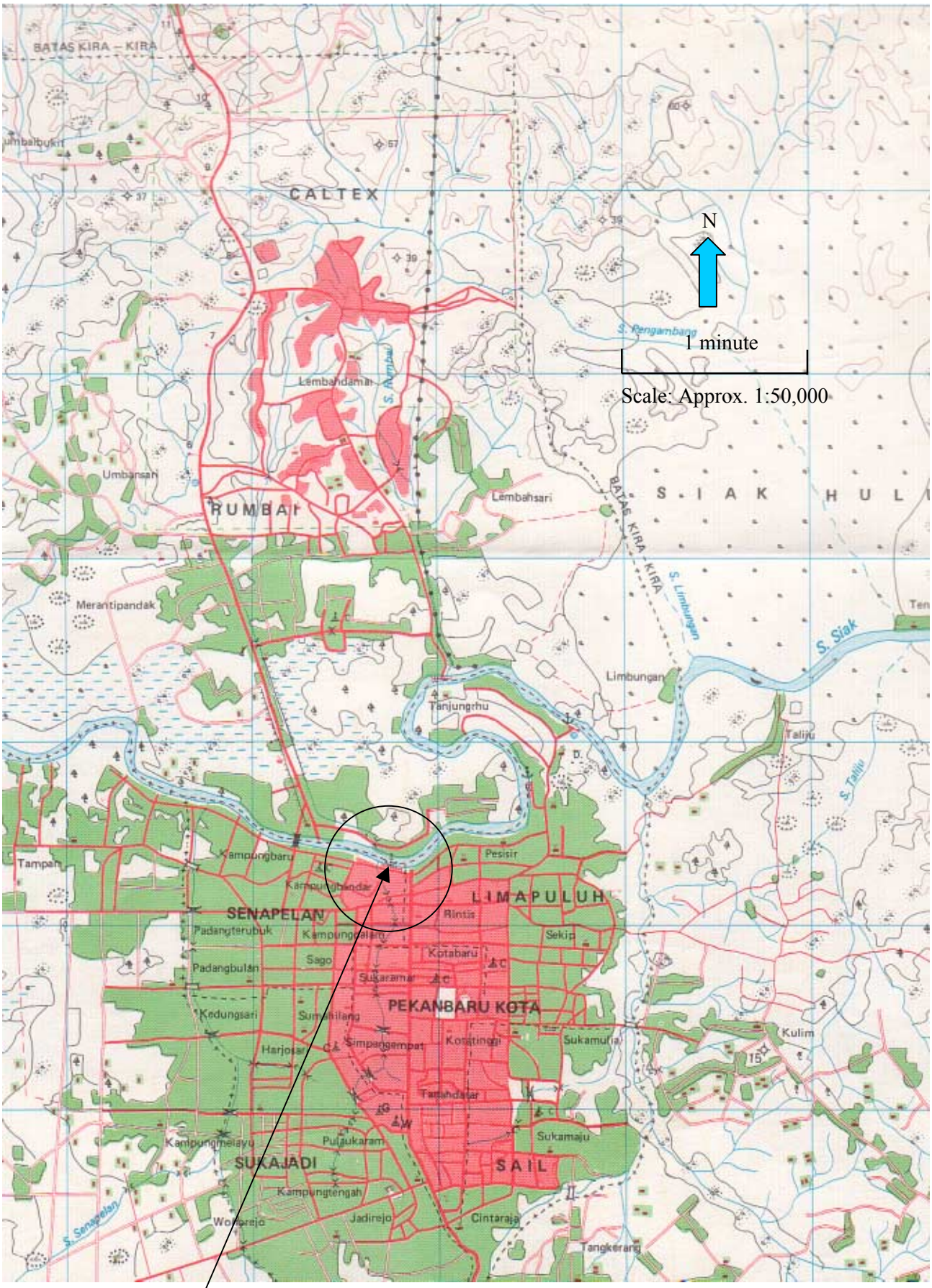
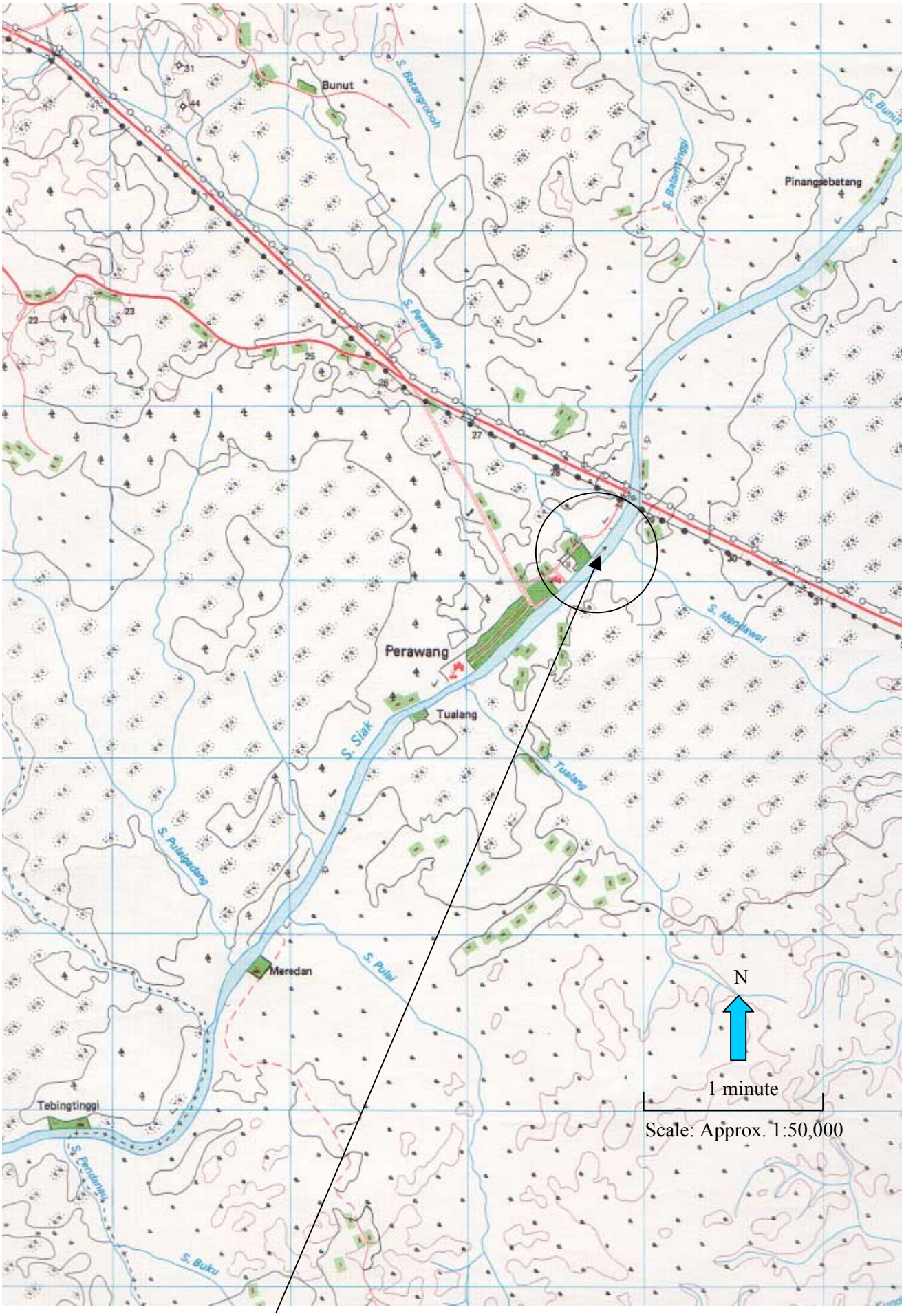


Figure 10.2.2 Location Map of Perawang



10.2.2 Jambi

(1) Problem Areas

The Study Team identified the problem areas of Jambi as follows:

1) Long Distance from the Estuary to Talang Duku

Long distance of the access channel is one of the major problems of Talang Duku terminal. Talang Duku is located around 90 miles from the river mouth. After entering the channel, it takes about 20 hours for a vessel to reach the terminal.

2) Navigational Constraints in the Batang Hari River

The access channel is very shallow at certain areas with the LWS of only 2.5 – 3.3 m. Maximum LOA allowed to call Talang Duku is also limited to 75m. According to the decree issued by ADPEL in February 2001, vessels of over three meters in draft, when passing the Kelemak Channel, are requested to wait until about three hours after the high tide at the following places:

a. Vessels going to Talang Duku should berth at Muara Sabak/Sabak Indah
b. Vessels going out of Talang Duku should berth at Simpang Tua/Keramat Orang Kayo Itam.

ADPEL in Jambi identified several problem areas along the Batang Hari River. Sharp bends, shallow depth, and narrow points are found in many areas along the river. Among them, Kelemak Channel poses the biggest constraint for vessel navigation.

3) Deteriorated Structure at Talang Duku

A part of the bulkhead supporting a pontoon at Talang Duku is deteriorated and needs repair works.

4) Vessel Size Limitation at Talang Duku

According to the decree, maximum vessel size calling at Talang Duku is limited to 75m in LOA and 5m in draft. On the other hand, some of the vessels engaged in international shipping calling at Talang Duku exceed this limit. If this trend continues, port users could divert their cargo from Talang Duku to Muara Sabak which has a deeper draft.

5) Poor Access to Muara Sabak

Access roads of Muara Sabak are in poor condition. Out of 115km between Jambi City and Muara Sabak, 50 km is not paved and becomes muddy during the rainy season. It is about a three hours' drive. The provincial government started to improve the road this year and plans to complete it in 2004. There is also a plan to create an alternative access road to Muara Sabak which will reduce the distance to 70 km. In order to make the new terminal at Muara Sabak

fully operational, these road improvements are urgently required.

6) Poor Linkage between the New Wharf and the Muara Sabak City Center

The new wharf of Muara Sabak and the city center are on different sides of the river. Though the two sides are linked by a small boat service, the linkage between them will need to be strengthened after the wharf becomes fully operational.

7) Maintenance Dredging at the Estuary

In order to maintain a water depth of 5 m around the river mouth, maintenance dredging is required in 5 –6 miles of the channel from the estuary. On average, 350 thousand m^3 of riverbed materials is dredged annually costing Rp. 2.6 billion.

8) Distribution of Roles between Talang Duku and Muara Sabak

Talang Duku is currently handling container, liquid bulk, and CPO. Muara Sabak is expected to handle rubber and CPO. Since Muara Sabak is more than 100 km away from the provincial capital and can cater for much larger vessels, it is better to clearly identify the competitive advantage of the two terminals and distribute cargoes accordingly.

(2) Development Potential

1) Prospective Industries

Palm oil and rubber plantations are the main industries of Jambi at present. Oil and gas production in the Jambi Province are low compared with Riau or South Sumatra. Per capita GRDP of the province is about half the national average, requiring economic development measures. The Study Team identified the following prospective industries for the Jambi Province: Hydraulic power plant, plantation of oil palm and rubber, CPO processing factory, oil refinery, petrochemical industry near Muara Sabak, and coal mining.

Table 10.2.3 Economic Indicators of the Jambi Province

Item	Indicators	Remarks
Area (km^2)	53,436	
Population (1,000)	2,370	In 1995
GRDP with Oil & Gas (billion Rp.)	6,859	Market Price in 1998
GRDP without Oil & Gas (billion Rp.)	6,184	Market Price in 1998
Industrial Output (billion Rp.)	979	Non Oil and Gas Manufacturing, market Price in 1998
Area for Crop (ha)	469,070	
Area for Forestry Production (ha)	727	
Crude Oil Production (BBLS)	NA	In 1998
Natural Gas Production (MSCF)	NA	In 1998

2) Demand Forecasts

The Study Team prepared a preliminary cargo projection (See Table 10.2.4 and Section 3). The Team assumed that improved service and facility at the public berths would attract a part of private cargo in the future.

Table 10.2.4 Preliminary Demand Forecast for Jambi

(1,000 t)

Year	International (excluding Major Bulk)	Domestic (excluding Major Bulk)	Major Bulk (Coal and CPO)	Total	Public	Total Container Cargo
1989	688	853	-	1,541	187	15
2000	1,064	2,454	150	3,518	161	248
2007	1,396	3,498	1,000	5,894	418	943
2025	2,869	5,955	3,000	11,824	2,603	2,187
Growth rates per year						
1989-2000	4%	10%		8%		
2000-2007	4%	5%		4%	15%	21%
2007-2025	4%	3%	6%	4%	11%	9%
2000-2025	4%	4%		5%	12%	12%

Figure 10.2.3 Location Map of Talang Duku

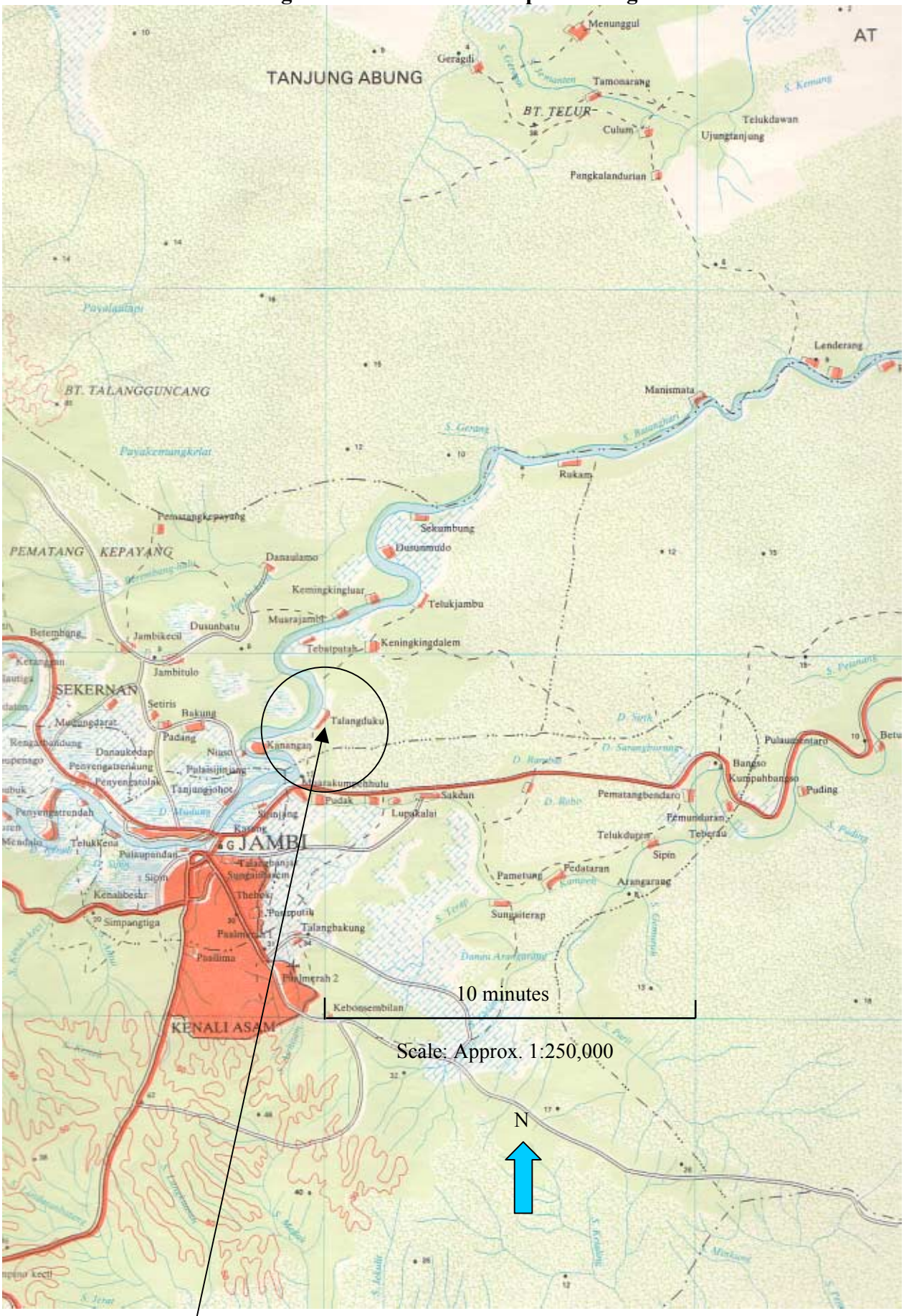
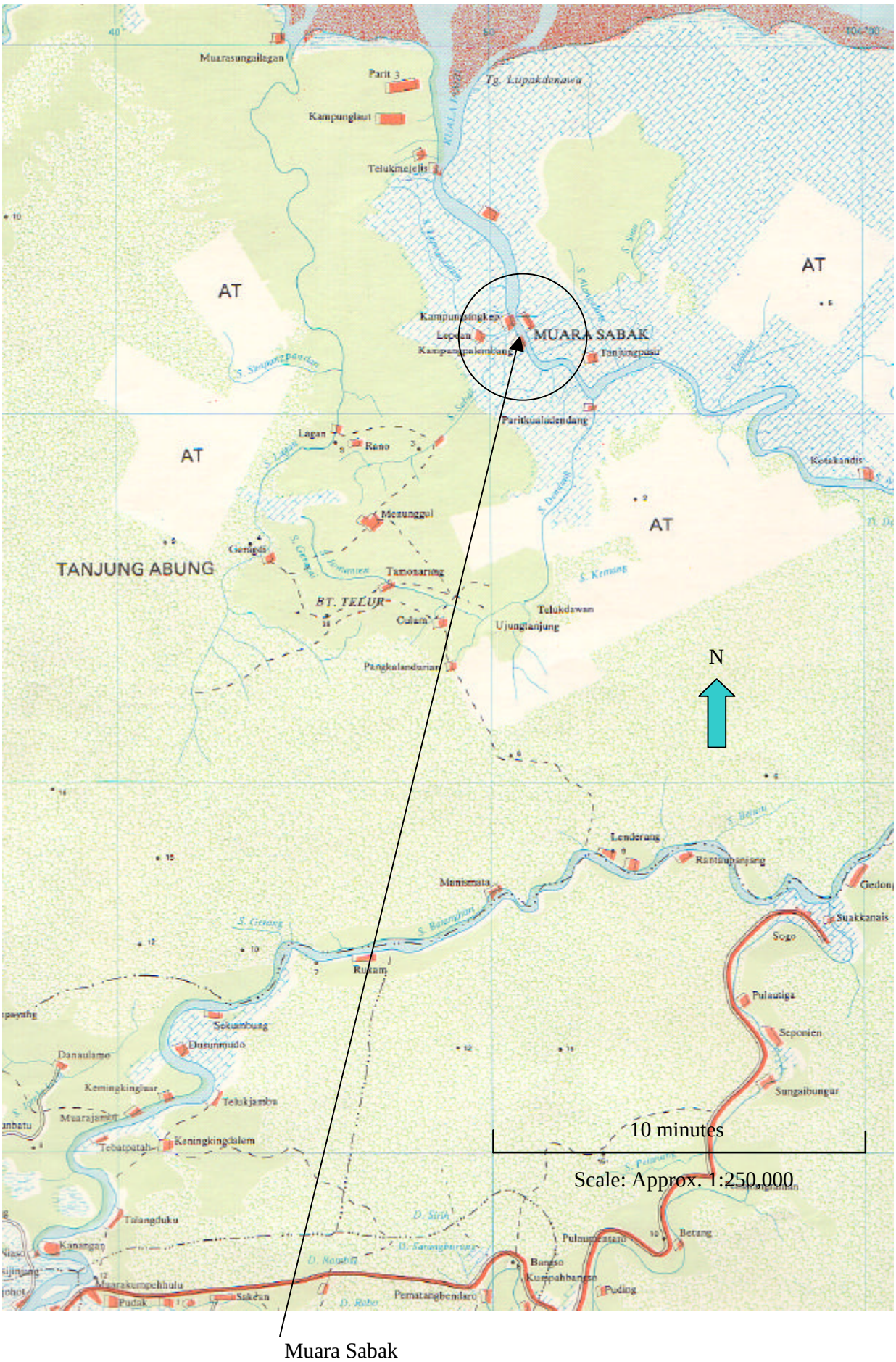


Figure 10.2.4 Location Map of Muara Sabak



10.2.3 Palembang

(1) Problem Areas

The Study Team identified the problem areas of Palembang as follows:

1) Long Distance from the Estuary to Boom Baru

Long distance of the access channel is one of the major problems of the existing port of Palembang. Palembang is located some 80 km from the river mouth. After entering the channel, it takes about six hours for a vessel to reach the terminal.

2) Navigational Constraints in the Musi River

Sharp bends at Sedumara, to the south of Pulau Singgis, and Tg. Kramat, to the east of Pulau Kramat pose navigational difficulties. The channel becomes narrower at the two bends as well. Thirty-five navigational aids are deployed between Boom Baru and the outer bar, but one of the aids placed at the outer bar has not functioned since being struck by a vessel.

3) Maintenance Dredging at the Outer Bar

In order to maintain the design depth of 6.5 m, 2.3 million m^3 of materials is dredged annually in the access channels. 85-90 % of the materials is from the Payung Island downward. Although the dredging is consuming a quarter of the total dredging budget of the government, it is still insufficient to maintain the design depth throughout the year. Optimization of the dredging is therefore urgently needed.

4) Insufficient Container Handling Capacity

Although Boom Baru container terminal has a gantry, crane rails are equipped on only half the length of the container quay. For this reason, the container terminal cannot operate at its full capacity.

(2) Development Potential

1) Prospective Industries

Oil and gas production greatly contribute to the economy of South Sumatra. Agriculture is another mainstay of the province's economy. Rubber, palm oil, and coffee are the main crops. A preliminary survey identified the following prospective industries for the South Sumatra Province: oil palm plantation, CPO processing factory and coalmine expansion.

Table 10.2.5 Economic Indicators of the South Sumatra Province

Item	Indicators	Remarks
Area (km^2)	109,254	
Population (,000)	7,208	In 1995
GRDP with Oil & Gas (billion Rp.)	33,072	Market price in 1998
GRDP without Oil & Gas (billion Rp.)	26,852	Market price in 1998
Industrial Output (billion Rp.)	5,467	Non Oil and Gas Manufacturing, Market Price in 1998
Area for Crop (ha)	564,126	
Area for Forestry Production (ha)	1,112	
Crude Oil Production (BBLS)	35,349,471	In 1998
Natural Gas Production (MSCF)	267,317,000	In 1998

2) Demand Forecasts

The Study Team prepared a preliminary cargo projection (See Table 10.2.6 and Section 3). The Team assumed that improved service and facility at the public berths would attract a part of private cargo in the future.

Table 10.2.6 Preliminary Demand Forecast for Palembang

(1,000 t)

Item / Year	International	Domestic	Total	Public	Total Container Cargo
1988	1,125	6,497	7,622	915	2
2000	1,524	9,400	10,924	1,422	493
2007	1,832	12,024	13,856	2,044	1,090
2025	3,416	23,099	26,515	4,511	3,386
Growth rates per year					
1988-2000	3%	3%	3%	4%	
2000-2007	3%	4%	3%	5%	12%
2007-2025	4%	4%	4%	4%	6%
2000-2025	3%	4%	4%	5%	8%

Note: Bulk cargo is included in the total

Figure 10.2.5 Location Map of Boom Baru and S. Lais

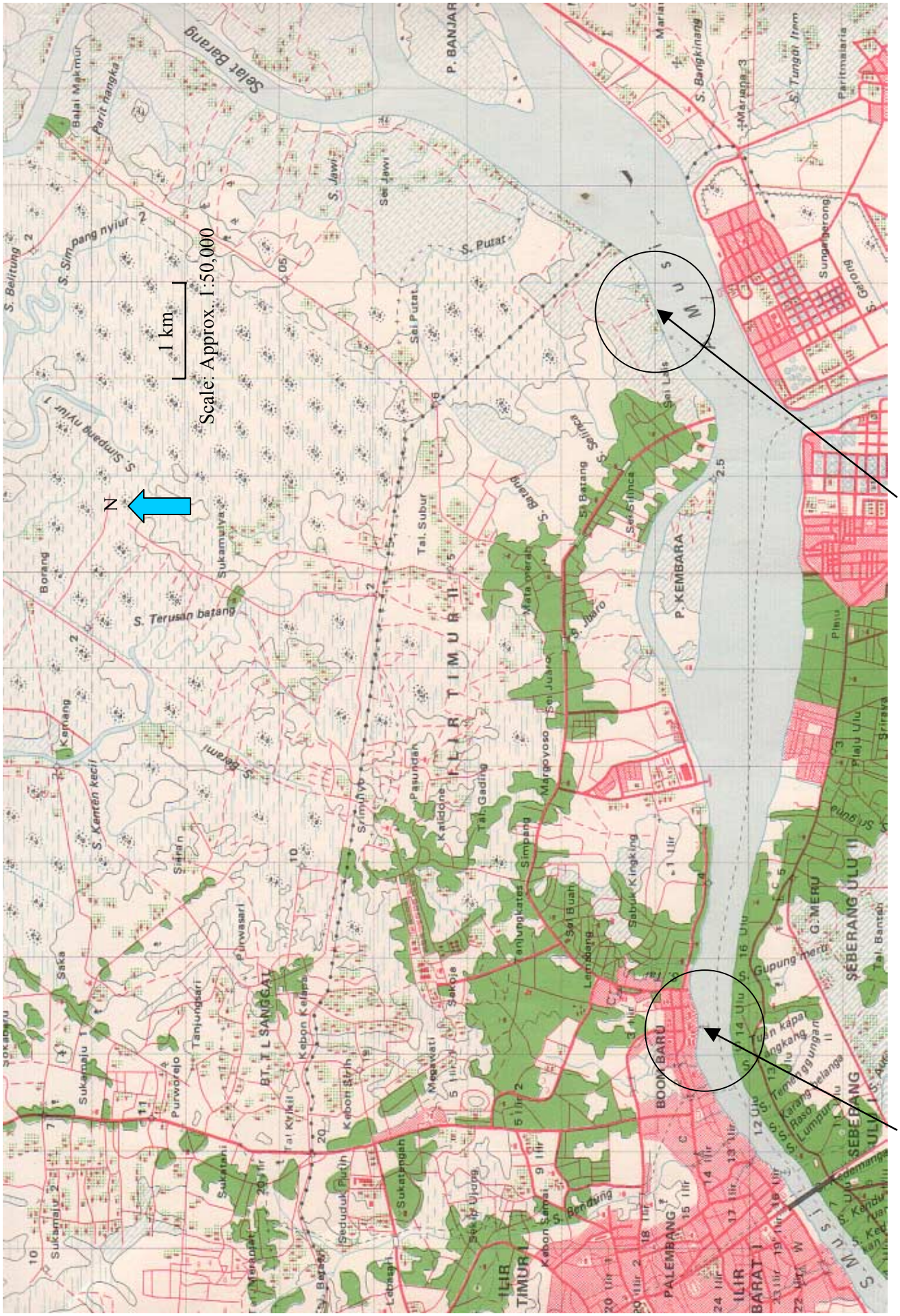


Figure 10.2.6 Location Map of Tg. Api-Api